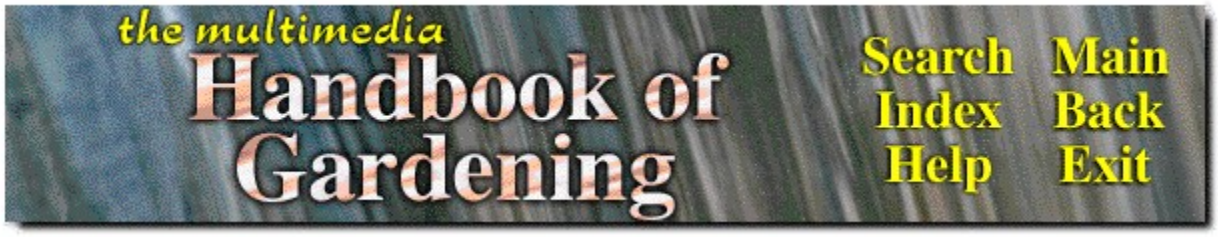

Hello, and welcome to the Multimedia Handbook of Gardening, created by The JLR Group, Inc.!

This disc is filled with hundreds of articles on a wide variety of gardening topics, with presentations for both the beginner and the experienced gardener alike. In addition to these articles, you'll discover stunning photography, Multimedia Garden Shows, movies, illustrations, music, and interactive text.

Please take a few minutes to read the short descriptions below. The following quick overview of the contents will help you to find your way around this large multimedia collection, and will help you to have more fun using the product!

The Basic Organization

After you click on the opening screen, you'll have several different options. At the top of the list is the Garden Explorer. The Explorer is one of the main ways you'll access the large collection of interactive gardening information in this multimedia handbook. In addition, you can research specific topics by using the Index and/or the Search feature. And finally, for true lovers of flowers, herbs, trees, fruits, and vegetables, the Historic Dictionary of Plants and the Garden Shows are not to be missed!

The Garden Explorer

Go for a stroll through an Interactive Garden with the Garden Explorer. The main explorer screen is based on an artwork specially commissioned for this product: a painting created by Boston-based artist Ruth Vantine. Here you can directly access hundreds of multimedia gardening topics, organized naturally as they would be in a real garden. You'll learn about everything from The Land, to Trees and Lawns, to Fruits, Vegetables, Herbs, and Flowers. You can even study garden-related topics such as Weather Info, Weed Control, and Garden Prep and Care. And these aren't even all the subjects in the Garden Explorer--you'll learn a lot in this multimedia garden!

Historic Dictionary of Plants

Have you ever heard of Sapodilla? How about Quinoa, or Purslane, Carthamine, Ervilla, Cinchona, or Madder? Did you know that in 1771 New Zealand Spinach

was brought to England by Captain Cook (good name for a plant-lover!)? Did you know that black pepper was used as a medicine by Hippocrates in 400 B.C.? What plant, originally thought to be poisonous, is nicknamed the "Love Apple"? Did you know that... well, you get the idea! Let's just say that if you're fascinated by plants, then you'll *really* enjoy browsing through the Historic Dictionary of Plants!

Garden Shows

Sit back and relax, get a cup of coffee or tea, and get ready to watch the Garden Show mini-movies. You'll hear a wide variety of music, from classical to country, as you watch some of your favorite garden plants and subjects. There are six shows: Robust Roses, Tulip Festival, North American Trees, English Country Gardens, Flowers in Bloom, and A Tour Through the Vineyards. Enjoy!

> NOTE: You can click right on the Garden Show screen to pause the movie and enjoy viewing a particular picture at your own pace.

The Gardener Speaks

This disc is filled with real-life answers to the practical problems gardeners face. Be sure to check out the Index, for special Instructional topics. Also included is a set of four videos, in which real gardeners answer real how-to questions. You'll learn about how to Build a Compost Pile, as well as hear valuable tips and techniques for Herb Gardens, Weed Control, and Garden Tools. Mark Twain once said "Good judgment comes from experience--but experience comes from poor judgment." Use these videos featuring experienced gardeners to get it right the first time!

Special Topics!

Every garden lover will enjoy these little gardening side trips. In contrast to the detailed information offered elsewhere, this section is for fun and enjoyment, plain and simple. You'll learn about a wide variety of gardening-related subjects, from the Hanging Gardens of Babylon to the Gardens of Versailles, from Japanese Gardens to Botanical Gardens. There's even a Special Topic called Gardens of the Poets, where you can learn about garden imagery in poetry, and hear audio clips of famous garden-related quotes!

Search

There is a powerful Search feature which you can easily use to look up any subject you want. Search is available at nearly all times. All you have to do is type the "S" key (upper or lower case). Then, simply type in any word or phrase you want to look up, for example tulip, tools, greenhouse, etc. You'll get a list of all the sections that have what you're looking for. Select any name on the list, click the Go To button, and you'll automatically zoom to that article.

NOTE: There are many items that Search will not find, since these items are located not in text but in narrations, movies, graphics, and so on. If you don't find what you're looking for with Search, try using the Wildcard feature described below. If you still don't find it, check the Index!

Search has many sophisticated features, and has additional Help Information built right into it. You can use the asterisk * (shift 8) as a "wildcard" to fill in for one or more missing letters. For example, searching for the word "acid*" will find not only acid, but acidity, acids, and so on.

Also, you can combine words you are searching for any way you want. For example, if you are curious to know what plants can be used medicinally, and can be stored in the freezer, you can type "medic* AND freez*" and you'll discover that there are indeed many different plants that fit this description.

If you wanted information on tubers, but not flowers,, you could type "tuber* NOT flower*" and you would find several plants and topics.

Index

The Index is available at nearly all times. All you have to do is type the "I" key (upper or lower case). Included is an extensive Master Index with hundreds of entries, and many of those entries have sub-entries. In addition, there are over one dozen sub-indexes. The Indexes provide an easy, quick way to look up the location of a specific topic that you're interested in. The entries aren't limited to just plants -- you can also find subjects and subject-groups as varied as Africa, Leonardo da Vinci, Zen, Seven Wonders, and Pitti Palace.

NOTE: There are many items that are in this collection, but not specified in the Index. If you don't find what you're looking for with Index, try using Search, especially with the Wildcard feature described above!

We hope you enjoy
The JLR Group, Inc.
Multimedia Handbook of Gardening,
and that you will have many
exciting explorations and gardening adventures!

Credits and Acknowledgments...

The Creation of
The Multimedia Handbook of Gardening

The Multimedia Handbook of Gardening was created over a long period of time by a core team of employees of The JLR Group, Inc. In addition, hundreds of people worked to create many of the photos and other media that are included in this product. It's impossible to list all of the individuals, corporations, schools and universities, and other people who were involved. We would like to thank certain people and groups by name for their contributions to this effort. We hope you enjoy the Multimedia Handbook of Gardening, and we hope you take a few moments to read through the Credits and Acknowledgments.

The Multimedia Handbook of Gardening

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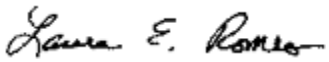
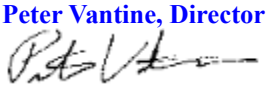
Laura E. Romeo, V.P. of Production
Peter Vantine, Director of Special Projects

James J. Romeo, Ph.D., Senior Editor

Laura E. Romeo, V.P. Production



Peter Vantine, Director of Special Projects



Listed below are some of the Media Artists, Technology Experts, Corporations, Writers, and Special Assistants who contributed to this product.

Ruth Vantine, Artist
Thank you for your wonderful painting. It has added great beauty to our Handbook.

Richard Vantine, Gardener
Thank you for your kind advice, and for allowing us to shoot film of your beautiful garden.

Alison Reid, Production Assistant, Writing and Editing.
Thank you for all your efforts during production -- your diligent research and high-quality writing is greatly appreciated.

Will Budreau, Production Assistant.
Thank you for helping with our general software development, and for your support and hard work.

Matt Lahey, Voice Over Talent

Gigi Abraham, Voice Over Talent

Adam Wolman, Voice Over Talent

CD Titles Inc., our publisher.
Deaver Brown, President; Karen L. Uminski, General Manager and Vice-President; Bruce Tannenbaum, Vice President of Sales and Marketing; Althea Hudson, Administrative Assistant; and Aaron Johnson, Shipping and Receiving. Many thanks for your encouragement, excellent advice, and understanding. This project would not have been possible without your kind support and professional contributions.

Laurie Vantine. Thank you for your encouragement and moral support. We truly appreciate it.

Microsoft Corporation, for Viewer, Word, and Word Basic.

Meirwyn Walters, legal counsel.

Adobe Systems Incorporated, for Photoshop and Premiere.

U.S. Government, and U.S. Government Printing Office.

Ken Volcjak, MIDI Guitarist, MIDI Editor.

Jeff Starfield, CD\Works™, CD-ROM One-Off Service.

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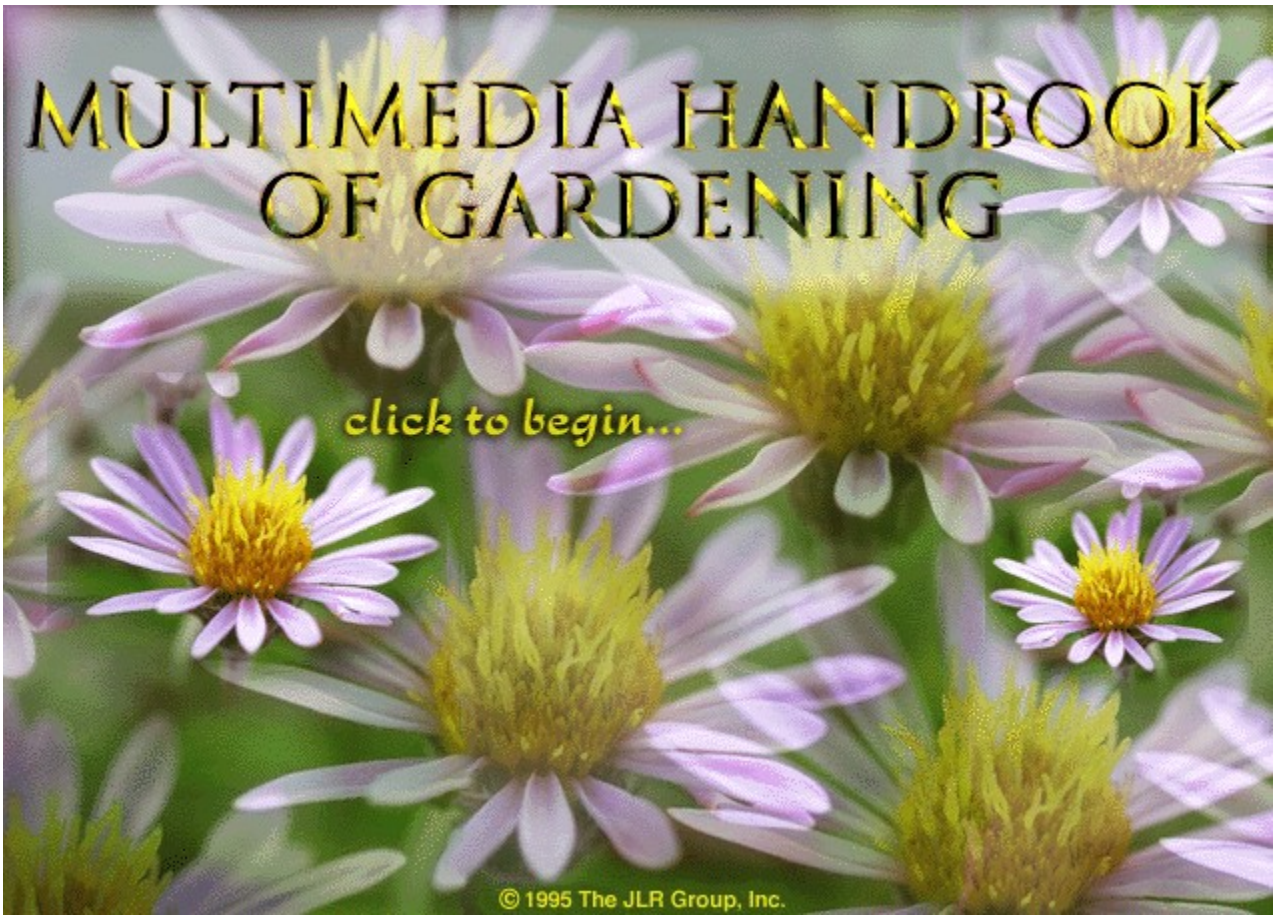
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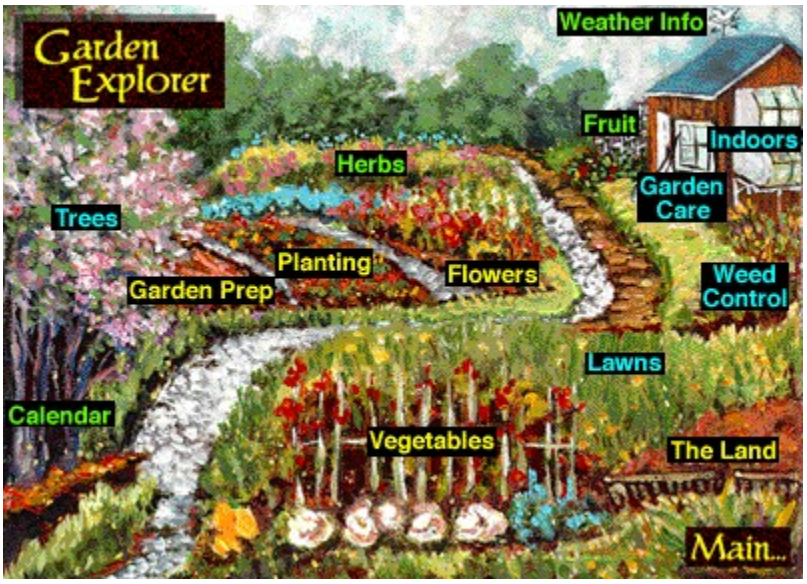
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A Tour Through The Vineyards

English Country Gardens

North American Trees

Click here to close this popup...

Click on any topic
to zoom to related
articles and multimedia...

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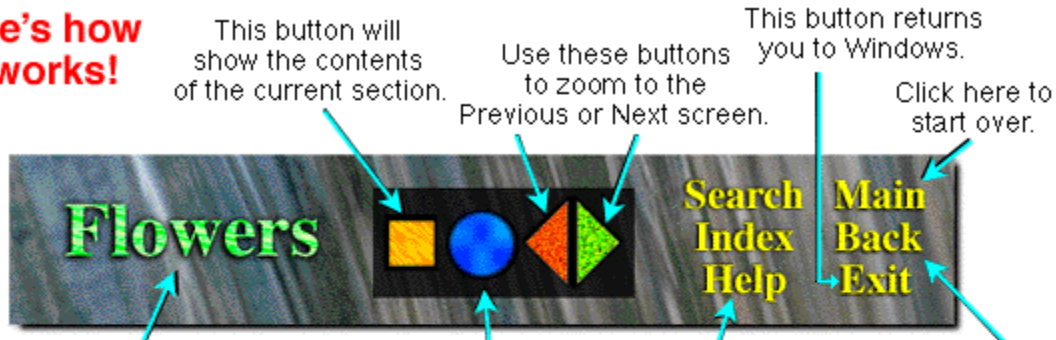
Here's how it works!



Great Shortcuts!

type B to return back to your previous location
type C to return to the Main Contents screen
type I or S to access the Index or Search
type < or > (comma and period) to browse left and right
type T to trace all the places you have been

Note:

Click on green type to zoom to a related topic.

Click here for more info...

Click here to hide me...

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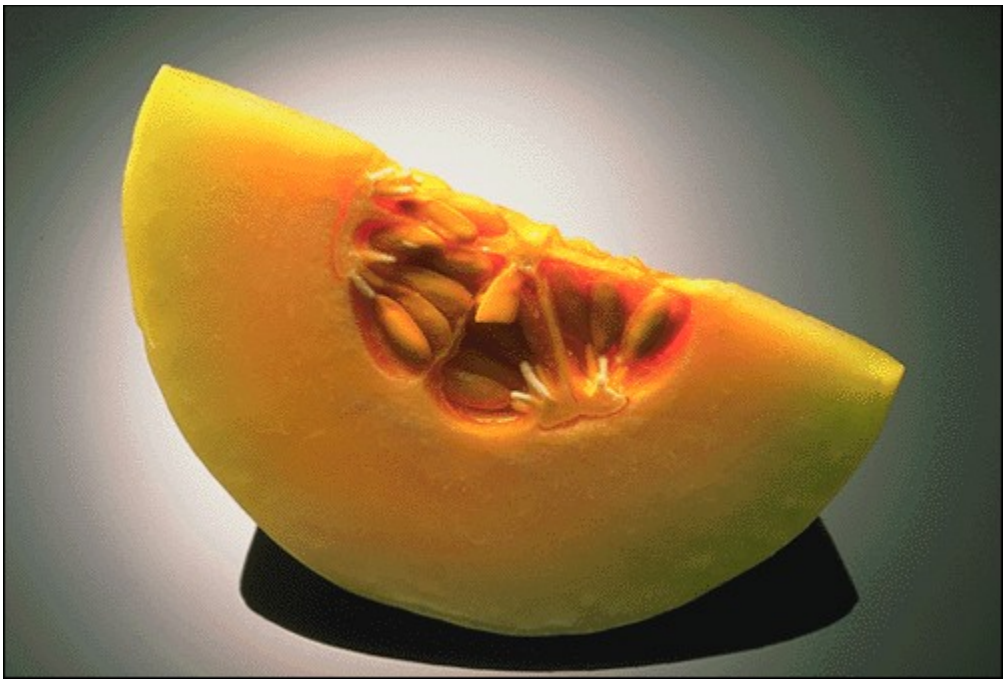

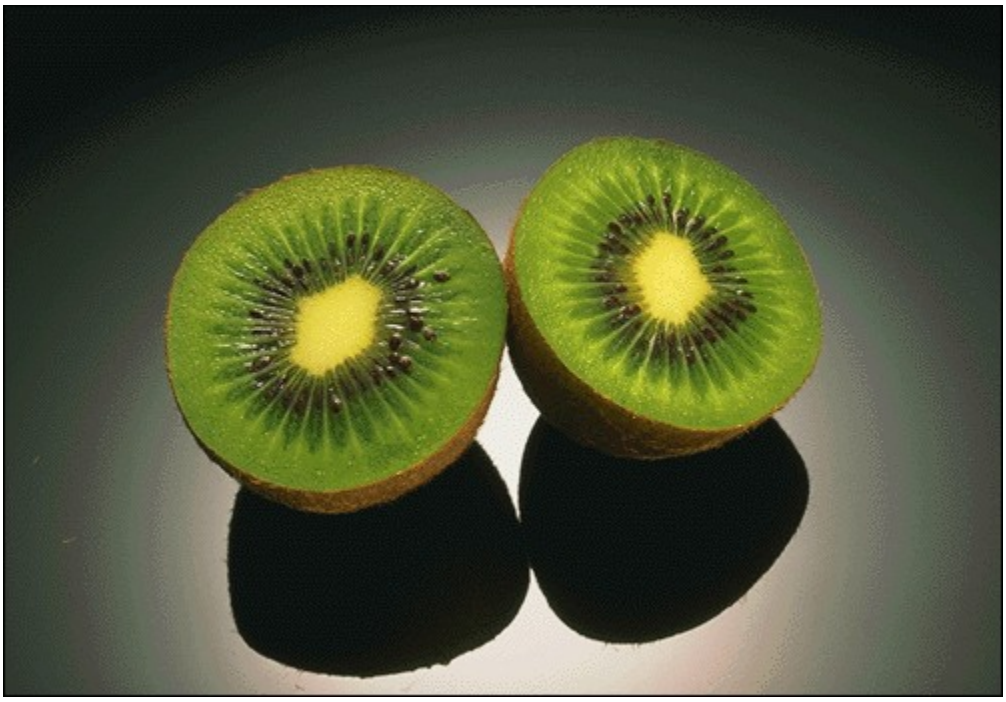

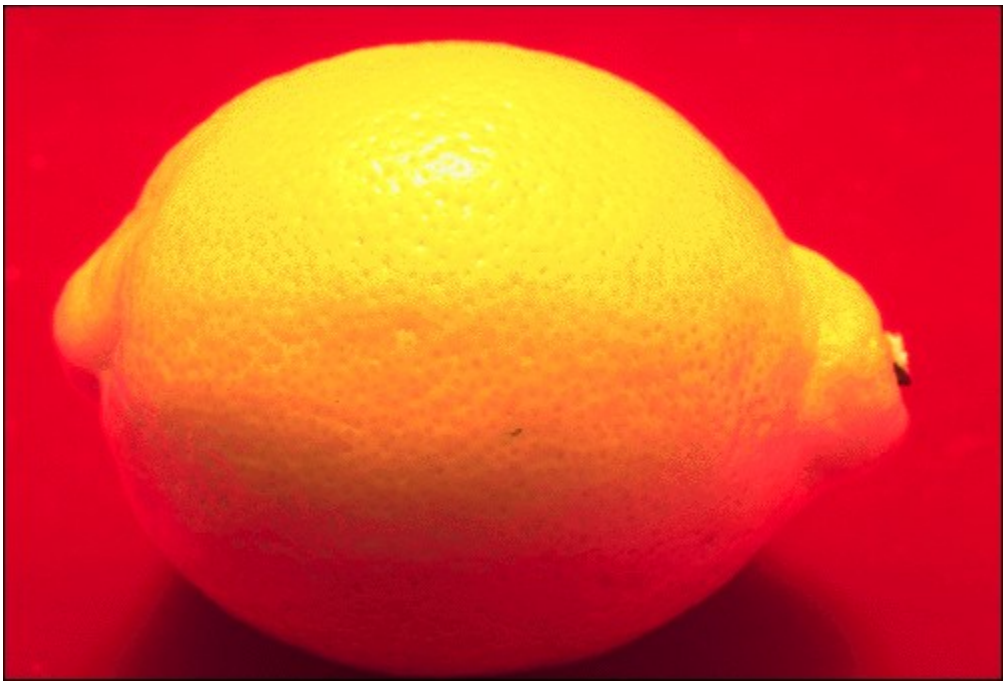

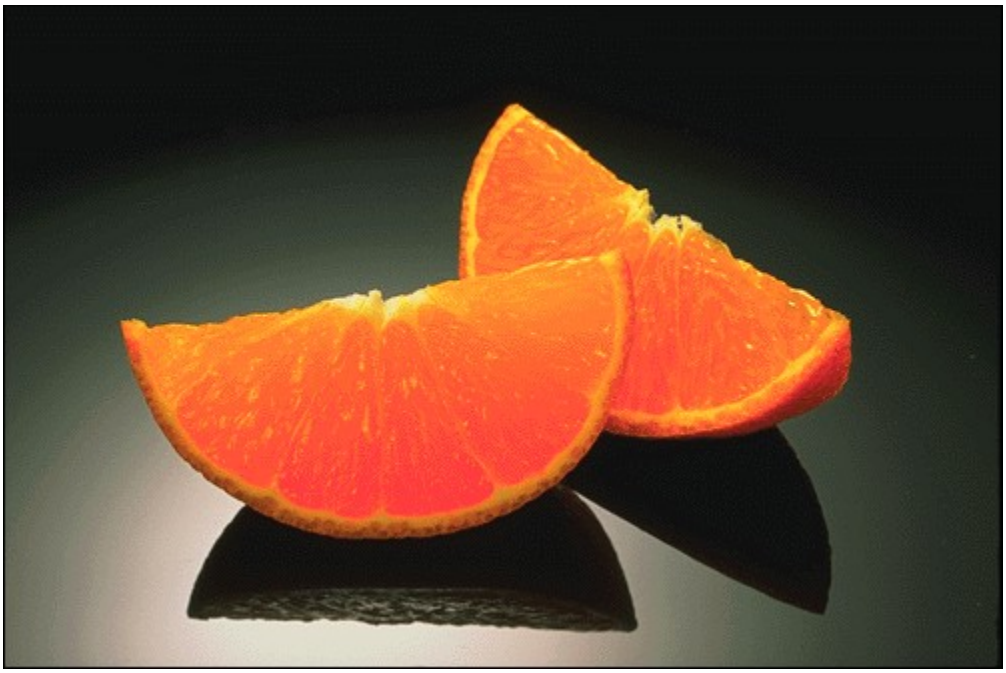

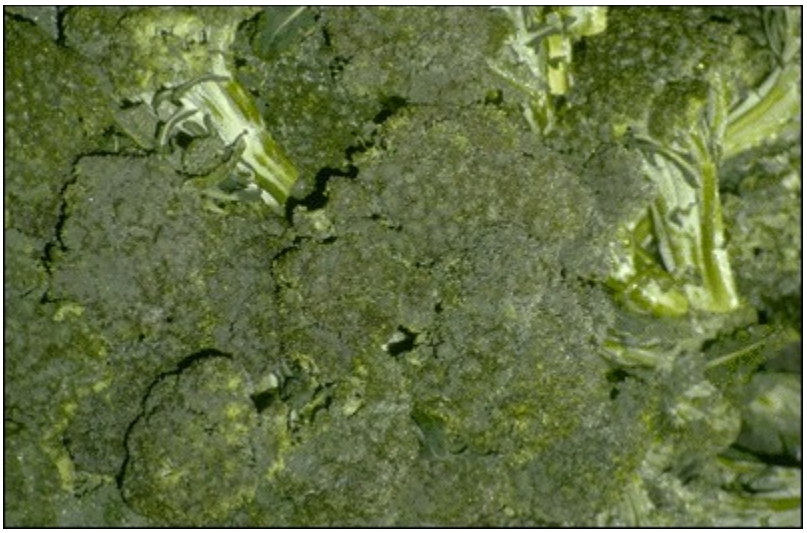

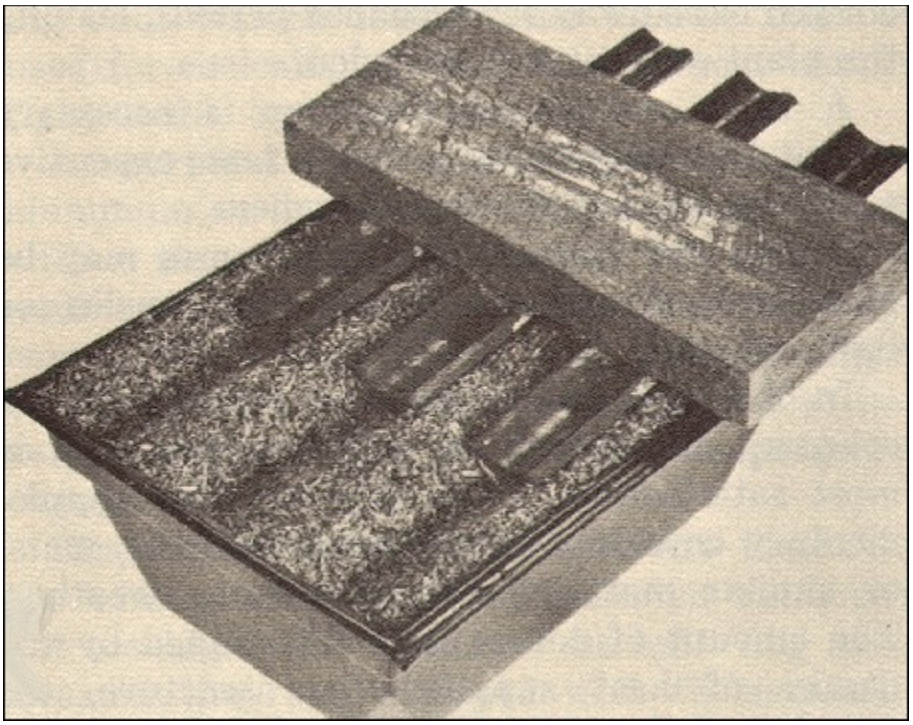

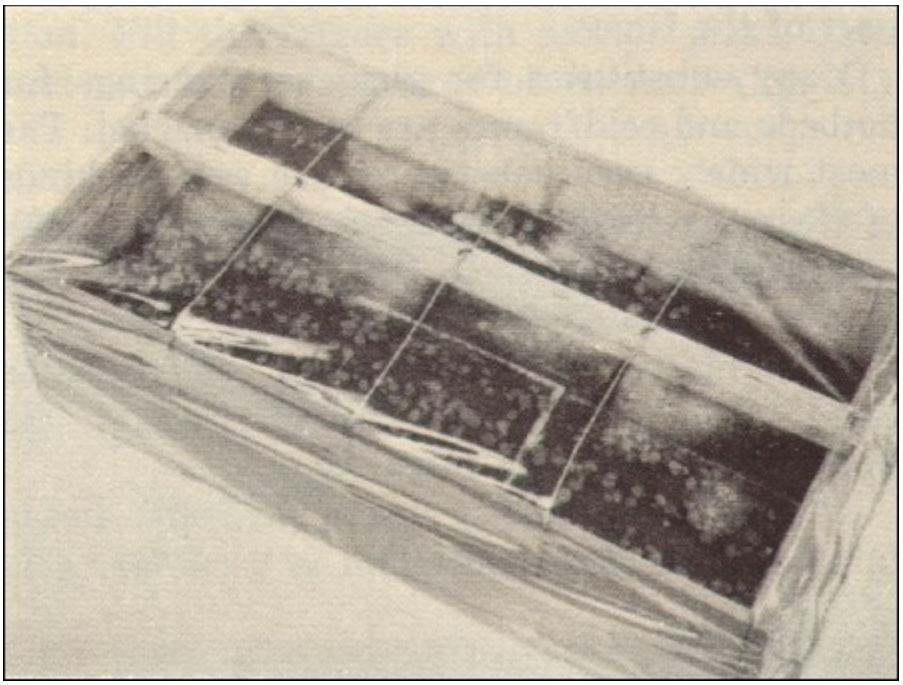

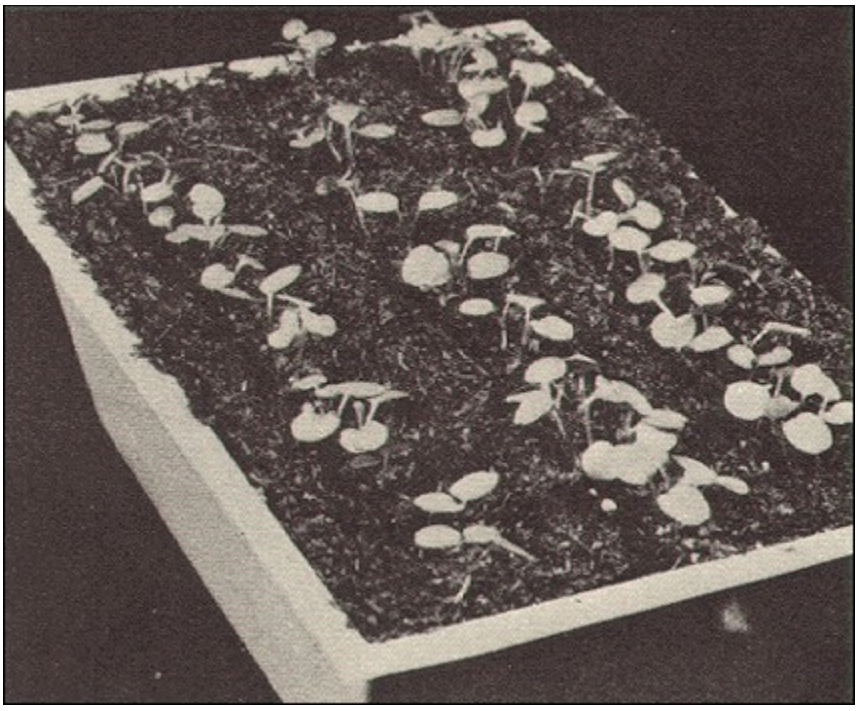

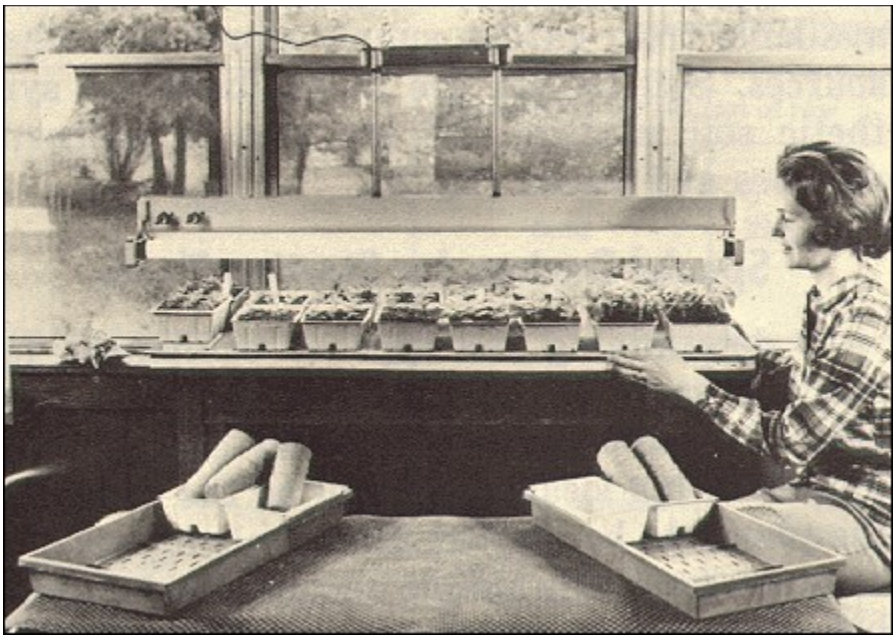

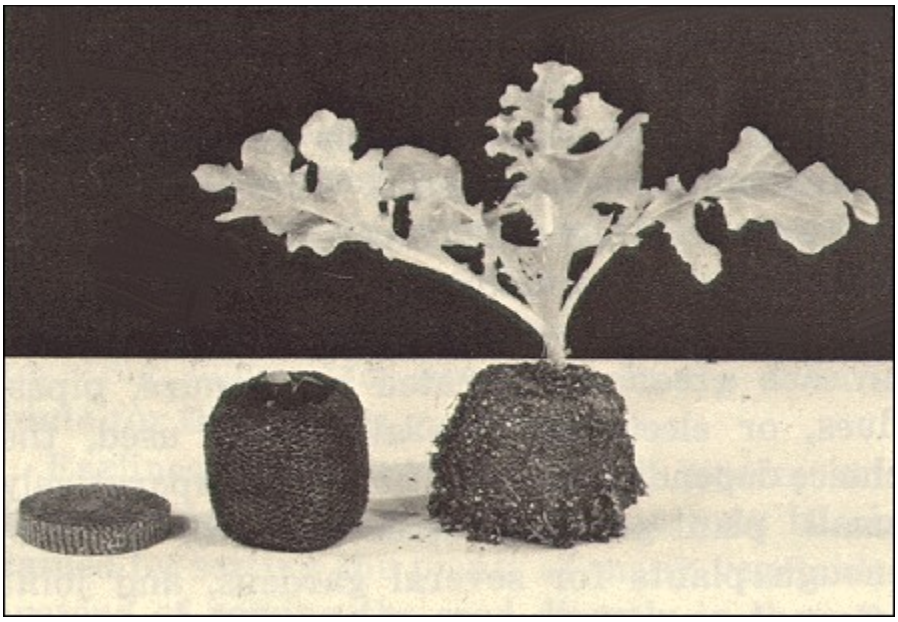

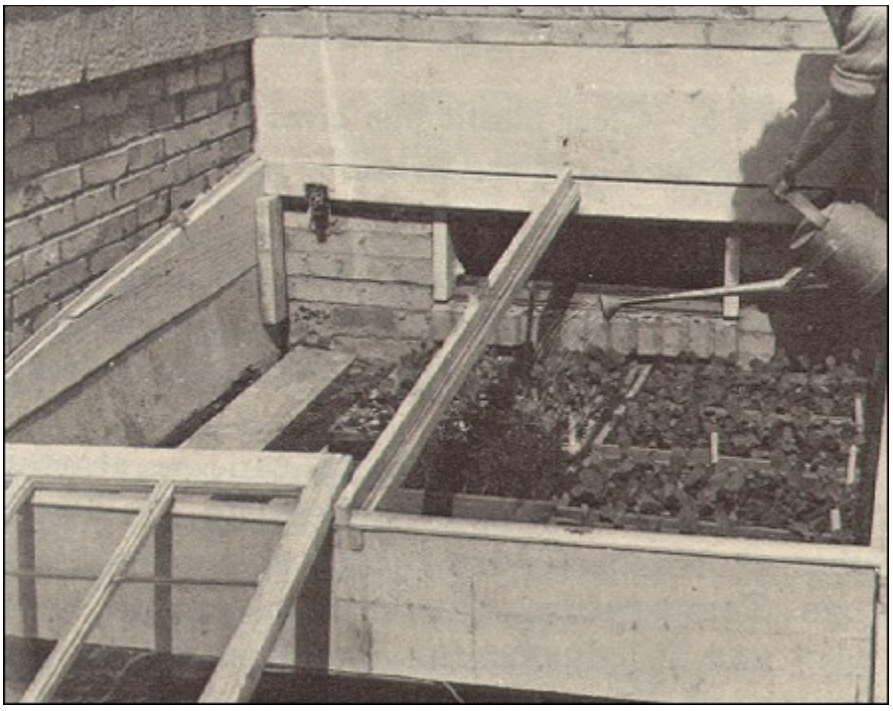

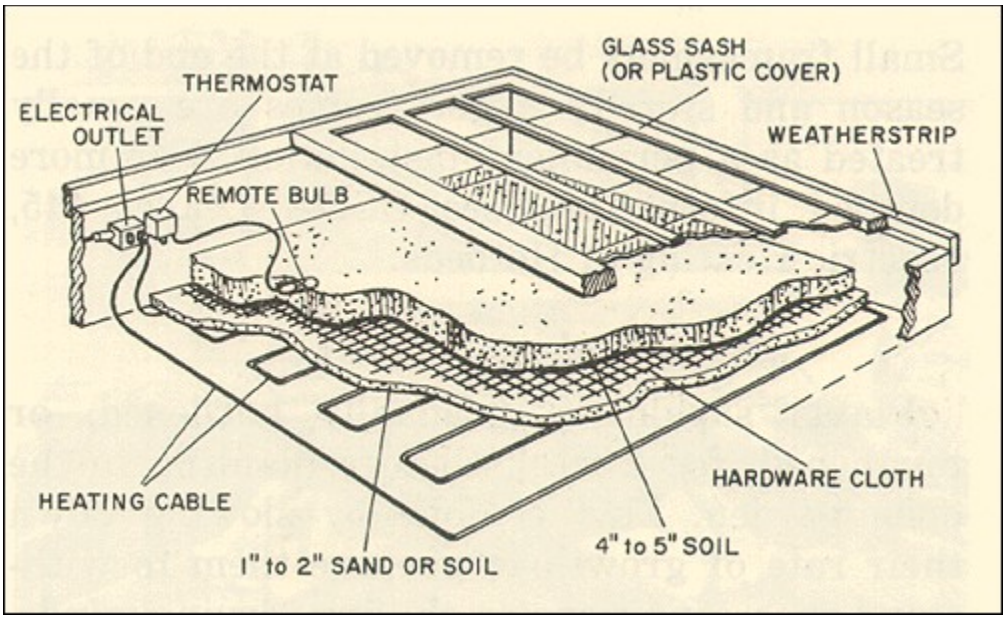
GLASS SASH
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THERMOSTAT
ELECTRICAL
OUTLET
WEATHERSTRIP
REMOTE BULB
HARDWARE CLOTH
HEATING CABLE
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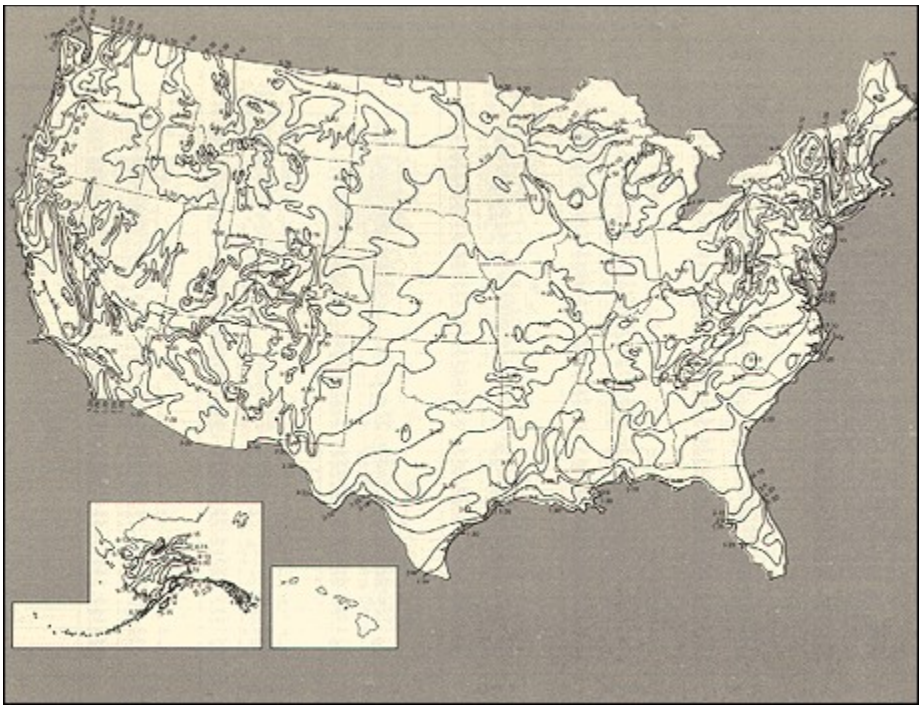
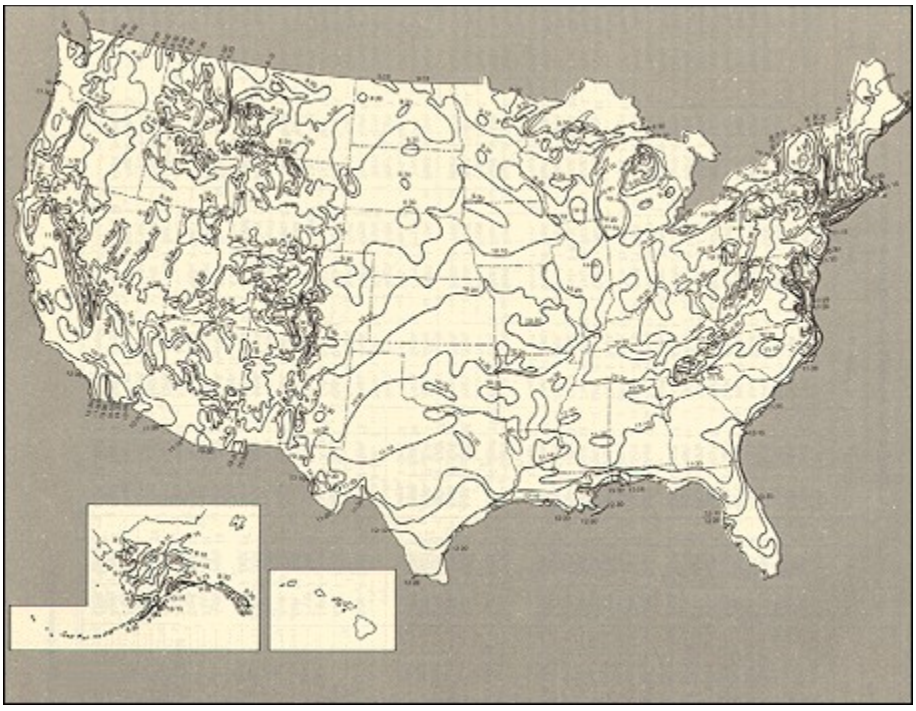
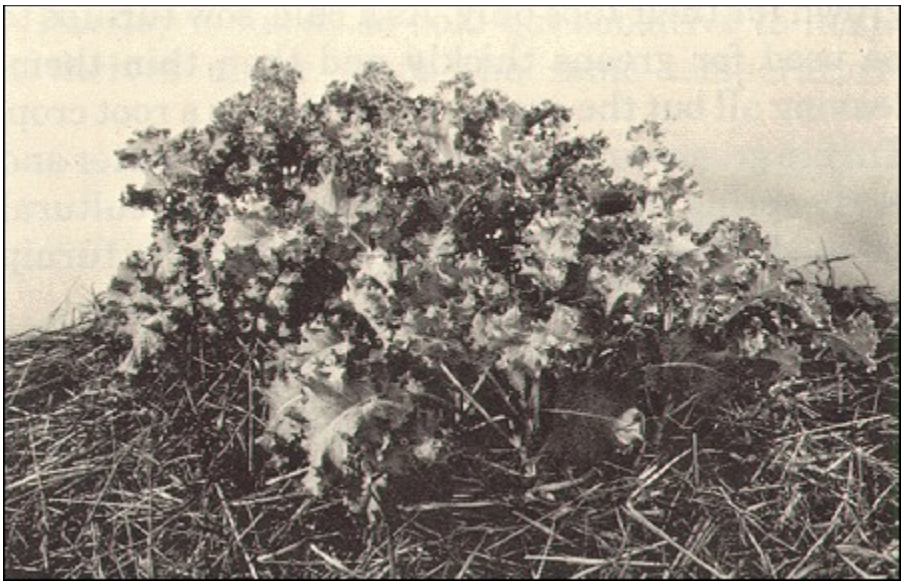
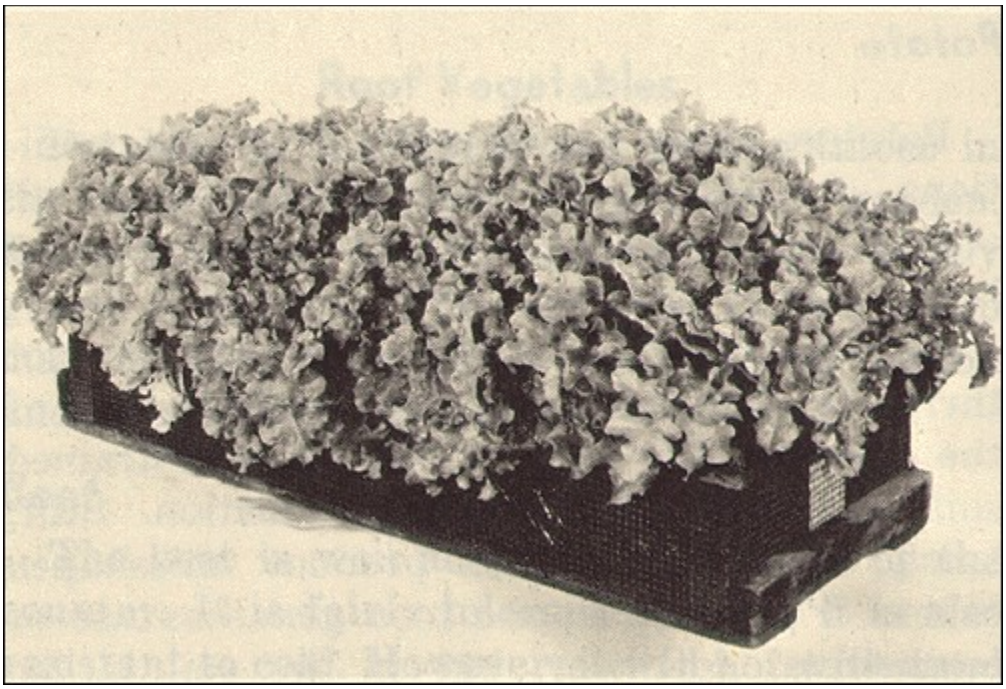
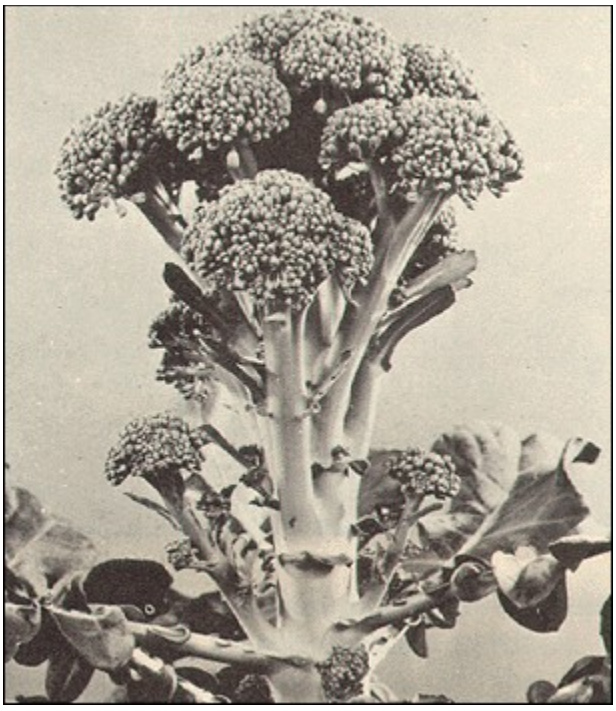
1" to 2" SAND OR SOIL

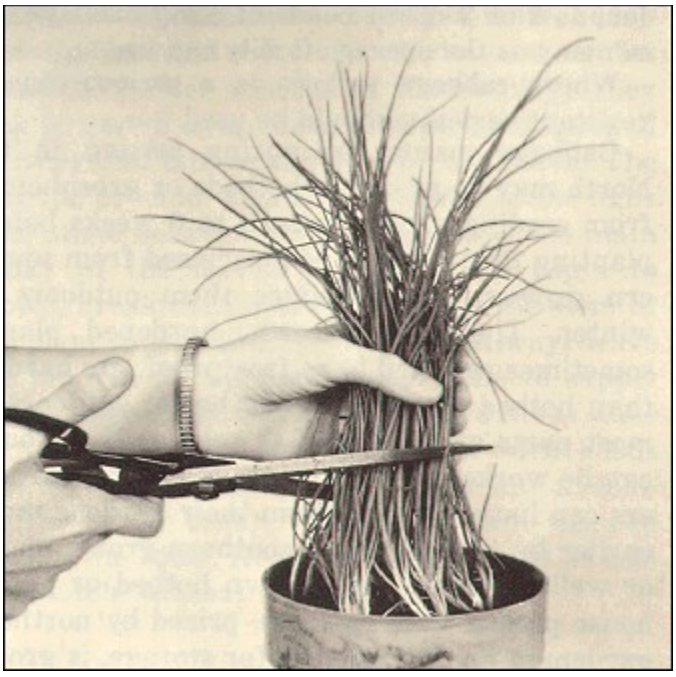


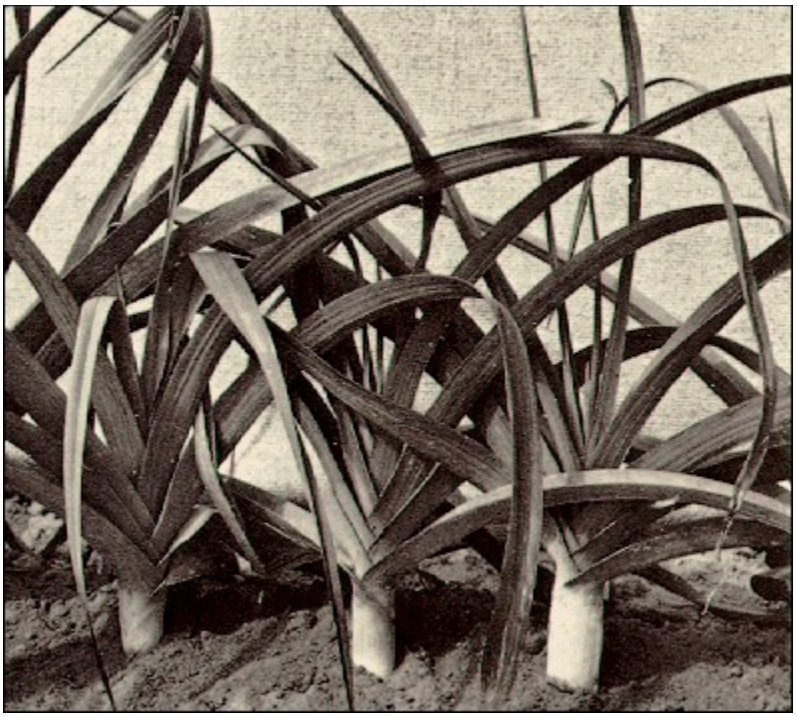


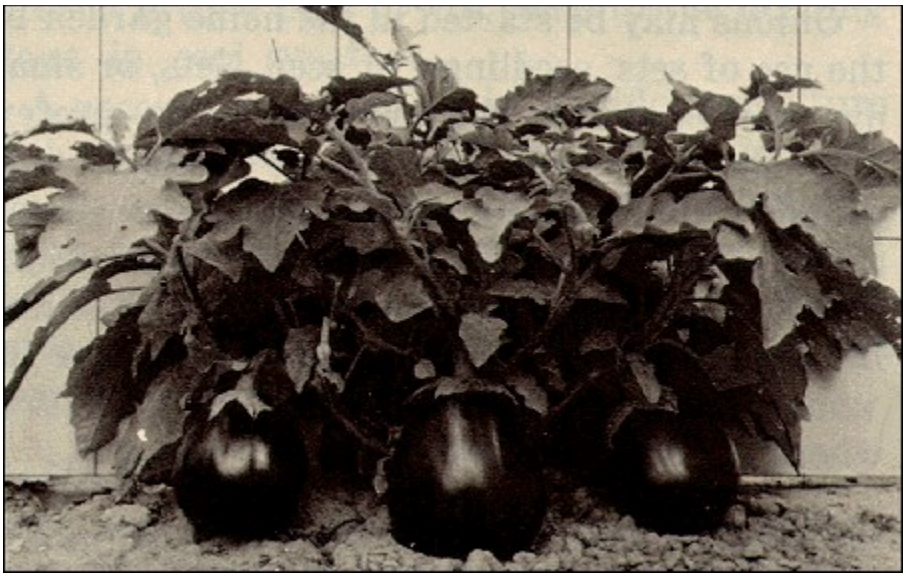


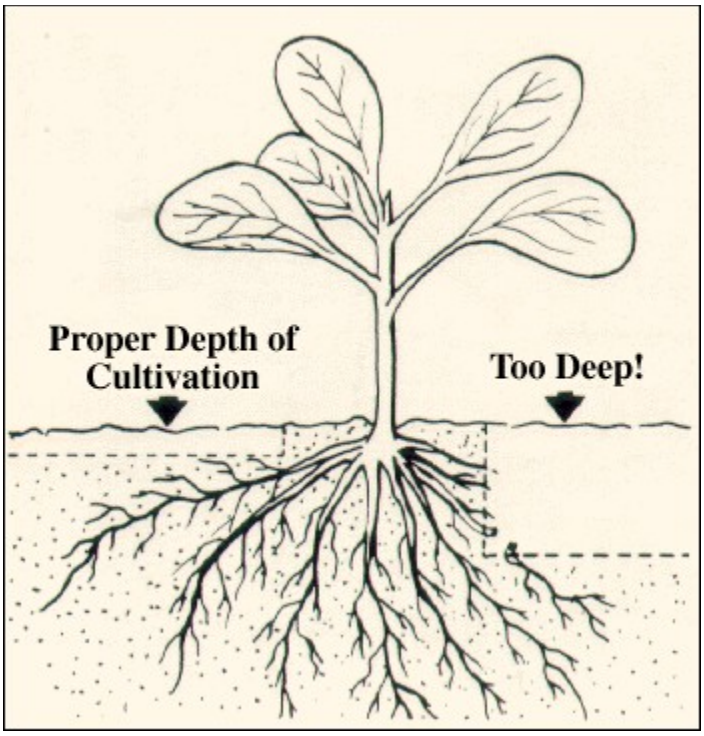


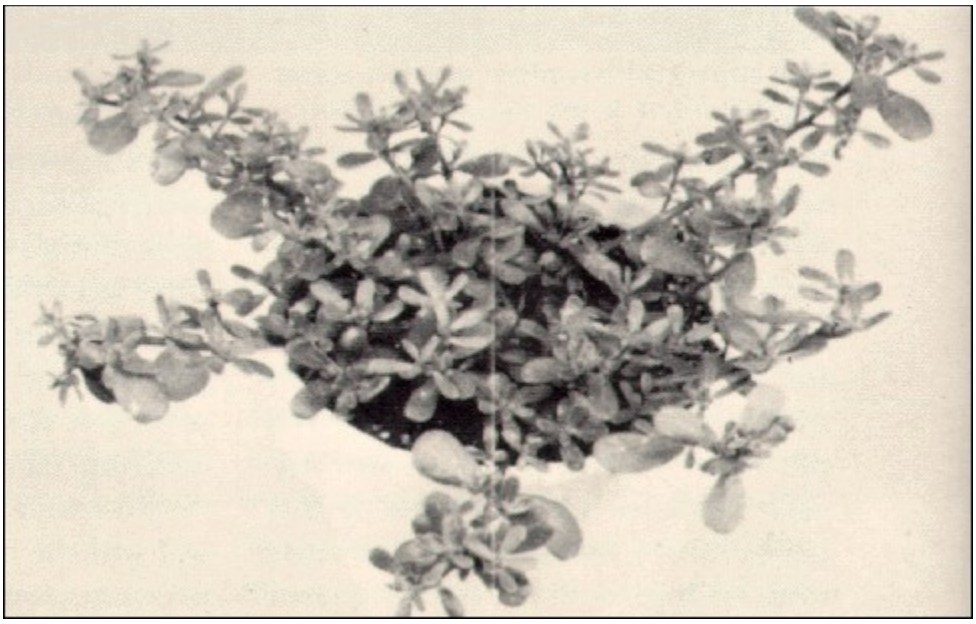


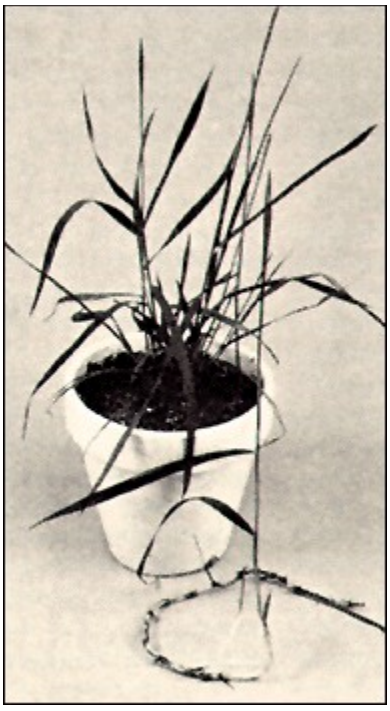


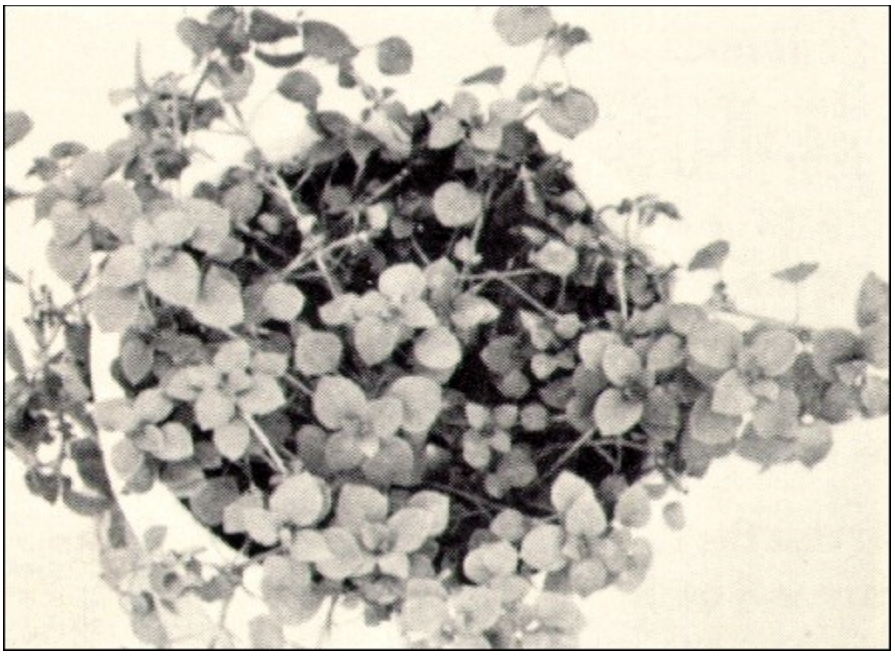


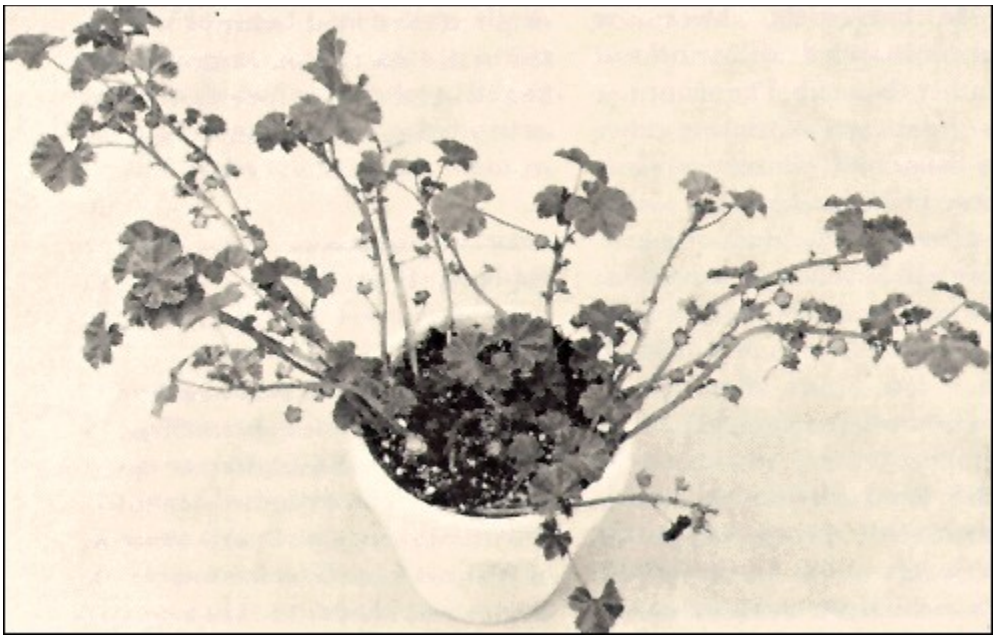


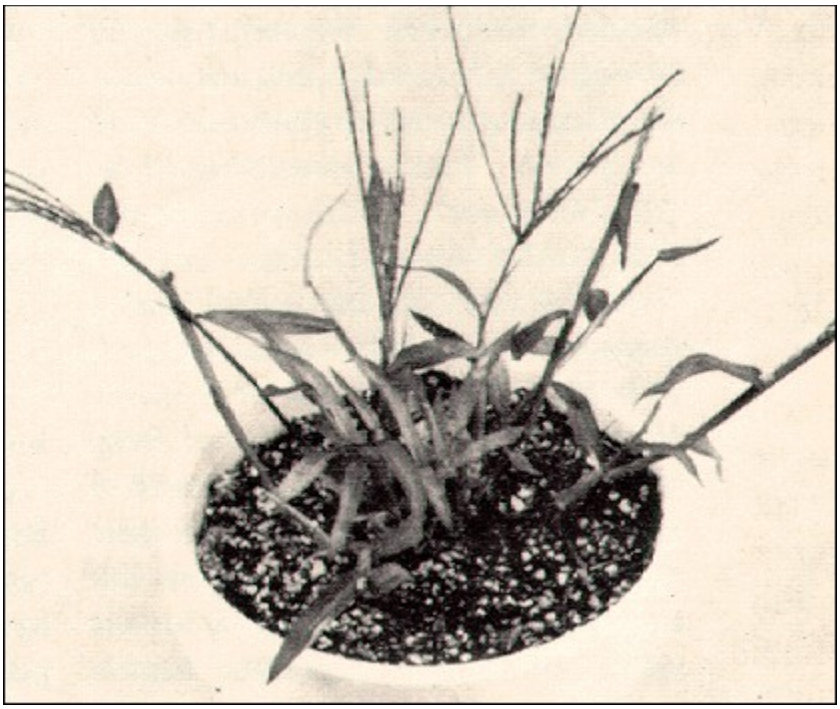

Proper Depth of Cultivation
Too Deep!

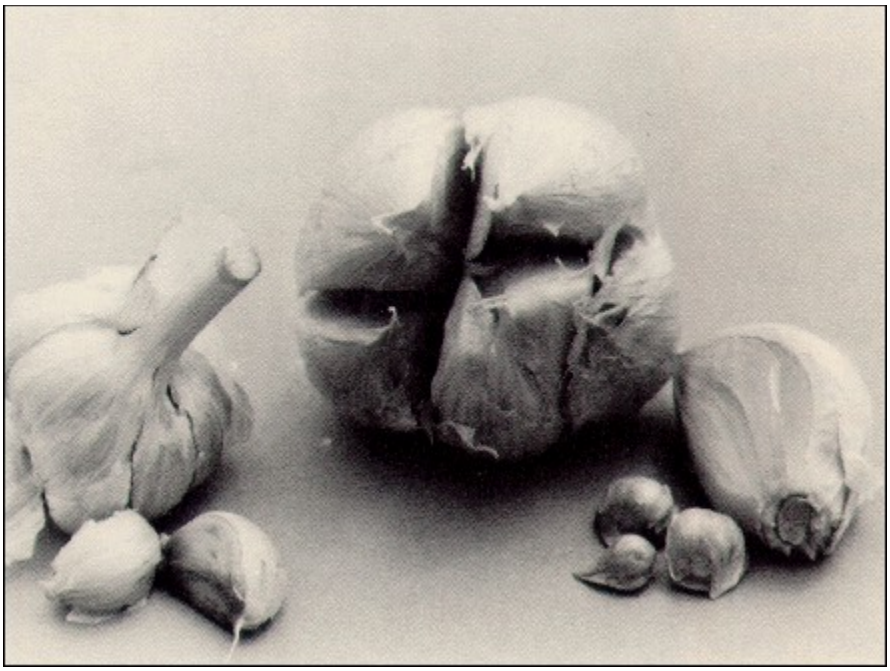


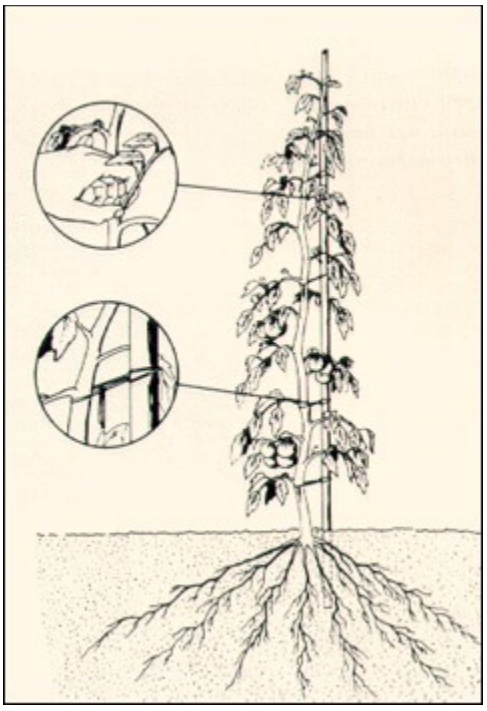


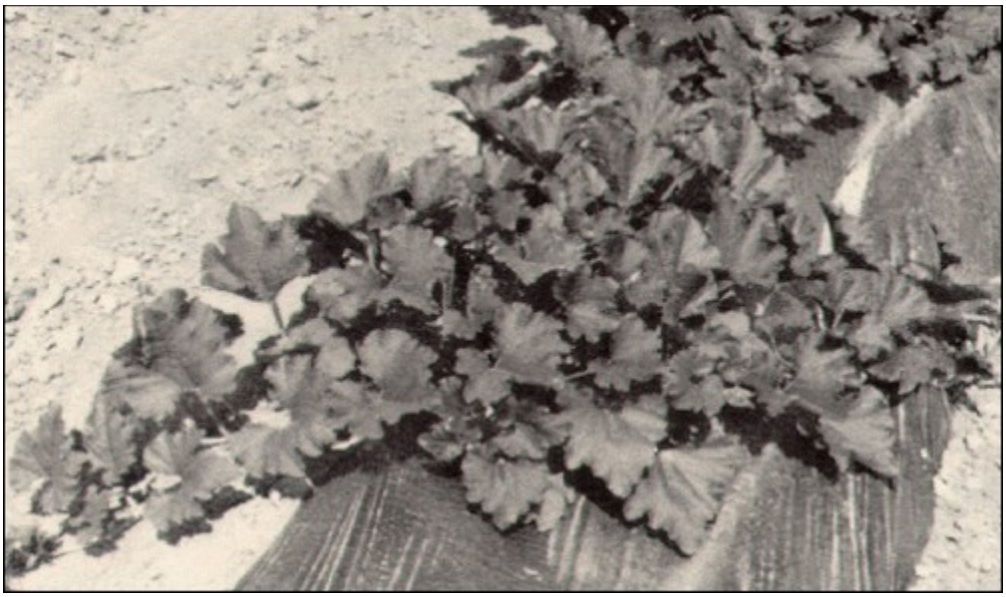


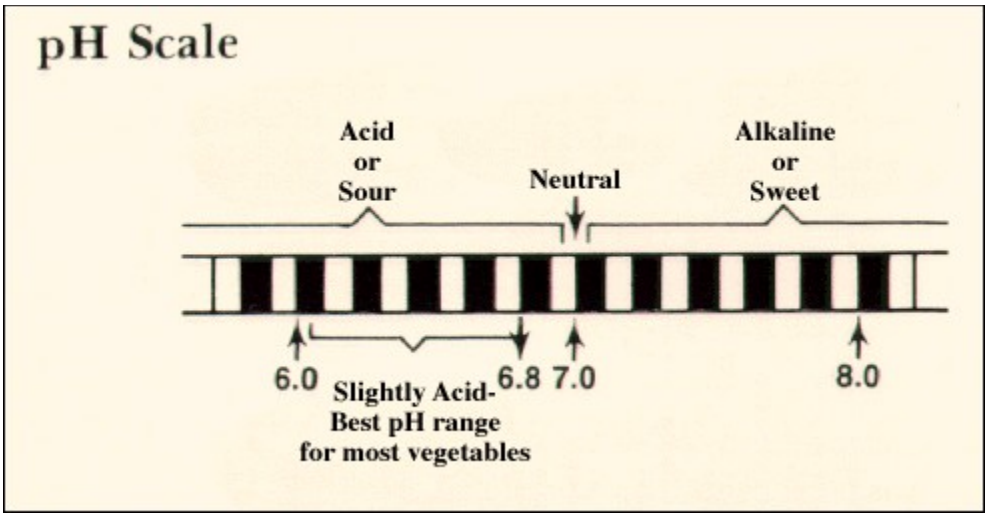


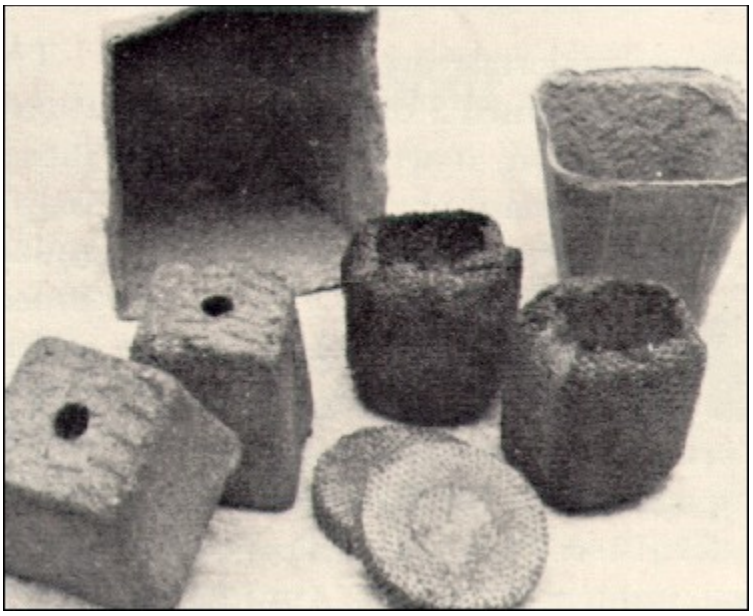


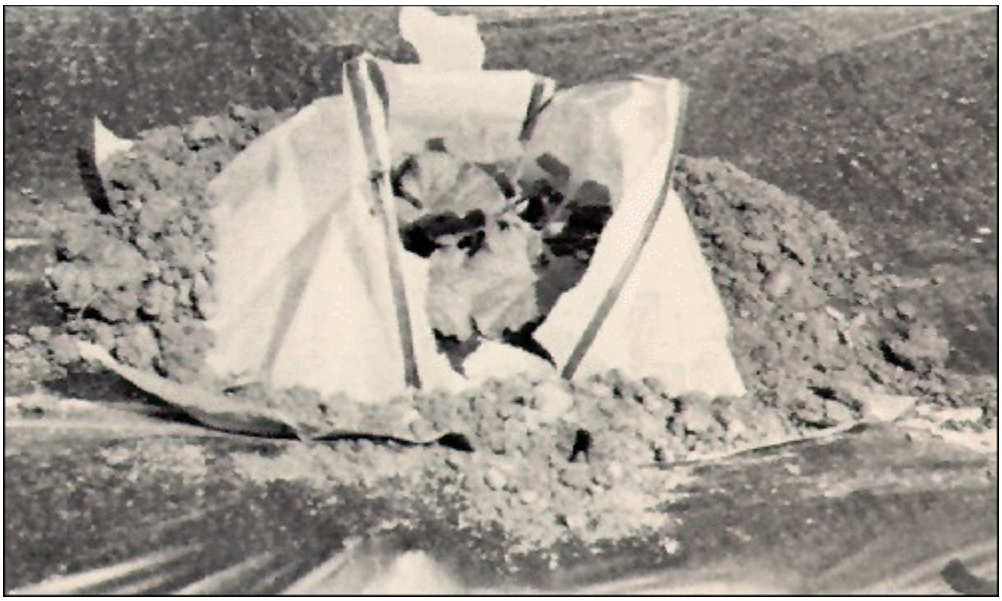


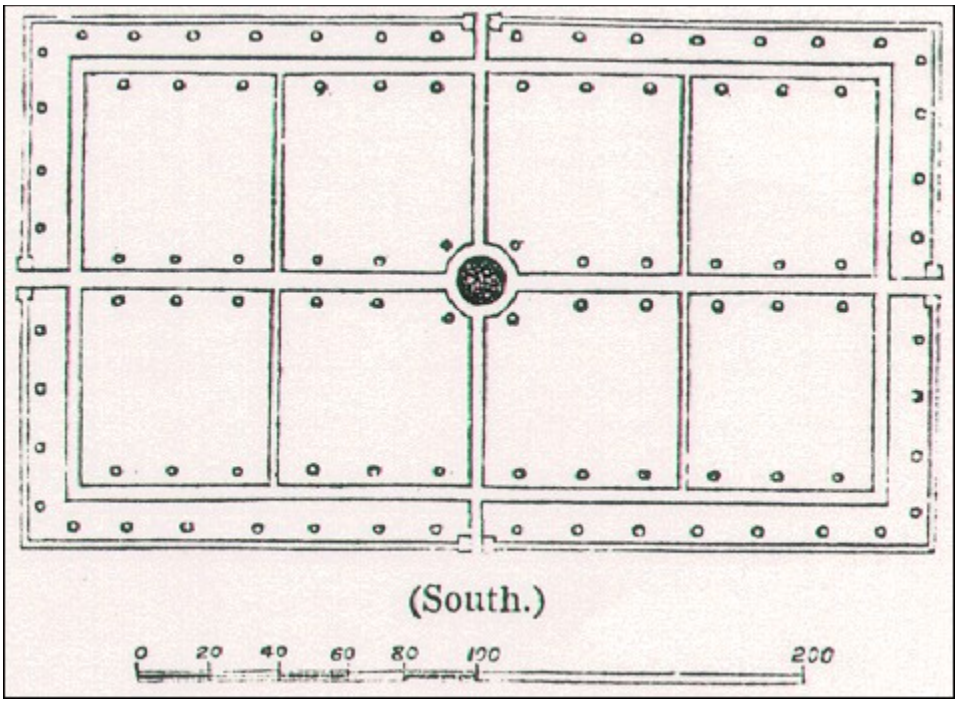





pH Scale
Acid
or
Sour
Neutral
Alkaline
or
Sweet
6.0
Slightly Acid-
Best pH range
for most vegetables
6.8
7.0
8.0



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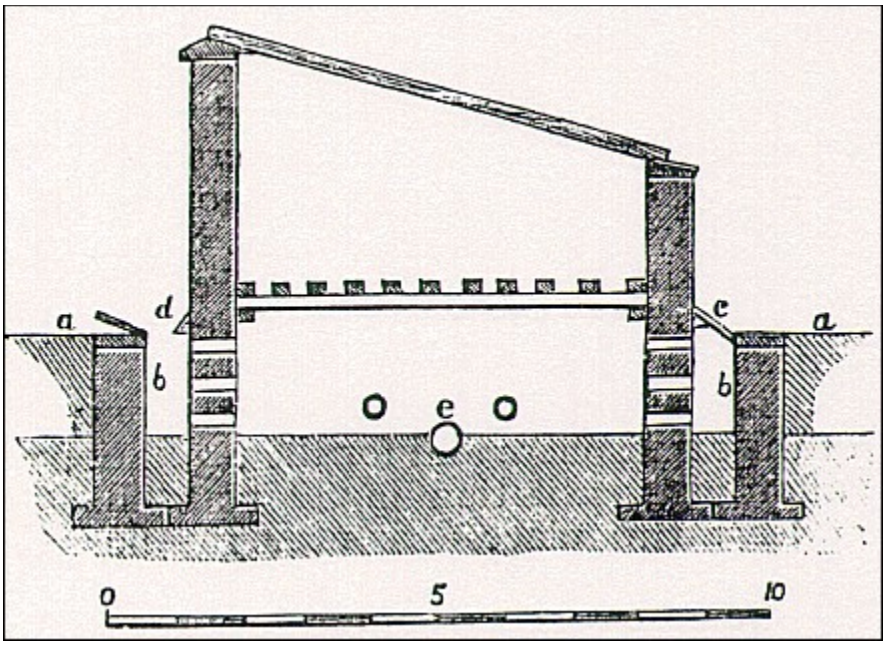
0 20 40 60 80 100 200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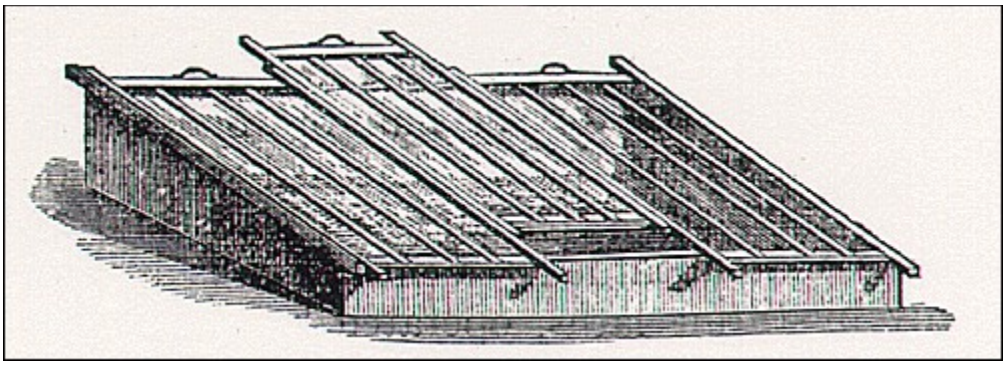

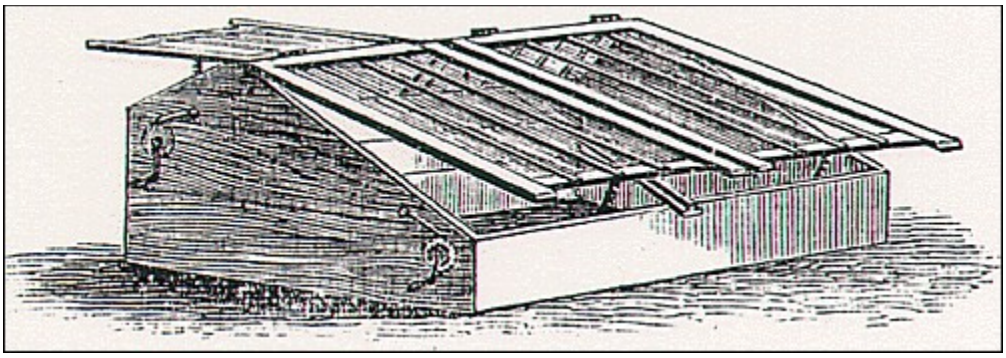

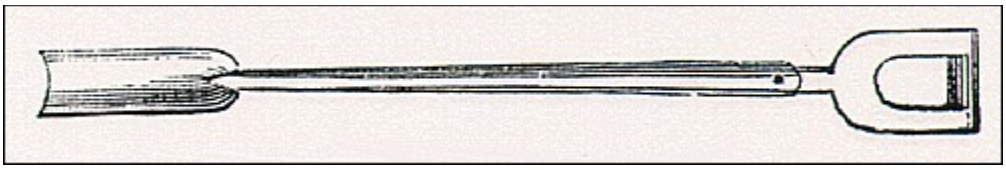

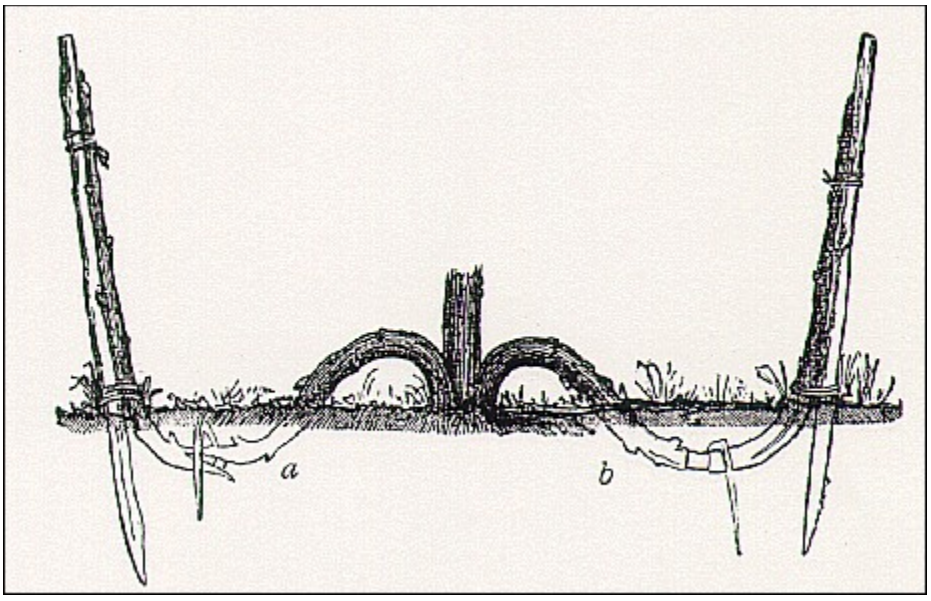
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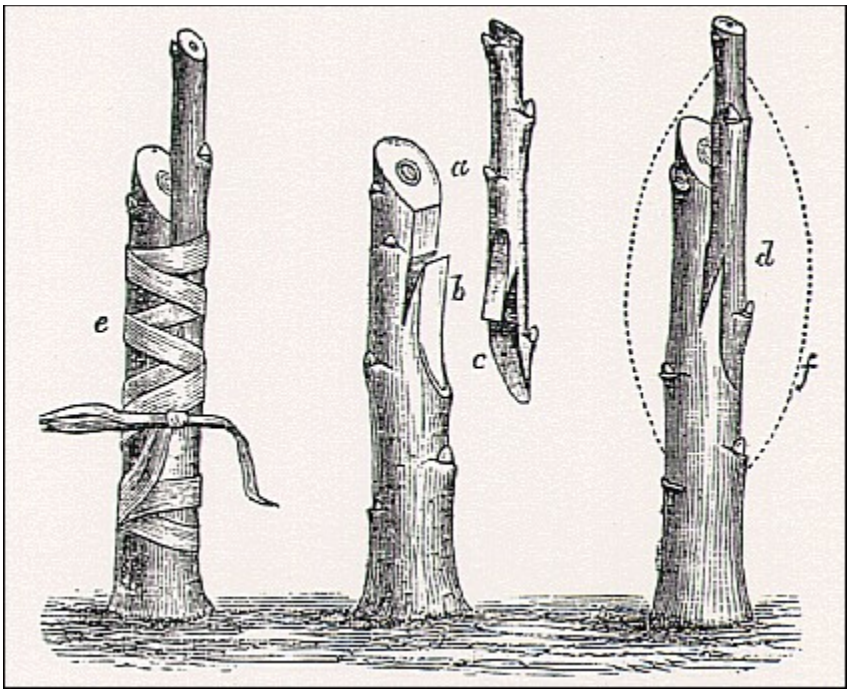
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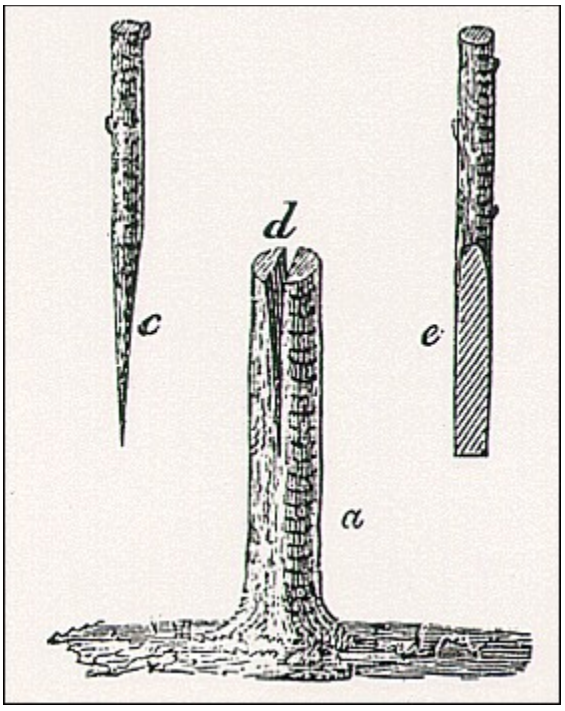
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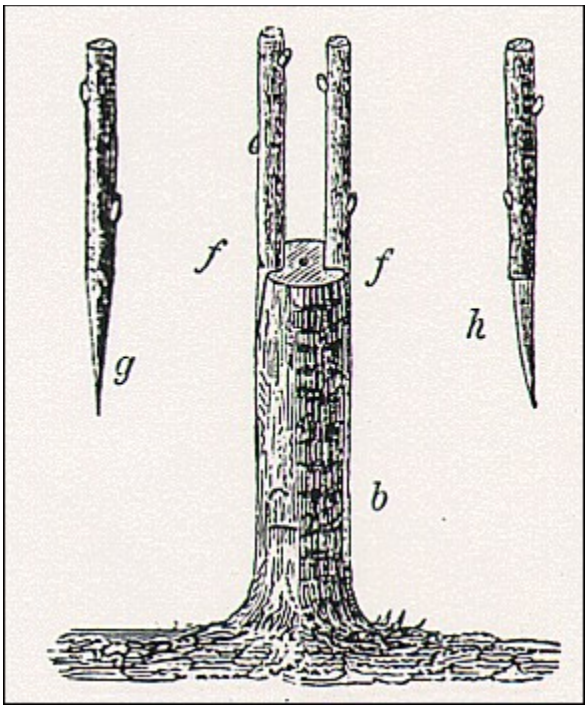
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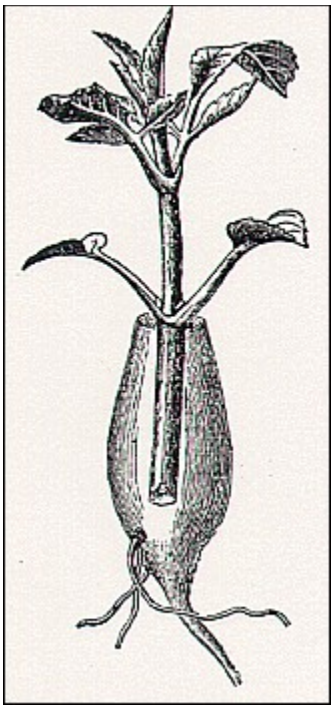

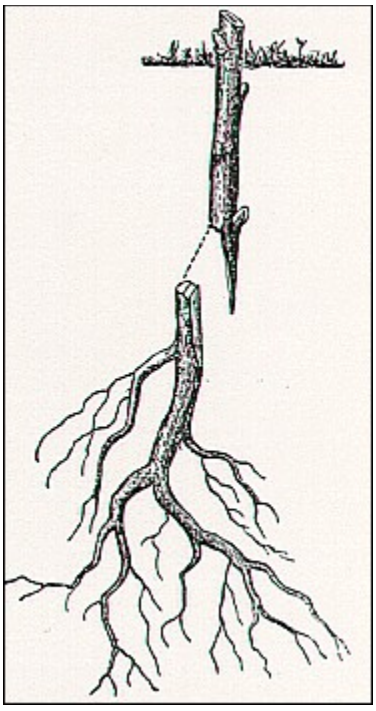

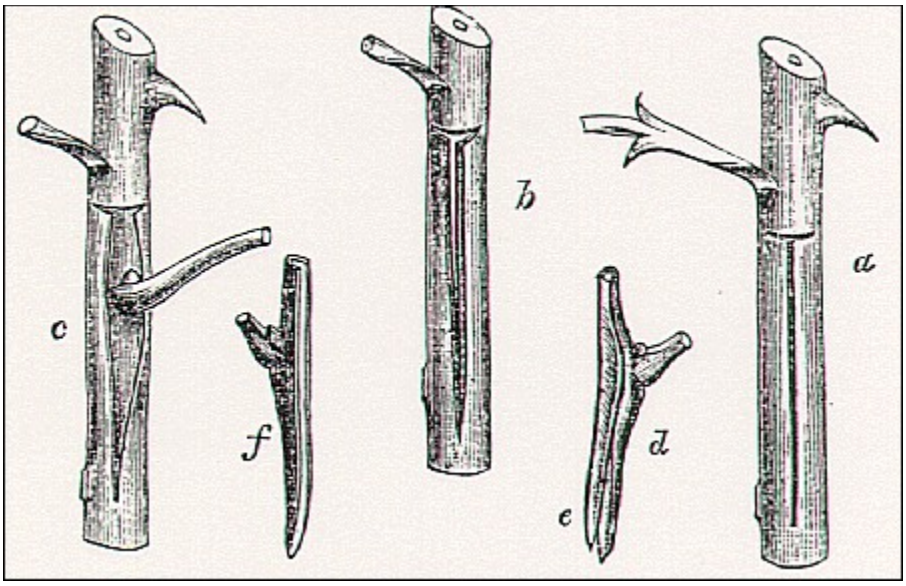
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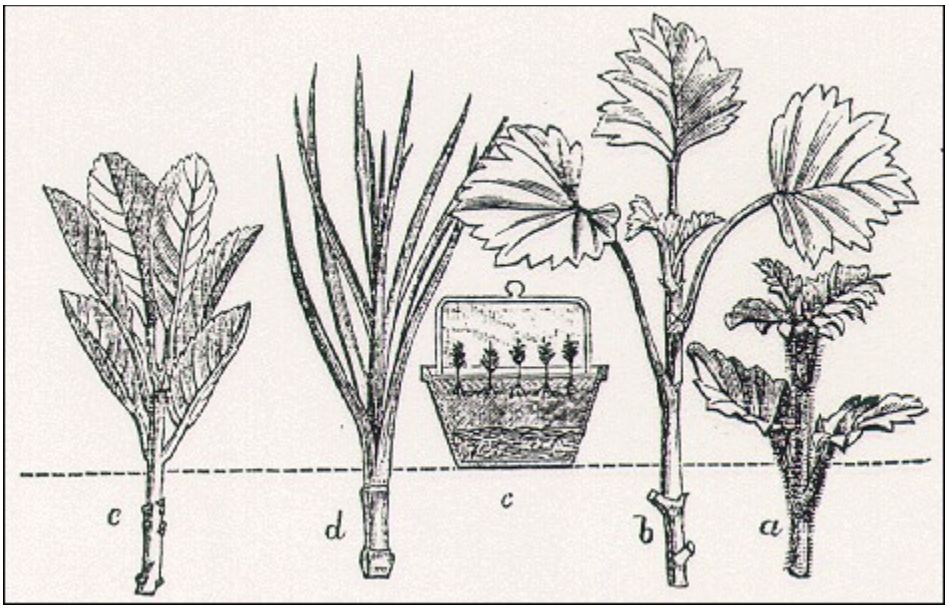
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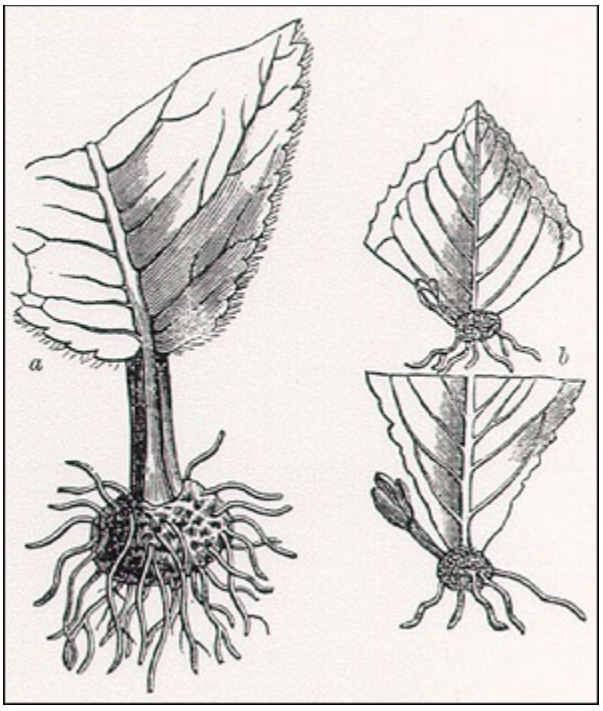
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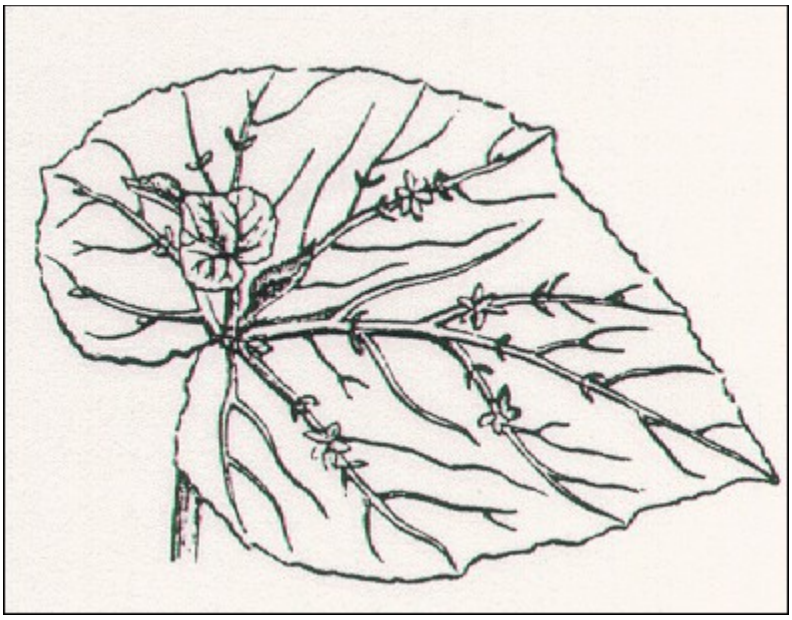

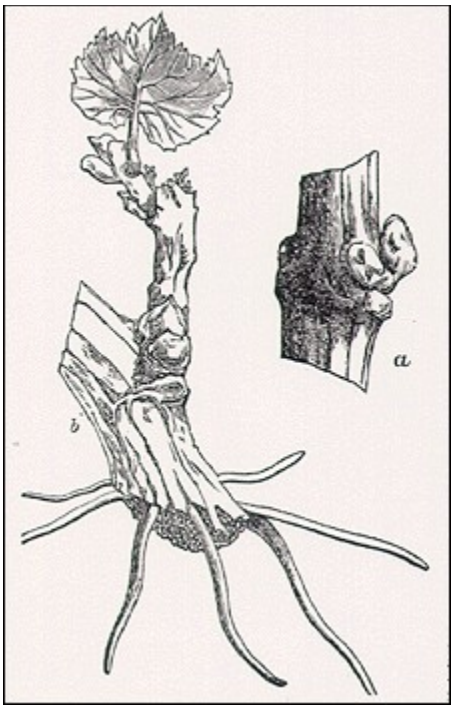
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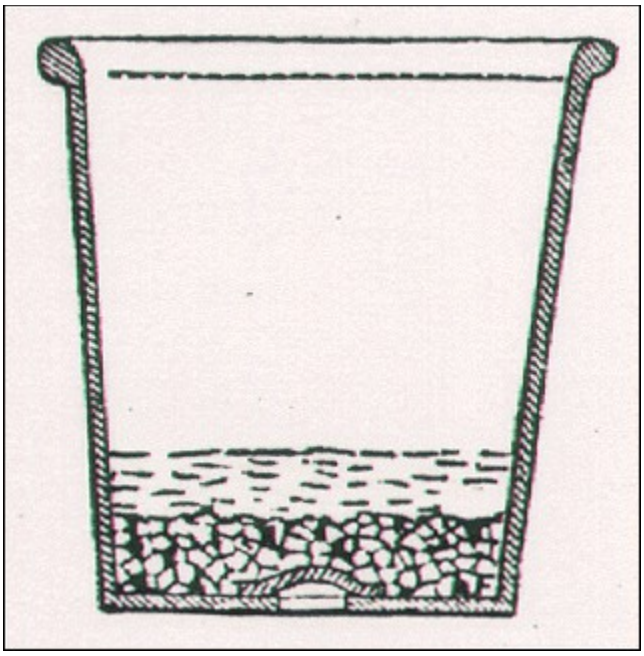

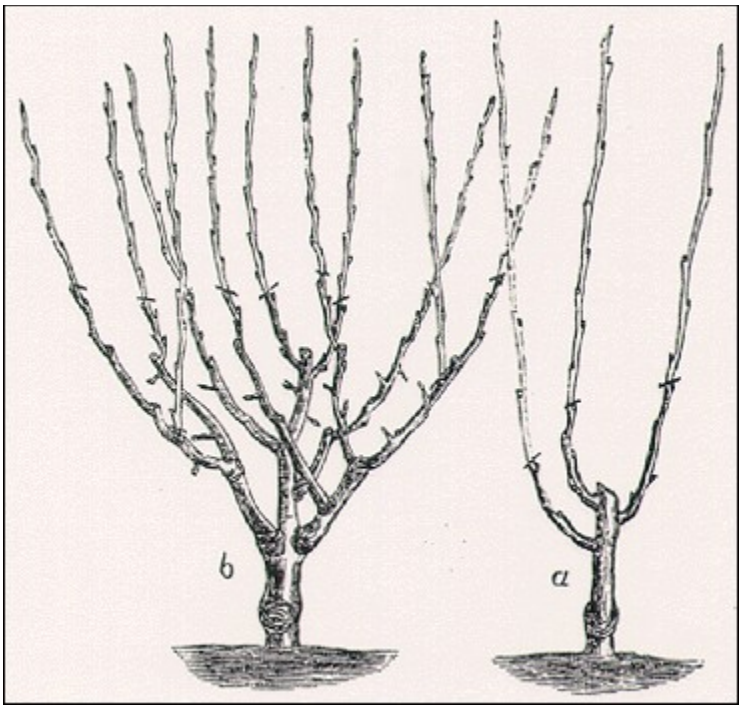
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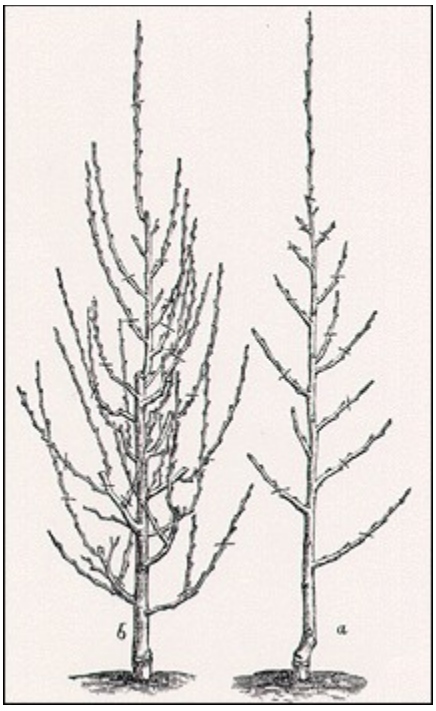
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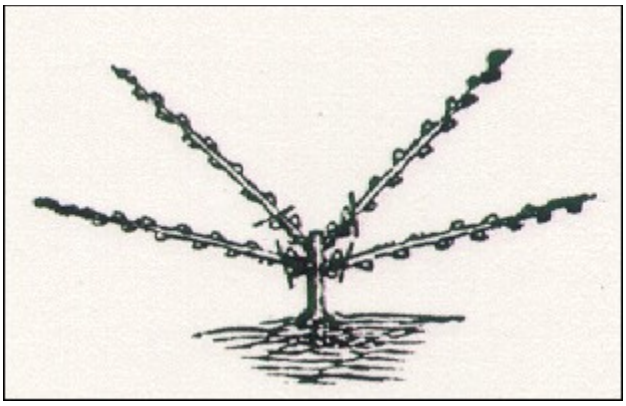

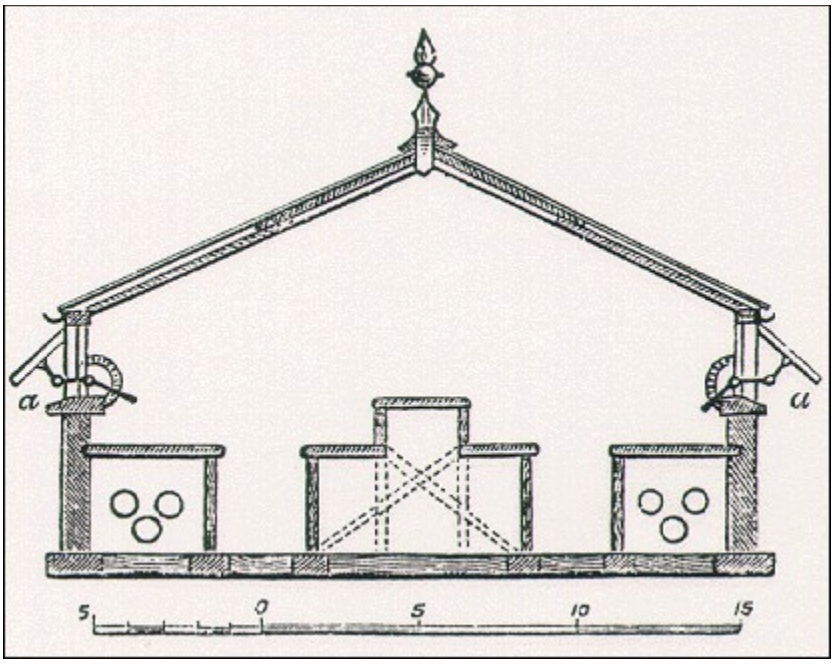
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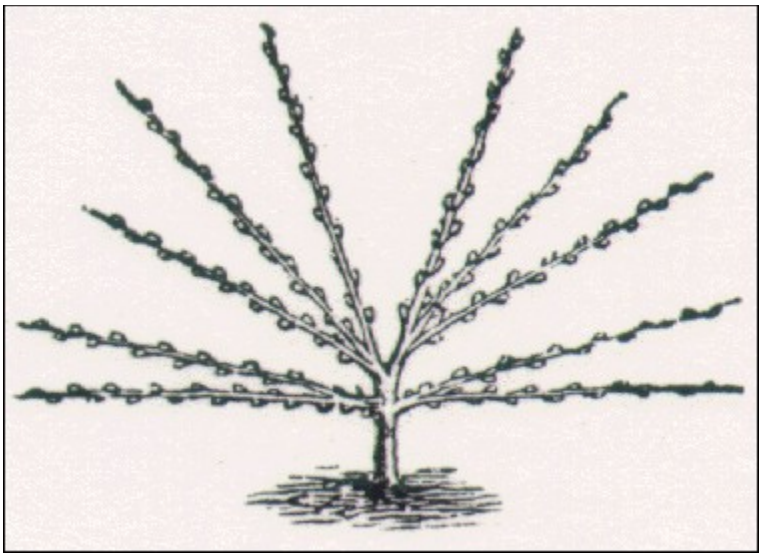

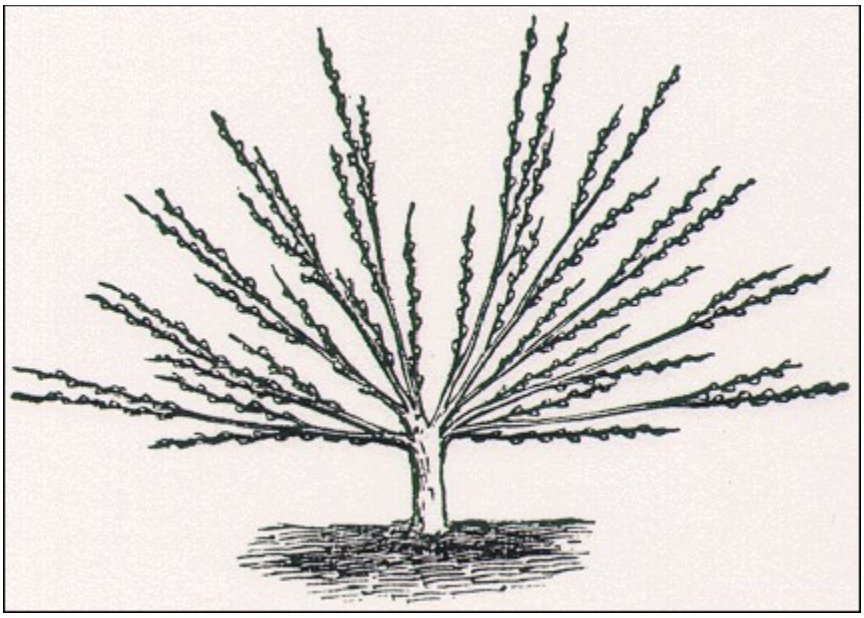

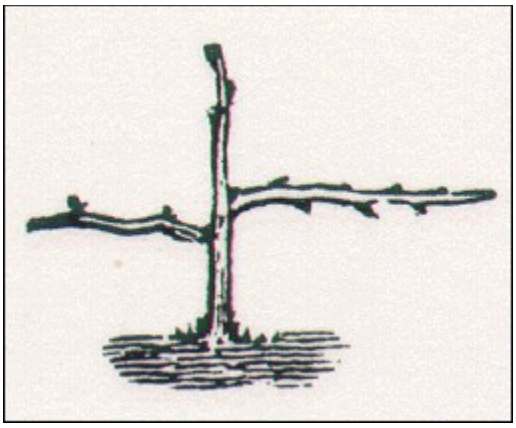

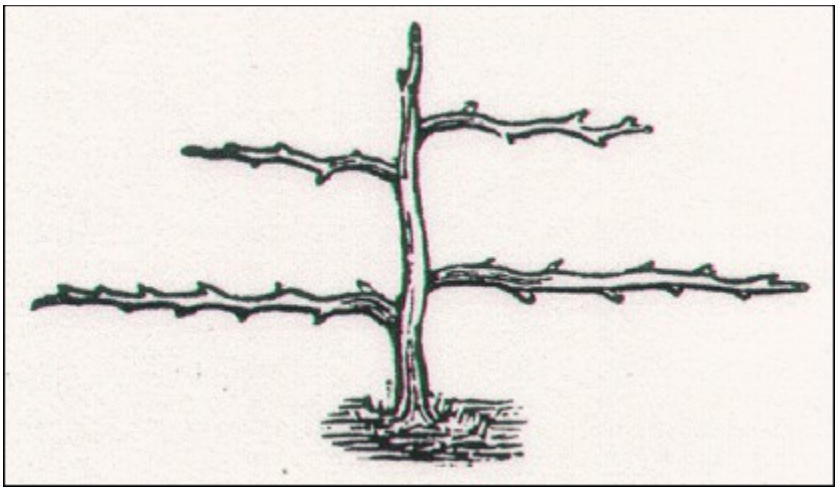

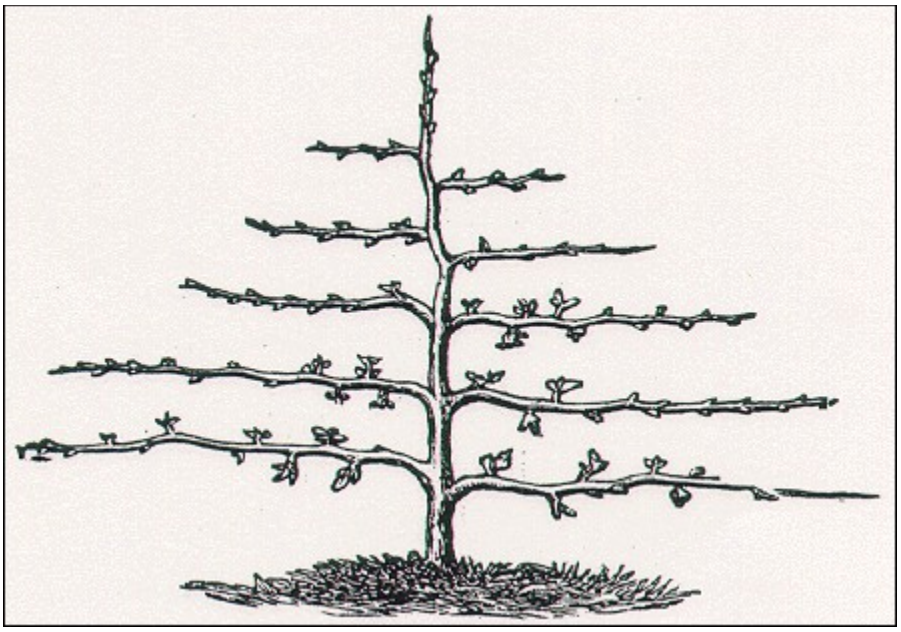

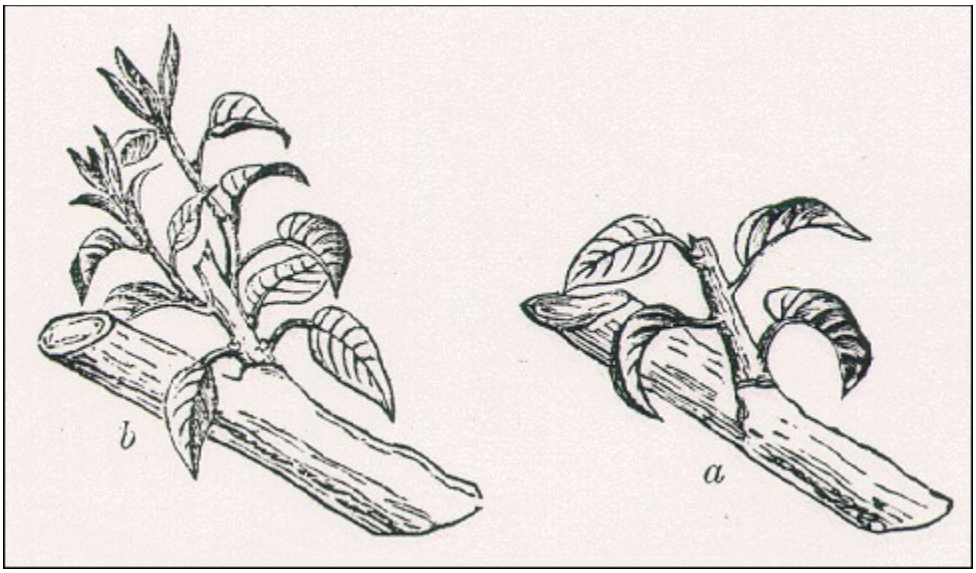
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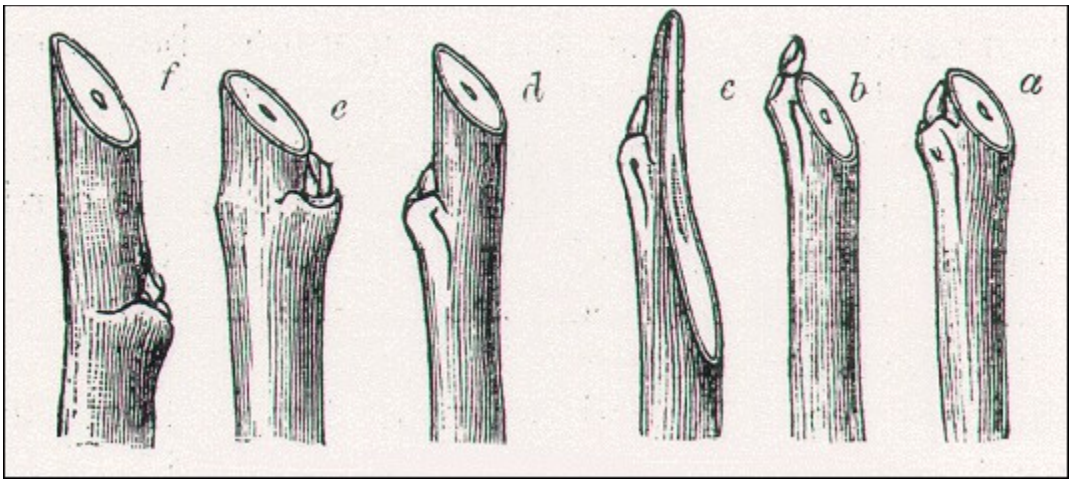
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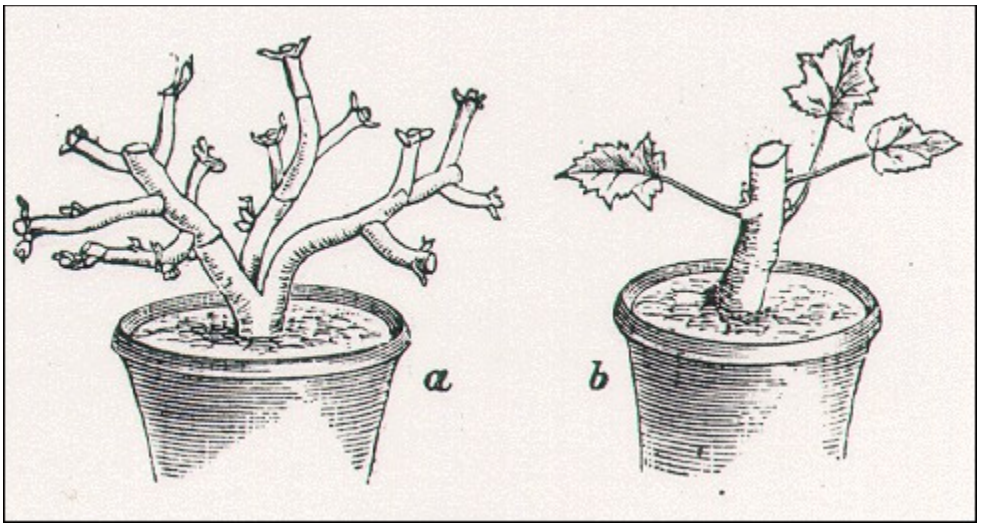
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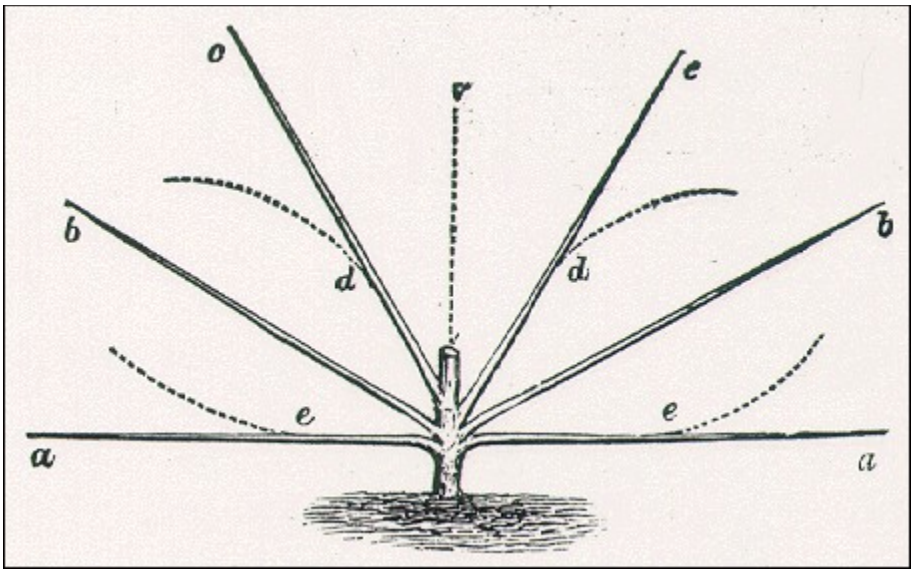
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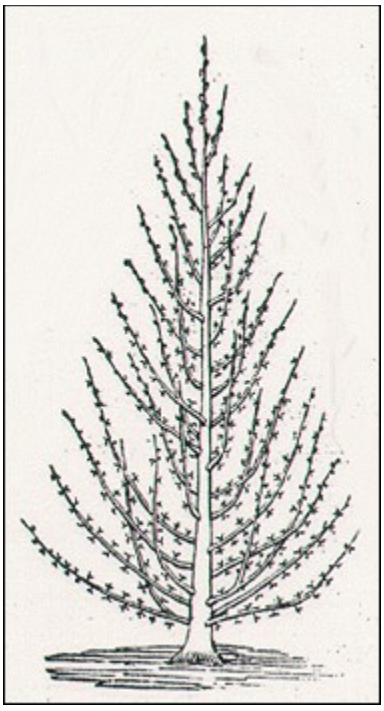

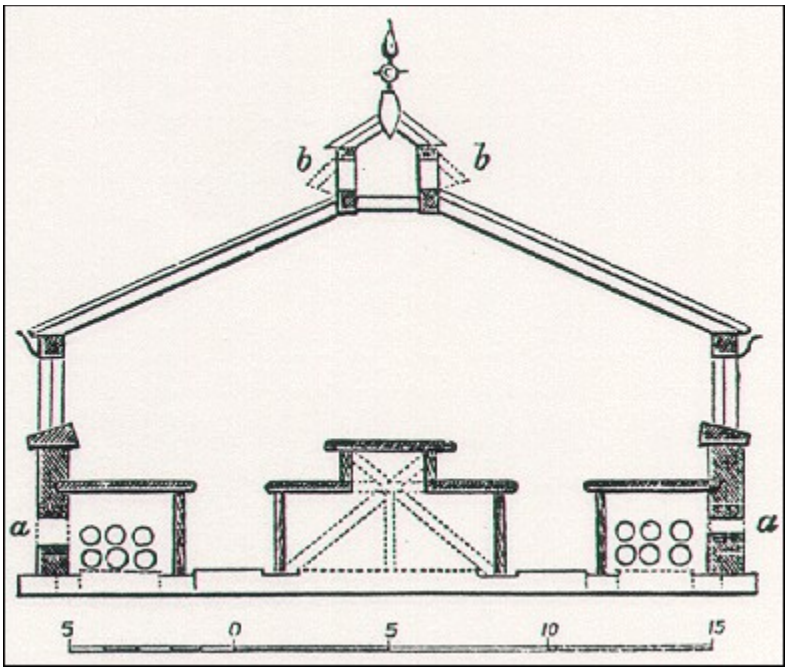
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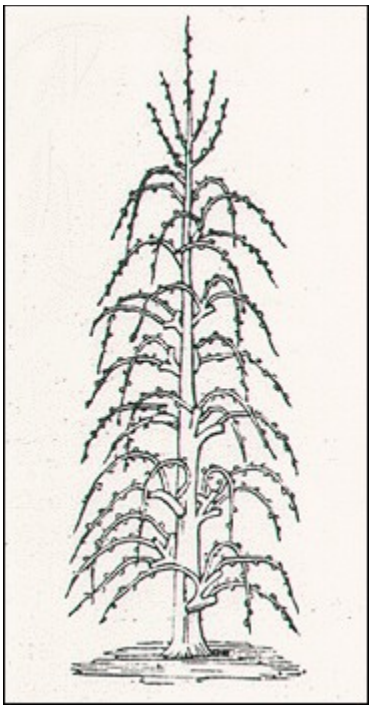

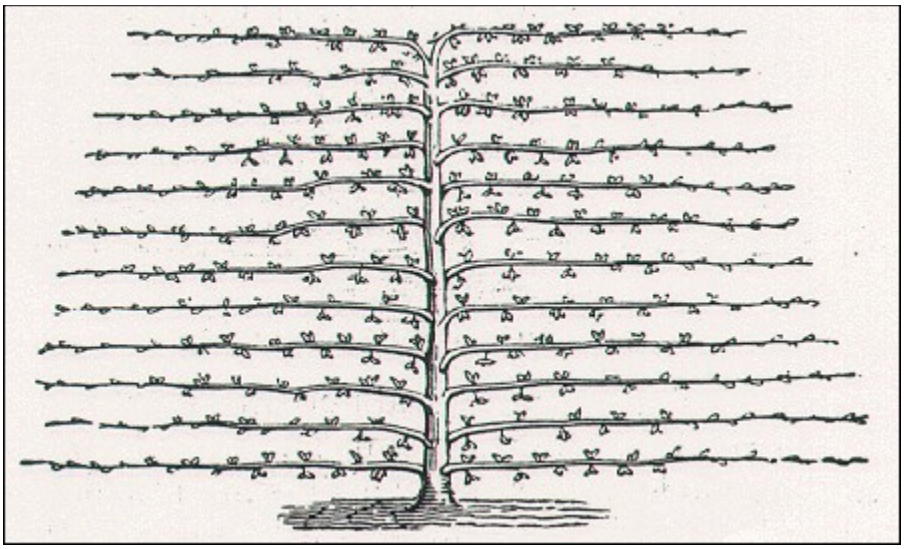

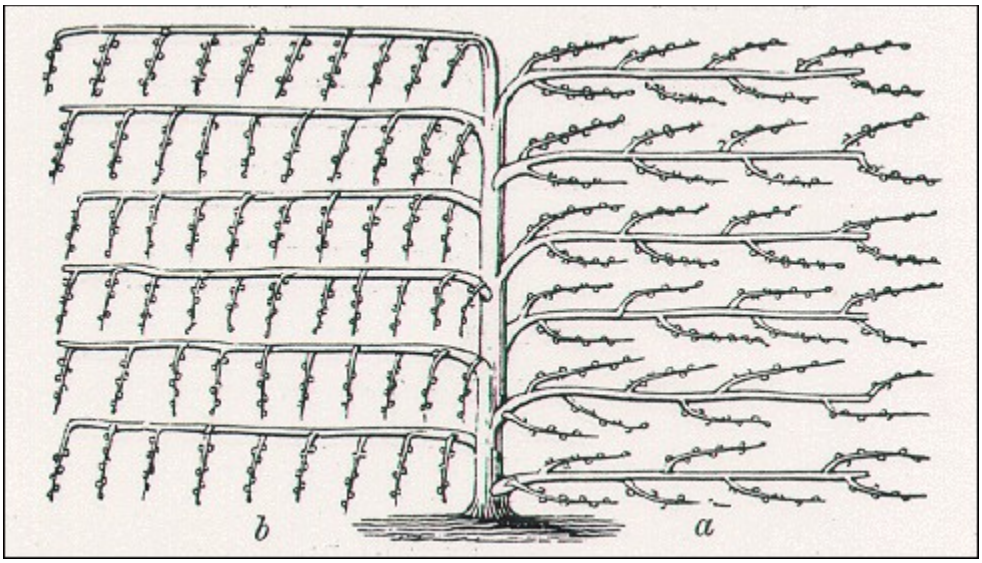
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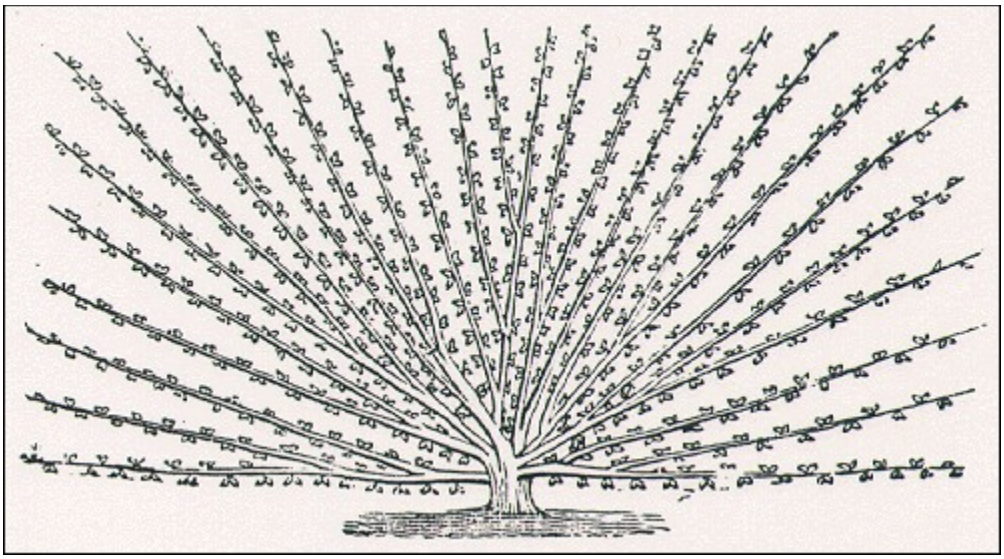

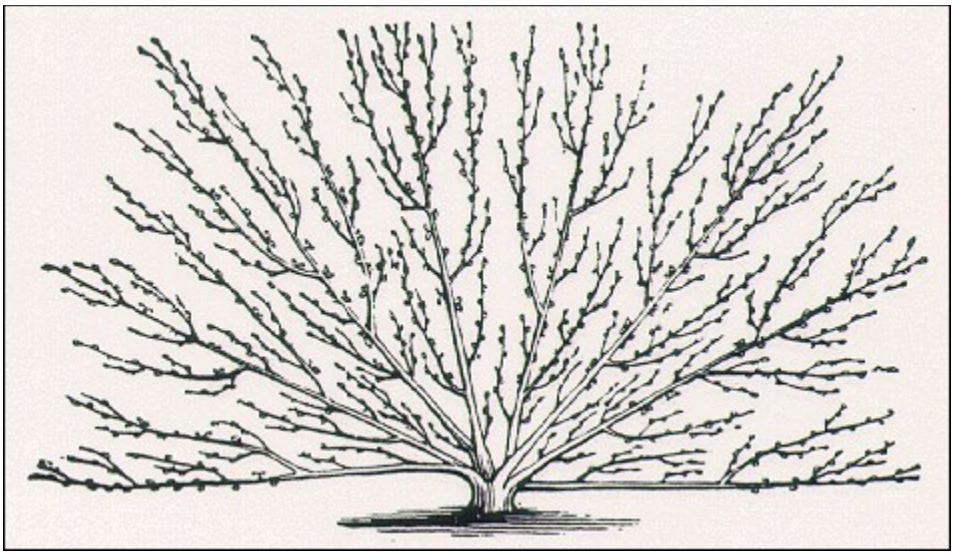

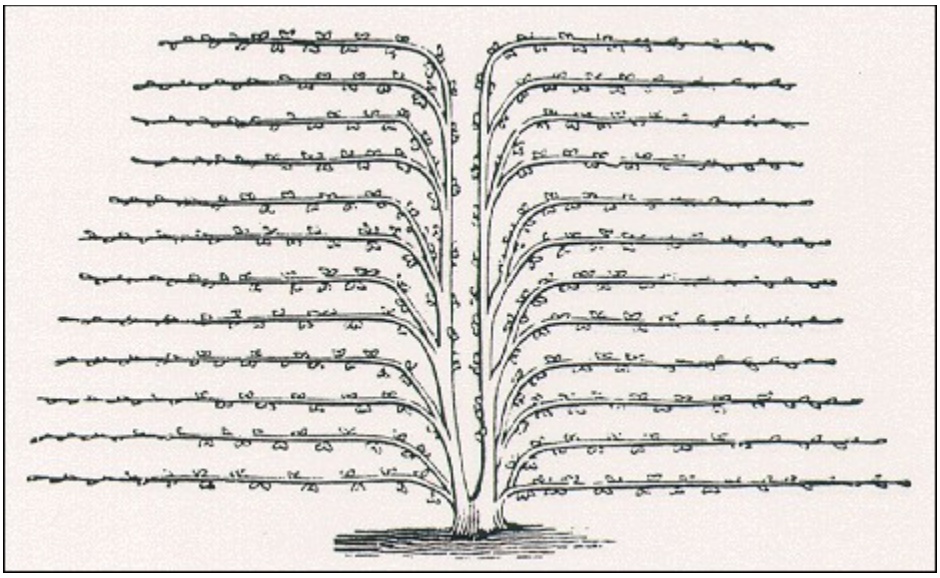

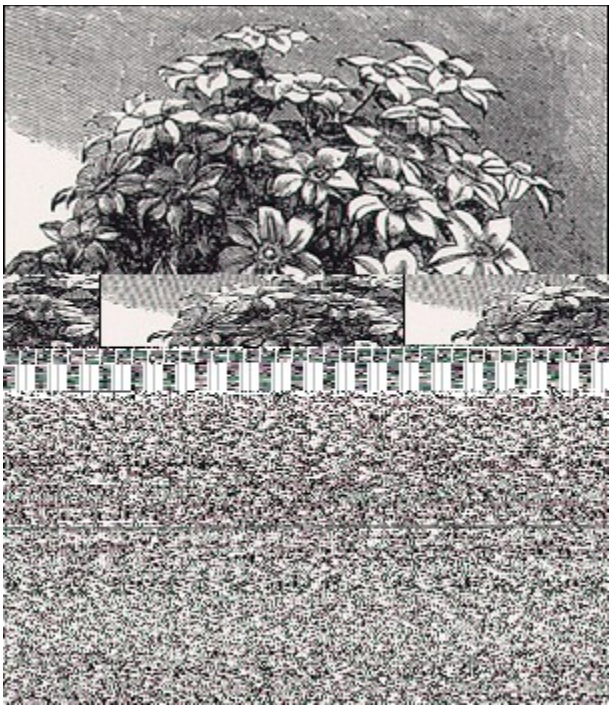

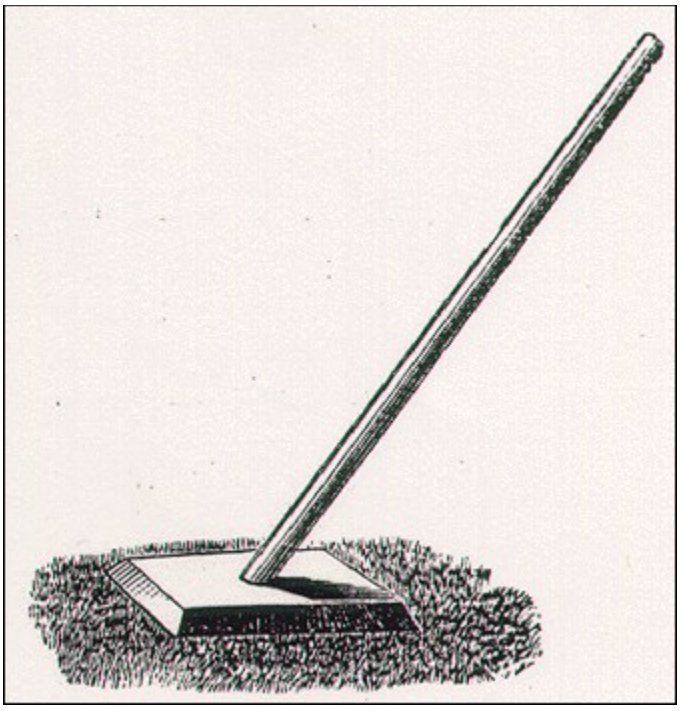

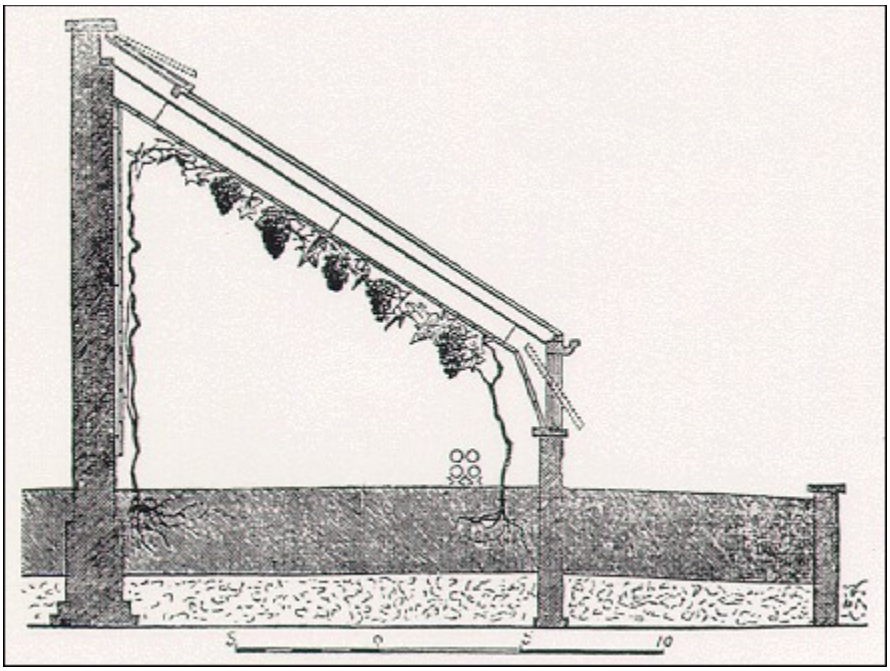
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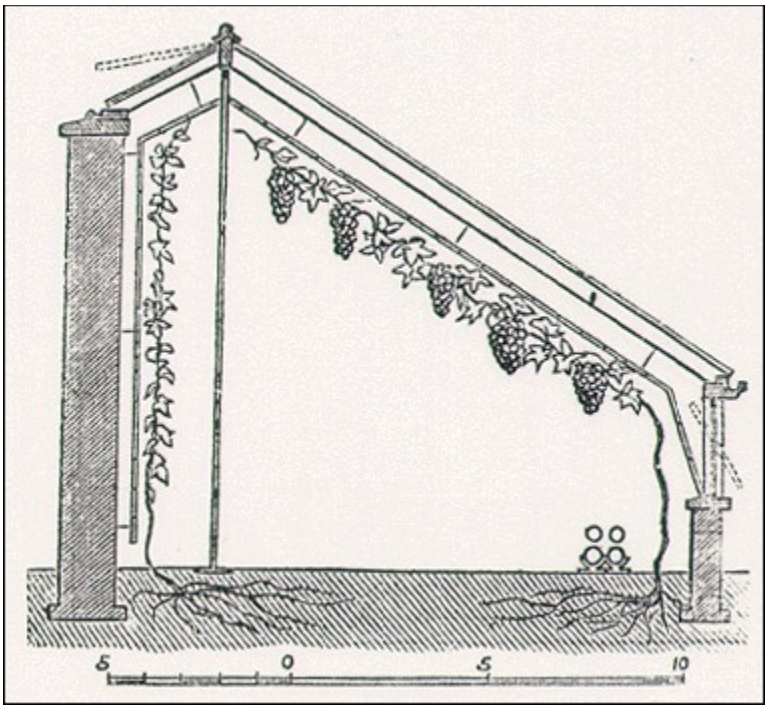
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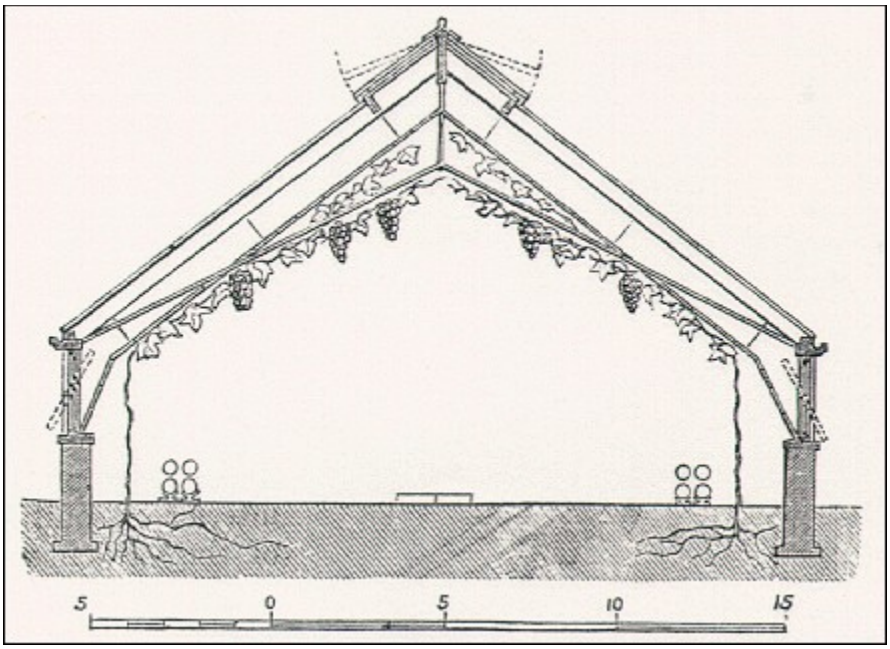
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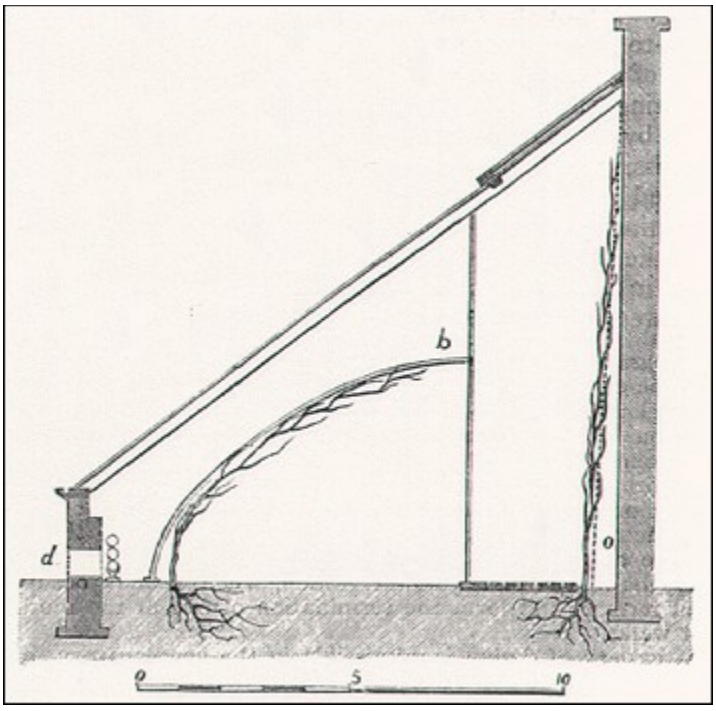
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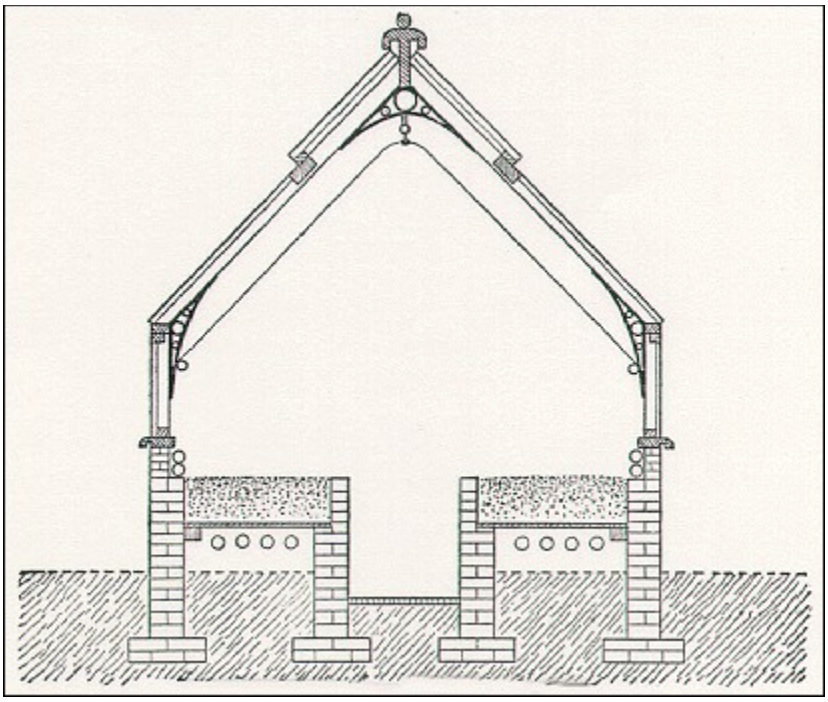

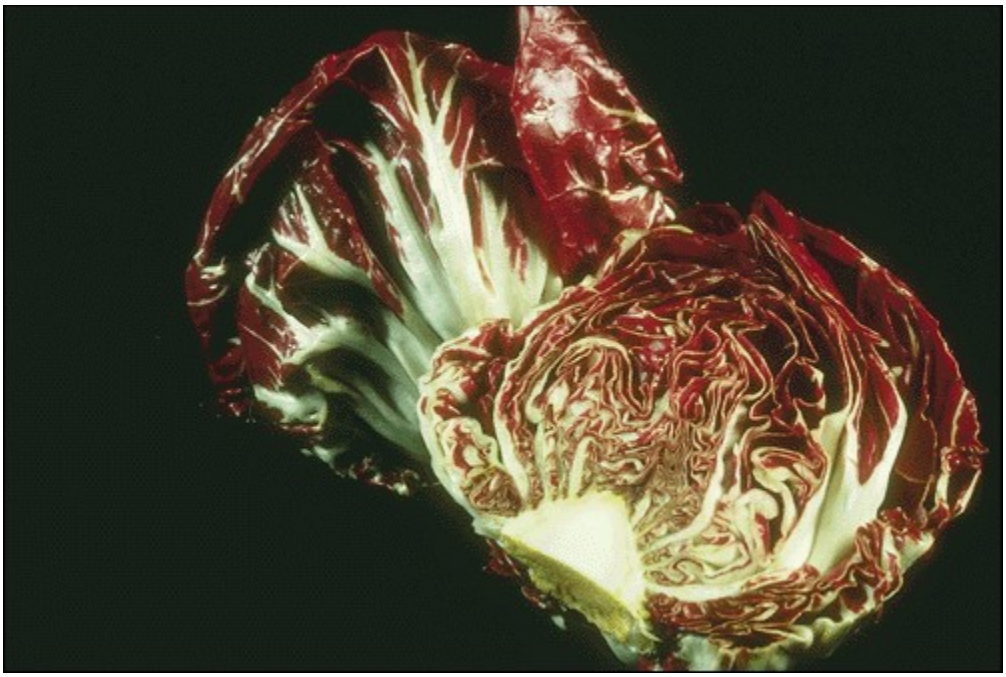

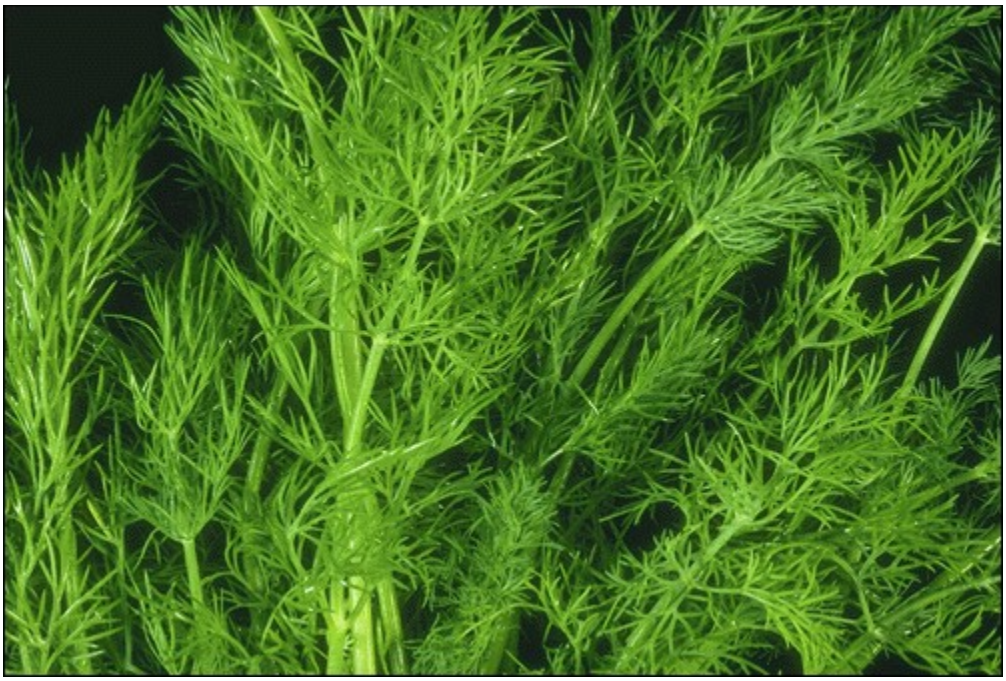

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{ewc MVMCI2, ViewerMCI, [device WaveAudio][stdcontrol][caption 'Mary, Mary, quite contrary...---------- Tommy ThumbPretty Song Book . 1744'][autostart][share Wave]wave.wav}

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{ewc MVMCI2, ViewerMCI, [device WaveAudio][stdcontrol][caption 'Training is everything...---------- Puddead WilsonCalendar Twain-1910'][autostart][share Wave]wave.wav}

{ewc MVMCI2, ViewerMCI, [device WaveAudio][stdcontrol][caption ' I wandered lonely as a cloud... ----------Wadsworth-1850'][autostart][share Wave]wave.wav}

{ewc MVMCI2, ViewerMCI, [device WaveAudio][stdcontrol][caption ' Whatin a name?...
----------and JulietShakespeare-1616'][autostart][share Wave]wave.wav}

{ewc MVMCI2, ViewerMCI, [device WaveAudio][stdcontrol][caption ' Preserve to our use the kindly fruits of the earth ----------Book of Common Prayer'][autostart][share Wave]wave.wav}

{ewc MVMCI2, ViewerMCI, [device WaveAudio][stdcontrol][caption ' Consider the lilies of the field... ----------Holy Bible'][autostart][share Wave]wave.wav}

{ewc MVMCI2, ViewerMCI, [device WaveAudio][stdcontrol][caption ' A work well done never needs doing over... ----------D. Everson'][autostart][share Wave]wave.wav}

{ewc MVMCI2, ViewerMCI, [device WaveAudio][stdcontrol][caption ' To see a World in a grain of sand... ----------of InnocenceBlake-1827'][autostart][share Wave]wave.wav}

Types of Soil (Screen 1 of 5)

The principal soils used in gardens, either alone, or mixed to form what are called composts, are loam, sand, peat, leaf-mold and various mixtures and combinations of these made up to suit the different subjects under cultivation.

Soils for vegetables should be friable and porous for quick water drainage, crop root penetration, and good aeration. A deep, fine sandy loam or silt loam is best. But the home owner who has little choice of site can grow many vegetables on relatively poor soils if the soils are properly conditioned.

An area that is composed of "fill dirt" is difficult to reclaim for a vegetable garden. A fill area usually consists of a high percentage of bottom subsoil (clay), stones, and debris. The fertility is usually very poor. It requires time, fertilizer, and a considerable amount of energy to make a fill soil productive.

Low and wet spots should also be avoided. If, after a moderate shower, water remains in puddles on the soil surface for several hours, the site should not. be used for vegetables. Very few vegetables can stand "wet feet" for long periods. However, some heavy soils can be improved and used for vegetables, but they are difficult to handle and must not be worked when they are too wet.

Sandy soils are satisfactory for vegetables in years with average rainfall, but supplemental irrigation may be necessary in dry periods. Organic matter added to these soils will improve their water-holding capacity.

Loam (Screen 2 of 5)

Loam is the staple soil for the gardener; it is not only used extensively in the pure and simple state, but enters into most of the composts prepared specially for his plants. For garden purposes loam should be rather unctuous or soapy to the touch when moderately dry, not too clinging nor adhesive, and should readily crumble when a compressed handful is thrown on the ground.

If it clings together closely it is too heavy and requires amelioration by the admixture of gritty material; if it has little or no cohesion when squeezed tightly in the hand, it is too light, and needs to be improved by the addition of heavier or clayey material. Sound friable loam cut one sod deep from the surface of a pasture, and stacked up for twelve months in a heap or ridge, is invaluable to the gardener.

When employed for making vine borders, loam of a somewhat heavier nature can be used with advantage, on account of the porous materials which should accompany it. For stone fruits a calcareous loam is best; indeed, for these subjects a rich calcareous loam used in a pure and simple state cannot be surpassed.

Somewhat heavy loams are best for potting pineapples, for melons and strawberries, fruit trees in pots, etc., and may be used with the addition of manures only; but for ornamental plants a loam of a somewhat freer texture is preferable and more pleasant to work. Loam which contains much red matter (iron) should be avoided.

Sand (Screen 3 of 5)

Sand is by itself of little value except for striking cuttings, for which purpose fine clean sharp silver sand is the best; and a somewhat coarser kind, if it is gritty, is to be preferred to the commented sands which contain a large proportion of earthy matter.

River sand and the sharp grit washed up sometimes by the road side are excellent materials for laying around choice bulbs at planting time to prevent contact with earth which is perhaps manure-tainted. Sea sand may be advantageously used both for propagating purposes and for mixing in composts.

For the growth of pot plants sand is an essential part of most composts, in order to give them the needful porosity to carry off all excess of moisture from the roots. If the finer earthy sands only are obtainable, they must be rendered sharper by washing away the earthy particles. Washed sand is best for all plants like heaths, which need a pure and lasting peaty compost.

Peat (Screen 4 of 5)

Peat soil is largely employed for the culture of such plants as rhododendrons, azaleas, heaths, etc.

In districts where heather and gritty soil predominate, the peat soil is poor and unprofitable, but selections from both the healthy and the richer peat soils, collected with judgment, and stored in a dry part of the compost yard, are essential ingredients in the cultivation of many choice pot plants, such as the Cape heaths and many of the Australian plants.

Many monocotyledons do well in peat, even if they do not absolutely require it.

Leaf-Mold (Screen 5 of 5)

Leaf-mold is eminently suited for the growth of many free-growing plants, especially when it has been mixed with stable manure and has been subjected to fermentation for the formation of hot beds.

In any state most plants feed greedily upon it, and when pure or free from decaying wood or sticks it is a very safe ingredient in composts; but it is so liable to generate fungus, and the mycelium or spawn of certain fungi is so injurious to the roots of trees, attacking them if at all sickly or weakened by drought, that many cultivators prefer not to mix leaf-mold with the soil used for permanent plants, as peaches or choice ornamental trees.

For quick growing plants, however, as for example most annuals cultivated in pots, such as balsams, cockscombs, globe-amaranths and the like, for cucumbers, and for young soft-wooded plants generally, it is exceedingly useful, both by preventing the consolidation of the soil and as a manure.

The accumulations of light earth formed on the surface in woods where the leaves fall and decay annually are leaf-mold of the finest quality. Leaves collected in the autumn and stored in pits or heaps, and covered with a layer of soil, make beautiful leaf-mold at the end of about twelve months, if frequently drenched with water or rain during this period.

Composts & Organic Matter

click here to see movie...
click here to see picture...

Organic matter improves soil as a growing medium for plants. It helps release nitrogen, minerals, and other nutrients for plant use when it decays. A mulch of partially rotted straw, compost, or undecomposed crop residue on the soil helps keep the soil surface from crusting, retards water loss from the soil, and keeps weeds from growing.

Practically any plant material can be composted for use in the garden. Leaves, old sod, lawn clippings, straw, and plant refuse from the garden or kitchen can be used. Often, leaves can be obtained from neighbors who do not use them or from street sweepings.

The purpose of composting plant refuse or debris is to decay it so that it can be easily worked into the soil and will not be unsightly when used in the garden. Composting material should be kept moist and supplied with commercial fertilizer, particularly nitrogen, to make it decay faster and more thoroughly.

Compost (Screen 2 of 4)

click here to see picture...

Compost is a good source of organic matter for the home garden. A compost pile can be made of leaves, weeds, straw, waste hay, and any waste vegetable matter other than diseased parts of vegetables. Pile these materials together as they accumulate, keeping the light materials, such as leaves, from blowing away by throwing a little soil over the pile.

Each spring start a new pile. Turn the old one over several times during the year to insure even decay; it will be ready to apply to the garden before spring plowing the second year. A leaf compost can, however, be used for a mulch the first spring after the pile is built, or it can be put directly on the garden and turned under the first year.

If equal layers of soil and composting materials are used and if the pile is turned 2 or 3 times during the season, it will make good potting or plant-growing soil for use during the winter.

Building a Compost Pile (Screen 3 of 4)

click here to see movie...

The usual practice in building a compost pile is to accumulate the organic material in some out-of-the-way place in the garden. It can be built on open ground or in a bin made of cinder blocks, rough boards, or wire fence. The sides of the bin should not be airtight or watertight. A convenient time to make a compost pile is in the fall when leaves are plentiful.

In building the compost pile, spread out a layer of plant refuse about 6 inches deep and add one-half pound or one cupful of 10-10-10, 10-20-10, or 10-6-4 fertilizer to each 10 square feet of surface. Then add 1 inch of soil and enough water to moisten but not to soak it. This process is repeated until the pile is 4 to 5 feet high. Make the top of the pile concave to catch rainwater.

Mix a cupful of agricultural lime and one of a complete commercial fertilizer, such as 5-10-5, or a forkful of manure with each bushel of compost to hasten decay and to make it a more valuable material. It is not necessary to add special bacteria or fertilizers.

The compost pile will not decay rapidly until the weather warms up in spring and summer. In midsummer, decay can be hastened by forking over the pile so moisture can get to parts that have remained dry. The compost should be ready for use by the end of the first summer.

For a continuing supply of compost, a new pile should be built every year. Compost can be used as a mulch, or worked into flower beds and the vegetable garden.

When properly prepared and thoroughly decayed, compost is not likely to harbor diseases or insects. If the compost is used in soil where an attempt is made to control plant diseases, or if it is mixed with soil used for raising seedlings, the soil should be disinfected with chemicals recommended by your local Extension agent or State agricultural college.

Mulches (Screen 4 of 4)

An organic mulch is especially desirable on light sandy soils and on cool-season crops. Organic mulches keep the soil several degrees cooler than bare soil or soil covered with black plastic mulch.

Mulches reduce heat radiation from the soil, increasing the chance of frost damage on a cool night. Organic mulches are best applied after the soil has become warm and as soon as the crop plants are large enough for them not to be buried by the material. It is usually put on just after the first cultivation.

Weed growth can be controlled by the use of mulches. Mulches also tend to conserve soil moisture, prevent erosion, do away with root damage caused by deep cultivation or hoeing, and keep the fruits of such crops as tomatoes, cucumbers, and melons clean. Straw, old hay or grass, leaves, sawdust, and wood shavings are the most common organic materials.

Sawdust can be used as a garden mulch when the vegetables are 2 to 3 inches high. Weeds should be removed before the sawdust is applied; any weeds that remain in the soil will grow through the sawdust, but they can be easily removed by hand.

Apply a one and a half-inch layer of sawdust over the entire garden. Approximately 1 cubic yard of sawdust will provide 1 inch of mulch over 324 square feet of area. About 4 cubic yards are needed for a garden 30 feet wide and 40 feet long. A garden 50x50 feet will require about 8 cubic yards.

Wood shavings, fine wood chips (do not use coarse wood chips), and peat moss can be used in the same manner and quantity as sawdust. Apply these materials when the young plants have become established and are several inches tall.

Old straw or hay that is free from weed seed is ideal. Straw mulch is applied like sawdust. A 3- to 6-inch layer of straw or hay is required, whereas a 1- or 2-inch layer of peat moss, grass clippings, composted leaves, or sawdust is enough.

If a large quantity of organic mulch is plowed under or worked into the soil, it may cause a temporary shortage of nitrogen so that the crops become yellow. This shortage can be prevented by adding approximately 1 pound of nitrate of soda or 1/2 pound of ammonium nitrate or 1/4 pound of ammonium sulfate to each bushel of sawdust.

Leaves make an excellent, economical mulch if gathered in the fall into flat-topped piles so that they become thoroughly soaked with rain and melted snow during winter and spring.

Farm Manure (Screen 1 of 13)

The primary function of manure, green manure, and compost is to supply organic matter. Farm manure can supply the bulk of the fertilizer elements (nitrogen, phosphoric acid, and potash) if it is supplemented with 1 or 1/2 pounds of superphosphate to each bushel of manure, which is enough for 50 to 75 square feet of garden area.

This rate equals approximately 1000 pounds of superphosphate and 20 tons of manure to the acre. Unless manure is well rotted, it should be applied before plowing or spading and then turned under. Poultry, sheep, and goat manure should be used at the rate of no more than 1 bushel to 100 square feet of garden.

Green Manure & Cover Crops

The organic matter in the soil can be increased, and erosion and leaching can be reduced by the use of an overwintering, green-manure crop, preferably rye or ryegrass.

Sow rye when a garden crop has been harvested and it is too late to grow another. Broadcast rye between the rows of late vegetables slightly before the first killing fall frost. Rye is seeded at the rate of 2 or 3 pounds to 1000 square feet. Stir the seed into the soil with a rake, hand cultivator, or harrow.

Rye should be plowed or spaded under early in the spring. Ryegrass is an excellent soil-improving crop and provides organic matter. In most areas of New York, ryegrass must be sown in early August to allow the grass to become established before winter.

Since it is slow in germinating and slow growing in the early stages, it can be planted in the garden without competing with the vegetables. In the fall when all vegetables are mature, the ryegrass under cool temperatures will make maximum growth. In the spring, the ryegrass is turned under. Ryegrass is seeded at the rate of 1/2 pound to 1000 square feet.

Farm-Yard Manure

Farm-yard manure consists of the mixed horse manure and cattle manure thrown together, and more or less soaked with liquid draining of the stable or byre.

It is no doubt the finest stimulant for the growth of plants, and that most adapted to restore the fertile elements which the plants have abstracted from exhausted soils.

This manure is best fitted for garden use when in a moderately fermented state.

Horse Manure (Screen 4 of 13)

Horse manure is generally the principal ingredient in all hot bed manure; and, in its partially decomposed state, as afforded by exhausted hot beds, it is well adapted for garden use.

It is most beneficial on cold stiff soils. It should not be allowed to lie too long unmoved when fresh, as it will then heat violently, and the ammonia is thus driven off.

To avoid this, it should be turned over two or three times if practicable, and well moistened preferably with farm-yard draining.

Cow Manure (Screen 5 of 13)

Cow manure is less fertilizing than horse manure, but being slower in its action it is more durable; it is also cooler, and therefore better for hot dry sandy soils.

Thoroughly decayed, it is one of the best of all manures for mixing in composts for florists' flowers and other choice plants.

Pig Manure (Screen 6 of 13)

Pig manure is very powerful.

Containing more nitrogen than horse, it should undergo moderate fermentation by mixing it with litter and a portion of earth.

When weeds are thrown to the pigs, this fermentation becomes specially desirable to kill their seeds.

Night-Soil (Screen 7 of 13)

Night-soil is an excellent manure for all bulky crops, but needs to be mixed with earth or peat, or coal-ashes, so as both to deodorize it and to ensure its being equally distributed.

Quicklime should not be used, as it dispels the greater part of the ammonia.

When prepared by drying and mixing with various substances, night-soil is sold as desiccated night-soil or native guano, the value of which depends upon the materials used for admixture.

Malt-Dust (Screen 8 of 13)

Malt-dust is an active manure frequently used as a top-dressing, especially for fruit trees in pots.

It is rapid in its action, but its effects are not very permanent.

Rape dust is somewhat similar in its character and action.

Bones (Screen 9 of 13)

Bones are employed as a manure with decided advantage both to vegetable crops and to fruit trees, as well as to flowers.

For turnips bone manure is invaluable.

The effects of bones are no doubt mainly due to the phosphates they contain, and they are most effectual on dry soils.

They are most quickly available when dissolved in sulfuric acid.

Guano (Screen 10 of 13)

Guano is a valuable manure and may be applied to almost every kind of crop with decided advantage.

It should be mixed with six or eight times its weight of loam or ashes, charred peat, charcoal dust or some earthy matter, before it is applied to the soil, as from its causticity it is otherwise not unlikely to kill or injure the plants to which it is administered.

Peruvian guano is obtained from the excreta of South American sea-birds, and fish guano from the waste of fish. Both are remarkable for the quantity of nitrates and phosphates they contain.

Pigeon Manure (Screen 11 of 13)

Pigeon manure approaches guano in its power as manure.

It should be laid up in ridges of good loamy soil in alternate layers to form a compost which becomes a valuable stimulant for any very choice subjects if cautiously used.

The manure of the domestic fowl is very similar in character.

Other Manures (Screen 12 of 13)

Horn, hoof-pairings, woolen rags, fish, blubber and blood, after treatment with sulfuric acid, are all good manures, and should be utilized if readily obtainable.

Liquid Manure (Screen 13 of 13)

Liquid manure, consisting of the draining of manure-heaps, stables, cowsheds, etc., or of urine collected from dwelling houses or other sources, is a most valuable and powerful stimulant, and can be readily applied to the roots of growing plants.

The urine should be allowed to putrefy, as in its decomposition a large amount of ammonia is formed, which should then be fixed by sulfuric acid or gypsum; or it may be applied to the growing crops after being freely diluted with water or absorbed in a compost heap.

Liquid manure can be readily made from most of the solid manures when required, simply by admixture with water. When thus artificially compounded, unless for immediate use, they should be made strong for convenience of storage, and applied as required much diluted.

Commercial Fertilizers

Commercial fertilizers may be used to advantage in most farm gardens, the composition and rate of application depending on locality, soil, and crops to be grown. On some soils with natural high fertility only nitrogen or compost may be needed.

The use of fertilizers that also contain small amounts of copper, zinc, manganese, and other minor soil elements is necessary only in districts known to be deficient in those elements.

State experiment station recommendations should be followed. Leafy crops, such as spinach, cabbage, kale, and lettuce, which often require more nitrogen than other garden crops, may be stimulated by side dressings.

As a rule, the tuber and root crops, including potatoes, sweet potatoes, beets, carrots, turnips, and parsnips, need a higher percentage of potash than other vegetables.

The quantity of fertilizer to use depends on the natural fertility of the soil, the amounts of organic matter and fertilizer used in recent years, and the crops being grown.

Tomatoes and beans, for example, normally require only moderate amounts of fertilizer, especially nitrogen; whereas onions, celery, lettuce, the root crops, and potatoes respond profitably to relatively large applications.

In some cases, 300 pounds of commercial fertilizer may be sufficient on a half-acre garden; in other cases, as much as 1,000 to 1,200 pounds can be used to advantage.

Commercial fertilizers, as a rule, should be applied either a few days before planting or when the crops are planted. A good practice is to plow the land, spread the fertilizer from a pail or with a fertilizer distributor, then harrow the soil two or three times to get it in proper condition and at the same time mix the fertilizer with it.

If the soil is left extremely rough by the plow, it -should be harrowed once, lightly, before fertilizing. For row crops, like potatoes and sweet potatoes, the

fertilizer may be scattered in the rows, taking care to mix it thoroughly with the soil before the seed is dropped or, in the case of sweet potatoes, before the ridges are thrown up.

Application of Fertilizer (Screen 2 of 14)

Application of the fertilizer in furrows along each side of the row at planting time does away with the danger of injury to seeds and plants that is likely to follow direct application of the material under the row. The fertilizer should be placed so that it will lie 2 to 3 inches to one side of the seed and at about the same level as, or a little lower than, the seed.

The roots of most garden crops spread to considerable distances, reaching throughout the surface soil. Fertilizer applied to the entire area, therefore, will be reached by the plants, but not always to best advantage. Placing fertilizer too near seedlings or young plants is likely to cause burning of the roots. The fertilizer should be sown alongside the rows and cultivated into the topsoil, taking care to keep it off the leaves so far as practicable.

Heavy yields of top-quality vegetables cannot be obtained without an abundance of available plant food in the soil. However, failure to bear fruit and even injury to the plants may result from the use of too much plant nutrient, particularly chemical fertilizers, or from an unbalanced nutrient condition in the soil.

Because of the small quantities of fertilizer required for short rows and small plots it is easy to apply too much fertilizer. The chemical fertilizers to be applied should always be weighed or measured.

If it is more convenient to measure the material than to weigh it, pounds of common garden fertilizer, ammonium phosphate, or muriate of potash, may be converted roughly to pints or cups by allowing 1 pint, or 2 kitchen measuring cups, to a pound. For example, say we use 0.25 pound for a 100-pound-per-acre application to 100 square feet. This would call for about 1/4 pint, or 1/2 cup, of fertilizer.

Ground limestone weighs about 1 1/3 times as much as the same volume of water; therefore, measured quantities of this material should be about one-fourth less than those calculated as equivalent to the weights in the table. For example, 3/4 pint of ground limestone weighs about 1 pound.

Ammonium sulfate and granular ammonium nitrate are much lighter, weighing about seven-tenths as much as the same volumes of water; therefore, volumes of these substances calculated by the foregoing method should be increased by about one-third.

Acidity/Alkalinity (pH) (Screen 3 of 14)

Most plants develop well in soils that are slightly acid to neutral (6.0 to 7.0) provided the proper nutrients are in the soil. These nutrients are available to plants in this range of pH. Generally, soils in moist climates are acid and those in dry climates are alkaline. A soil with a pH lower than 7.0 is an acid soil and one with a pH higher is alkaline.

A soil analysis will reveal the pH of the soil so that a decision can be made on whether to alter the pH or not. The county Extension agent can supply information on soil tests that can be performed for each locality. (Samples of soil should not be sent to the U.S. Department of Agriculture.)

Acid Soils (article continues...)

Acid soils can be limed to bring the pH to the favorable range. Lime, ground limestone, marl, or ground oyster-shells on garden soils serves a threefold purpose:

1. To supply calcium and other plant nutrients;

2. to reduce soil acidity;

3. to improve the physical character of certain heavy soils.

As a rule, asparagus, celery, beets, spinach, and carrots are benefited by moderate applications of lime, especially on soils that are naturally deficient in calcium. Dolomitic limestone should be used on soils deficient in magnesium. Most garden vegetables do best on soils that are slightly acid and may be injured by the application of lime in excess of their requirements.

For this reason lime should be applied only when tests show it to be necessary. In no case should the material be applied in large quantities than the test indicates. Most garden soils that are in a high state of fertility do not require the addition of lime

Alkaline Soils

Alkaline soils may be treated with an acid producing material. Organic matter, sulfur, and some sulfur containing materials can be used. When using organic matter in the form of manure, care must be taken that the manure itself is not alkaline. Some manures are alkaline and contain high amounts of soluble salts which are detrimental to plants, especially when applied in alkaline soils.

With good drainage, plenty of organic matter in the soil, and the moderate use of commercial fertilizers, the growth requirements of nearly all vegetables may be fully met.

Lime and pH (Screen 4 of 14)

A pH test may be necessary if the garden is in a new location. The symbol pH and figures accompanying it indicate the soil reaction. A soil with a pH of 7.0 is neutral; one with a pH of 7.1 or above is alkaline or sweet. Most vegetables grow best on a slightly acid soil where the pH is between 6.0 and 6.8.

click here to see picture...

Lime should be used on the garden only when a test has been made and the soil is too acid. If the pH is between 5.5 and 6.0, use 3 pounds of ground limestone to each 100 square feet of garden on sandy soils or 5 pounds on heavy soils.

The application can be made before or after plowing or spading. If the pH is between 5.0 and 5.5, apply the amounts given above before plowing; and make another application of the same amount after plowing but before raking or harrowing. If the pH is 4.9 or below, double the recommendation for the 5.0 to 5.5 range.

Many soil test kits for the amateur gardener are advertised in magazines. These kits are expensive and are not essential for a good garden. The nutritional requirements of a garden will be satisfied if the recommended amount of commercial fertilizer is applied each year.

Ammonia (Screen 5 of 14)

Ammonia is the most powerful and one of the most important of the constituents of manures generally, since it is the chief source whence plants derive their nitrogen.

It is largely supplied in all the most fertilizing of organic manures, but when required in the inorganic state must be obtained from some of the salts of ammonia, as the sulfate, the muriate or the phosphate, all of which, being extremely energetic, require to be used with great caution.

These salts of ammonia may be used at the rate of from 2 to 3 cwt. per acre as a top-dressing in moist weather. When dissolved in water they form active liquid manures. The most commonly used nitrogenous manures are nitrate of soda, nitrate of potash and sulfate of ammonia, the prices of which are constantly fluctuating.

Ashes (Screen 6 of 14)

Ashes from hard or anthracite coal are a partial substitute for organic matter, but have little value as fertilizer. They are used primarily to lighten heavy soils.

Applied to a depth of 2 inches or more and thoroughly worked in, they make a marked immediate improvement in the soil.

Wood ashes have the same effect on soil acidity as does lime and should not be applied to the home garden in large quantities unless the soil is definitely known to be acid. To correct an acid soil, use wood ashes at approximately double the rates suggested for lime.

Burnt Clay (Screen 7 of 14)

Burnt clay has a very beneficial effect on clay land by improving its texture and rendering soluble the alkaline substances it contains.

The clay should be only slightly burnt, so as to make it crumble down readily; in fact, the fire should not be allowed to break through, but should be constantly repressed by the addition of material.

The burning should be effected when the soil is dry.

Gas Lime (Screen 8 of 14)

Gas lime, after it has been exposed to the air for a few months is an excellent manure on heavy soils.

In a fresh state it is poisonous and fatal to vegetation, and is often used for this reason to dress land infested with wireworms, grubs, club-root fungus, etc.

Gypsum (Screen 9 of 14)

Gypsum, or sulfate of lime, applied as a top-dressing at the rate of 2 to 3 cwt. per acre, has been found to yield good results, especially on light soils.

It is also employed in the case of liquid manures to fix the ammonia.

Lime (Screen 10 of 14)

Lime in the caustic state is beneficially applied to soils which contain an excess of inert vegetable matter, and hence may be used for the improvement of old garden soils saturated with humus, or of peaty soils not thoroughly reclaimed.

It does not supply the place of organic manures, but only renders that which is present available for the nourishment of the plants.

It also improves the texture of clay soils.

Phosphoric Acid (Screen 11 of 14)

Phosphoric acid, in the form of phosphates, is a most valuable plant food, and is absorbed by most plants in fairly large quantities from the soil.

It induces the earlier production of flowers and fruits.

In a natural state it is obtained from bones, guano, and wood ashes; and in an artificial condition from basic slag or Thomas's phosphate, coprolites and superphosphate of lime.

Potash and Soda (Screen 12 of 14)

Potash and soda are also valuable inorganic manures in the form of carbonates, sulfates, silicates and phosphates, but the most valuable is the nitrate of potash.

The price, however, is generally so high that its use is practically nil, except in small doses as a liquid manure for choice pot plants. Cheaper substitutes, however, are now found in sulfite of potash, and muriate of potash and kainit.

The two last-named must not be applied direct to growing crops, but to the soil some weeks in advance of sowing or cropping. The manures of this class are of course of value only in cases where the soil is naturally deficient in them.

On this account the salts of soda are of less importance than those of potash. The value of wood ashes as a manure very much depends upon the carbonate and other salt of potash which they contain.

Salt (Screen 13 of 14)

Common salt acts as a manure when used in moderate quantities, but in strong doses is injurious to vegetation. It suits many of the esculeat crops, as onions, beans, cabbages, carrots, beet-root, asparagus, etc.; the quantity applied varies from 5 to 10 bushels per acre. It is used as a top-dressing sown by the hand.

Hyacinths and other bulbs derive benefit from slight doses, while to asparagus as much as 20 lb. to the rood has been used with beneficial effect. At the rate of from 6 to 10 bushels to the acre it may be used on garden lawns to prevent worm casts.

For the destruction of weeds on gravel walks or in paved yards a strong dose of salt, applied either dry or in a very strong solution, is found very effective, especially a hot solution, but after a time much of it becomes washed down, and the residue acts as a manure; its continued application is undesirable, as gravel so treated becomes pasty.

Soot (Screen 14 of 14)

Soot forms a good top-dressing; it consists principally of charcoal, but contains ammonia and a smaller proportion of phosphates and potash, whence its value as a manure is derived.

It should be kept dry until required for use.

It may also be used beneficially in preventing the attacks of insects, such as the onion gnat and turnip fly, by dusting the plants or dressing the ground with it.

Vegetable Refuse

Vegetable refuse of all kinds, when smother burned in a similar way, becomes a valuable mechanical improver of the soil; but the preferable course is to decompose it in a heap with quicklime and layers of earth, converting it into leaf-mold.

Potato haulms and club-rooted cabbage crops should, however, never be mixed with ordinary clean vegetable refuse, as they would be most likely to perpetuate the terrible diseases to which they are subject.

The refuse of such plants should be burned as early as possible. The ash may be used as manure.

Black Plastics (Screen 1 of 1)

Click here for step-by-step instruction on laying black plastic mulch...

Black or very dark plastics, usually made of polyethylene, have proved effective in hastening maturity as well as in controlling weeds. They frequently increase the yield of the warm season crops such as melons, peppers, eggplants, and tomatoes and may increase the yield of all early planted crops.

During the day, the dark plastic absorbs more of the sun's heat than do organic mulches and, at night, radiates the heat back faster. Thus, plants mulched with plastics are somewhat less liable to frost injury than those mulched with organic mulches.

It is important that the soil be well supplied with water from either a good soaking rain or irrigation a few days before the plastic is laid. It is almost impossible to lay plastic on a windy day. Plastic mulch can be laid immediately after planting, but for most transplanted crops it is much easier to apply it first and plant through it.

First make small furrows with a hoe or the plow of a hand cultivator about 3 to 4 inches deep with the distance between the furrows slightly less than the width of the plastic. The soil from the furrows should be thrown to the outside so that it will be available for covering the outer edge of the plastic. Do not stretch the plastic tightly, especially in hot weather, since it will shrink upon cooling.

It is advisable to anchor the loose end of the plastic with soil before unrolling the remainder of the material. If you are covering a long row, cover the outer edge of the plastic in the furrow with soil as you move along the row.

When the plastic has been laid and securely anchored on all sides, holes for the transplants can be punched through the plastic with a hand trowel or bulb planter. After setting the transplants, mound soil around the holes made for the plants to prevent the wind from whipping the plastic loose.

For small-seeded crops that are seeded directly in the row, it is best to plant the seed and then lay the plastic. The plastic can be laid between the rows or directly over the rows. If the plastic is applied directly over a seeded row, anchor it on all sides and then cut the plastic down the middle.

Make small furrows approximately 2 inches deep as close to the seeded row as possible without disturbing the seeds. Anchor the plastic in the furrows. Large-seeded crops such as corn, beans, and peas can be planted directly through the plastic.

Because of rapid changes in chemical regulations and recommendations, controls in this publication may be outdated.

Step-By-Step: Black Plastic Mulch

Step 1: Mark a row and open a furrow 3-4 inches deep.

click here to see picture...

Step 2: Continue to dig furrows to make a track slightly narrower than the width of the plastic.

click here to see picture...

Step 3: Anchor the plastic at one end of the row with soil.

click here to see picture...

Step 4: Gradually unroll plastic and anchor edges in the furrows.

click here to see picture...
click here to see picture...

Step 5: At the end of the row, cut plastic off and anchor the loose end.

click here to see picture...

Step 6: Area covered with plastic is now ready for transplanting or direct seeding.

click here to see picture...

Flower Gardens (Screen 1 of 2)

click here to see picture...
click here to zoom to the garden show "Flowers In Bloom"...

Wherever there is a flower garden of considerable magnitude, and in a separate situation, it should be constructed on principles of its own. The great object must be to exhibit to advantage the graceful forms and glorious hues of flowering plants and shrubs. Two varieties of flower gardens have chiefly prevailed.

click here to see picture...

In one the ground is turf, out of which flower-beds, of varied patterns, are cut; in the other the flower-beds are separated by gravel walks, without the introduction of grass.

When the flower garden is to be seen from the windows, or any other elevated point of view, the former is to be preferred; but where the surface is irregular, and the situation more remote, and especially where the beauty of flowers is mainly looked to, the choice should probably fall on the latter.

Flower Compartments (Screen 2 of 2)

The flower garden may include several different compartments. Thus, for example, there is the "Rock Garden," which should consist of variously grouped masses of large stones, those which are remarkable for being figured by water-wearing, or containing petrifactions or impressions, or showing something of natural stratification, being generally preferred.

click here to see picture...

In the cavities between the stones, filled with earth, alpine or trailing plants are inserted, and also some of the choicest flowers. In proper situations, a small pool of water may be introduced for the culture of aquatic plants. It requires a good deal of care and skill to arrange the boulders, walks, pools, or streams in natural and artistic fashion.

The selection of suitable alpines, perennials and shrubs and trees also necessitates considerable knowledge on the part of the gardener. A separate compartment laid out on some regular plan is often set apart for roses, under the name of the "Rosary."

click here to see picture...

The number of variegated and various-colored hardy shrubs is now so great that a most pleasant plot for a "Winter Garden" may be arrayed with plants of this class, with which may be associated hardy subjects which flower during that season or very early spring, as the Christmas rose, and amongst bulbs the crocus and snowdrop.

click here to see picture...

Later the spring garden department is a scene of great attraction; and some of the gardens of this character, as those of Cliveden and Belvoir, are among the most fascinating examples of horticultural art.

The old-fashioned stereotyped flower garden that one met with almost

everywhere is rapidly becoming a thing of the past, and grounds are now laid out more in accordance with their natural' disposition, their climatic conditions and their suitability for certain kinds of plants.

Besides the features already mentioned there are bamboo gardens, Japanese gardens, water gardens and wall gardens, each placed in the most suitable position and displaying its own special features.

Annual Flowers (Screen 1 of 26)

click here to see movie...

Some of the most popular garden flowers are the annuals-plants that live for only one year. Many varieties of annuals are colorful and easy to grow. They can be planted in many different areas around your home: along driveways, walks, terraces, and fences, or in front of permanent foundation plantings.

They add color to your garden if planted among perennial flowers and spring-flowering bulbs, in rock gardens, alongside shrubs, or even in herb gardens.

Started plants grow well in window boxes, hanging baskets, urns, containers, and movable tubs. If you have no outdoor gardening space, you can grow flowers on window sills and in window boxes using a "pillow pak." Annual flowers can be used indoors in fresh and dried arrangements, in corsages, or in potpourri.

Hardy Annuals (Screen 2 of 26)

click here to see picture...

Annual plants are those which grow up from seed, flower, ripen seed, and die in the course of one season one year. They are useful in the mixed garden, for though in some cases they are of short duration, many of them are possessed of much beauty of hue and elegance of form.

Annuals may be divided into three classes: the hardy, which are sown at once in the ground they are to occupy; the half-hardy, which succeed best when aided at first by a slight hot bed, and then transplanted into the open air; and the tender, which are kept in pots, and treated as greenhouse or stove plants, to which departments they properly belong.

Some of the more popular annuals, hardy and half-hardy, have been very much varied as regards habit and the color of the flowers, and purchases may be made in the seed shops of such things as China asters, stocks, Chinese and Indian pinks, larkspurs, phloxes, and others, amongst which some of the most beautiful of the summer flowers may be found.

The hardy annuals may be sown in the open ground during the latter part of March or beginning of April, as the season may determine, for the weather should be dry and open, and the soil in a free-working condition before sowing is attempted.

In favorable situations and seasons some of the very hardiest, as *Silene pendula,* Saponaria, Nemophila, Gilia, etc., may be sown in September or October, and transplanted to the beds or borders for very early spring flowering.

Those sown in spring begin to flower about June, The plants, if left to flower where they are sown, should be thinned out while young, to give them space for proper development. It is from having ample room that pricked out transplanted seedlings often make the finest plants. The soil should be rich and light.

Half-Hardy Plants

The half-hardy series are best sown in pots or pans under glass in mild heat, in order to accelerate germination.

Those of them which are in danger of becoming leggy should be speedily removed to a cooler frame and placed near the glass, the young plants being pricked off into fresh soil, in other pots or pans or boxes, as may seem best in each case.

All the plants must be hardened off gradually during the month of April, and may generally be planted out some time in May, earlier or later according to the season.

Tender Annuals (Screen 4 of 26)

The class of tender annuals, being chiefly grown for greenhouse decoration, should be treated much the same as soft-wooded plants, being sown in spring, and grown on rapidly in brisk heat, near the glass, and finally hardened off to stand in the greenhouse when in flower.

Ageratum (Screen 5 of 26)

click here to see picture...

Ageratums are grown primarily for their fuzzy clusters of blue, pink, or white flowers above mounds of sturdy green leaves.

Plants will tolerate either full sun or light shade, and they therefore represent a valuable addition to the shade garden.

China Aster (Screen 6 of 26)

click here to see picture...

China asters (callistephus) should not be confused with the fall asters, which are perennials. The flowers actually more closely resemble chrysanthemums, and they come in shades from white to yellow, pink, red, purple, and blue.

Although China asters can provide an impressive flowering show, they are not without problems. They need mulching to cover their shallow roots, and they are susceptible to both a fungus and a virus-like disease. Nonetheless, their beauty ensures their continuing popularity.

Cockscomb (Screen 7 of 26)

click here to see picture...

Celosia flower heads are among the most unusual of any annuals.

The 'Cristata' types have tops that resemble a rooster's comb or a brain!

The 'Plumosa' type's flower heads look more like an ostrich's plumes.
Both types are available in reds, orange, yellow, and purple.

The flower heads are very long-lived and can be dried as everlastings.

These plants bloom best in the hot sun.

Coleus (Screen 8 of 26)

click here to see picture...

Although still used most frequently as house plants, coleus also provide fascinating foliage contrast in a shady annual bed.

The wild, multi-hued leaves are available in heights ranging from 6 inches to 2 feet. Plants are very easily grown outdoors, as long as adequate water is provided. If plants become leggy, they can be pinched back, and the pinched stem can be rooted as a new plant.

click here to see picture...

Cornflower (Screen 9 of 26)

click here to see picture...

The old-fashioned cornflower, also known as the Bachelor's Button, will never win an award as the most stunning of all annuals.

But it is an easily grown, reliable bloomer that makes a good choice for first-time gardeners.

The flowers, which are available in shades of blue, pink, rose, and white, are most profuse when plants are grown in full sun.

Cosmos (Screen 10 of 26)

click here to see picture...

The yellow cosmos has blooms that closely resemble those of tickseed.

The more common pink- or red-flowered form grows twice as tall, often reaching heights of 5 to 6 feet.

Both forms are easily grown in full sun, although the taller plants may need staking.

Gazania (Screen 11 of 26)

click here to see picture...

Gazanias, which actually are perennials, are gaining increasing popularity as annuals because of their impressive 4-inch wide blooms.

A packet of seeds or flat of seedlings will typically have plants with flower colors ranging from yellow to gold, pink, red, and bronze.

Gazanias like it hot, so provide a full sun location and a very well-drained soil.

Geranium (Screen 12 of 26)

click here to see picture...

Everyone knows geraniums *(pelargonium)*, those tough, durable plants. In addition to upright zonal geraniums, there are also ivy geraniums, fancy-leaved 'Martha Washington' types, scented geraniums, and uprights grown from seed.

click here to see picture...

The zonal geraniums, which are the most common, grow best in full sun, with infrequent watering. Geraniums can be kept over winter by rooting cuttings or keeping plants on sunny windowsills.

Impatiens (Screen 13 of 26)

click here to see picture...

Impatiens are the most popular bedding plant in America. Children find plants easy and reliable to grow, and modern varieties display a tremendous range of colors and are more compact.

click here to see picture...

Although traditional types thrive in light shade, the 'New Guinea' impatiens, with their brightly colored leaves, do equally well in full sun. All Impatiens require frequent watering to prevent wilting, and they are sensitive to frost.

Marigold (Screen 14 of 26)

click here to see picture...

The wild Mexican marigold *(tagetes)* has been intensively bred to yield a wide selection of flower types and sizes and overall plant size.

click here to see picture...

There are marigold varieties for any garden setting, from dwarf types to 2-foot tall African hybrids.

click here to see picture...

Grow marigolds 'In a sunny site, with a well-drained fertile soil. They bloom very reliably.

Petunia (Screen 15 of 26)

click here to see picture...

Petunias of one variety or another will almost always show up in young people's gardens.

Hybrid varieties flower profusely throughout the season, are available in many colors, and hold up well in the rain.

click here to see picture...

The best-looking plants are grown in full or half-day sun, in a well-drained, loamy soil.

Pot Marigold (Screen 16 of 26)

click here to see picture...

Pot marigolds *(calendula)* self-sow freely, often sending seedlings up in the same area year after year.

They are a very easily grown plant, especially in sunny sites with fertile soil.

The yellow, orange, or salmon-colored flowers blend well with true marigolds or can be used as an alternative to them.

Snapdragon (Screen 17 of 26)

click here to see picture...

Snapdragons *(antirrhinum)* are a wonderful choice for young people. Their bright, cheery flowers, available in a wide color range, can be squeezed to make their "dragon mouths" slowly open, then snap closed.

Depending on the variety chosen, height will vary from 6 inches to as tall as 3 or 4 feet, allowing great flexibility in where they are placed in the annual border.

Grow snapdragons in a well-drained soil in full sun.

Spider Flower (Screen 18 of 26)

click here to see picture...

Cleomes are fun for kids because plants grow so rapidly, often achieving the height of an average nine-year-old by midsummer.

In fact, the long, curved reproductive parts of the flower heads do resemble the legs of a large spider.

Cleomes grow best in full sun or light shade, in the back of a flower border.

Like pot marigolds, they frequently self-sow seedlings the next season

Strawflower (Screen 19 of 26)

click here to see picture...

There are a number of wonderful qualities that strawflowers possess: they are available in many flower colors, they are free flowering, and they retain their color and shape nearly perfectly as dried blooms.

To dry, cut the flowers just before they fully open, strip off the foliage, and hang the flowers upside down in a dark, cool place.

Sunflower (Screen 20 of 26)

click here to see picture...

Rising from a modest history as a common farm weed, modern varieties of sunflower possess spectacular single or double flowers of white, yellow, bronze, and even lavender.

click here to see picture...

True to their name, sunflowers require a bright, sunny location for best flowering, although they are not fussy regarding soil type. Plant height is from 2 to 4 feet, depending on variety chosen.

Sweet Alyssum (Screen 21 of 26)

click here to see picture...

Sweet alyssum *(lobularia)* is the perfect annual edging plant, to be used along the front of flower beds.

The tiny white, pink, or purple flowers form neat heads that merge into solid masses of color.

Sweet alyssums tolerate almost any soil and will grow in sun or light shade.

Sweet Pea (Screen 22 of 26)

click here to see picture...

Sweet peas *(lathyrus)* are one of the easiest and most free flowering of any annual vine.

Wild sweet peas have light pink flowers, but the blooms on newer hybrids range from red to purple and blue.

Grow sweet peas where their roots can be protected from heat and sun. Provide ample amounts of water to encourage rapid growth.

Wax Begonia (Screen 23 of 26)

click here to see picture...

Although a true perennial, wax begonias are grown as annuals in the North because of their free-flowering habit the year they are started. Wax begonias are available in a wide selection of flower colors (red, pink, or white), flower sizes (from single blooms to golf-ball-sized doubles), and leaf colors (glossy green or bronzy red).

click here to see picture...

Plants do well in light shade and a rich, moisture-retaining soil. They are very sensitive to frost.

Zinnia (Screen 24 of 26)

click here to see picture...

Zinnia's daisy-like flowers are available in single or double forms in virtually all colors but blue. These plants grow best in a hot, dry location.

High humidity and plantings with poor air circulation can lead to a disfiguring leaf spot fungus.

click here to see picture...

Otherwise, zinnias are easy to care for, and they make long-lasting cut flowers.

Outdoor Annuals

The following annuals can be seeded outdoors as soon as the soil is workable:

Annual phlox (*Phlox drummondii*)

Baby's breath (*Gypsophila elegans*)

Bachelor's buttons (*Centaurea cyanus*)

Chinese forget-me-not (*Cynoglossum amabile*)

Iceland poppy (*Papaver nudicale*)

Larkspur (*Consolida ambigua*)

Love-in-a-mist (*Nigella damascena*)

Pot marigold (*Calendula officinalis*)

Sweet alyssum (*Lobularia maritima*)

Sweet pea (*Lathyrus odorata*)

Later Outdoor Annuals

The annuals listed below can also be started outdoors, but should not have their seed sown until all danger of frost has passed:

Calliopsis (*Coreopsis tinctoria*)

Candytuft (*Iberis spp.*)

China pink (*Dianthus chinensis*)

Cosmos (*Cosmos bipinnatus*)

Dwarf morning glory (*Convolvulus tricolor*)

Flowering tobacco (*Nicotiana alba*)

Four o'clocks (*Mirabilis jalapa*)

French marigold (*Tagetes patua*)

Madagascar periwinkle (*Catharanthus roseus*)

Morning glory (*Ipomoea spp.*)

Nasturtium (*Tropaeolum majus*)

Pincushion flower (*Scabiosa atropurpurea*)

Rose moss (*Portulaca grandiflora*)

Sunflower (*Helianthus spp.*)

Sweet William (*Dianthus barbatus*)

Starting Annuals from Seed

Starting annual flowers from seed indoors is a good project for late winter or early spring.

Materials

- a commercial "peat-lite" or soilless growing mix.

Or you may make one yourself, consisting of the following:

- vermiculite no. 2 size (4 quarts)
- shredded sphagnum peat moss (4 quarts)
- limestone (1 tablespoon)
- auperphosphate (1 tablespoon)
- 5-10-5 fertilizer (1 tablespoon)
- small starting trays of plastic, Styrofoam, or compressed peat
- seeds of annual flowers
- clear plastic bags
- cell paks for transplanting

Procedure

Perhaps you have had bad luck with the soil directly from your gardens. Garden soils are not the best media for sowing seeds indoors because they drain poorly, lack necessary organic matter, and are often infested with diseases or weeds.

A simple formula can be used to produce a superior medium for growing plants. This "peat-lite" or soilless mix drains well, is high in organic matter, and is relatively sterile (free of diseases and weed seeds).

If you will be mixing their own peat-lite, lightly moisten the peat moss with warm water before mixing to reduce dustiness. You should then mix the materials thoroughly on a clean surface. You may use the resultant mix immediately or keep it moist in a plastic bag until you are ready to use it.

Plants may be started in containers made of plastic, Styrofoam, or pressed fiber. The container must have holes in the bottom for drainage. When you are ready to sow seeds, fill the flat or container with the medium and firm

it well at the edges and corners.

Next, you should make rows by pressing the edge of a plastic or wooden plant label to a depth of 1/4 inch. You should not cover very fine seeds such as petunia, snapdragon, and begonia. Most other seeds should be covered with about 1/4 inch of mix or vermiculite. You should then soak the medium by setting each container in a pan filled with two inches of water and leave them for one hour.

Next, slip each container into a plastic bag and put it in a warm (70'-75' F.) place with good light, but not direct sunlight. Remove the bag in stages after the seedlings emerge. At this time, also move the plants into sunlight and keep the medium moist.

All growing plants need elbow room to be healthy and develop large numbers of flowers. When your seedlings have developed two true leaves (after the development of seed leaves), they must be thinned to the spacing recommended on the seed packet in order to receive enough light, water, and nutrients. You may try to transplant extra seedlings by carefully lifting each one out with a knife or narrow trowel. Otherwise, you can pinch out the unwanted seedlings.

Although your prepared or homemade peat-lite mix contains some fertilizer, it is necessary to provide supplemental nutrition for seedlings that remain in the mix for more than four weeks. Use a soluble fertilizer weekly at one-half the recommended strength.

The Annual Garden (Screen 1 of 1)

This article covers the basic gardening principles of proper planning, soil preparation, planting, weed control, watering, mulching, and cultivating of annual beds. Care of annual flower beds is a process that continues throughout the growing season. Success with annuals is based on selecting proper site conditions for each type of plant.

Materials

- paper (preferably graph paper), pencil, ruler
- seed catalogs describing annuals
- tools: spade or spading fork, iron rake, trowel, hoe, heavy cord, watering can
- agricultural limestone, peat moss or compost, granular or soluble fertilizer
- seedlings of annuals, pre-grown or purchased ready for planting

Planning the Garden

To choose plants for your garden, study the colored pictures and descriptions in flower seed catalogs and speak to other gardeners about the difficulty of growing particular species. California poppies, for example, are beautiful flowers, but they do not bloom reliably when grown in the Northeast.

Measure the area where the garden will be and make a plan on paper using a scale. Graph paper is easiest, especially for beginners. A suggested scale is 112 inch on paper for each foot of garden. A smaller scale may be necessary for larger gardens. You should mark the measurements in feet on the garden plan.

You should indicate on your plan where each variety will be planted. Give primary consideration to the following factors:

Mature height -- the garden plants should be divided between low-growing foreground types, tall upright background types, and middle-height plants for the middle of the border.

Flower color -- varieties set next to each other should have complementary or contrasting flower colors, but should not clash (for example, pinkish-purple next to orange).

Consideration must also be given to the available light in a location. Annuals such as marigolds, zinnias, and petunias do best in full sun, while begonias, salvia, and ageratum thrive in light to moderate shade.

If there are buildings, walls, fences, or trees near the garden, these should also appear on the plan. You should include an arrow indicating where north is located in relation to the garden.

Preparing the Soil

In the fall before planting, work on improving the areas you plan to use. You will need to remove all trash, large stones, roots, and other troublesome materials. In the spring, you can then begin to prepare the soil thoroughly. It is better to grow a small bed of flowers in well-prepared soil than to try to grow many flowers in a poorly prepared site.

You can tell when the garden is ready for planting in the spring by squeezing a handful of soil. If it crumbles when squeezed, the soil is ready for spading. If it forms a mud ball, you should wait a few days and test again.

Annual flowers grow best at a soil pH range of 6.0-7.0 (pH is a measure of how acid or alkaline a particular soil is). To prepare a soil for pH testing, dig several small samples to a depth of 4 or 5 inches, mix these together, and submit about half a pint of the mixture to your local Cooperative Extension office or garden center. If the soil test indicates that lime is needed, your group should apply half the quantity before spading and half afterward.

Adding organic matter (peat moss, compost, well-rotted manure, or peat humus) to soil makes it more workable and allows it to drain more easily. Spread the organic material over the soil, then spade the garden, turning under lime and humus. Alternatively, you could mix these materials into the soil by roto-tilling to a depth of 8 inches. You should also break up soil lumps with a hoe and smooth the surface with an iron rake, taking out all stones and very hard lumps of soil.

You should next spread 1 1/2 to 2 pounds of granular fertilizer such as 5-10-5 per 100 square feet of garden and work it into the soil with the rake. A pint 'at holds about 1 pound of 5-10-5. Alternatively, you could drench the soil with a solution of a soluble garden fertilizer or use an organic or other slow-release fertilizer at rates recommended on the package. Make sure you always wear gloves when working with fertilizer.

The garden is now ready for planting.

Planting the Garden

If you have not grown your own plants, now is the time to buy some from a greenhouse, garden store, or nursery. You should use your plan to decide how many plants will be needed. Plants are normally set 8-12 inches apart, depending upon their size when fully grown.

Wait until danger from frost is over to plant the garden. Late frosts may kill tender annuals if they are planted too early.

Keep as much soil around the seedlings as possible. You should dig holes for the plants with a trowel, loosening the sides of each hole with the trowel.

A cloudy day or late afternoon is a good time for transplanting. Some shade (provided by inverted flower pots, for example) may be necessary for a few days. Shade keeps plants from wilting after transplanting. Give the seedlings a little water each day until they are established.

Mulching

You should add a light mulch of about 3 inches to the garden. Mulches are any material used to cover the soil between rows or among plants. organic mulches keep the soil surface from crusting, prevent many weeds from growing, reduce moisture evaporation from the soil, and add valuable organic matter to the soil.

Wood chips, bark mulch, shredded leaves, and straw are all good mulches for annuals. Black plastic and landscape fabrics can also be used as mulches. Both will greatly reduce weed growth and soil moisture losses, while the landscape fabrics will also allow water and oxygen to

pass through to the soil.

Because many gardeners do not like the appearance of sheet plastic or landscape fabric mulches, they often will cover them with a top mulch, such as wood chips. This also extends the life of the synthetic mulches, since they are not exposed to ultraviolet rays from the sun.

Watering

During dry periods, water the garden once or twice a week to a depth of 1-2 inches, using soaker hoses, drip or trickle irrigation systems, or overhead sprinklers. Whichever system you choose, remember that it is far better to water infrequently and deeply than frequently and lightly.

Cultivating the Garden

After you have thinned and transplanted the plants, you will need to work the soil only enough to keep the soil crust broken up. Shallow cultivation using a push type hand cultivator or a sharp hoe is all that is necessary to maintain a loose soil and to keep down weeds. Mulched soils should not need any cultivation.

Investigations

Certain annuals make especially good cut flowers. Among these are marigolds, zinnias, China asters, and sunflowers. You can influence the size of individual blooms by pinching out all buds on a stem except the terminal bud.

Annuals are not only attractive to humans; they are also attractive to several insect pests. You could keep a gardener's log of which insect pests attack the annuals and how heavy their population becomes.

Consult with your Cooperative Extension agent on identification of particular insects and recommended methods-especially non-chemical ones-for managing them.

Perennial Flowers (Screen 1 of 19)

click here to see picture...
click here to zoom to the garden show "Robust Roses"...

Perennial plants have gained tremendously in popularity in recent years. Many of the most popular garden flowers are perennials, including iris, peonies, chrysanthemums, and daylilies. Increasingly, less well-known perennials such as Coreopsis and gaillardia are also being grown by home gardeners.

By definition, perennials are herbaceous plants with root systems that persist from year to year. Because of this, gardeners often make the mistaken assumption that perennials will last forever with little or no care.

Just like all groups of plants, perennials require regular attention and maintenance. If cared for, perennials can add much color to any border and also provide many cut flowers for your home.

Anemone (Screen 2 of 19)

click here to see picture...

The tall stems of pink, rose, or white flowers of Japanese anemone really attract attention in late summer and the fall months.

These plants grow best in light shade and a well-drained soil, high in organic matter.

Divide clumps only every four to five years. This is a fall-blooming perennial.

Anchusa (Screen 3 of 19)

Anchusa, pronounced "an-kew-sa," is an odd name. If it is difficult to remember, call it by its nickname-bugloss or perennial forget-me-not. This perennial has blue flowers, grows from 3 to 5 feet tall, and has large, heavy, hairy leaves. Anchusa is one of the few perennials that bears a good blue-colored flower.

Divide older plants in the spring by cutting the root mass into three to four sections. Reset the divisions in your perennial border. Because anchusa grows tall, try planting it behind dwarf daylilies. Like many of the perennials mentioned in this guide, anchusa needs lots of sunshine, so do not hide it under a bush. Give anchusa a stake and support it with soft twine. This is a spring-blooming perennial.

Aster (Screen 4 of 19)

click here to see picture...

Nature plants a beautiful perennial garden along country roads and highways with wild blue asters and yellow goldenrod. In autumn, your garden can be breaking into all shades of pink and blue with varieties of fall asters, also called "Michaelmas daisies."

Use white varieties between the blues to heighten the blue color. Both the tall and low varieties bring that needed color to your perennial border.

click here to see picture...

Fall asters, as the name implies, bloom largely during autumn and have many uses. Plant the taller varieties to hide fences or as a background for lower perennials. They are at home in a naturalistic planting, and they might even be planted along the barn or garage.

Divide clumps in spring and reset them in your border. Asters grow best in full sun, but will bloom brightly in partial shade. The plants grow rapidly in almost any soil, and you will have to stake the tall varieties. Pinch plants in early summer to reduce the need for staking and to force better branching. This is a fall-blooming perennial.

Bearded Iris (Screen 5 of 19)

The name *iris* comes from the Latin word iridis, "rainbow." Sometimes iris is also called "flag." The bloom of the bearded iris, which resembles the orchid's, appears in May.

Modern iris hybrids are high maintenance plants-they must have well-drained soil and good air circulation to prevent foliage diseases.

The stems, which are thick brown branches at the soil surface, are called *rhizomes*. To get new iris plants, divide old rhizomes in July and plant them in your perennial border. Each rhizome should include one fan of foliage. Be sure to put them in full sun, in a location where other plants can hide their fading summer foliage. This is a spring-blooming perennial.

Coreopsis (Screen 6 of 19)

Coreopsis is a popular yellow daisy-like flower, sometimes called "tick seed" because its seed looks much like a tick bug. Coreopsis blooms from June until frost. The annual forms have narrow, light green leaves and yellow flowers that are from 2 to 3 inches across.

The long, graceful stems of the flowers make them attractive for indoor use. Continual removal of the faded flowers before seeds form ensures a supply of Coreopsis blooms all summer. Dwarf varieties of Coreopsis are also available.

It is best to divide the old, crowded plants in early spring and to reset them about 3 feet apart. All Coreopsis asks is plenty of sunlight and a well-drained soil. This is a summer-blooming perennial.

Daylily (Screen 7 of 19)

click here to see picture...

The bright orange daylily *(hemerocallis)* that blooms along roads and on railroad banks is a summer perennial. Plant breeders have "tamed," or changed, the color, and your garden may have yellow, orange, maroon, or pinkish daylilies.

Some nurseries grow only daylilies. A single plant may have from fifty to seventy-five blossoms. By choosing only four of the many varieties, you can have blooms for much of the summer.

Divide daylilies as soon as they have finished blooming. They like full sun or partial shade, but they are content with only four hours of sunlight a day. Some daylilies grow only 2 feet tall, whereas others show their flowers on 4-foot stems; therefore, select varieties whose height and color fit into your border plan. Plant them in large clumps next to shrubbery or wherever you need lots of foliage.

Daylilies grow in practically all types of soil, but they will bloom more if you mix organic matter such as compost into the soil when you plant them. This is a summer-blooming perennial.

Gaillardia (Screen 8 of 19)

Gaillardia, also known as blanket flower, has blooms of rich yellow with red centers. The cut flowers keep well and can be used for corsages.

Gaillardia is easily divided in the spring and is happy in any soil except heavy clay. As it blooms from June until after killing frosts it can be planted in front of iris.

The many soft, hairy leaves tend to hide the iris after it has finished blooming. Because it grows to 3 feet, gaillardia may be planted in the middle of the flower border. The variety 'Goblin' is more compact and especially heavy blooming. This is a summer-blooming perennial.

Hardy Chrysanthemum (Screen 9 of 19)

click here to see picture...

There is no question that chrysanthemums are the kings of the fall flower garden. Different varieties bloom from late August through October. Their flower size and type is also quite variable, from tiny buttons, to familiar daisies, to giant balls.

click here to see picture...

Although there are many specialized techniques for altering the blooming time and size, propagating, and pruning chrysanthemums, the basic cultural practices are to grow plants in a location with full sun and a well-drained soil and to fertilize plants several times during the growing season.

When new shoots have grown 6 inches tall in the spring, pinch them back to promote side branching. Divide mums every other year in early spring. This is a fall-blooming perennial.

Peony (Screen 10 of 19)

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Peonies *(paeonia)* bloom from May to June and make a good background for annuals. They also make a good, low, summer hedge. Peony foliage is excellent in flower arrangements, too.

Because peonies grow about 3 feet tall, set them at the back or middle of your perennial border. They like lots of sun, so do not plant them on the north side of the house or underneath trees and shrubs.

Peonies have four flower types, from a single circle of petals with a yellow center to a completely double flower.

Each type has a name: single, Japanese, anemone, and the double types. Their colors range from red to white.

You may divide perennial border peonies from an old clump. Dig it up in September, cut it apart carefully, so you will not break any of the buds, or eyes, from the thick roots. Each root-or 44 toe"-that has three or more eyes makes a new plant.

As you set each division or "toe," be sure the eyes are only 1 to 2 inches underneath the ground. If you plant them deeper, they will not bloom. Set the plants 3 feet apart, because peonies need plenty of room.

Have a good welcome ready for them. Into each hole drop a shovelful of rotted manure or compost and a handful of complete fertilizer such as 5-10-5. Mix with soil thoroughly before planting. Do not expect your new peony plants to have many blooms the first year. This is a spring-blooming perennial.

Phlox (Screen 11 of 19)

click here to see picture...

Phlox means "flame" in Greek. No doubt the bright red heads of phlox are the reason for its name. Phlox is found in many perennial gardens, probably because the large cluster of showy flowers come in many shades of red, pink, and white, and the plants vary in height and time of bloom.

In fact, you can choose early and late varieties in all colors. A planting with colors graded from light pink to dark red is most striking. The blooms can also be used for cut flowers.

Phlox is best planted in groups in beds along driveways and paths and in front of shrubbery.

Divide phlox in spring and reset the outer sections of the old plants. They are vigorous plants and need plenty of moisture and good rich soil. If set too close together, phlox may be attacked by mildew.

Thin stems in very early spring to promote better air circulation and thus reduce the likelihood of mildew attack. Spray any mildewed plants with a fungicide material or choose only mildew-resistant varieties. This is a summer-blooming perennial.

Shasta Daisy (Screen 12 of 19)

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The shasta daisy, or *chrysanthemum maximum*, is a friendly neighbor of Coreopsis. It, too, has daisy-like flowers and blooms freely, giving many blossoms that fit into any summer flower arrangement inside or out of doors. Shasta daisies are related to fall mums. New varieties are double and look much like a chrysanthemum.

Sun and well-drained soil keep shasta daisies content. Divide crowded plants in early spring and reset them in the middle of the border, because they grow to a height of about 2 feet. Insects and diseases seldom bother shasta daisies. There also are dwarf varieties. This is a summer-blooming perennial.

Where to Grow Perennials

Of the many types of perennials, you can usually find one or more that will grow wherever there is good, well-drained soil. Certain perennials do well in shade; others must have sun all day; many perform best in a half day of sunlight.

Too much wind is hard on any kind of flower, but it is especially damaging to tall perennials like delphiniums and lupines. Thus, a relatively protected location is preferred.

Good backgrounds for perennials are shrub borders, hedges, or green fences. They also look well along a lawn edge, in front of shrubbery, or in the small strip between the boundary line and the driveway.

Perennials That Love Shade

Often a portion of a perennial border is shaded by a tall tree or large shrubs. Some perennials do not like this and show their disfavor by producing few blooms.

The following perennials bloom even if shaded part of the day:

Bee balm	**Daylily**	**Monkshood**
Bellflower	**Dutchman's Breeches**	**Plantain Lily**
Violets	**English Primrose**	**Siberian iris**
Columbine	**Japanese Anemone**	**Tufted pansy**

Living Bouquets (Screen 15 of 19)

Many perennials last a week after they have been cut. Be sure your perennial border has some of the following:

Baby's breath	**Coreopsis**	**Coralbells**	**Chrysanthemum**
Delphinium	**Gaillardia**	**Iris**	**Mountain bluet**
Painted daisy	**Peony**	**Phlox**	**Shasta daisy**

Dry Corner Perennials (Screen 16 of 19)

Some perennials will not grow normally in a soil that dries out quickly. If one end of your perennial bed dries out and the plants wilt, try growing the following:

Baby's Breath **Blanket Flower** **Daylily**

Golden Marguerite **New York Aster** **Rudbeckias**

Hardy Herbaceous Perennials

This term includes not only those fibrous-rooted plants of herbaceous habit which spring up from the root year after year, but also those old-fashioned subjects known as florists' flowers, and the hardy bulbs. Some of the most beautiful of hardy flowering plants belong to this class.

When the length of the flowering season is considered, it will be obvious that it is impossible to keep up the show of a single border or plot for six months together, since plants, as they are commonly arranged, come dropping into and out of flower one after another; and even where a certain number are in bloom at the same time, they necessarily stand apart, and so the effects of contrast, which can be perceived only among adjacent objects, are lost.

To obviate this defect, it has been recommended that ornamental plants should be formed into four or five separate suites of flowering, to be distributed over the garden. Not to mention the more vernal flowers, the first might contain the flora of May; the second that of June; the third that of July; and the fourth that of August and the following months.

These compartments should be so intermingled that no particular class may be entirely absent from any one quarter of the garden.

Before Planting (Screen 18 of 19)

Before beginning to plant, it would be well to construct tables or lists of the plants, specifying their respective times of flowering, colors and heights. To diversify properly and mingle well together the reds, whites, purples, yellows and blues, with all their intervening shades, requires considerable taste and powers of combination; and ascertained failures may be rectified at the proper time the next season.

The one great object aimed at should be to present an agreeable contrast - a floral picture; and, as at particular seasons a monotony of tint prevails, it is useful at such times to be in possession of some strong glaring colors. White, for instance, should be much employed in July, to break the duller blues and purples which then preponderate. Orange, too, is very effective at this season.

On the other hand, yellows are superabundant in autumn, and therefore reds and blues should then be sought for. The flower-gardener should have a small nursery, or reserve garden, for the propagation of the finer plants, to be transferred into the borders as often as is required.

As a rule, all the fibrous-rooted herbaceous plants flourish in good soil which has been fairly enriched with manure, that of a loamy character being the most suitable. Many of them also grow satisfactorily in a peaty soil if well worked, especially if they have a cool moist subsoil.

Pentstemons and phloxes, amongst others, succeed well in soil of this character, but the surface must be well drained; the former are rather apt to perish in winter in loamy soil, if at all close and heavy. The herbaceous border should be a distinct compartment varying from 6 to 10 ft. in width, and perhaps backed up by evergreens under certain conditions.

Such a border will take in about four lines of plants, the tallest being placed in group at the back and in the center, and the others graduated in height front. In the front row patches of the white arabis, the yellow alyssium, white, yellow, blue, or purple violas, and the recurring at intervals of 5 or 6 yards on a border a carry the eye forwards and give a balanced kind of finish to the.

The same might be done with dianthuses or the larger narcissi in the

second row, with paeonies, columbines and phloxes in the third, and with delphiniums, aconitums and some of the taller yellow composites as helianthus and rudbeckia at the back. Spring and autumn flowers, as well as those blooming in summer, should be regularly distributed throughout the border, which will then at no season be devoid of interest in any part.

Many of the little alpines may be brought into the front line planted between suitable pieces of stone, or they may be relegated to a particular spot, aid placed on an artificial rockery. Most of the hardy bulbs will do well enough in the border, care being taken not to disturb them while leafless and dormant.

Deep-Rooting Perennials

Some deep-rooting perennials do not spread much at the surface, and only require refreshing from time to time by top-dressings. Others, as the asters, spread rapidly; those possessing this habit should be taken up every second 6r third year, and, a nice patch being selected for replanting from the outer portions, the rest may be either thrown aside, or reserved for increase; the portion selected for replanting should be returned to its place, the ground having meanwhile been well broken up.

Some plants are apt to decay at the base, frequently from exposure caused by the lifting process going on during their growth; these should be taken up annually in early autumn, the soil refreshed, and the plants returned to their places, care being taken to plant them sufficiently deep.

Biennial Flowers (Screen 1 of 2)

click here to see movie...

Halfway between annuals and perennials, biennials produce foliage the first year, bloom the second year, and then die. Many also send out seed after flowering to continue the cycle for future years.

Note: Some plants, such as hollyhock and foxglove, have traditional biennial types and newly hybridized annual forms. Others, including English wallflower and money plant, can be started in early spring to be grown as an annual or in midsummer to bloom the next year.

Hollyhock (*Alcea rosea*): biennial, except new varieties (e.g., 'Majorette')

English daisy (*Bellis perennis*): perennial, often grown as an annual

Canterbury bell (*Campanula medium*): a true biennial

English wallflower (*Cheiranthus cheiri*): see Note above

Sweet William (*Dianthus barbatus*): both annual and biennial forms available

Money plant, Honesty (*Lunaria annua*): see Note above

Forget-me-not (*Myosotis alpestris*): a true biennial, annual species also available

Hardy Biennials (Details) (Screen 2 of 2)

Biennials live through one winter period. They require to be sown in the summer months, about June or July, in order to get established before winter; they should be pricked out as soon as large enough, and should have ample space so as to become hardy and stocky. They should be planted in good soil, but not of too stimulating a character.

Those that are perfectly hardy are best planted where they are to flower in good time during autumn. This transplanting acts as a kind of check, which is rather beneficial than otherwise. Of those that are liable to suffer injury in winter, as the Brompton and Queen Stocks, a portion should be potted and wintered in cold frames ventilated as freely as the weather will permit.

The Perennial Garden (Screen 1 of 1)

Perennial flowering plants have become increasingly popular in recent years. Because perennials emerge year after year, people make the mistake of assuming that they need little care. Here you will be instructed how to design and care for a perennial garden.

Materials

- paper (preferably graph paper)
- pencil
- ruler
- tools: spade or spading fork, iron rake, trowel, hoe, heavy cord, watering can
- supplies: organic matter (peat moss, humus), commercial fertilizer (such as 5-10-5), limestone
- perennials

Planning

You would not try to build a house without a blueprint; similarly, you should not develop a perennial garden without a plan. Use a scale of 1 inch for every 2 feet of border, or 1 inch for every 1 foot of garden.

If your border is 20 feet long and 5 feet wide, the plan will fit on a piece of paper a little longer than 10 by 2 1/2 inches wide, or 20 by 5 inches, depending on the scale that you use. A flower border with a slightly curved front edge is more pleasing to the eye than one with a straight edge.

Learn as much as you can about the care and characteristics of each plant that you plan to use. Consider a plant's sun or shade preference, habit of growth, height and spread, season of bloom, and flower and foliage color. You may wish to consult *Sequence of Bloom of Perennials, Biennials, and Bulbs* for more information on specific plants.

Place the plants in groups rather than in straight rows and plant the taller perennials at the back of the border where they will not shade or hide the smaller ones. You should select varieties that bloom at different times so flowers will be in bloom all season.

Select color combinations that are complementary or contrasting, but not clashing. Certain closely related colors, such as scarlet and orange-red, will clash. Including too many colors can also be distracting. You should write on the plan where each group of perennials is to be planted, the color, the variety, and the plant name.

Soil Preparation and Planting

The success or failure of a perennial garden can rest on how well the soil is prepared. Preparation can be done in the spring or fall. You should use heavy cord to outline the bed and define the area to be worked.

A 2- to 3-inch layer of organic matter, such as peat moss or humus, can be dug into the soil before planting. Check the pH of the soil with a test kit. If the soil is too acid, add ground limestone to raise the pH to between 6.0 and 6.5. The organic matter and ground limestone can be worked into the soil at the same time.

Add 1 1/2 to 2 pounds of a complete fertilizer, such as 5-10-5, to each 100 square feet of border area (to figure out how many square feet your garden is, multiply the average width by the length). Work the fertilizer into the top 4 inches of soil.

After you have prepared the soil and are ready to plant, use limestone to mark the various planting areas indicated on your plan. You can also mark the areas with a hoe handle, but the limestone will show up better during planting.

Your plan will help in deciding how many plants will be needed. Plants are normally set 1 to 1 1/2 feet apart, depending upon their size when fully grown.

Care of the Perennial Garden

Once the garden is planted, one of the most important aspects of perennial culture is weed control. Generally, the smaller the weeds are, the easier they are to pull.

A 3-inch layer of finely ground wood chips, shredded bark, or other organic mulch spread around the plants and on the bare spots in the border

not only keeps down weeds but helps to hold moisture during summer.

As the mulch decomposes, it adds valuable organic matter and some nutrients to the soil. Plan to add a thin cover layer of additional mulch every two to three years.

To fertilize perennials, you should apply a balanced soluble or granular fertilizer around the base of each plant in the spring. When using granular materials, water the entire bed afterward to ensure nutrient penetration into the soil.

During hot summer weather, make sure group members water the perennials to a depth of 3-4 inches once per week. Light waterings cause the roots to grow only near the surface where they are more prone to drought-related injury. As described earlier, mulches help to keep moisture in the flower beds.

Tall plants, such as delphiniums and peonies, may need stakes or cages to support them. Tie stalks loosely to pairs of stakes in two to three places to prevent the plant stems from snapping. The best time to place wire cages around these plants is in early spring, so the developing foliage can hide the wire but the stems can be supported by it.

Investigations

Certain perennials (such as chrysanthemums, iris, daylilies, peonies, and hostas) are available in a tremendous variety of forms. Try growing a garden bed of different types of a single plant. You may be amazed at how varied it can be and how long blooming time can be extended!

Propagating Perennials by Seed and Division

Most perennials can be propagated vegetatively (which involves dividing or cutting the mother plant) or by seed. All vegetatively propagated plants are genetically identical to the mother plant. Plants grown from seed may each have a unique genetic identity.

The time for planting will vary depending on the type of plant and propagation method you choose to use.

Materials

- pruning shears
- spade
- spading forks (2)
- organic matter
- phosphorus (bone meal, superphosphate)
- rooting hormone
- propagation pot or flat
- sand or perlite
- clear plastic
- soil heating cable
- fluorescent light fixture
- cold frame

Division

Most perennials grow larger each year, usually developing into clumps. As clumps expand, they compete with other plants, eventually causing crowded and unhealthy conditions. Some perennials, such as chrysanthemums, will develop a healthy outer ring of growth surrounded by a dying center.

The beauty of dividing perennials is that it produces new plants while allowing for the rejuvenation of old clumps. The divisions can be set elsewhere in the garden, can be given as gifts, or can be traded with a friend.

A general rule for perennials is to divide spring- and summer-blooming species in later summer or fall, and fall-blooming perennials in the spring. This provides plants with nearly a full growing season to reestablish before flowering.

A couple of exceptions to this rule are Oriental poppies, which should be divided when new shoots appear in July, and bearded iris, which should be divided in June or July while relatively dormant.

To make digging and dividing easier, you needs to water the perennial bed well. The dividing process is simple. First, to clear the field for the operation, have members prune the plants to be divided to within 6 inches of the ground.

Next, dig the entire clump out as completely as possible. If the center has died out, have members divide the living portion into small sections for replanting. Clumps that are completely living can be divided into four or six equal wedges.

Daylilies can be especially difficult to divide. Their thick, swollen roots completely ensnare around each other like interlocked octopuses. The best way to divide such stubborn clumps is to insert two sharp spading forks into the center, back to back. Then press the handles toward each other, using the leverage of the tines to pry the clump apart.

When dividing bearded iris clumps, cut out and discard any sections of the rhizome (the thick, underground stem) that are rotten or have evidence of borer holes. Reset individual rhizome pieces that contain single fans of foliage.

Peonies, which live for such long periods of time, occasionally need dividing. After digging the root mass in late summer, divide into root sections that each contain three to five eyes, or buds, for next year's growth.

When replanting divided perennials, prepare the planting hole by mixing in some aged organic matter (compost, leaf mold) and a source of phosphorus (bone meal, superphosphate). Water the new divisions regularly until they become established.

The following section will help you decide when to divide your perennials. Appearance of the clump, however, will eventually be the best guide as you become familiar with the growth habits of these plants.

Divide Each Year

Bee balm (*Monarda*), false dragonhead (*Physostegia*), common valerian, hardy ageratum (*Eupatorium*), hardy marguerite (*Anthemis*), sneezeweed (*Helenium*), chrysanthemums

Divide At 2-Year Intervals

Hardy asters, shasta daisies

Divide At 3- or 4-Year Intervals

Bearded iris, phlox, sea thrift (*Armeria*), pyrethrum

Seldom Need Dividing

Peony, Oriental poppy, Japanese anemone, lupine, baby's breath, gas plant (*Dictamnus*)

Stem Cuttings

A less severe manner of obtaining favorite perennials is to take Stem cuttings from established clumps. Among the perennials that lend themselves to this treatment are yarrow, chrysanthemum, delphinium, baptisia, scabiosa, and candytuft.

In the spring, cut all basal shoots when they are 3-4 inches long, at crown level or just below. Dip the base of each cutting in a rooting hormone, then place this treated base into a pot or flat filled with coarse sand or perlite. Keep the rooting medium moist (but not wet). Maintain high humidity by setting a tent of polyethylene plastic over the container. Place the container in a bright spot out of direct sunlight.

After several weeks, you should check to see if cuttings have rooted by pulling up gently on each stem. If considerable resistance is met, you can dig out each cutting with a spoon or narrow trowel. These new plants can be set in the garden or potted into 3- to 4-inch containers for later planting.

Seed Propagation

You might prefer to start perennials from seed: it is an inexpensive method of generating many new plants of one type; it allows you to grow the latest and most exciting cultivars; and it is satisfying to grow a plant from seed to blooming.

Modern, hybrid perennial seeds are available from seed catalogs and garden centers. In late winter, while snow still flies outside, members should sprinkle seeds on a moist germination mixture, such as a peat-lite mix.

You will need to follow label directions of whether or not to cover the

seeds lightly. To speed germination, set the seed container on a soil-heating cable. You should also cover the container with glass or plastic to increase humidity.

After seedlings emerge, roll back the plastic and set seedling trays under a four-bulb fluorescent light fixture, in a south-facing window, or in a greenhouse. When each seedling has developed two pairs of leaves, you should dig and set each one carefully in a separate cell, a market pack, or its own peat pot. You can continue to grow the young plants indoors until the season's last frosts.

Before setting seedlings into the garden, you will need to acclimate them to outdoor conditions by putting them into a cold frame. After at least one week of acclimating, seedlings may be planted into their permanent positions. the plants will probably not bloom this first season. Some species, like peonies, may take several years to mature to a flowering stage.

An alternative routine for seed sowing is to start seeds outdoors in a cold frame in June. If you wish to try this method, you should transplant the resulting seedlings into separate containers and leave them in the cold frame through the winter. Plants of blooming size can be set into the garden the following spring.

Investigations

Try varying the conditions in which you set stem cuttings. For example, you could treat the base of some cuttings with a rooting hormone, but not the stems of other cuttings of the same type of plant. You could also set a plastic tent over one propagation flat, but not over a second one. Ask them what differences you notice in how well the cuttings root.

Bulb Flowers (Screen 1 of 18)

click here to see picture...

Spring- and summer-flowering bulbs are easily grown and provide flowers for color, cutting, or mass effect. Daffodil, hyacinth, and tulip are spring-flowering bulbs; dahlia tubers, gladiolus corms, and lily bulbs bloom in summer or early fall. The term *bulb* in this section will also include corms, tubers, and rhizomes-defined below-because all of these structures store food for the growing plant.

B*ulb*: Underground storage organ composed of an enlarged, fleshy, shortened stem covered with modified leaves (bud scales). Example-tulip.

C*orn*: Flattened underground stem with few nodes (growing points). Example: crocus.

R*hizome*: Horizontal thickened stem that grows partly or entirely underground. Example-iris.

T*uber*: Short, fleshy underground stem with tiny scale leaves, each with a bud in its axil. Example-potato.

Among the more popular spring-flowering bulbs are narcissus (which includes daffodils, jonquils, and paper whites), tulips, hyacinth, bulbous iris, and the smaller bulbs, such as crocus, grape hyacinths, snowdrop, glory-of-the snow, squill, snowflake, and aconite.

Spring bulbs are most effective when grouped together within a flower border, among shrubs, beneath spring-flowering trees, in a rock garden, or near a walkway where they can be observed at close range.

The most popular summer-flowering bulbs are canna, dahlia, and gladiolus (all of which are tender and require lifting and storage over winter) and lilies (which are hardier and can be left in the ground year-round).

Begonia (Screen 2 of 18)

click here to see picture...

Tuberous begonias provide some of the most spectacular flower shows for shady areas, especially in containers. Plant the tubers in a flat of moist peat in March.

When stems and leaves have emerged, transfer to 4-inch pots. Set into containers or gardens outdoors once all danger of frost has passed.

Once the flowering has slowed or stopped in late winter, dig the tubers and store them in a 40'-50'F room in a flat of dry peat moss until the following spring. This is a summer-flowering bulb.

Caladium (Screen 3 of 18)

click here to see picture...

All of the bulbous plants described thus far are grown primarily for their blooms.

Caladiums, in contrast, are valued for their stunning leaves in patterns of white, green, pink, or red.

Caladiums are most effective when grown in pots or in small masses in a flower garden (they look especially good in the center of a circular bed). The tubers can be planted 2 inches deep directly outdoors after air temperatures warm to 70'F, or they can be started indoors, as described for cannas.

In the fall, dig the tubers and allow them to cure for one week in a warm, dry spot. Store the dried tubers in dry peat moss or perlite at 55'-60'F for the winter. In the spring, you can increase the number of tubers by cutting each one into pieces, with one or more eyes (buds) on each piece. This is a summer-flowering bulb.

Canna (Screen 4 of 18)

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Just as with clothing styles, particular plants go in and out of fashion. Cannas do not enjoy the popularity they once did, but are still able to provide a beautiful and dramatic effect. A recent breeding breakthrough may bring about renewed interest. 'Tropical Rose' is a canna variety that can be started from seed in late winter and bloom that summer.

The tallest forms of canna grow 5 feet tall, while dwarf varieties are 18 to 30 inches tall. Flowers are red, pink, orange, yellow, and cream. Cannas look best in the background or center of flower beds, or in containers.

Plant canna rhizomes from March until May in flats filled with peat moss. Cover the rhizomes with 1 inch of peat moss and water them often enough to keep the peat moss damp.

When shoots appear, replant the rhizomes in 4-inch pots. Use a mixture of equal parts of soil, peat moss, and perlite or vermiculite. Leave the potted plants indoors in a sunny window until all danger of frost has passed. Then plant them outside in full sunshine.

Dig the planting site thoroughly and mix organic matter (compost, leaf mold, well rotted manure) into the soil. Plant the rhizomes just below the soil surface. Space them 12-18 inches apart.

Water and fertilize the plants at two-week intervals throughout the growing season. Apply a light ring of 5-10-5 or 10-6-4 fertilizer around each plant. Stake the tall varieties; they fall over easily.

After the first light frost of the fall, cut the stems off the plants. Then dig up the rhizomes and allow them to dry. During the winter, store the rhizomes upside down in dry peat moss or vermiculite at 50'-60'F. This is a summer-flowering bulb.

Chionodoxa (Screen 5 of 18)

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Chionodoxa, or glory-of-the-snow, grows 3-4 inches tall. Its name is based on its habit of blooming very early, while snow is still melting.

Flowers are silvery pink, light blue, or white. Because of their small size, plant Chionodoxas in large clumps in rock gardens, in the front of borders, or under trees.

Plant bulbs 3 inches deep in the fall. Space them 2 inches apart within the clump. Leave bulbs in place until they become crowded, often five to eight years. This is a spring-flowering bulb.

Crocus (Screen 6 of 18)

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These familiar, star- or cup-shaped flowers are one of the mainstays of the spring garden. Generally, the smaller types bloom earlier, from late February through mid-March. The larger, hybrid crocuses flower from March through much of April.

For earliest bloom, plant crocus corms 3 inches deep in sunny but protected locations. The growing point appears as a sharp tip in the center of the corm; make sure that it faces up. As with glory-of-the-snow, plant crocuses in clumps or drifts. The small-flowering types are especially well suited to rock gardens. Crocuses seldom need replanting. This is a spring-flowering bulb.

Dahlia (Screen 7 of 18)

click here to see picture...

Dahlias are among the great imitators of the plant world. Different forms have blooms that resemble peonies, orchids, anemones, cactus flowers, and daisy pompons. Flower colors are almost as varied, from red and orange to yellow, bronze, gold, purple, and white. Dahlias make great cut flowers, and they are lovely in flower borders.

click here to see picture...

To grow dahlias successfully, you must locate the proper site. Dahlias need full sun and a well-drained, moisture-holding soil. The ideal soil pH is neutral to slightly acid.

Prepare the soil and fertilize dahlias as described for cannas. Plant the tubers as soon as the danger of frost has passed. Allow 2-3 feet between tubers for tall dahlias, 2 feet for medium plants, and 15 inches for shorter ones. Plant the tubers so that the eyes (growing points) are 2 inches below the surface.

Taller varieties of dahlias will need staking. The main shoot and side shoots should be loosely attached to stakes.

After the first fall frosts, cut back all stems to 6 inches. Then dig the tuber clumps and use a blunt stick to remove loose soil from around the tubers. In a flat, store the dry tubers on a 6-inch bed of peat moss, then cover with an additional layer of peat. This is a summer-flowering bulb.

Eranthis (Screen 8 of 18)

Eranthis (winter aconite) is one of the very first bulbs (actually a tuber) to bloom in February.

Its buttercup-like flowers contrast sharply with its skirt of frilled green leaves.

Plant the tubers 1 inch deep, in early fall, in sun or partial shade.

To propagate plants, lift and divide the tubers in May.

Replant the divisions at once. This is a spring-flowering bulb.

Galanthus (Screen 9 of 18)

Galanthus (snowdrop) is a welcome visitor as it pokes its nodding white flower heads 6 inches above late winter snows.

It blooms in protected spots in mid-February. Single- and double-flowered forms are available, all with distinctive green marking on the white petals.

Plant snowdrops in large clumps of twenty or more. Or you can mix Galanthus with other small, early blooming bulbs.

For best display, set the bulbs 4 inches deep, and 1 inch or less apart. This is a spring-flowering bulb.

Gladiolus (Screen 10 of 18)

click here to see picture...

Gladioluses enjoy their greatest popularity as cut flowers for arrangement, but they can also find homes in garden beds, if used carefully. The longest types of glads produce flower spikes 6 feet tall, with overlapping flowers 4 1127 inches wide. Obviously, these types are best used in the back of borders or in bed by themselves.

click here to see picture...

Other gladiolus forms bloom at more reasonable heights between two and four feet. The color range of glad flowers is wide, from red to maroon, orange to pink, and many shades in between.

Plant gladiolus corms in rows 36 inches wide for harvesting as cut flowers, or plant groups of corms in beds. Start planting as soon as the soil is dry enough to work in the spring.

Plant the corms 4-6 inches deep and 6-8 apart. Or, plant corms in 8-inch deep trenches, and fill in with loose soil as stems grow. When grown in this manner, glads seldom need staking. By staggering planting dates between May and July, you will be assured of a continuous supply of flowers later in the season.

When shoots are 6-10 inches tall, fertilize the plants with one pound of 10-6-4 fertilizer per 100 square feet of space. Water the soil around the plants every ten days in hot weather.

Gladiolus corms should be lifted in the fall after a light frost. Work excess soil off the corms, then dry them in a warm, shady area. Store the larger corms for the winter in a well ventilated area between 35' and 40-F. This is a summer-flowering bulb.

Hyacinth (Screen 11 of 18)

click here to see picture...

Hyacinths produce showy, fragrant flower heads of pink, blue, red, yellow, orange, or white in midspring. They are most effective when used in formal plantings among shrubs, in borders, or next to the house, where their fragrance can be appreciated.

Hyacinths grow 6 to 12 inches high. The taller varieties may need support, especially in windy areas. Plant smaller bulbs 3 to 4 inches deep and 4 to 6 inches apart. Add 2 inches to the spacing dimensions for larger bulbs. Plant bulbs in October.

Handle these bulbs carefully, because they bruise easily. Leave them in place for several years. Since flowers become smaller each year, dig and discard the bulbs when blooms become too small for good display. This is a spring-flowering bulb.

Iris (Screen 12 of 18)

click here to see picture...

There are so many types of iris, and their classification is so complex, that this entire guide could be devoted to this one subject.

One way to classify irises is on the basis of their underground growth structure those that grow from rhizomes versus those that grow from bulbs.

The rhizomatous types develop pointed, strap-like leaves that grow in fans and produce stiff stalks that each bear one or more flowers. Popular colors are yellow, bronze, blue, purple, pink, and salmon. The most popular of the rhizomatous types are the bearded irises, with their fleshy hairs or beards on the outer petals.

Of the bulbous irises, the most popular garden types are the very tall Dutch forms and the tiny reticulatas. Dutch iris flower in early summer and are noted for their large, long-lasting blooms. Four-inch tall reticulatas, in shades of blue, purple, or white, are best suited to sunny but protected rock gardens.

Rhizomatous irises need special care in planting. Choose a well-drained location, and set the rhizome horizontally 1 inch below the surface. Trim the leaves to a compact fan, firm soil around the rhizome, and then water. Planting is best done in midsummer.

Plant iris bulbs 3 inches deep and 6 inches apart in October. Leave bulbs in place three to four years, then divide bulbils (offshoots) and replant. This is a spring-flowering bulb.

Leucojum (Screen 13 of 18)

click here to see picture...

Leucojum (snowflake) grows 16 inches tall. The most common type (*Leucojum vernum*) blooms in May. Its flowers are white like those of Galanthus, but much larger.

Select a planting site that is well drained and lightly shaded. A rock garden is ideal. Plant bulbs 4 inches deep in October.

Space them 4 inches apart in clumps of 42 bulbs. Leave them in place for many years. This is a spring-flowering bulb.

Lilium (Screen 14 of 18)

click here to see picture...

Hybrid lilies are among the most beautiful plants grown from bulbs. They have many forms, heights, flowering times, and colors. All provide an eye-catching show of regal, beautiful flowers. Some of the most popular forms of hybrid lilies include

Asiatics: widely varied in color or form; flowers upright or facing outward; very hardy and reliable; long blooming.

Trumpets: offspring of four Chinese species; flowers range in form from narrow tubes with flared ends to large bowl-shaped blossoms; less hardy than Asiatics; fragrant.

Turk's cap: includes many breeding lines; flowers are pendant (point down) with petals curving back.

Aurelian: result from crosses of Trumpets with L. henryi; hardier than Trumpets, but often stems need support; very impressive blooms.

More than most bulbous plants, lilies are fussy about the location in which they are grown. They need a well-drained soil, full-day sun, but cool roots. One way to achieve this is a sunny location with low-growing plants set around the base of the bulbs.

Plant the bulbs at a depth that is three times the height of the bulb, with excellent drainage at the base of each planting hole. Space the bulbs 6-18 inches apart according to the height of the plants. Bulbs planted on their side are less prone to bulb rot. Water won't be held between the outer bulb scales, which ordinarily causes decay.

Water and fertilize the plants at frequent intervals during the growing season. Use a light ring of 5-10-5 or 10-6-4 fertilizer around each plant. Do not use High rates of high nitrogen fertilizers.

To provide the most strength to the bulbs, only cut a particular plant's stem for cut flower use every other year. Leave at least half of the stem to

continue to nourish the bulb. When the leaves turn yellow in the fall, cut all stems at the base. This is a summer-flowering bulb.

Muscari (Screen 15 of 18)

Muscari (grape hyacinth) grows 6-8 inches tall. Most types bloom in mid-April, in shades of blue or white.

Use Muscari in rock gardens or scattered among shrubs as a ground cover. Plant bulbs 3-4 inches deep and equally far apart.

It is unlikely that you will ever need to redig the bulbs since they naturalize freely. This is a spring-flowering bulb.

Narcissus (Screen 16 of 18)

The narcissus group includes daffodils, narcissi, and jonquils. They are classified into categories like trumpet, large cupped, and small-cupped, by the length of the crown in the center of the flower.

Narcissi grow 3-20 inches high. The shortest forms are excellent for rock gardens, whereas full-sized plants work well as clumps in garden beds or naturalized in lawns or fields.

Plant narcissus bulbs 4-6 inches deep and 6-8 inches apart. Dwarf narcissus can be planted to a depth of three times the length of the bulb. Blooming time varies, with the heaviest concentration in April.

After planting, daffodils and their relatives need little care and rarely need replanting. This is a spring-flowering bulb.

Scilla (Screen 17 of 18)

click here to see picture...

Scilla (squill) produces brilliant blue or more muted white flowers from early to mid-spring. They are best planted in informal groups at the edges of borders, beneath trees and shrubs, or in rock gardens.

Plant bulbs 4 inches deep, in early fall, in sun or partial shade.

Plantings multiply rapidly by self-sown seed or bulb divisions.

This is a spring-flowering bulb.

Tulip (Screen 18 of 18)

click here to see picture...
click here to zoom to the garden show "Tulip Festival"...

Certainly the best known, and probably most loved, of all of the spring-flowering bulbs is the tulip. We can hardly think of Holland without imagining fields of brilliant blooming tulips.

There are many types of hybrid tulips, with different characteristics. Some of the most popular are

click here to see picture...

Single Early: lower growing than late-flowering types; flowers open wide, nearly flat

Triumph: angular flowers on sturdy stems of medium height

Darwin Hybrid: large, square-shaped flowers on tall, strong stems

Lily-Flowered: elongated flowers with pointed petals that bend outward at tips

Double Late: flowers resemble peonies and are long lasting

Kaufmanniana: flowers open into six-pointed star; leaves mottled

click here to see picture...

With so many variations, you are sure to find a tulip type that suits your needs and taste. Plant bulbs 6-8 inches deep, in mid- to late fall. They will bloom in April or May.

Flowers of most types become smaller each year. Dig and discard hybrid bulbs after about three years or when flowers become too small for good display. This is a spring-flowering bulb.

Using Bulbs in the Garden

Hardy spring-flowering bulbs will provide years of beauty and enjoyment if planted in a well-drained site at the proper depth. The planted bulbs will provide color in the garden by the following spring.

Materials

- graph paper, pencil, and ruler
- bulb catalog
- spring-flowering bulbs (tulips, daffodils, crocuses, etc.)
- knife
- trowel
- 5-10-5 fertilizer
- peat moss or other organic matter

Procedure

There are two different approaches to starting this project: You can modify your flower border plan to include spring-flowering bulbs, or you can develop a new plan on paper just for bulbs.

The beauty of a bed can be enhanced when annuals are planted next to spring bulbs, thus hiding the fading foliage of the bulbs and extending the period of bloom. You can represent such an arrangement on paper by drawing the locations of the bulbs on a piece of trace paper which you then lay over the plan for annuals.

Based on the information given in the preceding section, determine whether the bulbs you plan to plant grow best in full sun or partial shade. Remember also to consider the flowering height of each bulb when deciding on placement. Always plant taller bulbs where they will not hide medium-sized or shorter ones.

Before preparing new flower beds, you should test the drainage of the soil. Dig a hole about a foot deep and fill it with water. If the water drains away in eight to ten hours, the soil is sufficiently well drained. If water remains in the hole after ten hours, it will be necessary to improve the drainage of the planting site.

One way to improve drainage is to create a raised bed consisting of a coarse soil type, to a height of a foot or more over grade level. The edges of the raised bed can slope down to grade level or can be contained by landscape timbers or other edging.

You should dig and plant the bulb bed when the soil is fairly dry. Wet soil packs tightly and retards plant growth. If you can crumble the soil between your fingers, it is dry enough for digging and planting.

You should add one pound of 5-10-5 or 5-10-10 fertilizer and a thick layer of peat moss or compost for each 50 square foot area. Then spade the soil to a depth of 8 to 12 inches to mix in the amendments and to increase aeration.

Plant bulbs upright at the depths recommended earlier. You should then water the planted beds thoroughly to help settle the bulbs in the soil. You can use plant labels to mark the location and variety of each cluster of bulbs.

Orchids (Screen 1 of 4)

click here to see picture...

For the successful cultivation of a mixed collection of tropical orchids, it is necessary that two or three houses, in which different temperatures can be maintained, should be provided.

click here to see picture...

The greater number of them are epiphytes or plants that grow on others without absorbing nourishment from them, and heat and moisture afford all or nearly all the nourishment they require.

click here to see picture...

At one time it was thought the plants themselves were better for being associated with such objects as ferns and palms, but they are best grown by themselves.

East Indian Orchid House

click here to see picture...

The East Indian orchid house takes in those species which are found in the warm parts of the eastern hemisphere, as well as those from the hottest parts of the western, and its temperature should range from about 70° to 80° during the Summer or growing season and from 65° to 70° during winter.

click here to see picture...

The Mexican or Brazilian orchid house accommodates the plants from the warm parts of South America, and its temperature should range from about 65° to 75° during summer and from 60° to 65° in winter.

A structure called the cool orchid house is set apart for the accommodation of the many lovely mountain species from South America and India, such as *odontoglossums masdevallias,* etc., and in this the more uniform the temperature can be kept the better, that in summer varying between 60° and 63°, and in winter from 45° to 60°.

click here to see picture...

A genial moist atmosphere must be kept up in the hottest houses during the growing season, with a free circulation of air admitted very cautiously by well-guarded ventilators. In winter, when the plants are at rest, little water will be necessary; but in the case of those plants which have no fleshy pseudobulbs to fall back upon for sustenance, they must not be suffered to become so dry as to cause the leaves to shrivel.

click here to see picture...

In the Mexican house the plants will generally be able to withstand greater drought occasionally, being greatly assisted by their thick pseudobulbs. In the cool or odontoglossum house a considerable degree of moisture must be maintained at all times, for in these the plants keep growing more or less continuously.

Potting of Orchids (Screen 3 of 4)

For potting or basketing purposes, or for plants requiring blockculture, the materials used are light fibrous peat, special leaf-mold, osmunda or polypodium fiber, and living sphagnum moss, which supply free drainage for the copious supply of water required. Good turfy loam is also used for some, such as *cypripedittins* and *calaitthes.*

click here to see picture...

Indeed the composts now used are varied considerably according to the particular group of orchids. The water should, however, be so used as not to run down into the sheathing bases of the leaves. While in flower, orchids may with advantage be removed to a drier and cooler situation, and may be utilized in the drawing-room or boudoir.

click here to see picture...

Of late years not only have many fine hybrids been raised artificially between various species, but some remarkable bigeneric hybrids (between what are considered two distinct genera) have also been produced. To keep a valuable collection of orchids in good condition requires the services of an expert orchid grower.

List of Orchids (Screen 4 of 4)

The following is a select list of genera in cultivation:

Acineta
Ada
Aerirides
Angraecum
Anguloa
Anoectochilus
AnseHia
Arachnanthe
ArpophyRum
Barkeria
Batemannia
Bifrenaria
Brassavola
Brassia
Brasso-Cattleya
Broughtonia
Bulbophyllum
Burlingtonlam
Calanthe
Catasetum
Cattleya
Chysis
Cirrhopetalum
Cochlioda
Coelia
Coelogyne
Comparettia
Cycnoches
Cymbidium
Cypripedium
Cyrtopodium
Dendrobium
Diacrium
Disa
Epidendrum
Eulophia
Eulophiella
Galeandra
Gongora
Grammatophvllum
Habenaria
Houlletia
lonopsis
Ipsea
Laelia
Laelio-Cattleva
Leptotes
Lissochilus
Lycaste
Masdevallia
Miltonia
Mormodes
Odontoglossum
Odontioda
Oncidium
Pachystoma
Peristeria
Pescatorea
Phajus
Phaio-calantlie
Phalaenopsis
Pilumna
Platyclinis
Pleione
Pleurothallis
Polystachya
Promenaea
Renanthera
Restrepia
Rodriguezia
Saccolabium
Schomburgkia
Scuticaria
Sobralia
Sophro-cattleya
Sophronitis
Spathoglottis
Stanhopea
Thunia
Trichopilia
Trichosma
Vanda
Zygo-colax
Zygopetalum

Pruning (Screen 1 of 1)

The pruning of flowering plants is generally a much lighter matter than the pruning of fruit trees. If a young seedling or cutting of any soft-wooded plant is to be bushy, it must have its top nipped out by the thumb-nail or pruning-scissors at a very early stage, and this stopping must be repeated frequently.

If what is called a well-furnished plant is required, an average of from 2 to 3 in. is all the extension that must be permitted -- sometimes scarcely so much - before the top is nipped out and this must be continued until the desired size is attained, whether that be large or small.

Then generally the plant is allowed to grow away till bloom or blooming shoots are developed. To form a pyramidal plant, which is a very elegant and useful shape to give to a decorative pot plant, the main stem should be encouraged to grow upright, for a length perhaps of 6 or 8 in. before it is topped; this induces the formation of laterals, and favors their development.

The best-placed upper young shoot is selected and trained upright to a slender stake, and this also is topped when it has advanced 6 or 8 in. further, in order to induce the laterals on the second portion to push freely. This process is continued till the required size is gained. With all the difficult and slow-growing plants of the hard-wooded section, all the pruning must be done in this gradual way in the young wood as the plant progresses.

Some plants, like pelargoniums, can only be kept handsomely formed and well furnished by cutting them down severely every season after the blooming is over. The plants should be prepared for this by keeping them rather dry at the root, and after cutting they must stand with little or no water till the stems heal over, and produce young shoots, or "break," as it is technically termed.

click here to see picture...

The appearance of a specimen Pelargonium properly pruned is shown in the illustration above, in which (a) shows a young plant, the head of which has been taken off to form a cutting, and whose buds are ready to break into young shoots. Three shoots will be produced, and these, after growing

from 4 to 6 in. in length, should be stopped by pinching out the point, this giving rise to lateral shoots.

These will blossom in due course, and, after being ripened thoroughly by full exposure to the sun, should be cut back as shown at (b). This is the proper foundation for a good specimen, and illustrates how all such subjects should be pruned to keep them stocky and presentable in form.

Fruit Trees

In the selection and distribution of fruit trees regard must of course be had to local situation and climate.

The best walls having a south or south-east aspect are devoted to the peach, nectarine, apricot, dessert pears, plums and early cherries.

Cherries and the generality of plums succeed very well either on an east or a west aspect.

Morello cherries, apples and stewing pears succeed well on a north wall.

Standard Fruit Trees

Standard Fruit Trees should not be planted, if it can be avoided, in the borders of the kitchen garden, but in the outer slips, where they either may be allowed to attain their full size or may be kept dwarfed.

Each sort of fruit should be planted by itself, for the sake of orderly arrangement. and in order to facilitate protection when necessary by a covering of nets.

Their produce is often superior in flavor to that of the same kind of fruit grown on walls.

Orchard-House Trees (Screen 3 of 3)

Peaches, nectarines, apricots, figs, and dessert plums, cherries, apples, and pears are commonly cultivated in the orchard-house. Peaches and nectarines are generally planted out, while the rest are more commonly cultivated in pots. This allows for the hardier pot plants to be taken outdoors while those planted out are in need of the room.

Click on any button below to see picture:

Peaches	**Nectarines**	**Apricots**	**Figs**
Plums	**Red Apple**	**Green Apples**	**Pears**

The pot plants are overhauled in the autumn, the roots pruned, a layer being cut off to allow new soil to be introduced. Surface dressing and feeding by liquid manure should also be afforded these plants while the fruit is swelling. Every effort should be made to complete the growth of peaches and nectarines while the sun is sufficiently strong to ripen them.

Tomatos are frequently employed to all gaps in the orchard-house. Should it be provided with a central path, requiring shade, Hambro and Sweet-Avater grapes serve the purpose well, and in favorable seasons afford excellent crops of fruit.

Fruit-Tree Borders

Fruit-tree borders can be decorative as well as a source for good fruit. They can also complement a flower garden by serving to define the garden space. No pains should be spared, in the preparation of fruit-tree borders, to secure their thorough drainage.

In case of adhesive clayey subsoil this can generally be secured by placing over the sloping bottom a good layer of coarse rubbly material, communicating with a drain in front to carry off the water, while earthenware drain tubes may be laid beneath the rubble from 8 to 10 ft. apart, so as to form air drains, and provided with openings both at the side of the walk and also near the base of the wall.

Over this rubbly matter, rough turfy soil, grass-side downwards, should be laid, and on this the good prepared soil in which the trees are to be planted. The borders should consist of 3 parts rich turfy loam, the top spit of a pasture, and 1 part light gritty earth, such as road-grit, with a small portion (one-sixth) of fine brick rubbish. They should not be less than 12 ft. in breadth, and may vary up to 15 or 18 ft., with a fall from the wall of about 1 in. in 3 ft.

The border itself should be raised a foot or more above the general level. The bottom of the border as well as that of the drain must be kept lower than the general level of the subsoil, else the soakage will gather in all the little depressions of its surface.

Fruit-tree borders should not be at all cropped with culinary vegetables, or very slightly so, as the process of digging destroys the roots of the trees, and drives them from near the surface, where they ought to be.

Shallow Planting

Shallow planting, whether of wall trees or standards, is generally to be preferred. A covering of a few inches of soil is sufficient for the roots, but a surface of at least equal size to the surface of the hole should be covered with manure or litter so as to restrain evaporation and preserve moisture.

In the case of wall trees a space of five or six inches is usually left between the stem at the insertion of the roots and the wall, to allow for increase of girth.

Young, standard trees should be tied to stakes so as to prevent their roots being ruptured by the windwaving of the stems and to keep them erect. The best time for planting fruit trees in the open air is from the end of September till the end of November in open weather.

Pruning Fruit Trees (Screen 1 of 3)

Fruit trees trained as espaliers, fans, or cordons against walls, trellises or fences, are not only pruned carefully in the winter but must be also pruned during the early summer months. Many of the smaller, useless shoots are rubbed out altogether; the best are allowed to grow perhaps a foot or more in length, and then either have the tips pinched out with the finger and thumb, or the ends may be cracked or broken, and allowed to hang down, but are not detached completely.

This is called summer pruning, and is an important operation requiring knowledge on the part of the gardener to perform properly. Shoots of peaches, nectarines and morello cherries are " laid in," that is, placed in between fruiting shoots where there is the space to be ripened for next year's crop.

Pruning Fruit Trees, Details

Pruning is a very important operation in the fruit garden, its object being twofold...

1. to give form to the tree, and

2. to induce the free production of flower buds as the precursors of a plentiful crop of fruit.

To form a standard tree, either the stock is allowed to grow up with a straight stem, by cutting away all side branches up to the height required, say about 6 ft., the scion or bud being worked at that point, and the head developed therefrom; or the stock is worked close to the ground, and the young shoot obtained therefrom is allowed to grow up in the same way, being pruned in its progress to keep it single and straight, and the top being cut off when the desired height is reached, so as to cause the growth of lateral shoots.

If these are three or four in number, and fairly balanced as to strength and position, little pruning will be required. The tips of unripened wood should be cut back about one-third their length at an outwardly placed bud, and the chief pruning required will be to cut away inwardly directed shoots which cross or crowd each other and tend to confuse the center of the tree.

Bushy heads should be thinned out, and those that are too large cut back so as to remodel them. If the shoots produced are not sufficient in number, or are badly placed, or very unequal in vigor, the head should be cut back moderately close, leaving a few inches only of the young shoots, which should be pruned back to buds so placed as to furnish shoots in the positions desired.

When worked at the top of a stem formed of the stock, the growth from the graft or bud must be pruned in a similar way. Three or four leading shoots should be selected to turn into boughs and form a well-balanced

framework for the tree; these boughs, however, will soon grow beyond any artificial system the pruner may adopt.

Root Pruning and Lifting

When, from the formation of wood being more active than that of fruit, the trees bear badly, it may be necessary to prune the roots.

Ignoring the general rule of non-interference with roots is warranted in these circumstances, as the operation consists in the removal of the coarser roots, a process which results in the development of a mass of fine feeding roots.

Moreover, there is a generally recognized quasi-antagonism between the vegetative and reproductive processes, so that, other things being equal, anything that checks the one helps forward the other.

Fruit Houses (Screen 1 of 6)

The principal of these are the vinery, peach house, cucumber and melon house and orchard house. These, or a portion of them, especially the vineries and peacheries, are frequently brought together into a range along the principal interior or south wall of the garden, where they are well exposed sun and light, an ornamental plant use being sometimes introduced into the center of the range in order to give effect to the outline of the buildings.

When thus associated, the houses are usually of the lean-to class, which have the advantage of being more easily warmed and kept warm than buildings having glass on both sides, a matter of great importance for forcing purposes.

The Vinery (Screen 2 of 6)

click here to see picture...
click here to zoom to the garden show "A Tour Through The Vineyards"...

The Vinery is a house devoted to the culture of the grapevine. When forming part of a range a vinery would in most cases be a lean-to structure, with a sharp pitch (45°-50°) if intended for early forcing, and a flatter roof (40°) with longer rafters if designed for the main and late crops.

click here to see picture...

The lean-to is the simplest form, often erected against some existing wall, and the best for early forcing, being warmer on account of the shelter afforded by the back wall. In this house the principal part of the roof is a fixture, ventilation being provided for by small lifting sashes against the back wall, and by the upright front sashes being hung on a pivot so as to swing outwards on the lower side.

click here to see picture...

The necessary heat is provided by four 4-in. hot-water pipes, which would perhaps be best placed if all laid side by side, while the vines are planted in front and trained upwards under the roof. A second set of vines may be planted against the back wall, and will thrive there until the shade of the roof becomes too dense.

click here to see picture...

The hip-roofed or three-quarter span is a combination of the lean-to and the span-roofed, uniting to a great degree the advantages of both, being warmer than the span and lighter than the lean-to. The heating and ventilating arrangements are much the same as in the lean-to, only the top sashes which open ax on the back slope, and therefore do not interfere so much with the vines on the front slope.

click here to see picture...

In both this and the lean-to the aspect should be as nearly due south as possible. Houses of this form are excellent for general purposes, and they are well adapted both for muscats, which require a high temperature, and for late-keeping grapes.

click here to see picture...

The span-roofed, the most elegant and ornamental form, is especially adapted for isolated positions; indeed, no other form affords so much roof space for the development of the vines. The amount of light admitted being very great, these houses answer well for general purposes and for the main crop.

The large amount of glass or cooling surface, however, makes it more difficult to keep up a high and regular temperature in them, and from this cause they are not so well adapted for very early or very late crops.

They are best, nevertheless, when grapes and ornamental plants are grown in the same house, except, indeed, in very wet and cold districts, where, in consequence of its greater warmth, the lean-to is to be preferred. This type of house, cheaply constructed, is in general use for raising grapes for market.

The Peach House (Screen 3 of 6)

The Peach House is a structure in which the ripening of the fruit is accelerated by the judicious employment of artificial heat. For early forcing, as in vineries, the lean-to form is to be preferred. and the house may have a tolerably sharp pitch.

click here to see picture...

A width of 7 or 8 ft., with the glass slope continued down to within a foot or two of the round, and without any upright front sashes, will be suitable for such a house, which may also be conveniently divided into compartments of from 30 to 50 ft. in length according to the extent of the building, small houses being preferable to larger ones.

As a very high temperature is not required, two or three pipes running the whole length of the house will suffice. The front wall should be built on piers and arches to allow the roots to pass outwards into a prepared border, the trees being planted just within the house. Abundant means of ventilation should be provided.

click here to see picture...

For more general purposes the house represented above will be found more useful. One set of trees is planted near the front, and trained to an arched trellis (b). Another set is planted at the back, and trained on a trellis (c), which is nearly upright, and leans against the back wall; or the back wall itself may be used for training.

There are no upright front sashes, but to facilitate ventilation there are ventilators d in the front wall, and the upper roof sashes are made to move up and down for the same object. Two or three hot-water pipes are placed near the front wall. The back wall is usually planted with dwarf and standard trees alternately, the latter being temporary, and intended to furnish the upper part of the trellis, while the permanent dwarfs are gradually filling up the trellis from below.

In any case the front trellis should stop conveniently short of the top of the sashes if there are trees against the back wall, in order to admit light to them. They would also be better carried up nearly parallel to the roof, and at about 1 ft. distant from it, supposing there were no trees at the back.

A span-roofed house, being lighter than a lean-to, would be so much the better for peach culture, especially for the crop grown just in anticipation of those from the open walls since a high temperature is not required. A low span, with dwarf side walls, and a lantern ventilator along the ridge, the height in the center being 9 ft., would be very well adapted for the purpose.

The trees should be planted inside and trained up towards the ridge on a trellis about a foot from the glass, the walls being arched to permit the egress of the roots. A trellis path should run along the center, and movable pieces of trellis should be provided to prevent trampling on the soil while dressing and tying in the young wood.

The Fruit Room (Screen 4 of 6)

This important store should be dark, moderately dry, with a steady, moderately cool atmosphere,and with the means of giving sufficient ventilation to keep the air sweet. It should also be sufficiently commodious to permit of the fruit being arranged in single layers on the shelves or trays.

A type of building which is popular for this purpose is built of wood, with or without brick foundations, and is thickly thatched with reeds or other non-conducting material externally on walls and roof-while the interior is match-boarded.

Ventilation is afforded at the ends, usually by tilting laths, operated by a cord. Two doors are provided at one end -- an inner, and an outer -- the inner being glazed at the top to admit light. They are generally span-roofed, about 6 ft. high at the eaves, and 8 or 10 ft. high at the ridge, according to width.

Size of Fruit Stores

The length and breadth of these stores should be governed by the amount and character of the storage accommodation to be provided. If intended for storage only, a width of 9 ft. 6 in. would suffice, but if intended to combine display with storage, the internal diameter should be about 13 ft. In the former type, the walls are fitted with four rows of shelves, about 3 ft. wide, and about 1 ft. 6 in. apart.

The shelves are of deal strips, 2 or 3 in. wide, laid about 1 in. apart for ventilation. These are being superseded, however, by sliding-out trays of convenient lengths and about 9 in. deep, working on fixed framework. By this means the storage accommodation is nearly doubled and the fruit is more easily manipulated.

The central gangway is about 3 ft. 6 in. wide. In the latter a central exhibition bench about 3 ft. wide and of convenient height is provided. Gangways 21 ft. wide flank this, while the shelves or drawers with which the walls are fitted are about 2.1 ft. wide.

Care of the Fruit Room (Screen 6 of 6)

This consists mainly in the storing only of such fruits as are dry and in proper condition, in judicious ventilation, especially in the presence of large quantities of newly gathered fruit, in the prompt removal of all decaying fruit, and in the exclusion of vermin.

It is also advisable to wash all woodwork and gangways annually with a weak solution of formalin, or other inodorous germicide.

The Herb Garden, Introduction

click here to see movie...

Herbs are wonderful plants to work with for the beginning gardener and can be enjoyed year-round. Because most herbs are actually weeds, they grow easily and without much care.

Herbs function in more ways than just seasoning foods. Some herbs make good borders or ground cover, while others assist in the growth of vegetable plants if planted nearby. You'll even find that some herbs, like basil and parsley, act as a natural insect repellant! Continue to browse through this section to explore 15 of the most common herbs that *you* can grow in your garden.

Anise

Main Uses: cosmetics, insect repellent, liqueurs, medicine, perfume, seasoning

Arranging: beside coriander

Harvesting: take only the leaves and flowers when they are brown

Preserving: screen-dry leaves and seeds

Foods: baked goods, desserts

Basil, Sweet

Main Uses: insect repellent, medicine, perfume, seasoning

Arranging: good with tomatoes

Harvesting: take the top half of the plant when full, but before flowering

Preserving: screen-dry, then oven crisp; store in oil or vinegar bottles; freezer

Foods: eggs, meats (lamb), pasta, pesto, tomatoes, tomato sauces

Chervil

Main Uses: medicine, seasoning

Arranging: beside radishes

Harvesting: take only the outer-most leaves in the fall and the second spring; leave the main stalk and some of the seed-heads

Preserving: mix in butter; store in oil bottle; freezer

Foods: sauces, seafood, soups

Chives

Main Uses: seasoning

Arranging: plant with carrots

Harvesting: cut leaves as needed all season; trim off flowers in the spring

Preserving: cut with scissors and freeze; store in vinegar bottle

Foods: cold soups, dips, salads (loses some flavor in cooking)

Dill

Main Uses: cologne, cosmetics, medicine, seasoning, tea

Arranging: away from carrots; plant with kale crops (cabbage)

Harvesting: when seed-heads are a light tan color, cut off top half of plant

Preserving: bunch-dry; store in oil or vinegar bottle; freezer

Foods: cucumbers, eggs, fish (salmon), potatoes, sour cream, yogurt

click here to see picture...

Fennel

Main Uses: cologne, liqueurs, medicine, seasoning, tea

Arranging: arrange by itself

Harvesting: take the whole plant when it flowers

Preserving: screen-dry; freezer; store in oil or vinegar bottle

Foods: pork (Italian sausage)

Lemon Balm

Main Uses: cologne, liqueurs, medicine, seasoning, sweetener, tea

Arranging: borders; plant with lettuce and spring-flowering bulbs

Harvesting: before plant flowers, cut off top half, anytime during the summer

Preserving: bunch-dry; store in vinegar bottle

Foods: flavoring in candy, jelly, tea

Marjoram, Sweet

Main Uses: cologne, medicine, seasoning, tea

Arranging: does well anywhere in garden

Harvesting: cut off the top third before flowering, midsummer and early fall

Preserving: screen-dry, then oven crisp

Foods: beef, chicken, vegetables

Mint

Main Uses: liqueurs, medicine, seasoning, tea

Arranging: plant with cabbage and tomatoes

Harvesting: cut off the top third in late spring, midsummer, and early fall

Preserving: bunch-dry; Candy, store in vinegar bottle

Foods: beverages, candy, cold soups (especially fruit soups), fruits, jelly, lamb, teas

Oregano

Main Uses: cologne, medicine, seasoning

Arranging: does well anywhere in garden

Harvesting: cut off the top half before flowering in early summer and fall

Preserving: bunch-dry, then oven crisp; store in oil or vinegar bottle

Foods: eggs, ground beef, Mexican and Italian dishes, pasta, tomatoes, tomato sauces

Parsley

Main Uses: insect repellent, medicine, seasoning

Arranging: arrange near tomatoes

Harvesting: cut off the outer most leaves when full; leave the main growth

Preserving: bunch-dry; oven-dry; freezer

Foods: garnishes, salads, soups (goes with almost everything)

click here to see movie...

Rosemary

Main Uses: cosmetics, insect repellent, medicine, seasoning

Arranging: arrange with beans, broccoli, cabbage, carrots, and sage

Harvesting: cut off the top quarter when full and well-rooted

Preserving: bunch-dry; screen-dry; store in oil or vinegar bottle

Foods: all meats, carrots

Sage

Main Uses: cosmetics, insect repellent, medicine, seasoning, tea

Arranging: away from cucumbers; arrange with cabbage, carrots, and rosemary

Harvesting: cut off the top third in early spring and midsummer

Preserving: screen-dry; bunch-dry; store in oil or vinegar bottle

Foods: pork, poultry, soups (goes with almost everything)

Tarragon, French

Main Uses: cologne, cosmetics, seasoning

Arranging: does well anywhere in garden

Harvesting: cut off top half three times yearly; mid-spring, summer, and fall

Preserving: store in oil or vinegar bottle; screen-dry; freezer

Foods: chicken, eggs, fish, salad dressings, sauces, vinegar

Thyme

Main Uses: cologne, cosmetics, insect repellent, liqueurs, medicine, tea

Arranging: arrange with cabbage

Harvesting: cut off the top third when full in spring and before plant flowers in the summer

Preserving: screen-dry; store in oil or vinegar bottle

Foods: chicken, clam chowder, meat sauces, poultry stuffing, soups & stocks, vegetables

Starting Plants in the House

Seeds can be germinated and seedlings started in a box, pan, or flowerpot of soil in a window. In addition to having at least 6 hours of direct sunlight each day, the room must be kept reasonably warm at all times.

Washed fine sand and shredded sphagnum moss are excellent media in which to start seeds. Place a layer of easily drained soil in the bottom of a flat and cover this soil with a layer -- about three-fourths inch thick -- of either fine sand or sphagnum moss. Press the sand or moss to form a smooth, firm seedbed.

Then, using a jig, make furrows in the seedbed one-half inch deep. Water the sand or moss thoroughly and allow it to drain.

click here to see picture...

Sow seeds thinly in the rows and cover the seeds lightly with a second layer of sand or moss. Sprinkle the flat, preferably with a fine mist, and cover the flat with a sheet of clear plastic film. The plastic film diffuses and subdues the light and holds moisture in the soil and air surrounding the seeds. Plastic films offer advantages over glass coverings in that they are light in weight and are non-shattering.

click here to see picture...

Place the seeded and covered flat in a location that is reasonably warm at all times and has 6 hours of direct sunlight each day. The flat will require no further attention until after the seedlings have developed their first true leaves. They are then ready to transplant to other containers.

click here to see picture...

Plants in Ornamental Pots

When plants are required to stand in ornamental china pots or vases, it is better, both for the plants and for avoiding risk of breakage, to grow them in ordinary garden pots of a size that will drop into the more valuable vessels.

Slate pots or tubs, usually square, are sometimes adopted, and are durable and otherwise unobjectionable, only, their sides being less porous, the earth does not dry so rapidly, and some modification of treatment as to watering is necessary. For large conservatory specimens wooden tubs, round or square, are frequently used ; these should be coated with pitch inside to render them more durable.

Various other contrivances take the place of garden pots for special purposes. Thus shallow square or oblong wooden boxes, made of light, inexpensive wood, are very useful for seed-sowing, for pricking out seedlings, or for planting cuttings.

When the disturbance of the roots incidental to all transplanting is sought to be avoided, the seed or plant is started in some cases in squares of turf (used grassy-side downwards), which can when ready be transferred to the place the plant is to occupy.

Cucumber and melon plants and vines reared from eves are sometimes started in this way, both for the reason above mentioned and because it prevents the curling of the roots apt to take place in plants raised in pots. Strips of turf are sometimes used for the rearing of early peas, which are sown in a warmish house or frame, and gradually hardened so as to bear exposure before removal to the open air.

Palms (Screen 1 of 2)

These form charming table and drawing-room plants when quite young. When more fully developed, and long before their full growth is attained, they are among the most decorative plants known for the conservatory and for subtropical gardening. They are easily cultivated, but should not be allowed to become dry.

The soil should consist of about 3 parts turfy loam, 1 part leaf mold, 1 part coarse silver sand, with enough chemical or other manure added to render the whole moderately rich. The older plants will occasionally require the roots pruned in order to keep them in as small pots as possible without being starved.

This should be done early in the spring, and the plants heavily shaded until feeding roots are again produced. It is of advantage to afford stove culture while the plants are quite young. A little later most of the genera succeed well under moderately cool conditions.

List of Palms (Screen 2 of 2)

The following genera are among those most commonly cultivated:

Acanthophoenix
Acauthorhiza
Areca
Bactris
Brahea
Calamus
Caryota
Ceroxylon
Chamaedorea
Chamaerops
Cocos
Corypha
Geonoma
Hyophorbe
Kentia
Latania
Livistonia
Martinezia
Oreodoxa
Phoenix
Pritchardia
Rhapis
Sabal
Stevensonia
Thrinax

Ferns (Screen 1 of 5)

These popular plants are usually increased by means of their spores, the "dust" produced on the back of their fronds. The spores should be sown in well-drained pots or seed pans on the surface of a mixture of fibrous sifted peat and small broken crocks or sandstone; this soil should be firmly pressed and well-watered, and the spores scattered over it, and at once covered with propagating glasses or pieces of sheet glass, to prevent water or dry air getting to the surface.

The pots should be placed in pans full of water, which they will absorb as required. A shady place is desirable, with temperature of 59° to 55° by night and 65° to 70° by day, or they may be set on a shelf in an ordinary propagating pit.

The spores may be sown as soon as ripe, and when the young plants can be handled, or rather can be lifted with the end of a pointed flat stick, they should be pricked out into well-drained pots or pans filled with similar soil and should be kept moist and shady. As they become large enough, pot them singly in 3-in. pots, and when the pots are fairly filled with roots shift on into larger ones.

Repotting Ferns

The best time for a general reporting of ferns is in spring, just before growth commences. Those with creeping rhizomes can be propagated by dividing these into well-rooted portions, and, if a number of crowns is formed, they can be divided at that season.

In most cases this can be performed with little risk, but the gleichenias, for example, must only be cut into large portions, as small divisions of the rhizomes are almost certain to die; in such cases, however, the points of the rhizomes can be led over and layered into small pots, several in succession, and allowed to remain unsevered from the parent plant until they become well-rooted.

In potting the well-established plants, and all those of considerable size, the soil should be used in a rough turfy state, not sifted but broken, and one-sixth of broken crocks or charcoal and as much sand as will insure free percolation should be mixed with it.

Stove Ferns (Screen 3 of 5)

The stove ferns require a day temperature of 65 to 75 degrees, but do not thrive in an excessively high or dry atmosphere. They require only shade that will shut out the direct rays of the sun, and, though abundant moisture must be supplied, the atmosphere should not be overloaded with it.

Ferns should not be allowed to become quite dry at the root, and the water used should always be at or near the temperature of the house in which the plants are growing.

Some ferns, as the different kinds of Gymnogramme and Cheilanthes, prefer a drier atmosphere than others, and the former do not well bear a lower winter temperature than about 60° at night. Most other stove ferns, if dormant, will bear a temperature as low as 55° by night and 60° by day from November to February.

About the end of the latter month the whole collection should be turned out of the pots, and redrained or repotted into larger pots as required. This should take place before growth has commenced. Towards the end of March the night temperature may be raised to 60°, and the day temperature to 70° or 75°, the plants being shaded in bright weather.

Such ferns as Gymnogrammes, which have their surface covered with golden or silver powder, and certain species of scaly-surfaced Cheilanthes and Nothochlaena, as they cannot bear to have their fronds wetted, should never be syringed; but most other ferns may have a moderate sprinkling occasionally (not necessarily daily), and as the season advances, sufficient air and light must be admitted to solidify the tissues.

British Ferns (Screen 4 of 5)

Hardy British ferns belonging to such genera as Asplenium, Nephrodium, Aspidium, Scolopendrium, have become fairly popular of late years, and many charming varieties are now used in borders and rookeries.

Spores may be sown as above described, but in a much lower temperature.

List of Ferns (Screen 5 of 5)

The following is a select list of genera:-

Acrostichum	Davallia	Osmunda
Actiniopteris	Dicksonia	Onoclea
Adiantum	Gleichenia	Phlebodium
Alsophila	Gymnogramme	Platycerium
Aspidium	HymenophyRum	Polypodium
Asplenium	Lastrea	Pteris
Blechnum	Lomaria	Scolopendrium
Cheilanthes	Lygodium	Todea
Cibotium	Nephrodium	Trichomanes
Cyathea	Nephrolepis	Woodwardia

Plant Houses (Screen 1 of 3)

These include all those structures which are more intimately associated with the growth of ornamental plants and flowers, and comprise conservatory, plant stove, greenhouse and the subsidiary pits and frames. They should be so erected as to present the smallest extent of opaque surface consistent with stability.

With this object in view, the early improvements of hot-house architecture substituted metal for wood in the construction of the roofs, and for the most part dispensed with back walls; but the conducting power of the metal caused a great irregularity of temperature, which it was found difficult to control; and, notwithstanding the elegance of metallic houses, this circumstance, together with their greater cost, has induced most recent authorities to give the preference to wood.

The combination of the two, however, shows clearly that, without much variation of heat or loss of light, any extent of space may be covered, and houses of any altitude constructed.

Plant Houses, History (Screen 2 of 3)

The earliest notice we have of such structures is given in the Latin writers of the 1st century. Columella and Pliny both refer to their use in Italy for the cultivation of the rarer and more delicate sorts of plants and trees. Seneca has given us a description of the application of hot water for securing the necessary temperature.

The botanist Jungermann had plant houses at Altdorf in Switzerland; those of Loader, a London merchant, and the conservatory in the Apothecaries' Botanic Garden at Chelsea, were among the first structures of the kind erected in British gardens.

These were, however, ill adapted for the growth of plants, as they consisted of little else than a huge chamber of masonry, having large windows in front, with the roof invariably opaque.

The next step was taken when it became fashionable to have conservatories attached to mansions, instead of having them in the pleasure grounds.

This arrangement brought them within the province of architects, and for nearly a century utility and fitness for the cultivation of plants were sacrificed, as still is often the case, to the unity of architectural expression between the conservatory and the mansion.

Plant Houses, Materials (Screen 3 of 3)

Plant houses must be as far as possible impervious to wet and cold air from the exterior, provision at the same time being made for ventilation, while the escape of warm air from the interior must also be under control.

The most important part of the enclosing material is necessarily glass. But as the rays of light, even in passing through transparent glass, lose much of their energy, which is further weakened in proportion to the distance it has to travel, the nearer the plant can be placed to the glass the more perfectly will its functions be performed; hence the importance of constructing the roofs at such an angle as will admit the most light, especially sunlight, at the time it is most required.

Plants in glass houses require for their fullest development more solar light probably than even our best hot-houses transmit-certainly much more than is transmitted through the roofs of houses as generally constructed.

Plant houses constructed of the best Baltic pine timber are very durable, but the whole of the parts should be kept as light as possible. In many houses, especially those where ornament is of no consequence, the rafters are now omitted, or only used at wide intervals, somewhat stouter sash-bars being adopted, and stout panes of glass (usually called 21-oz.) 12 to 18 in. wide, made use of.

Such houses are very light; being also very close, they require careful ventilation. The glass roof is commonly designed so as to form a uniform plane or slope from back to front in lean-to houses, and from center to sides in span-roofed houses.

To secure the greatest possible influx of light, some horticulturists recommend curvilinear roofs; but the superiority of these is largely due to the absence of rafters, which may also be dispensed with in plain roofs. They are very expensive to build and maintain.

Span and ridge-and-furrow roofs, the forms mostly preferred, are exceedingly well adapted for the admission of light, especially when they are glazed to within a few inches of the ground. They can be made, too, to cover in any extent of area without sustaining walls.

Indeed, it has been proposed to support such roofs to a great extent upon suspension principles, the internal columns of support being utilized for conducting the rain-water off the roof to underground drains or reservoirs. The lean-to is the least desirable form, since it scarcely admits of elegance of design, but it is necessarily adopted in many cases.

In glazing, the greater the surface of glass, and the less space occupied by rafters and astragals as well as overlaps, the greater the admission of light. Some prefer that the sash-bars should be grooved instead of rebated, and this plan exposes less putty to the action of the weather.

The simple bedding of the glass, without the use of over putty, seems to be widely approved; but the glass may be fixed in a variety of other ways, some of which are patented.

The Greenhouse (Screen 1 of 3)

click here to see picture...

The Greenhouse is a structure designed for the growth of exotic plants that require to be kept in a temperature considerably above the freezing point during winter. The best form is the span-roofed, a single span being better even than a series of spans such as form the ridge-and-furrow roof.

For plant culture, houses at a comparatively low pitch are better than higher ones where the plants have to stand at a greater distance from the glass, and therefore in greater gloom. The illustration below represents a convenient form of greenhouse. It is 20 ft. wide and 12 ft. high, and may be of any convenient length.

click here to see picture...

The side walls are surmounted by short upright sashes which open outwards by machinery, and the roof is provided with sliding upper sashes for top ventilation. The upper sashes may also be made to lift, and are in many respects more convenient to operate.

In the center is a two-tier stage 6 ft. wide, for plants, with a pathway on each side 3 ft. wide, and a side stage 4 ft. wide, the side stages being flat, and the center stage having the middle portion one-third of the width elevated 1 ft. above the rest so as to lift up the middle row of plant, nearer the light.

Span-roofed houses of this character should run north and south so as to secure an equalization of light, and should be warmed by two flow, and one or two return 4-in. hot-water pipes, carried under the side stages along each side and across each end.

Where it is desired to cultivate a large number of plants, it is much better to increase the number of such houses than to provide larger structures. The smaller houses are far better for cultural purposes, while the plants

can be classified, and the little details of management more conveniently attended to.

Pelargoniums, cinerarias, calceolarias, cyclamens, camellias, heaths, roses and other specialties might thus have to themselves either a whole house or part of a house, the conditions of which could then be more accurately fitted to the wants of the inmates.

Two Roofs Contrasted (Screen 2 of 3)

The lean-to house is in most respects inferior to the span-roofed. One of the latter could be converted into two of the former by a divisional wall along the center. Except where space does not permit a span-roofed building to be introduced, a lean-to is not to be recommended; but a house of this class may often be greatly improved by adopting a half-span or hipped roof, that is, one with a short slope behind and a longer in front.

Where the cultivation of large specimens has to be carried on, a span-roofed house of greater height and larger dimensions may sometimes prove useful; but space for this class of plants may generally be secured in a house of the smaller elevation simply by lowering or removing altogether the staging erected for smaller plants, and allowing the larger ones to stand on or nearer the floor.

The Plant Stove differs in no respect from the greenhouse except in having a greater extent of hot-water pipes for the purpose of securing a greater degree of heat, although as the plants in stove houses often attain a larger size, and many of them require a bed of coconut fiber, tan, or leaf mold to supply them with bottom heat, a somewhat greater elevation may perhaps be occasionally required in some of the houses.

For the smaller plants, and for all choicer subjects, the smaller size of house already recommended for greenhouses, namely 20 ft. wide and 12 ft. high, with a side table of 4 ft. on each side, a pathway of 3 ft. and a central stage on two levels of 6 ft. wide, will be preferable, because more easily managed as to the supply of heat and moisture.

click here to see picture...

It will be seen that along the ridge of the roof a raised portion or lantern light *b, b* is introduced, which permits of the fixing of two continuous ventilators, one along each side, for the egress of heated and foul air, openings *a, a* being also provided in the side walls opposite the hot-water pipes for the admission of pure cold air.

This type of house is also very suitable for greenhouse plants, but would not need so much heating apparatus. Three or four rows of flow and return pipes respectively will be required on each side, according to the heat proposed to be maintained.

Plant Stoves vs. Greenhouses

In their interior fittings plant stoves require more care than greenhouses, which are much drier, and in which consequently the staging does not so soon decay. In stoves the stages should be of slate or stone where practicable, and the supports of iron.

These should be covered with a layer of 2 or 3 in. of some coarse gritty material, such as pounded spar or the shell sand obtained on the sea-coast, on which the pots are to stand; its use is to absorb moisture and gradually give it out for the benefit of the plants.

The pathways should be paved with tiles, brick or stone, or made of concrete and cement, and the surface should be gently rounded so that the water required for evaporation may drain to the sides while the center is sufficiently dry to walk upon; they should also have brick or stone edgings to prevent the water so applied soaking away at the sides and thus being wasted.

The Forcing House

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Whenever continuous supplies of cucumbers, melons and tomatoes are required, it is most convenient to grow them in properly constructed forcing houses. Span-roofed houses are probably the most useful for the purpose. They are usually 12 to 14 ft. wide, by 10 to 12 ft. high, and of any convenient length.

Heating is effected by means of hot-water pipes below the beds and against the side ventilators. The walls bordering the central paths are arched or clotted to admit heat from the chambers below the beds.

Side pipes are occasionally dispensed with, heat being obtained by means of slots at the back of the beds, communicating with the chambers. The beds are also of use for plunging pot plants. Ventilation is provided at sides and top.

Pits and frames of various kinds are frequently used for the cultivator of cucumbers and melons, as well as hot beds covered by ordinary garden frames. In these cases the first supply of heat is derived from the hot bed made up within the pit.

When the heat of the original bed subsides, linings of fermenting dung must be added, and these must be kept active by occasional turnings and the addition of fresh material as often as required. It is better, however, to effect both top and bottom heating by hot-water pipes.

Orchard Houses (Screen 1 of 1)

Orchard Houses are span-roofed or lean-to structures, in which various fruits are cultivated without the aid of artificial heat.

Peaches, nectarines, apricots, cherries and the more tender varieties of plums and pears succeed well in houses of this kind.

The orchard house is among the most generally useful of all garden structures.

These houses require careful management in early summer so as to induce the more delicate varieties of peaches and nectarines to complete and ripen their growth before cold, sunless weather sets in.

Lawns (Screen 1 of 1)

click here to see movie...

In the formation of lawns the ground must be regularly broken up so that it may settle down evenly, any deep excavations that may have to be filled in being very carefully rammed down to prevent subsequent settlement. The ground must also be thoroughly cleared of the roots of all coarse perennial weeds, and be worked to a fine tilth ready for turfing or sowing.

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The more expeditious method is of course to lay down turf, which should be free from weeds, and is cut usually in strips of 1 ft. wide, 3 ft. long, and about 1 in. in thickness. This must be laid very evenly and compactly, and should then be beaten down firmly with the implement called a turf-beater (shown above).

When there is a space to cover, a much cheaper plan is to sow the lawn with grass-seeds, and equally effective, though the sward takes much longer to thicken. It is of the utmost importance that a good selection of grasses be made, and that pure seeds should be obtained.

Types of Grass Seed

The following sorts can be recommended, the quantities given being those for sowing an acre of ground:

Cynosurus cristatus -- Crested Dog's-tail -- 6 lb.

Festuca duriuscula -- Hard Fescue -- 3 lb.

Festuca ovina -- Sheeps Fescue -- 3 lb.

Lolium Perenne tenue -- 18 lb.

Poa nemoralis sempervirems -- Evergreen Meadow-grass -- 3 lb.

Poa trivialis -- Trivial Meadow-grass -- 3 lb.

Trisetum flavescens -- *Yellow* Oat-grass -- 2 lb.

Trifolium repens -- Dutch Clover -- 6 lb.

The seeds should be thoroughly mixed, and very evenly sown, after which the surface should be raked over to bury them, and then rolled down while dry so as to finish it off smooth and level. When thus sown, lawns require to be promptly weeded.

During the growing season established lawns should be mown at least once a week. They should be occasionally rolled, and towards autumn they require frequent sweepings to remove worm-casts.

Garden Tools (Screen 1 of 3)

click here to see movie...

Very few tools are necessary for a small garden. It is better to buy a few simple, high-grade tools that will serve well for many years than equipment that is poorly designed or made of cheap or low-grade materials that will not last.

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In most instances, the only tools needed are a spade or spading fork, a steel bow rake, a 7-inch common hoe, a strong cord for laying off rows, a wheelbarrow, and a garden hose long enough to water all parts of the garden. A trowel can be useful in transplanting, but it is not essential. If the soil is properly prepared, plants can be set more easily with the hands alone than with a trowel.

For gardens that are from 2,000 to 4,000 square feet, a wheel hoe is very useful because it can be used for most work usually done with a common hoe and with much less effort. The single-wheel type is probably the easiest to handle and best for use as an all-purpose wheel hoe. Other styles are available and may be used if preferred.

click here to see picture...

The cultivating tools, or attachments, for the wheel hoe should include one or more of the so-called hoe blades. They are best for weeding and are used more than the cultivator teeth or small plow usually supplied with a wheel hoe.

Small garden tractors save labor in soil preparation and cultivation. They are economical to use in working large gardens. A tractor might interest the voting people of the family in the garden. The slow-turning (90 to 150 rpm), rotary tiller type of garden tractor with an approximately 3-horsepower motor has proved satisfactory on very stony soils.

Gardening is easiest when all tools are clean and well sharpened. Tools last longer if kept rust free. Clean rusted tools with a rust-remover paste or with steel

wool. Keep all tools rust free by wiping with an oily rag and putting them under cover when not in use.

Tools For Larger Gardens

For gardens over 4,000 square feet, a rotary garden tiller is useful in preparing the soil for planting and controlling weeds.

Many gardeners who do little or no farming have the choice of hiring equipment for gardenland preparation or buying their own. Equipment for hire too often is unavailable when needed, so that a favorable season for planting may be missed.

Country gardeners, in increasing numbers, are turning to small farm and garden tractors for land preparation, cultivation, lawn mowing, and hauling sprayers in gardens and orchards.

Those who garden every year and who have large homesteads usually find this equipment a good investment. The size and type of equipment needed depend on the amount of work to be done, the contour of the land, and the character of the soil.

For cultivating and other light work a 2- to 3-horsepower tractor is used. If plowing or other heavy work is involved, a larger tractor is desirable. Modern outfits of this size are well adapted to cultivating small areas. A medium-size tractor suitable for cultivating a large garden can also be used for plowing.

The rotary tiller, which is capable of preparing light to medium soils for planting in one operation, has been widely adopted by gardeners who have such soils. In the hands of a careful operator and on land that is not too hard and heavy and is reasonably free from stones, roots, and other obstructions, this machine has many desirable features.

It can be adjusted to cultivate very shallowly or to plow the soil and fit it for planting. Tools such as sweeps may be attached, thereby adapting the machine to straddle-row cultivating.

Use of well-adapted implements in preparing garden land greatly lessens the work required in cultivating. Clean, sharp, high-grade tools greatly lessen garden

labor.

For larger gardens, a wheel-type hand fertilizer distributor, a sprayer or duster (preferably a wheelbarrow-type power sprayer), and a seed drill are generally profitable. Minor tools include two pointed iron stakes and weeders.

Irrigation Equipment (Screen 3 of 3)

If sufficient water is available, irrigation equipment is necessary in many areas and highly desirable in nearly all gardens. Furrow application requires careful planning and laying out of the garden area and precise handling of the soil to insure even distribution of water.

Overhead pipes with nozzles at short intervals, temporary lines of lightweight pipe with rotating sprinklers, and porous hose laid along the rows are extensively used. The most common practice is to use a length or two of garden hose, with or without sprinklers, fed by faucets on temporary or permanent lines of pipe through the garden.

In winter, when there is little heat from the sun, little water is used by plants so irrigation is not needed in most areas. However, in summer, rainfall is usually inadequate and irrigation is essential for maximum production.

Saving Seed (Screen 1 of 2)

Saving seed from the current year's crop is not a recommended practice. To be successful in this endeavor, the gardener must know the variety, whether hybrid or open pollinated, be able to determine when the seed is mature, and know the methods of removing and cleaning seed from the plant or fruit.

Immature and (or) poorly dried and cured seed will result in moldy, inviable seed. In addition, a number of different diseases can be carried by the seed. On the other hand, saving your own seed from an "old family variety," which is not commercially available, is the exception to the rule.

Storing Surplus Seed (Screen 2 of 2)

Very often a small seed packet contains more seed than space allows to plant. What becomes of the surplus seed?

Seed can be stored for several years in an atmosphere of low relative humidity, 45 percent or less, and a moderately cool temperature, 40' to 50F. The average household basement or kitchen is less than ideal.

However if the seed packets are sealed immediately after the desired amount of seed is planted and placed in a large jar or coffee can with airtight lids, the seed will remain viable for several years.

Seed with short storage life, 2 years or less, include corn, salsify, onion, and parsnip. Bean, carrot, leek, and pea seed remain viable for approximately 2 to 3 years; beet, Swiss chard, pepper, broccoli, cabbage, lettuce, cucumber, eggplant, muskmelon, radish, spinach, squash, and watermelon will remain viable for 3 to 5 years.

If the seed is old or poorly stored (warm, moist conditions), it is advisable to conduct a germination test or sow the seed much heavier than normal.

Watering (Screen 1 of 3)

In most areas the garden requires a moisture supply equivalent to about an inch of rain a week during the growing season for best plant growth. It requires roughly that amount of watering a week to maintain good production if the moisture stored in the soil becomes depleted and no rain falls over periods of weeks. An inch of rain is equivalent to about 28,000 gallons on an acre, or 900 gallons on a 30- by 50-foot garden.

It is much better to give the garden a good soaking about once a week than to water it sparingly more often. Light sprinklings at frequent intervals do little, if any, good.

The best way to apply water, when the soil and slope are suitable, is to run it the length of furrows between the rows until the soil is well soaked. If the soil is very sandy or the surface too irregular for the furrow method, sprinklers or porous irrigating hose must be used.

When watering becomes necessary for kitchen-garden crops, the hose should be laid on and the lines of esculents allowed to drink their fill, if fresh succulent vegetables are desired. So also, if well-swelled and luscious fruits, such as strawberries, are required, there must be no parching at the roots.

This applies even more strongly to conservatory borders and to forcing houses than to the outside fruit-tree borders, because from these the natural rain supply is in most cases more distinctly cut off. In the case of forcing-houses, the water should be heated before being applied to the borders containing the roots of the trees.

Watering of Potted Plants

In the watering of pot plants the utmost care is requisite if the plant be a shy-growing or valuable one, and yet it is almost impossible to give any intelligible instruction for performing the operation. The roots should never be suffered either to get thoroughly dry or to get sodden with excess of water.

An adept will know by the ring of the pot on striking it with his knuckles whether water is wanted or not, according as it rings loud and clear or dull and heavy. With very choice subjects watering may be necessary two or three times a day in drying or summer weather.

It is a wrong though common practice to press the surface of the soil in the pot in order to feel if it is moist enough, as this soon consolidates it, and prevents it from getting the full benefit of aeration.

Watering in Heated Houses

In all heated houses the water used should be warmed at least up to the temperature of the atmosphere, so as to avoid chilling the roots. This is also necessary in the case of water used for syringing the plants, which should be done two or three times a day in all stoves and forcing-houses, especially during the period when the young growth is being developed.

The damping of all absorbent surfaces, such as the floors or bare walls, etc., is frequently necessary several times a day in the growing season, so as to keep up a humid atmosphere; hence the advantage of laying the floors a little rounded, as then the water draws off to the sides against the kerbstone, while the center remains dry for promenaders.

In cooler structures it becomes necessary in the dull season of the year to prevent the slopping of water over the plants or on the floor, as this tends to cause "damping off," the stems assuming a state of mildew decay, which not infrequently, if it once attacks a plant, will destroy it piece by piece. For the same reason cleanliness and free ventilation under favorable weather conditions are of great importance.

Poor Growth and Yield (Screen 1 of 4)

Even the best cared for garden has its problems. Some of these problems are inconsequential, and often they cannot be attributed to any fault of the gardener. An occasional plant may suffer an abnormality or even die from an unknown cause. Adverse weather such as high or low temperature, too much or too little rain; or high winds can cause poor growth, blossom drop, and plant damage.

In many instances, poor soil conditions including improper fertilization, soil compaction, inadequate drainage, poor texture or structure, or undesirable pH are responsible for inadequate growth.

Poor location of the garden, excessive shading or competition from nearby trees, insects, diseases, root pruning caused by deep cultivation, and careless use of herbicides, insecticides, and fungicides are frequently the cause of abnormal plants.

Soil testing may or may not show the reason for poor growth. Perhaps the trouble is simply a lack of adequate fertilizer. A shortage of an essential plant nutrient is likely to reduce the yield of any crop before the deficiency causes visible symptoms. The next three screens, describing some of the more common nutrient deficiencies, should help in their identification and control.

Nitrogen Deficiency (Screen 2 of 4)

Plants deficient in nitrogen are yellower or paler green than healthy ones. Nitrogen is the most soluble of the common fertilizer nutrients and is usually the first to be leached out of coarse sandy or gravelly soils by excess rain or irrigation. It becomes deficient especially fast on soils that are low in organic matter, since decaying organic matter provides a continuous source of nitrogen during the season.

During a cold, wet spring nitrogen may be a limiting factor early in the season even on well-fertilized soils. In cold, wet soil the bacteria act very slowly to change the complex forms of nitrogen in manure, compost, and soil organic matter to the nitrates that the plants can use.

Plants that show signs of nitrogen deficiencies should receive extra nitrogen fertilizer. The easiest way to supply this is to *sidedress the* plants with nitrate of soda or ammonium nitrate. The *sidedressing* is usually done by sprinkling the dry nitrate along the row in a strip a few inches wide and a few inches away from the plants at the rate of 1 ounce of nitrate of soda or 1/2 ounce of ammonium nitrate to each 5 to 10 feet of row.

It should be watered in by sprinkling the garden enough to soak the soil 4 to 5 inches deep. The nitrate can be dissolved in water at the rate of 1 ounce to a gallon, if irrigation is not available, and poured on the soil around the base of the plants, not on the leaves. If nitrate is not available, a commercial fertilizer can be used at the rate of 1/4 cup to 25 feet of row.

Phosphorus Deficiency (Screen 3 of 4)

Phosphorus-deficient plants usually develop an abnormal reddish purple color. Soils that are too acid (pH below 4.9) often lack phosphorus. The deficiency shows most frequently on corn leaves and on tomato plants at setting time and can be corrected by using a high phosphorus starter solution, such as 10-52-17, or by dissolving 1 ounce of ammo-phos in 1 gallon of water and thoroughly soaking the soil.

Prevention is often better than cure. Phosphorus deficiency can be prevented by using an adequate amount of good commercial fertilizer before planting. A shortage of phosphorus delays crop maturity.

Some plants such as corn,cabbage, and others frequently turn reddish-purple in color after a period of cool weather. Normal color usually returns after a few warm days.

Potash Deficiency (Screen 4 of 4)

Potash deficiency appears as a yellowing or browning along the tips and edges of the leaves. The oldest leaves are affected first and most seriously.

Plants that have had the amount of manure or commercial fertilizer recommended on pages 4-5 are not likely to be deficient in potash.

If there is much of the growing season left, potash deficiency can be corrected by the application of an ounce of good complete commercial fertilizer dissolved in a gallon of water, for each 5 feet of row, followed by a good irrigation to get it down to the roots.

Historic Dictionary of Plants

Introduction...

This plant dictionary is a collection of information on over 150 plants, including a description of the plant family and type, the first year of cultivation, and historic background on each plant's origin and use.

To browse through this database, use the next and previous arrow buttons located at the top of the screen. Or you can find each plant listed individually in the Plant Dictionary Sub-Index (by clicking on the INDEX button). Enjoy exploring!

Agave

Description: Amaryllis Family; Perennial

Year of Cultivation (BC): 1000

History: Cultivation in Mexico far antedates Spanish discovery. Introduced into Europe 1561 from South America.

Alfalfa

Description: Pea Family; Perennial

Year of Cultivation (BC): 2500

History: Introduced into Greece 470 B.C. from Persia. Mentioned in Virgil. Brought to Mexico and South America by Spanish. Introduced into California in 1854 from Chile.

Almond

Description: Rose Family; Small tree

Year of Cultivation (BC): 4000

History: Cultivation pre-historic in western Asia. Mentioned by Theophrastus, Pliny, and Dioscorides.

Apple

Description: Rose Family; Small tree

Year of Cultivation (BC): 4000

History: Abundantly used by Lake Dwellers of the Stone Age in Italy and Switzerland.

Apricot

Description: Rose Family; Small tree

Year of Cultivation (BC): 4000

History: Cultivation in China antedates 2000 B.C. Introduced into Southeast Europe at the time of Alexander the Great, about 325 B.C.

Areca Nut Palm

Description: Palm Family; Small tree

Year of Cultivation (BC): 4000

History: Anciently cultivated by Malaysian peoples. Introduced into China 111 B.C.

Arnotto or Anatto

Description: Bixa Family; Small tree

Year of Cultivation (BC): 1000

History: Cultivation pre-historic in tropical America. Now naturalized in India.

Arrowroot

Description: Arrowroot Family; Perennial

Year of Cultivation (BC): 300

History: Cultivation widely diffused in tropical America and West Indies since Spanish discovery. Also introduced on the coast of Guinea in Africa.

Artichoke (European)

Description: Sunflower Family; Perennial

Year of Cultivation (BC): 2000

History: Cultivated by the Romans. Introduced into England 1548. Naturalized as a week in the pampas of Buenos Aires, spreading over vast areas in the nineteenth century.

Artichoke (Jerusalem)

Description: Sunflower Family; Perennial

Year of Cultivation (BC): 300

History: Tubers used by the Indians. Introduced into England 1616. Now cultivated in Europe.

Asparagus

Description: Laurel Family; Tree

Year of Cultivation (BC): 2000

History: Much changed by cultivation, the succulent young stems used for food attaining many times their normal size in the wild state.

Avocado, or Alligator Pear

Description: Laurel Family; Tree

Year of Cultivation (BC): 400

History: Common names absurd. Not a pear and bears no known relation to the alligator. Avocado is a corruption of the Mexican name.

Banana

Description: Banana Family; Perennial

Year of Cultivation (BC): 4000

History: Cultivation antedates historical records in India. Pliny mentions that the Greeks under Alexander the Great saw it in India.

Barley

Description: Grass Family; Annual

Year of Cultivation (BC): 4000

History: Cultivation extremely ancient. Found in oldest Egyptian monuments and in remains of Lake Dwellers of Stone Age in Switzerland. Mentioned by Theophrastus.

Beans, Broad

Description: Pea Family; Annual

Year of Cultivation (BC): 4000

History: Cultivation dates back to the Bronze Age by Lake Dwellers of Switzerland and Italy. Known to the Hebrews 1000 B.C.

Beans, Lima

Description: Pea Family; Annual

Year of Cultivation (BC): 400

History: Found in old Peruvian tombs. Introduced into Africa during period of the slave trade.

Beans, Navy or Kidney

Description: Pea Family; Annual

Year of Cultivation (BC): 400

History: Introduced into Europe subsequent to discovery of America.

Beans, Soy

Description: Pea Family; Annual

Year of Cultivation (BC): 4700

History: Very ancient in China; records show cultivation dating to 2700 B.C.

Beet

Description: Goosefoot Family; Biennial or Perennial

Year of Cultivation (BC): 2200

History: Anciently cultivated for leaves and roots used as vegetable. Sugar beet culture modern, being established in Germany and France about 1810.

Betel Pepper

Description: Pepper Family; Shrub

Year of Cultivation (BC): 2300

History: Leaves chewed with areca nut since 400 B.C. by Malays of the East Indies.

Blue Gum

Description: Myrtle Family; Tree

Year of Cultivation (BC): 75

History: Introduced into Europe, Asia, Africa, California in 1856.

Breadfruit

Description: Nettle Family; Tree

Year of Cultivation (BC): 400

History: In cultivation in tropical East Indies when first visited by Europeans.

Broom Corn

Description: Grass Family; Tree

Year of Cultivation (BC): 4000

History: The species of Sorghum, of which this is one of many varieties, has been in cultivation since very ancient times. Grown in the United States before 1800.

Buckwheat

Description: Buckwheat Family; Annual

Year of Cultivation (BC): 2000

History: Introduced into Europe from northwestern Asia during the Middle Ages.

Cabbage

Description: Mustard Family; Annual, Biennial, Perennial

Year of Cultivation (BC): 4000

History: Ancient Greeks cultivated three varieties. Pliny mentions six. In modern cultivation, varieties very numerous.

Cacao

Description: Byttneria Family; Small tree

Year of Cultivation (BC): 1000

History: Anciently cultivated in tropical America.

Carrot

Description: Parsley Family; Biennial

Year of Cultivation (BC): 2000

History: Introduced into England from Holland about 1500. In wild state becomes troublesome weed.

Carthamine

Description: Sunflower Family; Annual

Year of Cultivation (BC): 4000

History: Grave clothes of mummies are dyed with carthamine and fragments of the plant are found in ancient Egyptian tombs. Introduced into China about 150 B.C.

Cashew

Description: Sumac Family; Tree

Year of Cultivation (BC): 400

History: Widely diffused in tropical countries since Spanish discovery, particularly in India and Guinea. Introduced into East Indies by Portuguese.

Cassava

Description: Spurge Family; Small shrub

Year of Cultivation (BC): 1000

History: Long cultivated in Brazil, and after Spanish discovery extended to Africa and Asia.

Castor Oil Plant

Description: Spurge Family; Annual Small Shrub

Year of Cultivation (BC): 4000

History: Pre-historically cultivated. Seeds found in ancient Egyptian tombs. Mentioned by Theophrastus and Dioscorides.

Celery

Description: Parsley Family; Biennial

Year of Cultivation (BC): 3000

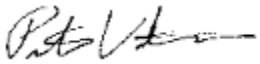
History: Anciently grown in Mediterranean region. Mentioned in Homer's Odyssey.

Cherry

Description: Rose Family; Small tree

Year of Cultivation (BC): 2000

History: Grown before Christian era in western Asia and southern Europe. Mentioned in Virgil's Georgics.



Chickling Vetch

Description: Pea Family; Annual

Year of Cultivation (BC): 2000

History: Cultivation in Southern Europe dates back to Greeks and Latins. Now cultivated in Northern India and Western Asia.

Chick Pea

Description: Pea Family; Annual

Year of Cultivation (BC): 4000

History: Cultivation ancient in India. Referred to in Homer's Iliad and by Theophrastus.

Chicory

Description: Sunflower Family; Perennial

Year of Cultivation (BC): 2000

History: Cultivated by the Greeks and Romans.

China Grass or Ramie

Description: Nettle Family; Perennial, Shrub

Year of Cultivation (BC): unknown

History: Not a grass, but a nettle, closely related to the hemp and the hop. Cultivation begun in Southern France about 1850 and sparingly in Southern United States about the same time.

Cinchona

Description: Madder Family; Small tree

Year of Cultivation (BC): 250

History: Bark introduced into Europe in 1639 by the Countess of Cinchon, whence the name. Now extensively cultivated in India, Japan, Ceylon, and Jamaica.

Cinnamon

Description: Laurel Family; Small tree

Year of Cultivation (BC): 150

History: Cultivation begun in Ceylon about 1765. Bark of wild trees used from remote antiquity.

Clove

Description: Myrtle Family; Small tree

Year of Cultivation (BC): 300

History: Brought to Europe by Portuguese after the establishment of East Indian trade.

Clover (Alsike)

Description: Pea Family; Perennial

Year of Cultivation (BC): 500

History: Introduced into Great Britain from Sweden in 1834.

Clover (Egyptian)

Description: Pea Family; Annual

Year of Cultivation (BC): 500

History: Cultivation universal though not ancient in Egypt. Later introduced in Southern United States.

Clover (Italian)

Description: Pea Family; Annual

Year of Cultivation (BC): 500

History: Cultivation long only local in Southern France. Introduced into Italy and England during the last 200 years. Now extending to the United States.

Clover (Red)

Description: Pea Family; Perennial

Year of Cultivation (BC): 500

History: Introduced into England from the Netherlands in 1663.

Coca

Description: Erythroxylon Family; Small shrub

Year of Cultivation (BC): 1000

History: Cultivation and use ancient in Peru and Bolivia. Supplies of leaves found buried with mummies in Peruvian tombs.

Coconut Palm

Description: Palm Family; Tree

Year of Cultivation (BC): 3000

History: Ancient cultivation in East Indies. Now extended to tropical coasts throughout the world.

Coffee

Description: Madder Family; Small tree

Year of Cultivation (BC): 500

History: Beginning of cultivation uncertain, but not ancient. Introduced for cultivation in South America by the Dutch in 1718.

Coracan

Description: Grass Family; Annual

Year of Cultivation (BC): 2000

History: Cultivation ancient in India. More recently extended into Japan, Egypt, and Abyssinia.

Corn Spurry

Description: Pink Family; Annual

Year of Cultivation (BC): 1500

History: Cultivation dates to the late Romans. Now widely diffused in North Africa, Western Asia, to Hindustan and Java. Sparingly naturalized in the United States.

Cotton

Description: Mallow Family; Annual, Small shrub

Year of Cultivation (BC): 2200

History: Known to ancient Greeks. Introduced into China about 900., Cultivation began in Virginia in 1724. First export in 1784.

Cow Pea

Description: Pea Family; Annual

Year of Cultivation (BC): 500

History: Cultivation widely diffused in tropical regions since establishment of European trade with the East following Spanish discovery. Introduced in Southern United States about 1725.

Cranberry

Description: Heath Family; Small shrub

Year of Cultivation (BC): 100

History: Cultivation begun in Massachusetts about 1800. Now sparingly cultivated in England.

Cucumber

Description: Gourd Family; Annual

Year of Cultivation (BC): 4000

History: Cultivation pre-historic. Known to Greeks and Romans. Introduced into China about 150 B.C.

Currant (Black)

Description: Gooseberry Family; Small shrub

Year of Cultivation (BC): 1500

History: Cultivation began in Europe during early Middle Ages.

Currant (Red)

Description: Gooseberry Family; Small shrub

Year of Cultivation (BC): 1200

History: Unknown to Greeks and Romans. Cultivation dates from the Middle Ages. Rare in England until after 1600.

Date Palm

Description: Palm Family; Tree

Year of Cultivation (BC): 4000

History: Very ancient cultivation in Egypt and Babylonia. Mentioned by Herodotus. Is the palm of the Bible.

Eggplant

Description: Potato Family; Annual

Year of Cultivation (BC): 4000

History: Anciently cultivated in India. Now extensively grown in East Indies; sparingly in temperate United States.

Endive

Description: Sunflower Family; Annual

Year of Cultivation (BC): 2000

History: Probably cultivated by Greeks and Romans, but proof not fully clear.

Ervilla

Description: Pea Family; Annual

Year of Cultivation (BC): 3000

History: Cultivated by ancient Greeks and Romans. Seeds excavated on the site of Troy. Still grown by modern Greeks and also in Italy.

Fenugreek

Description: Pea Family; Annual

Year of Cultivation (BC): 2000

History: Cultivation common in ancient Greece and Italy. Now abandoned in Europe, but maintained in India, Western Asia, and the Nile Valley since remote antiquity.

Figs

Description: Mulberry Family; Small tree

Year of Cultivation (BC): 4000

History: Cultivation pre-historic. Pictured in a pyramid in Egypt. Mentioned by Archilochus 700 B.C., also by Herodotus, Theophrastus, and Plato.

Flax

Description: Flax Family; Annual

Year of Cultivation (BC): 5000

History: Remotely ancient in cultivation, Egyptian mummy clothes are woven from flax fiber.

Garlic

Description: Lily Family; Perennial

Year of Cultivation (BC): 2000

History: Moderately ancient cultivation in China. Herodotus affirms that the ancient Egyptians grew it, but no records remain.

Gooseberry

Description: Gooseberry Family; Small shrub

Year of Cultivation (BC): 400

History: Cultivation may date to the Middle Ages. Became common in Germany an Holland about 1500 and was introduced into England during the sixteenth century.

Grape (American)

Description: Grape Family; Shrub

Year of Cultivation (BC): 300

History: First vineyard planted by Lord Delaware in 1610, but not extensively grown until after the introduction of the Concord grape during the last century. While the Concord, Catawba, Isabella, Hartford, and most of the cultivated varieties originated from the wild northern fox or plum grape, Vitis Labrusca, the Clinton grape was derived from the wild species, Vitis riparia, and most of the American wine grapes from the native summer grape, Vitis aestivalis.

Grape (European)

Description: Grape Family; Shrub

Year of Cultivation (BC): 5000

History: Remotely ancient in Egypt. Used by Lake Dwellers of the Bronze Age in Italy. Cultivated by the Phoenicians, Hebrews, Greeks, and Romans. Introduced into China 120 B.C.

Grape Fruit

Description: Orange Family; Tree

Year of Cultivation (BC): 2000

History: Long cultivated in India and Malay Archipelago. Cultivation established in Florida and California during last 25 years.

Guava

Description: Myrtle Family; Small tree

Year of Cultivation (BC): 400

History: Commonly grown from Mexico to Peru at date of Spanish discover. Since widely diffused in East and West India Islands, India, and China. Later established in Florida and California.

Hemp

Description: Nettle Family; Annual

Year of Cultivation (BC): 4000

History: Anciently cultivated in China, central Asia, and Russia. Probably brought into Europe by Scythians about 1500 B.C. Mentioned by Theophrastus and in the Talmud.

Henna

Description: Loosestrife Family; Shrub

Year of Cultivation (BC): 4000

History: Antiquity of use by women as dye for staining finger nails red shown by ancient Egyptian paintings and mummies.

Hop

Description: Nettle Family; Perennial

Year of Cultivation (BC): 1200

History: Cultivation first mentioned by Pepin 768. Began in England about 1525. Introduced into the United States 1629.

Horseradish

Description: Mustard Family; Perennial

Year of Cultivation (BC): 1000

History: Extensively naturalized as a weed in the United States. Non-seed bearing.

Indigo

Description: Pea Family; Shrub

Year of Cultivation (BC): 2000

History: Anciently cultivated in India. The dye was known to the Romans, who called it indicum, thus denoting its source in their commerce. Another species (Indigo Anil) is cultivated in Mexico.

Jujube

Description: Buckthorn Family; Small tree

Year of Cultivation (BC): 2500

History: According to Pliny was brought from Syria to Rome in the reign of Augustus.

Jute

Description: Linden Family; Annual

Year of Cultivation (BC): 2000

History: Long cultivated in India; much more recently in Ceylon, Sunda Islands, Philippine Islands, and Southern China; introduced into portions of tropical Africa; experimentally grown in Florida.

Kafir Corn

Description: Grass Family; Annual

Year of Cultivation (BC): 4000

History: Non-saccharine Sorghums are of ancient cultivation in Asia and Africa. Introduced into the United States about 1885 by the United States Department of Agriculture.

Leeks

Description: Lily Family; Perennial

Year of Cultivation (BC): 2000

History: Extensively cultivated in central and southern Europe, northern Africa, and Asia. Not now found in wild state.

Lemon

Description: Orange Family; Small tree

Year of Cultivation (BC): 2500

History: Cultivation ancient in India, whence it spread very early into Mesopotamia and Media; became known to the Greeks through the Medes, giving rise to the specific name medica. Mentioned by Theophrastus and Dioscorides.

Lentil

Description: Pea Family; Annual

Year of Cultivation (BC): 5000

History: Pre-Historic. Used by Lake Dwellers. Probably the "red pottage" of Esau mentioned in Genesis.

Lettuce

Description: Sunflower Family; Annual, Biennial

Year of Cultivation (BC): 2200

History: Cultivated by the Greeks and Romans.

Lime

Description: Orange Family; Small tree

Year of Cultivation (BC): 2000

History: Ancient cultivation in India, from whence it has been widely diffused in tropical countries.

Lupine

Description: Pea Family; Annual

Year of Cultivation (BC): 2200

History: Anciently cultivated in Italy. Known to Theophrastus and Pliny.

Lupine (Egyptian)

Description: Pea Family; Annual

Year of Cultivation (BC): 4000

History: Found in ancient Egyptian tombs. Still widely cultivated in Egypt.

Madder

Description: Madder Family; Perennial

Year of Cultivation (BC): 2000

History: Culture becoming non-important on account of substitution by the artificial dye, alizarin.

Maize (Corn)

Description: Grass Family; Annual

Year of Cultivation (BC): 2000

History: Anciently cultivated in Peru even before the Incas, and by the Toltecs and Aztecs in Mexico. Found in the catacombs of Peru and in the remains of North American Mound Builders. Darwin found ears of Indian corn buried in soil that was formerly part of the shore in Peru, but now over eighty feet above sea level. Like wheat, maize is unknown in the wild state and evidently has been so greatly modified by cultivation as to be incapable of maintaining itself from year to year independent of human agency.

Mango

Description: Sumac Family; Small tree

Year of Cultivation (BC): 4000

History: Ancient in India. Introduced into South America (Brazil) about 1750.

Manila Hemp

Description: Banana Family; Small tree

Year of Cultivation (BC): 500

History: Cultivation limited to the Philippine Islands, chiefly to Luzon, where it has been long cultivated.

Mate

Description: Holly Family; Small tree

Year of Cultivation (BC): 1000

History: Use ancient in Brazil and Paraguay. Cultivation increasing.

Millet (Common)

Description: Grass Family; Annual

Year of Cultivation (BC): 5000

History: Cultivation pre-historic in Southern Europe, Egypt, and Asia. Greatly used by Swiss Lake Dwellers of the Stone Age. Mentioned by Theophrastus and Cato.

Millet (Italian)

Description: Grass Family; Annual

Year of Cultivation (BC): 5000

History: Cultivation pre-historic in Asia. In China it is sown at a royal ceremony, dating back to 2700 B.C.

Mulberry (Black)

Description: Nettle Family; Small tree

Year of Cultivation (BC): 2000

History: Mentioned by Greek and Latin authors. Naturalized in Greece, Italy, and Spain. Still much cultivated in Greece.

Mulberry (White)

Description: Nettle Family; Small tree

Year of Cultivation (BC): 4000

History: Ancient cultivation in China in silk culture. Planted in Southern Europe since 1540; in the United States since 1830.

Mushroom

Description: Mushroom Family; Perennial

Year of Cultivation (BC): 1000

History: In cultivation since Middle Ages. The only cryptogamous plant in extensive cultivation.

Muskmelon (Cantaloupe)

Description: Gourd Family; Annual

Year of Cultivation (BC): 2000

History: Represented in a painting found in Herculaneum. Introduced into China 800. Fruit greatly improved during last 400 years.

Mustard (Black)

Description: Mustard Family; Annual

Year of Cultivation (BC): 2000

History: Cultivation ancient in the Mediterranean basin. Naturalized as a weed in the United States.

Mustard (White)

Description: Mustard Family; Annual

Year of Cultivation (BC): 2000

History: Cultivation ancient in the Mediterranean basin. Naturalized as a weed in the United States.

New Zealand Spinach

Description: Carpetweed Family; Annual

Year of Cultivation (BC): 130

History: Brought to England by Captain Cook in 1771 and put in cultivation by Sir Joseph Banks. Now sparingly diffused in gardens in Europe and the United States.

Nutmeg

Description: Nutmeg Family; Small tree

Year of Cultivation (BC): 2000

History: Ancient cultivation in East Indies. Later introduced into West Indies and Brazil.

Oats

Description: Grass Family; Annual

Year of Cultivation (BC): 3800

History: Pre-historic in central Europe. Found in lake dwellings of the Bronze Age. Pliny states that the Germans lived on oatmeal. Not cultivated by ancient Egyptians or Hebrews. First Chinese record later than 600.

Ochrus

Description: Pea Family; Annual

Year of Cultivation (BC): 2300

History: Mentioned by Theophrastus, but cultivation local in Southern Europe in both ancient and modern times.

Oil Palm

Description: Palm Family; Tree

Year of Cultivation (BC): 400

History: In cultivation when Guinea was first visited by travelers early in the sixteenth century. Introduced into Brazil and West Indies by slave traders, where it has now become naturalized.

Okra

Description: Mallow Family; Annual

Year of Cultivation (BC): 1500

History: Anciently grown in tropical Africa. Was in cultivation in Egypt in 1216. Now diffused in tropical countries and in the Southern United States.

Olive

Description: Olive Family; Small tree

Year of Cultivation (BC): 4000

History: Cultivated by ancient Egyptians. Mentioned in Homer's Iliad and Odyssey, and in the earliest Hebrew books. According to Pliny cultivation began at Rome about 600 B.C.

Onion

Description: Lily Family; Biennial

Year of Cultivation (BC): 4000

History: Cultivated by the ancient Egyptians; also by the Greeks and Romans.

Orange

Description: Orange Family; Small tree

Year of Cultivation (BC): 1500

History: Cultivation developed in Middle Ages. Unknown to Greeks and Romans. First planted in the United States by Spanish at St. Augustine, Florida, in 1562.

Papaw

Description: Papaya Family; Small tree

Year of Cultivation (BC): 1000

History: Long cultivated in West Indies. Now diffused in all tropical regions.

Parsley

Description: Parsley Family; Biennial

Year of Cultivation (BC): 1200

History: Cultivated by Charlemagne. Introduced into England in 1548.

Parsnip

Description: Parsley Family; Biennial

Year of Cultivation (BC): 2000

History: Cultivation developed in central and southern Europe during Middle Ages.

Pea

Description: Pea Family; Annual

Year of Cultivation (BC): 2000

History: Cultivation appears to have begun with the Romans and Greeks. Now widely grown in Europe, North America, and Asia as far east as India.

Pea (Flat-podded)

Description: Pea Family; Annual

Year of Cultivation (BC): 2000

History: Long cultivated in Southern Europe and diffused by modern cultivation in western Asia.

Pea (Garden)

Description: Pea Family; Annual

Year of Cultivation (BC): 3800

History: Cultivated by Lake Dwellers of Bronze Age and by ancient Greeks. Mentioned by Theophrastus.

Peach

Description: Rose Family; Small tree

Year of Cultivation (BC): 4000

History: Cultivation pre-historic in China. Introduced among Greeks and Romans about 100.

Peanut

Description: Pea Family; Annual

Year of Cultivation (BC): 1000

History: Ancient cultivation in South America. Founded in ancient Peruvian tombs. Introduced into Africa about 1500. Important in the United States since 1866.

Pear

Description: Rose Family; Tree

Year of Cultivation (BC): 4000

History: Pre-historically cultivated by Lake Dwellers of Bronze Age. Mentioned by Homer, Theophrastus, and Pliny.

Pepper (Black)

Description: Pepper Family; Shrub

Year of Cultivation (BC): 2300

History: Long cultivated. Used as a medicine by Hippocrates 400 B.C. In Middle Ages was one of the most prized and costly spices.

Pepper (Red)

Description: Potato Family; Annual

Year of Cultivation (BC): 500

History: Early cultivation in the West Indies. Introduced into Europe in sixteenth century.

Peppermint

Description: Mint Family; Perennial

Year of Cultivation (BC): 150

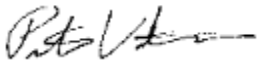
History: Commercial Cultivation for oil begin in Surrey, England about 1750. Now extended to the United States. Also cultivated in Japan.

Pineapple

Description: Bromelia Family; Perennial

Year of Cultivation (BC): 500

History: In cultivation at time of Spanish discovery in tropical America. Introduced in sixteenth century into India and Guinea; then into Florida, California, and Hawaii.



Pistachio Nut

Description: Sumac Family; Shrub

Year of Cultivation (BC): 1900

History: Long cultivated in western Asia. Introduced into Italy about 30.

Plum

Description: Rose Family; Small tree

Year of Cultivation (BC): 2000

History: Extensively cultivated by the Romans. Mentioned by Pliny. The prune is a variety that produces fruit containing a high percentage of sugar, which can be dried without removing the skins or stones.

Pomegranate

Description: Myrtle Family; Tree

Year of Cultivation (BC): 4000

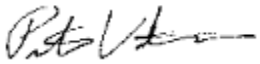
History: Cultivated throughout historic time. Represented in ancient Assyrian and Egyptian sculptures. Introduced into China 150 B. C. Cultivated in the United States in Florida and California.

Poppy

Description: Poppy Family; Annual

Year of Cultivation (BC): 3000

History: Known to the Lake Dwellers. Used by Greeks and Romans. Mentioned by Homer.



Potato

Description: Potato Family; Perennial

Year of Cultivation (BC): 2000

History: Cultivation ancient in Peru. Widely diffused from Chile to Columbia at time of Spanish discovery but no evidences of culture in Mexico or by North American Indians. Introduced into what is now North Carolina and Virginia late in the 16th century. Brought to Europe first by the Spaniards early in the sixteenth century and to England by Sir Walter Raleigh in 1585.

Prickly Pear

Description: Cactus Family; Small tree

Year of Cultivation (BC): 500

History: Cultivated in Mexico before the Spanish conquest. One of first American plants taken to Old World. Introduced into Southern Europe, Asia, and Africa. Now widely naturalized.

Pumpkin

Description: Gourd Family; Annual

Year of Cultivation (BC): 500

History: Cultivated by Indians at time of earliest discoveries in the United States.

Purslane

Description: Purslane Family; Annual

Year of Cultivation (BC): 4000

History: Diffused in cultivation throughout the world since earliest times. Now extensively naturalized in the United States.

Quince

Description: Rose Family; Small tree

Year of Cultivation (BC): 4000

History: Cultivation very ancient in Western Asia and in Greece. Mentioned by Plutarch and Pliny.

Quinoa

Description: Goosefoot Family; Annual

Year of Cultivation (BC): 1000

History: Extensive ancient cultivation in the Andean plateau, Colombia to Chile. Was staple food for natives of this region at date of Spanish conquest.

Radish

Description: Mustard Family; Annual

Year of Cultivation (BC): 3000

History: Cultivated in gardens from China to Europe since ancient times. Mentioned in Chinese records 1100 B.C.

Rape

Description: Mustard Family; Biennial

Year of Cultivation (BC): 4000

History: Pre-historic cultivation in Europe.

Raspberry (Black)

Description: Rose Family; Small shrub

Year of Cultivation (BC): 75

History: Cultivation began in the United States in 1832. Now general in Eastern States.

Raspberry (Red)

Description: Rose Family; Shrub

Year of Cultivation (BC): 1000

History: Long and widely cultivated in northern Europe; sparingly in the United States.

Rhubarb

Description: Buckwheat Family; Perennial

Year of Cultivation (BC): 2000

History: In Europe long grown as vegetable, foliage plant, and for medicinal properties of the root.

Rice

Description: Grass Family; Annual

Year of Cultivation (BC): 5000

History: Mentioned in Chinese records dating back to 2800 B.C. Cultivation in Southern United States began before 1700.

Rye

Description: Grass Family; Annual

Year of Cultivation (BC): 2000

History: Least ancient of Old World cereals. Unknown to the ancient Greeks, but mentioned by Pliny. Cultivation probably did not antedate the Christian Era in Roman countries, but may have been more ancient in Russia and Thrace.

Saffron

Description: Iris Family; Perennial

Year of Cultivation (BC): 4000

History: Cultivation remotely ancient in Western Asia.

Sainfoin

Description: Pea Family; Perennial

Year of Cultivation (BC): 500

History: Cultivation appears to have begun in France about 1400

Sapodilla

Description: Sapodilla Family; Tree

Year of Cultivation (BC): 500

History: Cultivation antedates Spanish discovery in tropical America. Since much diffused in tropical regions of India and East India Islands.

Sea Kale

Description: Mustard Family; Perennial

Year of Cultivation (BC): 200

History: Cultivation developed in Europe in the eighteenth century.

Sesame

Description: Bignonia Family; Annual

Year of Cultivation (BC): 4000

History: Cultivation very ancient in Sunda Islands. Introduced into India about 1000 B.C.; Egypt, about 500 B.C.; in Brazil before 1650.

Sisal Hemp

Description: Amaryllis Family; Small tree

Year of Cultivation (BC): 500

History: Long cultivated to limited extent in Mexico and Central America. Greatly increased in Yucatan in last 100 years.

Sorghum Cane

Description: Grass Family; Annual

Year of Cultivation (BC): 4700

History: Anciently cultivated in Egypt, India, and China. Many varieties now grown throughout the world.

Spinach

Description: Goosefoot Family; Annual

Year of Cultivation (BC): 2000

History: Cultivation ancient in Western Asia. Brought into China by Chang-kien about 150 B.C. Introduced into Europe in fifteenth century.

Strawberry (American)

Description: Rose Family; Perennial

Year of Cultivation (BC): 300

History: Introduced into England in 1629. The principal strawberry grown in the United States, where culture became important with introduction of Hovey's strawberry in 1834.

Strawberry (Chilean)

Description: Rose Family; Perennial

Year of Cultivation (BC): 300

History: Introduced into France from Chile in 1715. Now much crossed with the American and the European strawberry in cultivation.

Sugar Cane

Description: Grass Family; Annual

Year of Cultivation (BC): 2000

History: Brought to Europe by Crusaders. Introduced into Brazil, Mexico, and West Indies, 1500-1550.

Sumac

Description: Sumac Family; Small tree

Year of Cultivation (BC): 500

History: Cultivated in Spain, Italy, and Sicily for the leaves, which are used in tanning.

Sunflower

Description: Sunflower Family; Annual

Year of Cultivation (BC): 500

History: In cultivation by the Indians, who used seeds for food and hair oil, at period of early discoveries. Introduced into Europe about 1550. Mentioned by Champlain in his travels, 1610.

Sweetpotato

Description: Convolvulus Family; Perennial

Year of Cultivation (BC): 2000

History: Widely cultivated in tropical countries. Ancient in China and antedating Spanish discovery in West Indies.

Taro

Description: Arum Family; Perennial

Year of Cultivation (BC): 2000

History: Cultivation ancient in Polynesia, Reached China before 100 B.C. and long cultivated in India and Egypt. Mentioned by Pliny.

Tea

Description: Camellia Family; Shrub

Year of Cultivation (BC): 4600

History: Mentioned in Chinese records dating 2700 B.C. Extensively grown in India since 1870. Experimentally grown in the southern United States.

Timothy Grass

Description: Grass Family; Perennial

Year of Cultivation (BC): 190

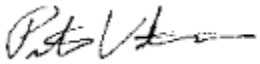
History: Named for Timothy Hanson, who introduced the seed in the Carolinas about 1720.

Tobacco

Description: Potato Family; Annual

Year of Cultivation (BC): 200

History: Almost universally used by Indians of North and South America since ancient times. Tobacco pipes abundant in Aztec tombs, also found among remains of the Mound Builders. Introduced into Europe by Oviedo about 1520. Cultivated by first colonists in Virginia.



Tomato

Description: Potato Family; Annual

Year of Cultivation (BC): 500

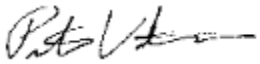
History: Cultivated in Peru at time of Spanish discovery. Formerly called "Love Apple" and considered poisonous, but during last century cultivation has become extensive in all temperate climates.

Turnip

Description: Mustard Family; Biennial

Year of Cultivation (BC): 4000

History: Pre-historic in Europe, but not known to ancient Egyptians, Hebrews, or Chinese.



Vetch

Description: Pea Family; Annual

Year of Cultivation (BC): 2000

History: In cultivation by the Romans at the time of Cairo.

Watermelon

Description: Gourd Family; Annual

Year of Cultivation (BC): 4000

History: Very anciently cultivated by Egyptians. Most extensive cultivation in the United States is in the Southern States; in Europe, in southern Russia.

Wheat

Description: Grass Family; Annual

Year of Cultivation (BC): 5000

History: Cultivation pre-historic in Asia. Grown by the Lake Dwellers, ancient Egyptians, and by the Chinese as early as 2700 B.C. Like maize, wheat is unknown in a wild state. Origin not established with certainty, but weight of evidence indicates the Euphrates region.

Yam

Description: Yam Family; Perennial

Year of Cultivation (BC): 2000

History: Long cultivation in East Indies and Pacific Islands. Now spread to many tropical countries.

Planting the Garden (Screen 1 of 7)

click here to see movie...

One of the most important elements of success in growing vegetables is planting, or transplanting, each crop at the time or times that are best for the operation in each locality. Temperatures often differ so much between localities not many miles apart that the best planting dates for some one vegetable may differ by several days or even 2 weeks.

Vegetable crops may be roughly grouped and sown according to their hardiness and their temperature requirements. The frost-free date in spring is usually 2 to 3 weeks later than the average date of the last freeze in a locality and is approximately the date that oak trees leaf out.

Arranging the Garden (Screen 2 of 7)

click here to see movie...

No one plan or arrangement for a garden can suit all conditions. Each gardener must plan to meet his own problem. Careful planning will lessen the work of gardening and increase the returns from the labor. Planting seeds and plants at random always results in waste and disappointment. Suggestions for planning a garden are here presented with the idea that they can be changed to suit the individual gardener.

The first consideration is whether the garden is to be in one unit or in two. With two plots, lettuce, radishes, beets, spinach, and other vegetables requiring little space are grown in a small kitchen garden, and potatoes, sweet corn, pumpkins, melons, and other vegetables requiring more room are planted in a separate patch, as between young-orchard-tree rows or in other areas where conditions are especially suitable for their culture.

Cultivation Methods (Screen 3 of 7)

The cultivation methods to be employed are important in planning the garden. When the work is to be done mainly with a garden tractor, the site and the arrangement should be such as to give the longest practicable rows. On slopes of more than 1 1/2 percent, especially on light-textured soil, the rows should extend across the slope at right angles, or on the contours where the land is uneven.

click here to see picture...

The garden should be free from paths across the rows, and turning spaces of 10 to 12 feet should be provided at the end's. The rows for small-growing crops may be closer together for hand cultivation than for cultivation with power equipment.

Any great variation in the composition of the soil within the garden should be taken into consideration when deciding on where to plant various crops. If part of the land is low and moist, such crops as celery, onions, and late cucumbers should be placed there. If part is high, warm, and dry, that is the proper spot for early crops, especially those needing a soil that warms up quickly.

Permanent Crops (Screen 4 of 7)

Permanent crops, such as asparagus and rhubarb, should be planted where they will not interfere with the annual plowing of the garden and the cultivation of the annual crops. If a hotbed, a coldframe, or a special seedbed is provided, it should be either in one corner of, or outside, the garden.

Tall-growing crops should be planted where they will not shade or interfere with the growth of smaller crops. There seems to be little choice As to whether the rows do or do not run in a general east-and-west or in a general north-and south direction, but they should conform to the contours of the land.

Succession of Crops

Except in dry-land areas, all garden space should be kept fully occupied throughout the growing season. In the South, this means the greater part of the year. In fact, throughout the South Atlantic and Gulf coast regions it is possible to have vegetables growing in the garden every month of the year.

In arranging the garden, all early-maturing crops may be grouped so that as soon as one crop is removed another takes its place. It is desirable, however, to follow a crop not with another of its kind, but with an unrelated crop. For example, early peas or beans can very properly be followed by late cabbage, celery, carrots, or beets; early corn or potatoes can be followed by fall turnips or spinach.

It is not always necessary to wait until the early crop is entirely removed; a later one may be planted between the rows of the early crop -- for example, sweet corn between potato rows. Crops subject to attack by the same diseases and insects should not follow each other.

In the extreme North, where the season is relatively short, there is very little opportunity for succession cropping. In dry-land areas, inter-cropping generally is not feasible, because of limited moisture supply. Therefore, plenty of land should be provided to accommodate the desired range and volume of garden crops.

Late Summer & Fall Garden

Although gardening is commonly considered a spring and early-summer enterprise, the late summer and fall garden deserves attention too.

Second and third plantings of crops adapted to growing late in the season not only provide a supply of fresh vegetables for the latter part of the season but often give better products for canning, freezing, and storing.

Late-grown snap and lima beans and spinach, for example, are well adapted to freezing and canning; beets, carrots, celery, and turnips, to storage. In the South, the late-autumn garden is as important as the early-autumn one.

Southern-Grown Plants

Vegetable plants grown outdoors in the South are shipped to all parts of the country. They are grown cheaply and usually withstand shipment and resetting very well. They may not always be as good as home-grown plants, but they save the trouble of starting them in the house or in a hot-bed.

Plants of beets, Brussels sprouts, cabbage, cauliflower, lettuce, onions, peppers, and tomatoes are extensively grown and shipped; tomato, cabbage, and onion plants make up the bulk of the shipments. The plants are usually wrapped in bundles of 50 each and shipped by either mail or express.

Tomato and pepper plants are packed with a little damp moss around the roots, but onion and cabbage plants are usually packed with bare roots. Shipments involving large numbers of bundles are packed in ventilated hampers or slatted crates and usually are sent by motor-truck or rail express. Shipments by air mail and air express are increasing.

The disadvantages of using southern-grown plants are the occasional delays in obtaining them and the possibility of transmitting such diseases as the wilt disease of the tomato, black rot of cabbage, and disorders caused by nematodes.

State-certified plants that have been carefully inspected and found as free of these troubles as can be reasonably determined are available. Southern-grown plants are now offered for sale by most northern seedsmen, by mail-order houses, and often by local hardware and supply houses.

Planting and Care

The garden can be planted over a period of 3 to 4 months, depending on the length of the growing season. Spinach, peas, onions, and lettuce will do best if planted as early as the soil can be worked. Tomatoes and other tender plants should not be set out until the danger of frost is past. Plantings of cabbage, cauliflower, broccoli, Chinese cabbage, turnips, and so forth for fall harvest should be made in late June or early July.

Marking rows. A heavy cord stretched tightly between stakes makes it easy to mark a straight row. To open furrows for large seeds, walk backward, stepping on the cord to hold it in place, and drag the tilted blade of the hoe along the string. For small seeds, drag the hoe handle along the string in short strokes, as in sweeping.

Row Spacing (Screen 2 of 7)

Rows are designed for convenience in planting, cultivating, and harvesting.

If they are too closely spaced, competition between plants and with weeds for water, plant nutrients, and sunlight is intensified, and harvesting becomes difficult.

Standard 3- and 6-foot row spacings are the most convenient if small power tools are used.

Sowing the Seed (Screen 3 of 7)

click here to see picture...

Seeds should be sown a little thicker than the plants will finally stand to allow for those that fail to grow or that may be killed when they are very young.

Space the seed uniformly.

Heavy seeding wastes seed and time in thinning the plants.

Drills or Hills (Screen 4 of 7)

click here to see picture...

A drill is a row of single plants spaced more or less evenly.

A hill is a cluster of plants, not a mound of soil.

Mounds are not recommended as mounded soil dries out more quickly than level soil.

Depth to Plant

Cover the large seeds such as corn, peas, and beans with 1 to 2 inches of soil and all small seeds such as carrots, lettuce, and the like with 1/4 to 1/2 inch of soil.

A general rule is to plant shallow in early spring, especially on heavy soils. In warmer weather and on lighter soils, deeper seeding is usually advisable. In covering the seed, provide good contact between the soil and seed by gently firming the soil over the seed.

Some additional loose soil can be pulled over the row to leave a slight ridge. In hot, dry weather when the soil around the seed dries out quickly, frequent light watering will help germination. Another possibility is to shade the row until the young plants start to push through the soil. This can be done with boards or papers held in place with stones or soil.

Thinning (Screen 6 of 7)

Remove surplus plants before they can compete with those that are to remain.

The total yield is likely to be much greater if thinning is done early than if it is done only by removing those that are large enough to eat.

Ties (Screen 7 of 7)

For tying plants to trellises and stakes, soft tarred string or raffia (the fiber from the Raphia palm of Madagascar) is used.

In training Greenhouse plants the young branches should be drawn outwards by means of ties fastened to a string or wire under the pot-rim; the center then fills up, and slender stakes are used as required; but the fewer these are in number the better.

Climbers are trained from the bottom around or across trellises, of which the cylindrical or the balloon-shaped, or sometimes the flat oval or circular, are the best forms. The size should be adapted to the habit of the plant, which should cover the whole by the time flowers are produced.

Bast fiber and raffia fiber are to be preferred for light subjects of this character, as they can be split to any degree of fineness. Very durable trellises for greenhouse climbers are made of slender round iron rods for standards, having a series of hooks on the inner edge, into which rings of similar metal are dropped; the rings may be graduated so as to form a broad open top, or may be all of the same size, when the trellis will assume the cylindrical form. The illustration below shows a pot specimen of clematis trained over a balloon-shaped trellis.

The training of certain bedding plants over the surface of the soil is done by small pegs of birch wood or bracken, by loops of wire or cheap hair-pins, or sometimes by loops of raffia having the ends fixed in the soil by the aid of the dibble. The object is to fill up the blank space as quickly and as evenly as possible.

Transplanting (Screen 1 of 3)

The term "transplanting" means shifting of a plant from one soil or culture medium to another. It may refer to the shifting of small seedlings from the seedbed to other containers where the plants will have more space for growth, or it may mean the setting of plants in the garden row where they are to develop for the crop period.

click here to see picture...

Contrary to general belief, transplanting does not in itself stimulate the plant or make it grow better; actually growth is temporarily checked, but the plant is usually given more space in which to grow. Every effort should be made during transplanting to interrupt the growth of the plant as little as possible.

Plants started in seed flats, flowerpots, and other containers in the house, the hotbed, the greenhouse, or elsewhere should be shifted as soon as they can be handled to boxes, flowerpots, plant bands, or other containers where they will have more room to develop. If shifted to flats or similar containers, the plants should be spaced 2 or more inches apart.

This provides room for growth until the plants can be moved to their permanent place in the garden. Most gardeners prefer to place seedlings singly in flowerpots, paper cups with the bottoms pierced for drainage, plant bands, berry boxes, or other containers. When the plants are set in the garden, the containers are carefully removed.

Soil for transplanting should be fertile, usually a mixture of rich topsoil and garden compost, with a very light addition of a commercial garden fertilizer.

Moistening the seedbed before removing the seedlings and care in lifting and separating the delicate plants make it possible to shift them with little damage to the root system and with only minor checks to their growth.

Plants grown singly in separate containers can be moved to the garden with almost no disturbance to the root system, especially those that are hardened for a week or two before being set outdoors. Plants being hardened should be watered sparingly, but just before they are set out, they

should be given a thorough soaking.

Transplanted Plants (Screen 2 of 3)

It is seldom possible to keep the transplanted plants in house windows without their becoming spindling and weak. For healthy growth, place them in a hotbed, coldframe, or other place where they will receive an abundance of sunshine, ample ventilation, and a suitable temperature.

click here to see picture...

Strong, vigorous seedlings can be started under 40-watt fluorescent tubes. These tubes should be 6 to 8 inches above the seedlings. Temperatures should be about 600 F at night and 700 during the day. Best results are obtained if the fluorescent fixture is next to a window to increase the amount of light reaching the young plants.

Transplanting Smaller Plants

In transplanting smaller subjects, such as plants for the flower garden, much less effort is required. The plant must be lifted with as little injury to its rootlets as possible, and carefully set into the hole, the soil being filled in round it, and carefully pressed close by the hand.

For moving small plants the garden trowel is a very convenient tool, but we are inclined to give the preference to the hand-fork. For larger masses, such as strong growing herbaceous plants, a spade or digging-fork will be requisite and the soil may be trodden down with the feet.

When seedlings of vigorous plants have to be pricked out, a dibble or dibber is the best implement to be used. The ground being prepared and, if necessary, enriched, and the surface made fine and smooth, a hole is made with the dibble deep enough and large enough to receive the roots of the seedling plants without doubling them up, and the hole is filled in by working the soil close to the plant with the point of the dibble.

The pricking out of seedlings in pots in the propagating pit is effected in a similar way. The plants, indeed, often require to be removed and set from 1/2 in. to 1 in. apart before they have become sufficiently developed to admit of being handled with any degree of facility, and for these a pointed stick of convenient size is used as a dibble.

In delicate cases, such as seedling gloxinias and begonias, it is best to lift the little seedling on the end of a flattish pointed stick, often cleft at the apex, pressing this into the new soil where the plant is to be placed, and liberating it and closing the earth about it by the aid of a similar stick held in the other hand.

Potting and Repotting

Garden pots are made with a comparatively large hole in the bottom, and those of the largest size have also holes at the side near the bottom ; these openings are to prevent the soil becoming saturated or soured with superabundant water.

To prepare the pot for the plant, a broadish piece of potsherd, called a crock, is placed over the large hole, and if there be side holes they also are covered. The bottom crock is made from a piece of a broken garden pot, and is laid with the convex side upwards ; then comes a layer of irregular pieces of crock of various sizes, about 1 in. deep in a 5-in. pot, 2 in. in an 11-in or 12-in pot, etc.

click here to see picture...

The mode of crocking a pot is shown in the illustration above. A few of the coarser lumps from the outer edge of the heap of potting soil are spread over the crocks. The same end, that of keeping the finer particles of the soil from mixing with the drainage crocks, may be attained by shaking in a little clean moss.

A handful or two of the soil is then put in, and on this the plant with its roots spread out is to be set, a trifle higher than the plant should stand in the pot when finished off ; more soil is to be added, and the whole pressed firmly with the fingers, the base of the stem being just below the pot-rim, and the surface being smoothed off so as to slope a little outwards.

When finished off, the pots should be watered well, to settle the soil; but they should stand till the water has well drained away, since, if they are moved about while the fresh soil is very wet, there will be a risk of its becoming puddled or too much consolidated.

Larger plants do not need quite such delicate treatment, but care should be taken not to handle the roots roughly. The soil for these may be somewhat coarser, and the amount of drainage material more ample. Larger bodies of soil also require to be more thoroughly consolidated before watering; otherwise they would settle down so as to leave an unsightly void at the pot-rim.

Some plants, especially when potted temporarily, may be dealt with in a simpler way. A single crock may be used in some cases, and in others no crock at all, but a handful of half-decayed leaves or half-decayed dung thrown into the bottom of the pot.

This mode of potting does well for bulbs, such as hyacinths, which are either thrown away or planted out when the bloom is over. The bedding plants generally may be potted in this way, the advantage being that at planting-out time there is less risk of disturbing the roots than if there were potsherds to remove.

Plants of this character should be potted a little less firmly than specimens which are likely to stand alone in the pot, and indeed the soil should be made comparatively light by the intermixture of leaf-mold or some equivalent, in order that the roots may run freely and quickly into it.

Potting of Epiphytal Plants

For epiphytal plants like orchids the most thorough drainage must be secured by the abundant use of potsherds, small pots being sometimes inserted inside the larger ones, or by planting in shallow pots or pans, so that there shall be no large mass of soil to get consolidated.

For most of these the lightest spongy but sweet turfy peat must be used, this being packed lightly about the roots, and built up above the pot-rim, or in some cases freely mixed before use with chopped sphagnum moss and small pieces of broken pots or nodules of charcoal. The plants under these conditions often require to be supported by wooden pegs or sticks.

Some of the species grow better when altogether taken out of the soil and fixed to blocks of wood., but in this case they require a little coaxing with moss about the roots until they get established. In other cases they are planted in open baskets of wood or wire, using the porous peat and sphagnum compost.

Both blocks and baskets are usually suspended from the roof of the house, hanging free, so that no accumulation of water is possible. These conditions of orchid-growing have undergone great changes of late years, and the plants are grown much as other stove and greenhouse plants in ordinary pots with composts not only of peat but of leaf-mold, and fibers from osmunda and polypodium ferns.

Temporary Repotting (Screen 3 of 3)

When repotting is adopted as a temporary expedient, as in the case of bedding-out plants which it is required to push forward as much as possible, it will suffice if provision is made to prevent the drainage hole from getting blocked, and a rich compost is provided for the encouragement of the roots.

When, however, a hard-wooded plant has to be repotted, the case is different; it may stand without further potting for one year or two years or more, and therefore much more care is necessary. The old ball of earth must be freed from all or most of the old crocks without doing injury to the roots, and the sharp edge of the upper surface gently rubbed off.

If there be any sour or sodden or effete soil into which the roots have not run, this should be carefully picked out with a pointed stick. The ball is to be set on the new soil just high enough that when finished the base of the stem may be somewhat below the pot-rim, and the space between the old ball and the sides of the pot is to be filled in gradually with the prepared compost, which is from time to time to be pressed down with a blunt-ended flat piece of wood called a potting-stick, so as to render the new soil as solid as the old.

The object of this is to prevent the plant from starving by the water applied all running off by way of the new soil, and not penetrating the original ball of earth: When this amount of pressure is necessary, especially in the case of loamy composts, the soil itself should be rather inclined to dryness, and should in no case be sufficiently moist to knead together into a pasty mass.

In ordinary cases the potting soil should be just so far removed from dryness that when a handful is gently pressed it may hang together, but may lose its cohesion when dropped.

Irrigation (Screen 1 of 1)

Irrigation is seldom needed in home gardens, but in some years additional water during periods of drought may improve the quality and yields of summer vegetables. Moisture will more likely be a limiting factor on sandy or shallow soils than on heavy or deep soils.

Irrigation may prove beneficial when there has been no soaking rain (approximately 1 inch) for 10 to 14 days. If water must be carried in a pail, it may pay to water only recently transplanted vegetables. But a gardener who has a hose and adequate water pressure may find that it pays to water the entire garden once every week during dry periods.

When irrigating, apply enough water to soak loamy soil to a depth of 5 to 6 inches and sandy soil to 10 to 12 inches. This takes approximately 2/3 gallon of water to each square foot of garden or about 65 gallons for 100 square feet. With sprinklers the amount of water applied can be determined by placing 4 or 5 straight-sided cans in the area being watered. One inch of water equals 1 inch of rain.

Furrow irrigation, running the water down small furrows between rows, is possible if the garden is nearly level or has a uniform slope.

Soil Pellets (Screen 1 of 1)

click here to see picture...

Soil pellets are the simplest and easiest method for starting plants and are readily available from garden supply stores and other sources.

Soil pellets are a well-balanced synthetic soil mixture and are free of soil-borne diseases and weeds.

Starting The Plants (Screen 1 of 5)

Earliness, economy of garden space, and lengthening of the growing season may be obtained by setting the plants of many vegetables instead of sowing the seed directly in the garden. Moreover, it is almost impossible to establish good stands from seed sown directly in place in the garden with delicate plants, such as celery, under average conditions.

In the warmer parts of the United States, practically all vegetable plants may be started in specially prepared beds in the open with little or no covering. In the temperate and colder regions, if an early garden is desired, it is essential that certain crops, such as tomatoes, peppers, eggplant, early cabbage, cauliflower, and early head lettuce, be started indoors, in hotbeds, or in cold-frames. Occasionally onion, beet, cucumber, squash, and melons are started under cover and transplanted.

Special Devices (Screen 2 of 5)

In determining the type of equipment for starting early plants, the gardener must consider the temperature and other climatic conditions in his locality, as well as the nature of the plants to be started. Hardy plants, such as cabbage, need only simple inexpensive facilities, but such heat-loving, tender seedlings as peppers and eggplant must have more elaborate facilities for successful production.

In the warmer parts of the United States, and in the well-protected locations elsewhere, a coldframe or a sash-covered pit on the sunny side of a building usually suffices.

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In colder sections, or in exposed areas elsewhere, some form of artificial heat is essential. Where only a little protection against cold damage is needed, a coldframe in which a temporary bank of lamps can be placed may be sufficient.

The hotbed, lean-to, or sash greenhouse heated by manure, pipes, flues, or electricity are all widely used, the choice depending on conditions. A comparatively small plant-growing structure will provide enough plants for several gardens, and joint efforts by a number of gardeners will usually reduce the labor of producing plants.

The plant-growing structure should always be on well-drained land free from danger of flooding. A sunny, southern exposure on a moderate slope, with trees, a hedge, a board fence, or other form of windbreak on the north and west, makes a desirable site. Plenty of sunshine is necessary.

Hotbeds and other plant-growing devices require close attention. They must be ventilated at frequent intervals, and the plants may require watering more than once daily. Convenience in handling the work is important.

Sudden storms may necessitate closing the structure within a matter of minutes. Plant growing at home should not be undertaken by persons obliged to be away for extended periods, leaving the plant structure unattended.

A tight well-glazed structure is necessary where the climate is severe; less expensive facilities are satisfactory elsewhere.

Hot-Caps and Hot-Tents

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Plant protectors (hot-caps, hot-tents) are usually made of wax paper and serve as miniature cold frames. They are used early in the spring to start tender plants from seed and to protect very early transplants.

Hot-tents are larger than hot-caps and are recommended for the vine crops and tomatoes. Place the caps over the seeded hills or transplants as soon as seeding or transplanting is done.

Cover the flanges at the bottom of the cap with soil to hold them in place. Cut a small slit a half inch or so on the south side of the protector to provide ventilation.

After the danger of frost has passed, open the cap gradually to harden the plant. First make a small hole in the top or raise one side of the cap and enlarge that opening. The entire cap can be removed about a week later.

Covers for Hotbeds (Screen 4 of 5)

Covers for hotbeds and cold-frames may be glass sash, -fiber glass, plastic film, muslin, or light canvas.

In the moderate and cooler sections of the country, standard 3- by 6-foot hotbed sash is most satisfactory. Even this requires supplementary covering with canvas, blankets, mats, or similar material during freezing weather.

The amount of covering is determined by the degree of heat supplied the structure, the severity of the weather, and the kind of plants and their stage of development. Farther South, where less protection is necessary, a muslin cover may be all that is needed and for only a part of the time.

Many substitutes for glass as coverings for hotbeds and cold-frames are on the market. The most widely used substitutes are various kinds of clear plastic film. Some of these have a lifespan of only one season, and others a lifespan of 3 to 5 years.

Clear plastic film transmits as much light as glass in the visible range, and more than glass in the ultraviolet and infrared ranges.

The film comes as flat sheets (on rolls) and in tubular form. Flat-sheet film is used for tacking onto wooden frames; the tubular form is used for enclosing metal tubular frames with a tight double layer of film.

Large plant hoods made from semicircular aluminum or galvanized steel pipe and fitted with a sleeve of tubular plastic film make excellent cold-frames or seasonal row covers. When used in this way, a double layer of plastic film provides an air space that insulates against 4' to 7' of frost temperature change.

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Electrically heated plant beds are ideal for the home gardener, provided electric rates are not too high. The beds may be built any size. Because they are equipped with thermostatic control, they require a minimum of attention. It is now possible to buy frames-completely equipped with heating cables, switches, and thermostats-ready to assemble and set in

position. Fill the frames with soil or plant boxes and connect to a source of current.

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Small frames may be removed at the end of the season and stored; larger frames are usually treated as a permanent installation.

Hardening Plants

Plants should be gradually hardened, or toughened, for 2 weeks before planting in the open garden. This is done by slowing down their rate of growth to prepare them to withstand such conditions as chilling, drying winds, shortage of water, or high temperatures.

Cabbage, lettuce, onion, and many other plants can be hardened to withstand frost; others, such as tomatoes and peppers cannot. Withholding water and lowering the temperature are the best ways to harden a plant. This may be done in a glass or plastic coldframe.

About 10 days before being planted in the open ground, the young plants in beds or flats are blocked out with a large knife. Blocking, or cutting the roots, causes new roots to form quickly near the plants, making recovery from transplanting in the open easier. Blocking also makes it easier to remove the plants from the bed or flat with minimum injury.

Propagation (Screen 1 of 27)

The increase of plants, so far as the production of new individuals of particular kinds is concerned. is one of the most important and constantly recurring of gardening operations.

In effecting this, various processes are adopted, which will now be described.

By Seeds (Screen 2 of 27)

This may be called the natural means of increasing the number of any particular kind of plant, but it is to be remembered that we do not by that means secure an exact reproduction of the parent, especially in the case of plants raised or evolved in the course of generations by hybridization and selection.

We may get a progeny very closely resembling it, yet each plant possessing a distinct individuality of its own; or we may get a progeny very unlike the parent, or a mixed progeny showing various degrees of divergence. Many seeds will grow freely if sown in a partially ripened state; but as a general rule seeds have to be kept for some weeks or months in store, and hence they should be thoroughly ripened before being gathered.

They should be sown in fine rich soil, and such as will not readily get consolidated. In the case of outdoor crops, if the soil is inclined to be heavy, it is a good plan to cover all the smaller seeds with a light compost. Very small seeds should only have a sprinkling of light earth or of sand, and sometimes only a thin layer of soft moss to exclude light and preserve an equable degree of moisture.

Somewhat larger seeds sown indoors may be covered to the depth of one-eighth or one-fourth of an inch, according to their size. Outdoor crops require to be sown, the smaller seeds from 1/2 to 1 in., and the larger ones from 2 to 4 in. under the surface, the covering of the smaller ones especially being light and open.

Many seeds grow well when raked in, that is, the surface on which they are scattered is raked backwards and forwards until most of them are covered. Whatever the seeds, the ground should be made tolerably firm both beneath and above them; this may be done by treading in the case of most kitchen garden crops, which are also better sown in drills, this admitting the more readily of the ground being kept clear from weeds by hoeing. All seeds require a certain degree of heat to induce germination.

For tropical plants the heat of a propagating house 75° to 80°, with a bottom heat of 80° to 90° is desirable, and in many cases absolutely necessary; for others, such as half-hardy annuals, a mild hot bed, or a temperate pit ranging from 60° to 70°, is convenient; while of course all

outdoor crops have to submit to the natural temperature of the season. It is very important that seeds should be sown when the ground is in a good working condition, and not clammy with moisture.

By Offsets (Screen 3 of 27)

This mode of increase applies specially to bulbous plants, such as the lily and hyacinth, which produce little bulbs on the exterior round their base. Most bulbs do so naturally to a limited but variable extent; when more rapid increase is wanted the heart is destroyed, and this induces the formation of a larger number of offsets.

The stem bulbs of lilies are similar in character to the offsets from the parent bulb. The same mode of increase occurs in the gladiolus and crocus, but their bulb-like permanent parts are called corms, not bulbs. After they have ripened in connection with the parent bulb, the offsets are taken off, stored in appropriate places, and at the proper season planted out in nursery beds.

By Tubers

The tuber is a fleshy underground stem, furnished with eyes which are either visible, as in the potato and in some familiar kinds of *Tropaeolum (T. tuberosum)* and of *Oxalis (0. crenata),* or latent, as in the Chinese yam *(Dioscorea Batatas).* When used for propagation, the tubers are cut up into what are called sets, every portion having an eye attached being capable of forming an independent plant.

The cut portions of bulky sets should be suffered to lie a short time before being planted, in order to dry the surface and prevent rotting; this should not, however, be done with such tropical subjects as caladiums, the tubers of which are often cut up into very small fragments for propagation, and of course require to be manipulated in a properly heated propagating pit.

No eyes are visible in the Chinese yam, but slices of the long club-shaped tubers will push out young shoots and form independent plants, if planted with ordinary care.

By Division (Screen 5 of 27)

Division, or partition, is usually resorted to in the case of tufted growing plants, chiefly perennial herbs; they may be evergreen, as chamomile or thrift, or when dormant may consist only of underground crowns, as larkspur or lily-of-the-valley; but in either case the old tufted plant being dug up may be divided into separate pieces, each furnished with roots, and, when replanted, generally starting on its own account without much check.

Suffruticose plants and even small shrubs may be propagated in this way, by first planting them deeper than they are ordinarily grown, and then after the lapse of a year, which time they require to get rooted, taking them up again and dividing them into parts or separate plants.

Box edging and southernwood are examples. effected by merely working fine soil in amongst the base of the stems, and giving them time to throw out roots before parting them.

By Suckers (Screen 6 of 27)

Root suckers are young shoots from the roots of plants, chiefly woody plants, as may often be seen in the case of the elm and the plum. The shoots when used for propagation must be transplanted with all the roots attached to them, care being taken not to injure the parent plant.

If then, spring from a thick root it is not to be wantonly severed, but the soil should be removed and the sucker taken off by cutting away a clean slice of the root, which will then heal and sustain no harm. Stem suckers proceed from the base of the stem, as is often seen in the case of the currant and lilac.

They should be removed in any case; when required for propagation they should be taken with all the roots attached to them, and they should be as thoroughly disbudded below ground as possible, or they are liable to continue the habit of suckering.

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In this case, too, the soil should be carefully opened and the shoots removed with a suckering iron, a sharp concave implement with long iron handle, as shown above. When the number of roots is limited, the tops should be shortened, and some care in watering and mulching should be bestowed on the plant if it is of value.

By Runners (Screen 7 of 27)

The young string-like shoots produced by the strawberry are a well-known example of runners.

The process of rooting these runners should be facilitated by fixing them close down to the soil, which is done by small wooden hooked pegs or by stones hair-pins, short lengths of bent wire may be used.

After the roots are formed, the strings are cut through, and the runners become independent plants.

By Proliferous Buds

Not unlike the runner, though growing in a very different way, are the bud-plants formed on the fronds of several kinds of ferns belonging to the genera *Asplenium*, *Woodwardia, Polystichum, Lastrea, Adiantum, Cystpteris,* etc. In some of these *(Adiantum caudatzim, Polystichum lepidocaulon)* the rachis of the frond is lengthened out much like the string of the strawberry runner, and bears a plant at its apex.

In others *(Polystichum angulare proliferum)* the stipes below and the rachis amongst the pinnae develop buds, which are often numerous and crowded. In others again *(Woodwardia orientalis, Asplenium bulbiferum),* buds are numerously produced on the upper surface of the fronds.

These will develop on the plant if allowed to remain. For propagation the bulbiferous portion is pegged down on the surface of a pot of suitable soil; if kept close in a moist atmosphere, the little buds will soon strike root and form independent plants.

In *Cystopteris* the buds are deciduous, falling off as the fronds acquire maturity, but, if collected and pressed into the surface of a pot of soil and kept close, they will grow up into young plants the following season.

In some genera of flowering plants, and notably in Bryophyllum, little plants form on various parts of the leaves. In some Monocotyledons, ordinarily in Chlorophytum, and exceptionally in Phalaenopsis and others, new plants arise on the flower stems.

By Layers (Screen 9 of 27)

Layering consists in preparing the branch of a plant while still attached to the parent, bending it so that the part operated on is brought under ground, and then fixing it there by means of a forked peg.

Some plants root so freely that they need only pegging down; but in most cases the arrest of the returning sap to form a callus, and ultimately young roots, must be brought about artificially, either by twisting the branch, by splitting it by girding it closely with wire, by taking off a ring of bark, or by tonguing.

In tonguing the leaves are cut off the portion which has to be brought under ground, and a tongue or slit is then cut from below upwards close beyond a joint, of such length that, when the cut part of the layer is pegged an inch or two (or in larger woody subjects 3 or 4 in.) below the surface, the elevation of the point of the shoot to an upright position may open the incision, and thus set it free, so that it may be surrounded by earth to induce it to form roots.

The whole branch, except a few buds at the extremity, is covered with soil. The best seasons for these operations are early spring and midsummer, that is, before the sap begins to flow, and after the first flush of growth has passed off.

One whole summer, sometimes two, must elapse before the layers will be fully rooted in the case of woody plants; but such plants as carnations and picotees, which are usually propagated in this way, in favorable seasons take only a few weeks to root, as they are layered towards the end of the blooming season in July, and are taken off and planted separately early in the autumn. The illustration below shows a woody plant with one layer prepared by tonguing and another by ringing.

click here to see picture...

In general, each shoot makes one layer, but in plants like the *Wistaria or Clematis,* which make long shoots, what is called serpentine layering may be adopted; that is, the shoot is taken alternately below and above the surface, as frequently as its length permits.

There must, however, be a joint at the underground part where it is to be tongued and pegged, and at least one sound bud in each exposed part from which a shoot may be developed to form the top of the young plant.

By Circumposition

When a plant is too high or its habit does not conveniently admit of its being layered, it may often be increased by what is called circumposition, the soil being carried up to the branch operated on. The branch is to be prepared by ringing or notching or wiring as in layering, and a temporary stand made to support the vessel which is to contain the soil.

The vessel may be a flower-pot sawed in two, so that the halves may be bound together when used, or it may be a flower-pot or box with a side slit which will admit the shoot; this vessel is to be filled compactly with suitable porous earth, the opening at the slit being stopped by pieces of slate or tile.

The earth must be kept moist, which is perhaps best done by a thick mulching of moss, the moss being also bound closely over the openings in the vessel, and all being kept damp by frequent syringings. Gardeners often dispense with the pot, using sphagnum moss and leaf-mold only when propagating India rubber plants, perpetual carnations, dracaenas, etc.

By Grafts (Screen 11 of 27)

Grafting is so extensively resorted to that it is impossible here to notice all its phases. It is perhaps of most importance as the principal means of propagating our hardy kinds of fruit, especially the apple and the pear; but the process is the same with most other fruits and ornamental hardy trees and shrubs that are thus propagated.

The stocks are commonly divided into two classes: (1) free stocks, which consist of seedling plants, chiefly of the same genus or species as the trees from which the scions are taken; and (2) dwarfing stocks, which are of more diminutive growth, either varieties of the same species or species of the same or some allied genus as the scion, which have a tendency to lessen the expansion of the engrafted tree.

The French Paradise is the best dwarfing stock for apples, and the quince for pears. In determining the choice of stocks, the nature of the soil in which the grafted trees are to grow should have full weight. In a soil, for example, naturally moist, it is proper to graft pears on the quince, because this plant not only thrives in such a soil, but serves to check the luxuriance thereby produced.

The scions should always be ripened portions of the wood of the preceding year, selected from healthy parents; in the case of shy-bearing kinds, it is better to obtain them from the fruitful branches. The scions should be taken off some weeks before they are wanted, and half-buried in the earth, since the stock at the time of grafting should in point of vegetation be somewhat in advance of the graft.

During winter, grafts may be conveyed long distances, if carefully packed. If they have been six weeks or two months separated from the parent plant, they should be grafted low on the stock, and the earth should be ridged up round them, leaving only one bud of the scion exposed above ground. The best season for grafting apples and similar hardy subjects in the open air is in March and April; but it may be commenced as soon as the sap in the stock is fairly in motion.

Whip- and Tongue-Grafting

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Whip-grafting or Tongue-grafting is the most usual mode of performing the operation when there is no great difference in thickness between the stock and scion.

The stock is headed off by an oblique transverse cut as shown at (a), a slice is then pared off the side as at (b), and on the face of this a tongue or notch is made, the cut being in a downward direction; the scion (c) is pared off in a similar way by a single clean sharp cut, and this is notched or tongued in the opposite direction as the figure indicates.

The two are then fitted together as shown at (d), so that the inner bark of each may come in contact at least on one side, and then tied round with damp soft bast as at (e); next some grafting clay is taken on the forefinger and pushed down on each side so as to fill out the space between the top of the stock and the graft, and a portion is also rubbed over the ligatures on the side where the graft is placed.

A handful of the clay is then taken, flattened out, and rolled closely round the whole point of junction, being finished off to a tapering form both above and below, as shown by the dotted line (f).

To do this deftly, the hands should be plunged from time to time in dry ashes, to prevent the clay from sticking to them. Various kinds of grafting wax are now obtainable, and are a great improvement upon the clay process. Some cold mastics become very pliable with the warmth of the hands. They are best applied with a piece of flat wood; or very liquid waxes may be applied with a brush.

Cleft-Grafting (Screen 13 of 27)

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Cleft-grafting is another method in common use.

The stock a is cleft down from the horizontal cut (d) (but not nearly so much as the sketch would indicate), and the scion, when cut to a thin wedge form, as shown at (c) and (e), is inserted into the cleft; the whole is then bound up and clayed as in the former case.

This is not so good a plan as whip-grafting; it is improved by sloping the stock on one side to the size of the graft.

Crown- or Rind-Grafting

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Crown-grafting or Rind-grafting is preferable to cleft-grafting, inasmuch as it leaves no open spaces in the wood.

The stock (b) is cut off horizontally or nearly so in January or February.

At grafting-time a slit is cut in the bark a wedge-shaped piece of iron or a small chisel being inserted to raise the bark; the scion is then cut to the same wedge-shaped form graft and inserted in the space opened for it between the alburnum and the bark, after which it is tied down and clayed or waxed over in the manner already described.

Side-Grafting (Screen 15 of 27)

Side-grafting is performed like whip-grafting, the graft being inserted on the side of a branch and not at the cut end of the stocks It may be practiced for the purpose of changing a part of the tree, and is sometimes very useful for filling out vacant spaces, in trained trees especially.

Inarching is another form of side-grafting. Here the graft is fixed to the side of the stock, which is planted or potted close to the plant to be worked. The branches are applied to the stock while yet attached to the parent tree, and remain so until united. In the case of trained trees, a young shoot is sometimes inarched to its parent stem to supply a branch where one has not been developed in the ordinary way.

Greenhouse Plant Grafts

For the propagation by grafts of stove and greenhouse plants the process adopted is whip-grafting or a modification of it. The parts are, however, sometimes so small that the tongue of the graft is dispensed with, and the two stems simply pared smooth and bound together.

In this way hardy rhododendrons of choice sorts, greenhouse azaleas, the varieties of the orange family, camellias, roses, rare conifers, clenatises and numerous other plants are increased.

Raffia, which has taken the place of bast, is generally used for tying, and grafting wax is only used occasionally with such plants under glass. All grafting of this kind is done in the propagating house, at any season when grafts are obtainable in a fit state the plants when operated on being placed in close frames warmed to a suitable temperature. Roses and clematis, however, are generally grafted from January to March and April.

Root-Grafting (Screen 17 of 27)

Root-grafting is sometimes resorted to where extensive increase is an object, or where stem-grafting or other means of propagation are not available.

In this case the scion is grafted directly on to a portion of the root of some appropriate stock, both graft and stock being usually very small; the grafted root is then potted so as to cover the point of junction with the soil, and is plunged in the bed of the propagating house, where it gets the slight stimulus of a gentle bottom heat.

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Dahlias (shown above), peonies, and Wistarias may be grafted by inserting young shoots into the neck of one of the flesh roots of each kind respectively. The best method of doing so is to cut a triangular section near the upper end of the root, just large enough to admit the young shoot when slightly pared away on two sides to give it a similar form.

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In the case of large woody plants thus worked the grafted roots, after the operation is completed, are planted in nursery beds, so that the upper buds only are exposed to the atmosphere, as shown in the figure.

By Buds

Budding is the inserting of a bud of a choice variety cut with a portion of bark into the bark of the stock of an inferior nature where it is bound gently but firmly. Stone fruits, such as peaches, apricots, plums, cherries, etc., are usually propagated in this way, as well as roses and many other plants.

In the propagating house budding may be done at any season when the sap is in motion but for fruit trees, roses, etc., in the open air, it is usually done in July or August, when the buds destined for the following year are completely formed in the axils of the leaves, and when the bark separates freely from the wood it covers. Those buds are to be preferred, as being best ripened, which occur n the middle portion of a young shoot, and which are quite dormant at the time.

Shield- or T-Budding (Screen 19 of 27)

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The simplest and most generally practiced form of budding is that called shield-budding or T-budding. The operator should be provided with a sharp budding knife having a thin ivory or bone handle, for raising the bark of the stock.

A horizontal incision is made in the bark quite down to the wood, and from this a perpendicular slit is drawn upwards to the extent of perhaps an inch, so that the slit has a resemblance to the letter T, as at (a). A bud is then cut by a clean incision from the tree intended to be propagated, having a portion of the wood attached to it, and so that the whole may be about 1 in. long, as at (d).

The bit of wood (e) must be gently withdrawn, care being taken that the bud adheres wholly to the bark or shield, as it is called, of which (f) is a side view. The bark on each side of the perpendicular slit being then cautiously opened, as at (b), with the handle of the knife, the bud and shield are inserted as shown at (c).

The upper tip of the shield is cut off horizontally, and brought to fit the bark of the stock at the transverse incision. Slight ties of soft cotton wool or worsted, or moist raffia, are then applied. In about a month or six weeks the ligatures may be removed or slit with the knife to allow for the swelling stem, when, if the operation has been successful, the bud will be fresh and full, and the shield firmly united to the wood.

In the following spring a strong shoot will be thrown out, and to prevent its being blown out by the wind, must be fastened to a stake, or to the lower portion of the old stock which has been left for the purpose.

To be successful the operation should be performed with a quick and light hand, so that no part of the delicate tissues be injured, as would happen if they were left for a time exposed, or if the bud were forced in like a wedge. The union is effected as in grafting, by means of the organizable sap or cambium, and the less this is disturbed until the inner bark of the shield is pressed and fixed against it the better.

Trees to be grown in the form of a bush are usually budded low down on the stem of the stock as near the root as possible to obviate the development of wild suckers later on. Standard trees, however, are budded on a sturdy young shoot close to the top. In either case the stocks should have been carefully planted at least the previous November when the work is to be done in the open air the following July or August.

By Branch Cuttings

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Propagation by cuttings is the mode of increase most commonly adopted, next to that by seeds. It is effected by taking a portion from a branch or shoot of the plant, and placing it in the soil. There are great differences to be observed in the selection and treatment of cuttings.

Sometimes soft green leafy shoots, as in *Verbena* (a), are used; sometimes the shoots must be half-ripened, and sometimes fully matured. So of the mode of preparation, some will root if cut off or broken off at any point and thrust into wet earth or sand in a warm place (a), others require to be cut with the utmost care just below a joint or leaf-base, and by a keen blade so as to sever the tissues without tearing or bruising; and others again after being cut across may be split up for a short distance, but there seems to be no particular virtue in this.

It is usual and in most cases necessary to cut away the lower portion of a cutting up to just below the node or joint (b, d, e). The internodal parts will not often divide so as to form separate individual plants; sometimes, however, this happens. It is said that the smallest piece of *Torenia asiatica,* for instance, will grow.

As for position, certain cuttings grow readily enough if planted outdoors in the open soil, some preferring shade, others sunshine, while less hardy subjects must be covered with a bell-glass, or must be in a close atmosphere with bottom heat, or must have the aid of pure silver sand to facilitate their rooting (c).

Cuttings should in all cases be taken from healthy plants, and from shoots of a moderate degree of vigor. It is also important to select leafy growths, and not such as will at once run up to flower. Young shoots which have become moderately firm generally make the best cuttings, but sometimes the very softest shoots strike more readily.

For all indoor plants in a growing state spring is a good time for taking cuttings, but at any time during the summer months is also favorable if cuttings are obtainable.

Cuttings of Deciduous Plants

Cuttings of deciduous plants should be taken off after the fall of the leaf.

These cuttings should be about 6 in. to 1 ft. in length, and should be planted at once in the ground so as to leave only the top with the two or three preserved buds exposed.

If a clean stem, however, is desired, a longer portion may be left uncovered.

Gooseberries, currants, roses and many hard, deciduous trees and shrubs are easily propagated in this way if the cuttings are inserted in well-drained soil about the end of October or early in November.

Cuttings of Growing Plants

Cuttings of growing plants are prepared by removing with a sharp knife, and moderately close, the few leaves which would otherwise be buried in the soil; they are then cut clean across just below a joint; the fewer the leaves thus removed, however, the better, as if by keeping them from being exhausted helps to supply the elaborated sap out of which the roots are formed.

Free-rooting subjects should have thoroughly well-drained pots, a portion of the soil proper for the particular plants made very sandy, and a surfacing of clean sharp silver sand about as deep as the length of the cutting.

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Such difficult plants as heaths are reared in silver sand, a stratum of which is placed over the sandy peat soil in a specially prepared cutting pot, and thus the cuttings, though rooting in the sand under a bell-glass, find at once on the emission of roots congenial soil for them to grow in (c).

Hardy plants, such as pinks, pansies, etc., are propagated by cutting planted during early summer in light rich soil. The cuttings of pinks are called pipings (d), and are planted about June, while pansies may be renewed in this way both in spring and in autumn.

By Leaf Cuttings (Screen 23 of 27)

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Many plants maybe propagated by planting their leaves or portions of the leaves as cuttings, as, for example, the *Gloxinia* (a) and *Gesnera,* the succulent *Sempervivum, Echeveria, Pachyphytum* and their allies, and such hard-leaved plants as *Theophrasta* (b).

The leaves are best taken off with the base whole, and should be planted in well-drained sandy soil; in due time they form roots, and ultimately from some latent bud a little shoot which forms the young plant. The treatment is precisely like that of branch cuttings.

Gloxinias, begonias, etc., grow readily from fragments of the leaves cut clean through the thick veins and ribs, and planted edgewise like cuttings. This class of subjects may also be fixed flat on the surface of the cutting pot, by means of little pegs or hooks, the main ribs being cut across at intervals, and from these points roots, and eventually young tubers, will be produced.

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By Root Cuttings

Some plants which are not easily increased by other means propagate readily from root cuttings. Amongst the indoor plants which may be so treated, *Bouvardia, Pelargonium,* Aralia and Wigandia may be mentioned. The *modus operandi* is to turn the plant out of its pot, shake away the soil so as to free the roots, and then select as many pieces of the stouter roots as may be required.

These are cut up into half-inch lengths (more or less), and inserted in light sandy soil round the margin of a cutting pot, so that the upper end of the root cutting may be level with the-soil or only just covered by it. The pots should be watered so as to settle the soil, and be placed in the close atmosphere of the propagating pit or frame, where they will need scarcely any water until the buds are seen pushing through the surface.

Root Cuttings, Herbaceous Plants

There are various herbaceous plants which may be similarly treated, such as sea-kale and horseradish, and, among ornamental plants, the beautiful autumn-blooming *Anemone japonica, Bocconia cordata, Dictamnus Fraxinella,* the burning bush; the sea hollies (Eryngium), the globe thistle *(Echinops vitro),* the Oriental poppy *(Papaver orientatale),* the sea lavender *(Statice latifolia), Senecio pulcher,* etc.

The sea-kale and horseradish require to be treated in the open garden, where the cut portions should be planted in lines in well-worked soil; but the roots of the others should be planted in pots and kept in a close frame with a little warmth till the young shoots have started.

Root Cuttings, Ornamental Trees

Various hardy ornamental trees are also increased in this way: the quince, elm, robinia and mulberry, and the rose amongst shrubs. The most important use to which this mode of propagation is put is, however, the increase of roses, and of the various plums used as stocks for working the choicer stone fruits.

The method in the latter case is to select roots averaging the thickness of the little finger, to cut these into lengths of about 3 or 4 in., and to plant them in lines just beneath the surface in nursery beds. The root cuttings of rose-stocks are prepared and treated in a similar way.

By Cuttings of Single Eves

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This mode of propagation is by cutting the ripened young branches into short lengths, each containing one well-matured bud or eye, with a short portion of the stem above and below. It is a common mode of propagating vines, the eyes being in this case cut from the ripened leafless wood.

The eyes (a) are planted just below the surface in pots of light soil, which are placed in a hot bed or propagating pit, and in due time each pushes up a young shoot which forms the future stem, while from about its base the young roots are produced (b) which convert it into an independent plant.

In the case of plants with persistent leaves, the stem may be cut through just above and below the bud, retaining the leaf which is left on the cutting, the old wood and eye being placed beneath the soil and the leaf left exposed. In this way the India-rubber tree *(Ficus elastica),* for example, and many other tender plants may be increased with the aid of a brisk bottom heat.

Many of the free-growing soft-wooded plants may also be grown from cuttings of single joints of the young wood, here rapid increase is desired; and in the case of opposite-leaved plants two cuttings may often be made from one joint by splitting the stem longitudinally each cutting consisting of' a leaf and a perfect bud attached to half the thickness of the stem.

Forcing (Screen 1 of 4)

Forcing is the accelerating, by special treatment, of the growth of certain plants, which are required to be had in leaf, in flower, or in fruit before their natural season, as, for instance, the leaves of mint at Easter or the leafstalks of sea-kale and rhubarb at Christmas, the flowers of summer in the depth of winter, or some of the choicest fruits perfected so much before their normal period as to complete, with the retarded crops of winter, the circle of the seasons.

In the management of artificial heat for this purpose, a considerable degree of caution is required. The first stages of forcing should, of course, be very gentle, so that the whole growth of the plants may advance in harmony.

The immediate application of a very hot atmosphere would unduly force the tops, while the roots remained partially or wholly inactive; and a strong bottom heat, if it did not cause injury by its excess, would probably result in abortive growth.

Forcing, Temperature

Any sudden decrease of warmth would be very prejudicial to the progress of vegetation through the successive stages of foliation, inflorescence and fructification. But it is not necessary that one unvarying range of temperature should be kept up at whatever pains or risk. Indeed, in very severe weather it is found better to drop a little from the maximum temperature by fire heat, and the loss so occasioned may be made good by a little extra heat applied when the weather is more genial.

Night temperatures also should always be allowed to drop somewhat, the heat being increased again in the morning. In other words, the artificial temperature should increase by day and decrease by night, should rise in summer and fall in winter, should, in short, imitate as nearly as possible the varying influence of the sun.

Forcing, Light (Screen 3 of 4)

For the growth of flowers generally, and for that of all fruits, every ray of light to be obtained in the dull winter season is required, and therefore every possible care should be taken to keep the glass clean. A moist genial atmosphere too is essential, a point requiring unremitting attention on account of the necessity of keeping up strong fires.

With moisture as with heat, the cultivator must hold his hand somewhat in very severe or very dull weather; but while heat must not drop so as to chill the progressing vegetation, so neither must the lack of moisture parch the plants so as to check their growth.

There are some few subjects which when forced do not require a light house. Thus amongst flowers the white blossoms of the lilac, so much prized during winter, are produced by forcing purple-flowered plants in darkness. Rhubarb and sea-kale among esculents both need to be forced in darkness to keep them crisp and tender, and mushrooms also are always grown in dark structures.

In fact, a roomy mushroom house is one of the most convenient of all places for forcing the vegetables just referred to. The lilac would be better placed in a dark shed heated to about 70° or 80°, in which some dung and leaves could be allowed to lie and ferment, giving off both a genial heat and moisture.

Forcing, Ripening

One of the most important preliminaries to successful forcing is the securing to the plants a previous state of rest. The thorough ripening of the preceding season's wood in fruit trees and flowering plants, and of the crown in perennial herbs like strawberries, and the cessation of all active growth before the time they are to start into a new growth, are of paramount importance.

The ripening process must be brought about by free exposure to light, and by the application of a little extra heat with dryness, if the season should be unfavorable; and both roots and tops must submit to a limitation of their water supply. When the ripening is perfected, the resting process must be aided by keeping the temperature in which they await the forcing process as low as each particular subject can bear.

Prepare To Plant! (Screen 1 of 2)

There are several elements of design which are necessary for a successful and pleasing garden.

Among them are site, soil, and structure.

It is a good idea to draw a garden plan before planting is begun, taking into account factors such as plant color and size, and needed space.

Prep Time and Method

The time and method of preparing the garden for planting depend on the type of soil and the location. Heavy clay soils in the northern sections are frequently benefited by fall plowing and exposure to freezing and thawing during the winter, but when the garden is cover-cropped, it should not be plowed until early spring.

In general, garden soils should be cover-cropped during the winter to control erosion and to add organic matter. Gardens in the dry land areas should be plowed and left rough in the fall, so that the soil will absorb and retain moisture that falls during the winter. Sandy soils, as a rule, should be cover-cropped, then spring-plowed.

Whenever there is a heavy sod or growth of cover crop, the land should be plowed well in advance of planting and the soil disked several times to aid in the decay and incorporation of the material. Land receiving applications of coarse manure either before or after plowing should have the same treatment.

Soils should not be plowed or worked while wet unless the work will certainly be followed by severe freezing weather. Sandy soils and those containing high proportions of organic matter-peats and mucks for example-bear plowing and working at higher moisture content than do heavy clay soils.

The usual test is to squeeze together a handful of soil. If it sticks together in a ball and does not readily crumble under slight pressure by the thumb and finger, it is too wet for plowing or working. When examining soil to determine if it is dry enough to work, samples should be taken both at and a few inches below the surface.

The surface may be dry enough, but the lower layers too wet, for working. Soil that sticks to the plow or to other tools is usually too wet. A shiny, unbroken surface of the turned furrow is another indication of a dangerously wet soil condition.

Fall-plowed land should be left rough until spring, when it may be prepared by disking, harrowing, or other methods. Spring-plowed land should be worked into a suitable seedbed immediately after plowing. Seeds germinate and plants grow more readily on a reasonably fine, well-prepared soil than on a coarse, lumpy one, and thorough preparation greatly reduces the work of planting and caring for the crops.

It is possible, however, to overdo the preparation of some heavy soils. They should be brought to a somewhat granular rather than a powdery fine condition for planting. Spading instead of plowing is sometimes advisable in preparing small areas, such as beds for extra-early crops of lettuce, onions, beets, and carrots.

Selecting a Site (Screen 1 of 3)

A back yard or some other plot near your home in full sunlight is the most convenient spot for a home vegetable garden. However, poor drainage, shallow soil, and shade from buildings or trees may mean the garden must be located in an area farther from the house.

In planning your garden, consider what and how much you will plant. It is better to have a small garden well maintained than a large one neglected and full of weeds. Diagram the garden rows on paper and note the length you wish to assign to each vegetable. Use a scale of a selected number of feet to an inch. Then you can decide how much seed and how many plants to buy.

Consider also the possibility of working your vegetables in plots in front of your shrubbery. Many vegetables are ornamental in appearance. Some vegetables can be grown in your flower beds; others can be grown entirely in containers.

The amount of sunlight your garden gets must also be considered. Leaf y vegetables, for example, can be grown in partial shade but vegetables producing fruit must be grown in direct sunlight.

Site (Screen 2 of 3)

The site of the house will more or less determine that of the garden. The flower garden can be placed so as to surround or lie contiguous to it, while the fruit and vegetable gardens, either together or separate, should be placed on one side or in the rear, according to fitness as regards the nature of the soil and subsoil, the slope of the surface or the general features of the scenery.

In the case of villa gardens there is usually little choice the land to be occupied is cut up into plots, usually rectangular, and of greater or less breadth, and in laying out these plots there is generally a smaller space left in the front of the villa residence and a larger one behind, the front plot being usually devoted to approaches, shrubbery and plantations, flower beds being added if space permits, while the back or more private plot has a piece of lawn grass with flower beds next the house, and a space for vegetables and fruit trees at the far end, this latter being shut off from the lawn by an intervening screen of evergreens or other plants. Between these two classes of gardens there are many gradations, but our remarks will chiefly apply to those of larger extent.

The almost universal practice is to have the fruit and vegetable gardens combined; and the flower garden may sometimes be conveniently placed in juxtaposition with them. When the fruit and vegetable gardens are combined, the smaller and choicer fruit trees only should be admitted, such larger growing hardy fruits as apples, pears, plums, cherries, etc., being relegated to the orchard.

Ground possessing a gentle inclination towards the south is desirable for a garden. On such a slope effectual draining is easily accomplished, and the greatest possible benefit is derived from the sun's rays. It is well also to have an open exposure towards the east and west, so that the garden may enjoy the full benefit of the morning and evening sun, especially the latter; but shelter is desirable on the north and north east, or in any direction in which the particular locality may happen to be exposed. In some places the south western gales are so severe that a belt of trees is useful as a break wind and shelter.

Considerations (Screen 3 of 3)

Where to have a garden. Vegetables thrive in full sunlight and need at least 5 or 6 hours during the middle of the day.

Excessive shading results in spindly plants and poor yields.

If possible, the garden should be reasonably near the house so that the gardener can work in it at odd moments.

It should be an area that is or can be fenced conveniently to protect it from livestock, woodchucks, rabbits, and children.

Preparing The Soil (Screen 1 of 8)

Good soil for growing vegetables must be protected by proper cultivation, use of organic matter, maintenance of soil fertility, and control of plant pests. Properly prepared soil provides a desirable medium for root development, absorbs water and air rapidly, and usually does not crust badly.

Tillage practices do not automatically create good garden soil. Tillage is needed to control weeds, mix mulch or crop residues into the soil, and alter soil structure. Unnecessary tillage increases crusting on the soil surface, and if the soil is wet, tillage compacts it.

Fertility requirements differ between long and short growing seasons and among soil types. In almost every State, the Extension Service will test soils and provide fertilizer recommendations.

Soil (Screen 2 of 8)

A hazel-colored loam, moderately light in texture, is well adapted for most garden crops, whether of fruits or vegetables, especially a good warm deep loam resting upon chalk; and if such a soil occurs naturally in the selected site, little will be required in the way of preparation. If the soil is not moderately good and of fair depth, it is not so favorable for gardening purposes.

Wherever the soil is not quite suitable, but is capable of being made so, it is best to remedy the defect at the outset by trenching it all over to a depth of 2 or 3 ft., incorporating plenty of manure with it. A heavy soil, although at first requiring more labor, generally gives far better results when worked than a light soil.

The latter is not sufficiently retentive of moisture and gets too hot in summer and requires large quantities of organic manure to keep it in good condition. It is advantageous to possess a variety of soils; and if the garden be on a slope it will often be practicable to render the upper part light and dry, while the lower remains of a heavier and damper nature.

Natural soils consist of substances derived from the decomposition of various kinds of rocks, the bulk consisting of clay, silica and lime, in various proportions. As regards preparation, draining is of course of the utmost importance.

The ground should also be trenched to the depth of 3 ft. at least, and the deeper the better so as to bring up the subsoil whether it be clay, sand, gravel, marl, etc. for exposure to the weather and thus convert it from a sterile mass into a living soil teeming with bacteria. In this operation all stones larger than a man's fist must be taken out, and all roots of trees and of perennial weeds carefully cleared away.

When the whole ground has been thus treated, a moderate liming will, in general, be useful, especially on heavy clay soils. After this, supposing the work to have occupied most of the summer, the whole may be laid up

in ridges, to expose as great a surface as possible to the action of the winter's frost.

Clay Soils (Screen 3 of 8)

Argillaceous or clay soils are those which contain a large percentage (45-50) of clay, and a small percentage (5 or less) of lime. These are unfitted for garden purposes until improved by draining, liming, trenching and the addition of porous materials, such as ashes, burnt ballast or sand, but when thoroughly improved they are very fertile and less liable to become exhausted than most other soils.

Loamy soils contain a considerable quantity (30-45 %) of clay, and smaller quantities of lime, humus and sand. Such soils properly drained and prepared are very suitable for orchards, and when the proportion of clay is smaller (20-30 %) they form excellent garden soils, in which the better sort of fruit trees luxuriate. Marly soils are those which contain a considerable percentage (10-20%) of lime, and are called clay marls, loamy marls and sandy marls, according as these several ingredients preponderate.

The Clay marls are, like clay soils, too stiff for garden purposes until well worked and heavily manured; but loamy marls are fertile and well suited to fruit trees, and sandy marls are adapted for producing early crops.

Calcareous soils, which may also be heavy, intermediate or light, are those which contain more than 20 % of lime, their fertility depending on the proportions of clay and sand which enter into their composition; they are generally cold and wet.

Vegetable soils or molds, or humus soils, contain a considerable percentage (more than 5) of humus, and embrace both the rich productive garden molds and those known as peaty soils.

Subsoil (Screen 4 of 8)

The nature of the subsoil is of scarcely less importance than that of the surface soil. Many gardeners are still afraid to disturb an unsuitable subsoil, but experienced growers have proved that by bringing it up to the surface and placing plenty of manure in the bottoms of the various trenches, the very best results are attained in the course of a season or so.

An uneven subsoil, especially if retentive, is most undesirable, as water is apt to collect in the hollows, and thus affect the upper soil. The remedy is to make the plane of its surface agree with that of the ground. When there is a hard pan this should be broken up with the spade or the fork, and have plenty of manure mixed with it.

When there is an injurious preponderance of metallic oxides or other deleterious substances, the roots of trees would be affected by them, and they must therefore be removed.

When the subsoil is too compact to be pervious to water, effectual drainage must be resorted to; when it is very loose, so that it drains away the fertile ingredients of the soil as well as those which are artificially supplied, the compactness of the stratum should be increased by the addition of clay, marl or loam. The best of all subsoils is a dry bed of clay overlying sandstone.

Artificial Soil Mixes (Screen 5 of 8)

Suitable artificial-soil mixes are available from garden stores or seed houses. These mixes are disease, insect, and weed free. In addition they are lightweight and easy to handle. A mix should be spread in flats or shallow wooden boxes about 2 1/2 inches deep and thoroughly watered. An alternative is to place bands or peat pots in the boxes first and fill these.

Place 2 seeds at 2 inch intervals each way and then cover with an additional 1/2-3/4 inch of mix. Water again and place containers in a warm location (60'F nights and 70'-75F days) for the germination period.

Add water as needed to maintain good moisture in the mix, but avoid continued saturation. Since frequent watering may increase disease hazard, water thoroughly each time. After plants have 2 or 3 true leaves, daily watering may be needed.

When seedlings start the first true leaf (3rd leaf), thin to one plant per spot to give an average spacing of 4 square inches per plant. Maintain the temperatures suggested for germination until a few days before setting the plants in the garden and exposing them to other conditions.

Under this procedure tomato plants should be ready for the garden in 5 to 6 weeks, peppers and eggplant in 6 or 7 weeks, cabbage and similar crops in 4 or 5 weeks, and melons and other vine crops in 2 or 3 weeks. Onions, which should be seeded and grown much more thickly than the others, take 5 to 6 weeks.

If the plants develop a pale green or yellowish color, they may be deficient in nitrogen. This can be corrected by adding a tablespoonful of soluble complete fertilizer per gallon of water for one watering. In case the plants cannot be set out in the garden at the expected date, they can be held back by reducing the application of water.

Plowing or Spading (Screen 6 of 8)

The ground should be turned over in the spring just as soon as it is dry enough to work.

A good test is to mold a handful of the soil into a ball.

If the ball is not sticky and crumbles readily when pressed with the thumb, the soil is ready to be worked.

Plow or spade the soil to a depth of 8 inches.

Fitting The Soil (Screen 7 of 8)

Harrow or rake spring-plowed or spaded soil soon after turning to break up the clods and to prevent excessive drying.

A final raking may be necessary just before seeding.

For the small-seeded crops, such as carrots, a well-pulverized surface insures easier planting, better germination, and a more even stand.

Large-seeded and transplanted crops need less tillage.

Drainage (Screen 8 of 8)

Good drainage of the soil is essential. Soil drainage may often be improved by installing agricultural tile, digging ditches, and sometimes by plowing deep into the subsoil. The garden should be free of low places where water might stand after a heavy rain. Water from surrounding land should not drain into the garden, and there should be no danger of flooding by overflow from nearby streams.

Good air drainage is necessary to lessen the danger of damage by frost. A garden on a slope that has free movement of air to lower levels is most likely to escape late-spring and early autumn frost damage.

A gentle slope of not more than 1 1/2 percent facing in a southerly direction helps early crops get started. In sections that have strong winds, a windbreak of board fence, hedge, or trees on the windward side of the garden is recommended. Hedges and other living windbreaks should be far enough away from the garden to prevent shade or roots from interfering with the garden crops.

Sunshine (Screen 1 of 1)

The garden should get the direct rays of the sun all day if possible. Some crops can tolerate partial shade, but no amount of fertilizer, water, or care can replace needed sunshine. Even where trees do not shade garden crops, tree roots may penetrate far into the soil and rob crops of moisture and plant food.

Damage to garden crops by tree roots may be largely prevented by digging a trench 1 1/2 to 2 feet deep between the trees and the garden, cutting all the tree roots that cross the trench. Then put a barrier of waste sheet metal or heavy roofing paper along one wall of the trench and refill it. This usually prevents root damage for several years.

Protecting The Garden (Screen 1 of 1)

Usually, the garden should be surrounded by a fence sufficiently high and close-woven to keep out dogs, rabbits, and other animals. The damage done by stray animals during a season or two can equal the cost of a fence. A fence also can serve as a trellis for beans, peas, tomatoes, and other crops that need support.

In most sections of the country, rodents of various kinds damage garden crops. In the East, moles and mice cause much injury. Moles burrow under the plants, causing the soil to dry out around the roots. Mice either work independently or follow the burrows made by moles, destroying newly planted seeds and young plants. In the West, ground squirrels and prairie dogs damage vegetable gardens. Most of these pests can be partially controlled with traps.

Tallies or Labels

The importance of properly labeling plants can hardly be over-estimated. For ordinary purposes labels of wood of various sizes (sold in bundles) are the most convenient. These should be wiped with a little white paint or linseed oil, and written with a soft lead pencil before the surface becomes dry.

Copying-ink pencils should not be used, as water will wash away the writing. For permanent plants, as trees, roses, etc., metallic labels with raised type are procurable from dealers, and are neat, durable and convenient. For stove and greenhouse plants, orchids, ferns, etc., labels made of xylonite, zinc and other materials are also used.

Planning The Garden (Screen 1 of 11)

Choosing the crops. The home gardener should choose those vegetables which the family likes best. Some vegetables -- celery is a good example -- are difficult to grow. Usually, better quality celery can be purchased at the grocery store.

The more perishable vegetables like sweet corn, peas, snap beans, broccoli, and asparagus should receive first consideration in the home garden. These vegetables, when freshly harvested, have a flavor seldom found in grocery store produce.

Space is another consideration. A small space will provide vegetables for many meals if it is planted with such crops as tomatoes, snap beans, summer squash, broccoli, or cabbage. Corn, peas, winter squash, and melons require more space in relation to the amount they produce.

The inexperienced gardener should grow fewer crops and select those that are easy to grow. Corn, snap beans, peas, tomatoes, and squash are good for beginners. Broccoli, cabbage, cucumbers, and melons are somewhat more difficult because of their requirements for disease and insect control; the small-seeded crops such as beets and carrots are more difficult to get started.

The garden can be planted at one time, or the gardener can make a succession of plantings. One planting will give a long harvest of tomatoes, peppers, summer squash, beets, carrots, broccoli, and cucumbers. If sweet corn is planted at one time, it must include several varieties with a spread of maturity.

Such crops as summer squash, broccoli, and cucumber must be kept picked in order for them to continue to bear. On the other hand, a single planting of some crops will produce for only a short time even if more than one variety is used. Radishes, head lettuce, and peas fall in this category. An intermediate group in which 2 or 3 plantings may be needed to insure a long season are cabbage, snap beans, and leaf lettuce.

If the family is going on an extended vacation, crops that have a short harvest period should be avoided or else planted to mature before or after the vacation. It is especially handy to have growing in the garden the

vegetables that are used frequently in cooking or in salads such as tomatoes, peppers, parsley, and chives.

Even an experienced gardener needs a plan on paper. It can be only a list of the crops to be grown with the number of rows, the distance between rows, and the planting dates for each vegetable; or it can be a detailed map of the garden drawn to scale.

Planning Tips (Screen 2 of 11)

With information on how to do it, even a beginner can plan his or her own garden by keeping the following points in mind.

1. Group the crops according to height to prevent shading.

2. The garden rows can be either east and west or north and south. If they run cast and west, plant the tall-growing crops on the north side of the garden so that they do not shade the small ones.

3. If the garden is on a hillside, run the rows across the slope, not up and down it. This helps to hold moisture and reduce erosion.

4. Group together the small-growing, quick-maturing crops.

5. Productivity of a small garden can be increased by succession planting. Remove refuse of early-maturing crops and make a second application of fertilizer before the second planting.

6. Practice crop rotation if possible. Rotation should be by families as well as by individual crops.

The Plan (Screen 3 of 11)

In laying out the garden, the plan should be prepared in minute detail before commencing operations. The form of the kitchen and fruit garden should be square or oblong, rather than curvilinear, since the working and cropping of the ground can thus be more easily carried out. The whole should be compactly arranged, so as to facilitate working, and to afford convenient access for the carting of the heavy materials.

This access is especially desirable as regards the store-yards and framing ground, where fermenting manures and tree leaves for making up hot beds, coals or wood for fuel and ingredients for composts, together with flower-pots and the many necessaries of garden culture, have to be accommodated.

In the case of villas or picturesque residences, gardens of irregular form may be permitted; when adapted to the conditions of the locality, they associate better with surrounding objects, but in such gardens wall space is usually limited.

Paths (Screen 4 of 11)

The distribution of paths must be governed by circumstances.

Generally speaking, the main paths for cartage should be 8 ft. wide, made up of 9 in. hard core covered by 4 in. of gravel or ash, with a gentle rise to center to throw off surface water.

The smaller paths, not intended for cartage, should be 4 ft. to 6 ft. wide, according to circumstances, made up of 6 in. hard core and 3 in. of gravel or ash, and should be slightly raised at center.

Walls (Screen 5 of 11)

A considerable portion of the north wall is usually covered in front with the glazed structures called forcing-houses, and to these the houses for ornamental plants are sometimes attached; but a more appropriate site for the latter is the flower garden, when that forms a separate department.

It is well, however, that everything connected with the forcing of fruits or flowers should be concentrated in one place. The frame ground, including melon and pine pits, should occupy some well-sheltered spot in the slips, or on one side of the garden, and adjoining to this may be found a suitable site for the compost ground, in which the various kinds of soils are kept in store, and in which also composts may be prepared.

As walls afford valuable space for the growth of the choicer kinds of hardy fruits, the direction in which they are built is of considerable importance.

In the warmer parts of the country the wall on the north side of the garden should be so placed as to face the sun at about an hour before noon, or a little to the east of south in less favored localities it should be made to face direct south, and in still more unfavorable districts it should face the sun an hour after noon, or a little west of south.

The east and west walls should run parallel to each other, and at right angles to that on the north side, in all the most favored localities; but in colder or later ones, though parallel, they should be so far removed from a right angle as to get the sun by eleven o'clock.

On the whole, the form of a parallelogram with its longest sides in the proportion of about five to three of the shorter, and running east and west, may be considered the best form, since it affords a greater extent of south wall than any other.

Example Plan (Screen 6 of 11)

click here to see picture...

The illustration above represents a garden of one acre and admits of nearly double the number of trees on the south aspect as compared with the east and west; it allows a greater number of espalier or pyramid trees to face the south; and it admits of being divided into equal principal compartments, each of which forms nearly a square. The size of course can be increased to requisite extent.

The spaces between the walls and the outer fence are called slips. A considerable extent is sometimes enclosed this way, and utilized for the growth of such vegetables as potatoes, winter greens, and seakale, for the small bush fruits, and for strawberries. The slips are also convenient as affording a variety of aspects, and thus helping to prolong the season of particular vegetable crops.

Shelter (Screen 7 of 11)

A screen of some kind to temper the fury of the blast is absolutely necessary. If the situation is not naturally well sheltered, the defect may be remedied by masses of forest trees disposed at a considerable distance so as not to shade the walls or fruit trees.

They should not be nearer than, say, 50 yds., and may vary from that to 100 or 150 yds. distance according to circumstances, regard being had especially to peculiarities occasioned by the configuration of the country, as for instance to aerial currents from adjacent eminences.

Care should be taken, however, not to hem in the garden by crowded plantations, shelter from the prevailing strong winds being all that is required, while the more open it is in other directions the better. The trees employed for screens should include both those of deciduous and of evergreen habit, and should suit the peculiarities of local soil and climate.

Of deciduous trees the sycamore, wych-elm, horse-chestnut, beech, lime, plane and poplar may be used, the abele or white poplar, *Populus alba,* being one of the most rapid growing of all trees, and, like other poplars, well suited for nursing other choicer subjects; while of evergreens, the holm oak, holly, laurel (both common and Portugal), and such conifers as the Scotch, Weymouth and Austrian pines, with spruce and silver firs and yews, are suitable. The conifers make the most effective screens.

Extensive gardens in exposed situations are often divided into compartments by hedges, so disposed as to break the force of high winds. Where these are required to be narrow as well as lofty, holly, yew or beech is to be preferred; but, if there is sufficient space, the beautiful laurel and the bay may be employed where they will thrive.

Smaller hedges may be formed of evergreen privet or of tree-box. These subordinate divisions furnish, not only shelter, but also shade, which, at certain seasons, is peculiarly valuable.

Belts of shrubbery may be placed round the slips outside the walls; and these may in many cases, or in certain parts, be of sufficient breadth to furnish pleasant retired promenades, at the same time that they serve to mask the formality of the walled gardens, and are made to harmonize with

the picturesque scenery of a pleasure ground.

Water Supply (Screen 8 of 11)

Water is one of the most important elements in plant life. Rain-water is the best, next to that river or pond water, and last of all that from springs; but a chemical analysis should be made of the last before introducing it, as some spring waters contain mineral ingredients injurious to vegetation.

Iron pipes are the best conductors; they should lead to a capacious open reservoir placed outside the garden, and at the highest convenient level, in order to secure sufficient pressure for effective distribution, and so that the wall trees also may be effectively washed.

Stand-pipes should be placed at intervals beside the walks and in other convenient places, from which water may at all times be drawn, and to which a garden hose can be attached, so as to permit of the whole garden being readily watered.

The mains should be placed under the walks for safety, and also that they may be easily reached when repairs are required. Pipes should also be laid having a connection with all the various greenhouses and forcing-houses, each of which should be provided with a cistern for aerating the daily supplies. In fact, every part of the garden, including the working sheds and offices, should have water supplied without stint.

Fence (Screen 9 of 11)

Gardens of large extent should be encircled by an outer boundary which is often formed by a sunk wall or ha-ha surrounded by an invisible wire fence to exclude ground game, or consists of a hedge with low wire fence on its inner side. Occasionally this sunk wall is placed on the exterior of the screen plantations, and walks lead through the trees, so that views are obtained of the adjacent country.

Although the interior garden receives its form from the walls, the ring fence and plantations may be adapted to the shape and surface of the ground. In smaller country gardens the enclosure or outer fence is often a hedge, and there is possibly no space, enclosed by walls, but some divisional wall having a suitable aspect is utilized for the growth of peaches, apricots, etc., and the hedge merely separates the garden from a paddock used for grazing.

The still smaller gardens of villas are generally bounded by a wall or wood fence, the inner side of which is appropriated to fruit trees. For the latter walls are much more convenient and suitable than a boarded fence, but in general these are too low to be of much value as aids to cultivation, and they are best covered with bush fruits or with ornamental plants of limited growth.

Walks (Screen 10 of 11)

The best material for the construction of garden walks is good binding gravel. The ground should be excavated to the depth of a foot or more the bottom being made firm and slightly concave, so that it may slope to the center, where a drain should be introduced; or the bottom may be made convex and the water allowed to drain away at the sides.

The bottom 9 in, should be filled in compactly with hard, coarse materials, such as stones, brickbats, clinkers, burned clay, etc., on which should be laid 2 or 3 in. of coarse gravel, and then 1 or 2 in. of firm binding gravel on the surface. The surface of the walks should be kept well rolled, for nothing contributes more to their elegance and durability.

All the principal lines of walk should be broad enough to allow at least three persons to walk abreast; the others may be narrower, but a multitude of narrow walks has a weak effect. Much of the neatness of walks depends upon the material of which they are made.

Gravel from an inland pit is to be preferred; though occasionally very excellent varieties are found upon the sea-coast. Gravel walks must be kept free from weeds, either by hand weeding, or by the use of one of the many weed killers now on the market. In some parts of the country the available material does not bind to form a close, even surface, and such walks are kept clean by hoeing.

Grass walks were common in English gardens during the prevalence of the Dutch taste, but, owing to the frequent humidity of the climate, they have in a great measure been discarded. Grass walks are made in the same way as grass lawns. When the space to be thus occupied is prepared, a thin layer of sand or poor earth is laid upon the surface and over this a similar lava of good soil.

This arrangement is adopted in order to prevent excessive luxuriance in the grass. In many modern gardens pathways made of old paving stones lead from the house to different parts. They give an old-fashioned and restful appearance to a garden, and in the interstices charming little plants like thyme, *Ionopsidium acaule,* etc., are allowed to grow.

Edgings

Walks are separated from the adjoining beds and borders in a variety of ways. If a living edging is adopted, by far the best is afforded by the dwarf box planted closely in line. It is of extremely neat growth, and when annually clipped will remain in good order for many years.

Very good edgings, but of a less durable character, are formed by thrift *(Armeria vulgaris),* double daisy *(Bellis perennis),* gentianella *(Gentiana acaulis)* and London pride *(Saxifraga umbrosa), Cerastium tomentosum, Stachys lavata* and the beautiful evergreen *Veronica rupestris* with sheets of bright blue flowers close to the ground, or by some of the finer grasses very carefully selected, such as the sheep's fescue *(Festuca ovina)* or its glaucous-leaved variety.

Indeed, any low-growing herbaceous plant, susceptible of minute division, is suitable for an edging. Amongst shrubby plants suitable for edgings are the evergreen candytuft *(Iberis sempervirens), Euonymus radicans variegate,* ivy, and *Euonymus microphyllus-a* charming little evergreen with small serrated leaves.

Edgings may also be formed of narrow slips of sandstone flag, slate, tiles or bricks. One advantage of using edgings of this kind, especially in kitchen gardens, is that they do not harbor slugs and similar vermin, which all live edgings do, and often to a serious extent, if they are left to grow large.

In shrubberies and large flower-plots, verges of grass-turf, from 1 to 3 ft. in breadth, according to the size of the border and width of the walk, make a very handsome edging, but they should not be allowed to rise more than an inch and a half above the gravel, the grass being kept short by repeated mowing, and the edges kept trim and well-defined by frequently clipping with shears and cutting once or twice a year with an edging iron.

Garden Structures

Walls

The position to be given to the garden walls has been already referred to. The shelter afforded by a wall, and the increased temperature secured by its presence, are indispensable for the production of all the finer kinds of outdoor fruits; and hence the inner side of a north wall, having a southern aspect is appropriated to the more tender kinds.

It is, indeed, estimated that such positions enjoy an increased temperature equal to 7° of latitude; that is to say, the mean temperature within a few inches of the wall is equal to the mean temperature of the open plain 7° farther south. The eastern and western aspects are set apart for fruits of a somewhat hardier character.

Where the inclination of the ground is considerable, and the presence of high walls would be objectionable, the latter may be replaced by sunken walls. These should not rise more than 3 ft. above the level of the ground behind them.

As dryness is favorable to an increase of heat, such walls should be either built hollow or packed behind to the thickness of 3 or 4 ft. with rubble stones, flints, brickbats or similar material, thoroughly drained at bottom. For mere purposes of shelter a height of 6 or 7 ft. will generally be sufficient for the walls of a garden, but for the training of fruit trees it is found that an average height of 12 ft. is most suitable.

In gardens of large size the northern or principal wall may be 14 ft., and the side walls 12 ft. in height; while smaller areas of an acre or so should have the principal walls 12 and the side walls 10 ft. in height. As brick is more easily built hollow than stone, it is to be preferred for garden walls.

A 14-in. hollow wall will require 12,800 bricks, while a solid 9-in. one, with piers, will need 11,000 but the hollow wall, while thus only a little more costly, will be greatly superior, being drier and warmer, as well as more substantial. Bricks cannot be too well burnt for garden walls; the harder they are the less moisture will they absorb.

Many excellent walls are built of stone. The best is dark-colored

whinstone, because it absorbs very little moisture. The stones can be cut (in the quarries) to any required length. and built in regular courses.

Stone walls should always be built with thin courses for convenience of training over their surface. Concrete walls, properly coped and provided with a trellis, may in some places be cheapest, and they are very durable. Common rubble walls are the worst of all.

Coping

The coping of garden walls is important, both for the preservation of the walls and for throwing the rain-water off their surfaces. It should not project less than from 2 to 2.5 in., but in wet districts may be extended to 6 in. Stone copings are best, but they are costly, and Portland cement is sometimes substituted.

Temporary copings of wood, which may be fixed by means of permanent iron brackets just below the stone coping, are extremely useful in spring for the protection of the blossoms of fruit trees.

They should be 9 in. or 1 ft. wide, and should be put on during spring before the blossom buds begin to expand; they should have attached to them scrim cloth (a sort of thin canvas), which admits light pretty freely, yet is sufficient to ward off ordinary frosts; this canvas is to be let down towards evening and drawn up again in the morning.

These copings should be removed when they are of no further utility as protectors, so that the foliage may have the full benefit of rain and dew. Any contrivance that serves to interrupt radiation, though it may not keep the temperature much above freezing, will be found sufficient.

Standard fruit trees must be left to take their chance; and, indeed from the lateness of their flowering, they are generally more injured by blight, and by drenching rains, which wash away the pollen of the flowers, than by the direct effects of cold.

Espalier Rails

Subsidiary to walls as a means of training fruit trees, espalier rails were formerly much employed, and are still used in many gardens. In their simplest form, they are merely a row of slender stakes of larch or other wood driven into the ground, and connected by a short rod or fillet at top.

The use of iron rails has now been almost wholly discontinued on account of metallic substances acting as powerful conductors of both heat and cold in equal extremes. Standards from which galvanized wire is tightly strained from one end to the other are preferable and very convenient.

Trees trained to them are easily got at for all cultural operations, space is saved, and the fruit, while freely exposed to sun and air, is tolerably secure against wind. They form, moreover, neat enclosures for the vegetable quarters, and, provided excess of growth from the center is successfully dealt with, they are productive in soils and situations which are suitable.

Pits and Frames (Screen 2 of 12)

These are used both for the summer growth and winter protection of various kinds of ornamental plants, for the growth of such fruits as cucumbers, melons, and strawberries, and for the forcing of vegetables.

When heat is required, it is sometimes supplied by means of fermenting dung, or dung and leaves, or tanners bark, but it is much more economically provided by hot-water pipes. Pits of many different forms have been designed, but it may be sufficient here to describe one or two which can be recommended for general purposes.

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An excellent pit for wintering bedding-out plants or young greenhouse stock is shown above. It is built upon the pigeon-hole principle as high as the ground level (a), and above that in 9-in. brickwork. At a distance of 9 in. retaining walls (b), are built up to the ground level, and the spaces between the two are covered by thick boarding, which is to be shut down as shown at (c) in cold weather to exclude frost, and opened as shown at (d) in mild weather to promote a free circulation of air through the pit.

The height of the pit might be reduced according to the size of the plants; and, to secure the interior against frost, flow and return hot-water pipe (c) should pass along beneath the staging, which should be a strong wooden trellis supported by projections in the brickwork. The water which drains from the plants or is spilt in watering would fall on the bottom, which should be made porous to carry it away.

For many plants this under current of ventilation would be exceedingly beneficial, especially when cold winds prevented the sashes from being opened. A pit of this character may be sunk into the ground deeper than is indicated in the figure if the subsoil is dry and gravely, but in the case of a damp subsoil it should rather be more elevated, as the soil could easily be sloped up to meet the retaining wall.

Frames (Screen 3 of 12)

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Frames should be made of the best red deal, 1 1/4 in. thick. A convenient size is 6 ft. wide, 24 in. high at the back and 15 in front; and they are usually 12 ft. long, which makes three lights and sashes, though they can be made with two lights or one light for particular purposes. Indeed, a one-light frame is often found very convenient for many purposes.

The lights should be 2 in. thick, and glazed with 21 oz. sheet glass, in broad panes four or five to the breadth of a light, and of a length which will work in conveniently and economically, very long panes being undesirable from the havoc caused by accidents, and very short ones being objectionable as multiplying the chances of drip, and the exclusion of light by the numerous lappings; panes about 12 in. long are of convenient size for garden lights of this character.

In all gardens the frames and lights should be of one size so as to be interchangeable, and a good supply of extra lights (sashes) may always be turned to good account for various purposes.

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Span-roof garden frame may under some circumstances be useful as a substitute for the light frame. It is adapted for storing plants in winter, for nursing small plants in summer and for the culture of melons and other crops requiring glass shelter.

These frames are made 11 in. high in front, 22 at the back and 32 at the ridge, with ends of 11-in. red deal; the sashes, which are 2 in. thick, back separately. The lights are completely back when necessary to the plants within is one of the form of pit.

Mushroom House (Screen 4 of 12)

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Mushrooms may be grown in sheds and cellars, or even in protected ridges in the open ground, but a special structure is usually devoted to them. A lean-to against the north side of the garden wall will be found suitable for the purpose, though a span-roofed form may also be adopted, especially if the building stands apart.

The internal arrangement of a lean-to mushroom house is shown above. The length may vary from 30 ft. to 60 ft. a convenient width is 10 ft., which admits of a 3 1/2 ft. central path, and beds 3 ft. wide an each side.

The shelves should be of slate, supported by iron uprights, each half having a front ledge of bricks set on edge in cement. The slabs of slate forming the shelves should not be too closely fitted, as a small interval will prevent the accumulation of moisture at the bottom of the bed.

They may be supported by iron standards or brick piers, back and front, bearing up a flat bar of iron on which the slates may rest; the use of the bar win give wider intervals between the supports, which will be found convenient for filling and emptying the beds.

The roof may be tiled or slated; but, to prevent the injurious influence of hot sun, there should be an inner roof or ceiling, the space between which and the outer roof should be packed with sawdust. A hot-water pipe should run along both sides of the pathway, close to the front ledge of the lowest beds. The different shelves can be planted in succession, and the lower ones, especially those on the floor level, as being most convenient, can be utilized for forcing sea-kale and rhubarb.

Heating Apparatus

Plant houses were formerly heated in a variety of ways by fermenting organic matter, such as dung, by smoke flues, by steam and by hot water circulating in iron pipes. The last-named method has proved so satisfactory in practice that it is now in general use for all ordinary purposes.

The water is heated by a furnace, and is conveyed from the boiler into the houses by a main or flow pipe, connected by means of siphon branches with as many pipes as it is intended to serve. When cooled it is returned to the boiler by another main or return pipe.

Heat is regulated in the structures by means of valves on the various branch pipes. The flow pipe is attached to the boiler at its highest point, to take the heated water as it ascends. The return pipe is connected with the boiler at or near its lowest point. The highest points of the pipes are fitted with small taps, for the removal of air, which would retard circulation if allowed to remain.

Heating by hot water may be said to depend, in part, on the influence of gravity on water being to some extent overcome by heating in a boiler. It ascends the flow pipe by convection, where its onward journey would speedily end if it were not for the driving force of other molecules of water following, and the suction set up by the gravitation into the boiler of the cooled water by the return pipe.

The power of water to conduct heat is very low. The conducting power of the iron in which it is conveyed is high. It is, however, probable that conduction is to some extent a factor in the process.

Pipes (Screen 6 of 12)

It is a mistake to stint the quantity of piping, since it is far more economical and better for the plants to have a larger surface heated moderately than a smaller surface heated excessively. In view of the fact that air expands, becomes lighter, and rises under the influence of heat, the pipes should be set near the floor.

If intended to raise the temperature of the structure, they should be set on iron or brick supports just clear of walls, earth or other heat absorbing bodies. Those intended to provide bottom heat, however, are set in water tanks running under the beds, or in enclosed dry chambers under the beds, or are embedded in the soil or plunging material.

The first-named method is distinctly superior to others. Pipes of 2 in., 1 in., 4 in. and 6 in. diameters are mostly used, the 4 in. size being the most convenient for general purposes. The joints are packed or caulked with tow, smeared with a mixture of white and rid lead. Flanged joints are made to bolt together on washers of vulcanized rubber.

Boilers (Screen 7 of 12)

There are numerous types of boilers in use, illustrative of efforts to secure as much exposure as possible to the action of the flames. The water-tube type, with multiple waterways, consists of a number of separate tubes joined together in various ways. Some of these are built in the form of a blunt cone, and are known as conical tubular boilers.

Others are built with the tubes arranged horizontally, and are known as horizontal tubular boilers. The majority of the latter are more or less saddle-shaped. Boilers with a single waterway are of three principal types, the Cornish, the saddle and the conical. The Cornish is cylindrical with the furnace occupying about half the length of the cylinder.

The saddle is so named from its supposed resemblance to a saddle. It is set to span the furnace, additional exposure to heat being secured in a variety of ways by flues. Exposure in the conical boiler is direct on its inner surface, and is supplemented by flues.

Tubular boilers, especially the horizontal types, are very powerful and economical. The Cornish type is a rather slow and steady boiler, and is much used for providing heat for large areas. The saddle boiler is very commonly employed to provide heat for moderately sized and small areas. Both are powerful and economical.

Conical boilers are more expensive to set by reason of their shape, and are not so convenient to manipulate as the horizontal kinds. All the above types require a setting of masonry.

Portable boilers are convenient for heating small areas, and are less expensive to install than those described above. They are less economical, however, owing to loss of heat from their exposed surfaces. Sectional boilers, in which portions can be added or taken away according to the amount of heating surface required, are also used.

Water Supply (Screen 8 of 12)

Wastage of water in the boilers should be made good automatically from a cistern controlled by means of a ball-cock.

It should be placed as high above the boiler as practicable.

The feed should connect with the return pipe near the point at which it enters the boiler.

Stokeholds (Screen 9 of 12)

These usually have to be excavated to admit of the boilers being set below the level of the pipes they are intended to serve.

In consequence of their depth, the draining of stokeholds often presents difficulties.

Care should be taken to allow sufficient room to properly manipulate the fires and to store fuel.

It is important that the ventilation should be as efficient as practicable, especially where coke fuel is to be used.

Stoking (Screen 10 of 12)

The management of the furnaces is relatively easy and consists in adapting the volume and intensity of the fires to particular needs. It involves the keeping clean of flues, ashpits and especially the fires themselves. Where coke or ordinary hard coal are used, the removal of clinkers should be done systematically, and the fires stirred.

Anthracite coal fires should not be stirred more than is absolutely necessary, and should not be fed in driblets. They require more draught than coke fires, but care must be taken not to give too much, as excessive heat is likely to melt or soften the fire-bars.

Draught is regulated in the ashpit by opening or closing the bottom door of the furnace and by the damper on the smoke shaft. The latter must be of a fairly good height, according to circumstances, to secure a good draught.

Solar Heat (Screen 11 of 12)

The importance of sun heat to the general well-being of plant life, its influence on the production of flowers and the ripening of edible fruits, has long been appreciated in gardening.

The practice of "closing up" early in the afternoon, i.e. the closing of ventilators (accompanied by syringing and damping of surfaces to produce a humid atmosphere) has for its object the conservation of as much solar heat as practicable.

Ventilation (Screen 12 of 12)

This consists in the admission of air for the purpose of preventing stagnation of the atmosphere and for the regulation of temperature. Means of affording ventilation in all plant houses should be provided in at least two places as near the floor as practicable, and at the top.

Mechanical contrivances whereon whole sets of ventilators may be operated simultaneously are in common use, and are much more convenient and economical than the older method of working each ventilator separately. Efficient ventilating can only be effected by the exercise of common sense and vigilance, and care must be taken to avoid cold draughts through the houses.

Selecting Seed (Screen 1 of 3)

Except in special cases, it pays the gardener to buy seed from reputable seedsmen and not to depend on home-grown supplies. Very fine varieties that do extremely well in certain areas have been grown for long periods from locally produced seed, and such practices are to be commended, provided adequate measures are taken to keep the strains pure.

Vegetables that are entirely, or readily, cross-pollinated *among plants of their* kind include corn, cucumbers, melons, squash, pumpkins, cress, mustard, Brussels sprouts, cabbage, cauliflower, collards, kale, kohlrabi, spinach, onion, radish, beet, and turnip. Those less readily cross-pollinated are eggplant, pepper, tomato, carrot, and celery. Beans, peas, okra, and lettuce are generally self-pollinated, but occasionally cross-pollinated, lima beans sometimes rather extensively.

Because sweet corn will cross with field corn, it is unwise to save sweet corn seed if field corn is growing in the same neighborhood. Hybrid sweet corn should not be saved for seed. The custom of saving seed from a choice watermelon is safe, provided no citrons or other varieties of watermelons are growing nearby.

Likewise, seed from a muskmelon is safe, even though it was grown side by side with cucumbers. Beans do not readily cross and their seed also may be saved. Cabbage, kohlrabi, kale, collards, broccoli, and cauliflower all intercross freely, so each must be well isolated from the others if seed is to be saved.

Ordering Seeds (Screen 2 of 3)

Seeds should be ordered well in advance of planting time, but only after the preparation of a garden plan that shows the size of the plantings and the quantity of seed required.

Crops and varieties that are known to be adapted to the locality should be selected. The agricultural experiment station of each State, local Extension agents, and experienced gardeners are usually able to give advice about varieties of vegetables that are adapted to the area. Standard sorts of known quality and performance are usually the best choice.

Disease-resistant strains and varieties of many important vegetables are - now so generally available that there is little reason for risking the loss of a crop through planting susceptible sorts. This phase of the subject is treated in detail under the individual crops.

Some seeds retain their vitality longer than others. Seeds may be divided into three groups as follows:

1. Comparatively short-lived, usually not good after 1 to 2 years-corn, leek, onion, parsley, parsnip, rhubarb and salsify;

2. moderately long-lived, often good for 3 to 5 years-asparagus, beans, Brussels sprouts, cabbage, carrot, cauliflower, celery, kale, lettuce, okra, peas, pepper, radish, spinach, turnip and watermelon; and

3. long-lived, may be good for more than 5 years-beet, cucumber, eggplant, muskmelon, and tomato.

Buying Seed (Screen 3 of 3)

The quality of seed varies, but many states' laws protect the gardener fairly well against poor seed and misrepresentation.

The kind, variety, percentage of germination, and date of testing are marked on every package offered for sale.

The rule of thumb is to buy enough seed at one time to last through the entire season.

Selecting Varieties (Screen 1 of 1)

The selection of vegetable varieties is a difficult problem. Seed catalogs are colorful and profusely illustrated. The written description of each variety convinces the gardener that it must be included in the garden. Since it is impossible to grow every variety, following these rules will aid in your selection.

Buy vegetable seeds and transplants by variety name. Varieties differ so much in the time of maturity, in quality, and in disease resistance that success or failure in your garden may be determined by the choice of variety.

The best means of disease control in the home garden is through the use of disease and insect resistant varieties; these varieties should be bought whenever possible. Purchase your seed and transplants from a reputable firm.

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...the renaissance...

The renaissance was a reawakening after the long, bleak centuries of the middle ages and a return to classical values. This revolution was to rejuvenate gardening as well as the other arts, and indeed the social climate encouraged men to become "uomo universale," which meant that the great talents of the day became skilled in all disciplines.

Many of the designers of gardens are widely known as painters, sculptors, architects, and scientists. The influence of Greek thought was clear in early Italian Renaissance gardening.

The placement of gardens was, as in Greek times, chosen so as to get a good view of the sea as well as of cities, hills, and plains. Texts on the cultivation of gardens written by Pliny in the first century A.D. were rediscovered and studied by property owners.

But the gardens of the Medici, a rich and powerful family of Renaissance men starting with Cosimo the Elder in the late 14th century, went far beyond anything that had been seen in ancient Greece. The most extensive of their many famous gardens are the Boboli, which are located in Florence behind the Pitti Palace.

The palace itself was begun as a rival to the Medici family's Via Larga site but ran out of funds before it could be completed and, to the chagrin of its owner Luca Pitti, had to be sold to the very family against whom it had been intended to compete.

In the hands of Cosimo I and his descendants the palace was enlarged, and the grounds were developed into the marvelous sanctuary which remains to this day.

Originally, there were distinct regions of the garden for different uses. There was a botanical garden and a labyrinth, which unfortunately fell into

disrepair and were abandoned. The rest of the gardens, however, are better maintained.

The great fountain of Oceanus still sits in the middle of an island on the lowest level of the garden, surrounded by a wall decorated with citrus trees and roses.

The prevailing color is green, and each shrub is carefully clipped. Emphasis on greenery was more a matter of necessity than taste to the Italians, as the dryness of summer precluded more delicate flowers.

The gardens, in turn, had a part in determining fashion, as bright and garish colors became the vogue as a contrast to the regular green of the outdoor spaces.

Most of Boboli's area is taken up by a large amphitheater which fits smoothly into the hills behind the palace. It was carefully situated so as to afford a beautiful view from any of its many levels, and several famous sculptures are placed at the heads of staircases between these.

Its large size made it perfect for entertaining eminent guests in grandiose fetes, some of which have become legendary. For the visit of Francis I, Leonardo da Vinci designed a mechanical lion which would strew flowers before the king.

Then in 1651, on the occasion of the marriage of Cosimo III, the most impressive fete of them all occurred. A gigantic statue of Atlas was drawn into the amphitheater in a great parade and was followed by an impressive mechanical display.

...decorative displays...

click here to see movie...
click here to see picture...

Botanical gardens were originally created solely for the purpose of classifying plants, but now are more for the display of decorative species.

click here to see picture...

This type of garden combines utility and aesthetic pleasure, collecting plants for their beauty and organizing them by their taxonomy. Arboretums are similar but focus on trees, and can either stand alone or be incorporated into a larger botanical gardens.

click here to see picture...

As people keep moving to urban environments, the value of having a store-house of carefully tended plants in the midst of the city becomes more appreciated. The gardens allow opportunity for study as well as a retreat from city life for nature lovers.

click here to see picture...

Each plant is labeled, and some botanical gardens have assembled plants from all over the world for the appreciation of any visitors who care to stroll through it.

click here to see picture...

Predecessors of modern botanical gardens were first recorded in ancient China, and in Mediterranean countries. These were for the purpose of growing fruit and producing medicine.

click here to see picture...

As printed materials became available in later centuries, a group of people known as herbalists arose, who catalogued descriptive works about plants and started to try to assemble collections of them.

click here to see picture...

The first true botanical gardens appeared in the sixteenth century in Italy and were associated with medical schools. The gardens were used both for teaching and for medicinal production, and also were the site of the first collection of Dutch bulbs, which latter grew into a large industry.

click here to see picture...

Botany came into being as a science in the eighteenth and nineteenth century, and there were reportedly 1600 botanical gardens by 1800. Since then their popularity has decreased somewhat, and more decorative gardens have regained favor.

click here to see picture...

Famous botanical gardens which still exist include the Jardin des Plantes in Paris, which was founded in the 1600s, and the English Royal Botanic Gardens at Kew.

click here to see picture...

The Kew gardens are historically important for the popularization of rubber and quinine (which has medicinal uses as a counter to malaria). It is also, along with the Canadian Niagara Falls Parks Commission's School of Horticulture, one of the foremost institutions for the training of gardeners.

...a passion for nature...

click here to zoom to the Quotations & Music screen...
click here to zoom to the garden show "English Country Gardens"...

While some poets depend on flowers, so do some gardens depend on poets. Some even go so far as to suggest that "the chief use of flowers is to illustrate quotations from the poets." This mutual relationship is not surprising, as the orderly distribution of flowers in a carefully tended garden can be considered akin to the restraint of meter and rhyme in poetry.

click here to see picture...

That Keats had a profound knowledge and love of flowers is shown in his letters and poems. In "I stood tiptoe upon a little hill" is found this incomparable description of sweet peas:

Here are the Sweet Peas, on tiptoe for a flight,
With wings of gentle flush o'er delicate white,
And taper fingers catching at all things
To bind them all about with tiny wings.

There are also books which purport to be collections of flower references from the poets. One such of these is *Dante's Garden,* although it refers more to trees since Italian gardens of his day were of trees rather than flowers.

The flowers of Shakespeare are well known, and there exist more than 200 Shakespeare Gardens, also known as Shakespeare Borders, which are laid out and set with every tree, shrub, and flower named in Shakespeare. A good example of these is a garden at Hillside, near Albany, New York.

click here to see picture...

There is less bloom in a Shakespeare Border than in a typical modern

flower bed, and the flowers are not so large or brilliant; but, quiet as they are, they are said to excel the blossoms of the same plants of Shakespeare's own day, which we learn from old herbalists were smaller and less varied in color than those of their descendants.

Modern authors have seldom given their names to gardens, not even Tennyson with his intimate and extended knowledge of garden flowers. A Mary Howitt Garden was planted, but it would have slight significance save to its maker since no one cares to read Mary Howitt nowadays.

click here to see picture...

Nonetheless, poets' relationships with nature have always been close. Matthew Arnold, for instance, asks "Did you every hear a poet who did not talk flowers? Don't you think a poem which for the sake of being original should leave them out would be like those verses where the letter a or e, or some other, is omitted? No; they will bloom over and over again in poems as in the summer fields, to the end of time, always old and always new."

Quotations & Music:

NOTE: Click on any number below to hear selection; some musical selections extend well past the end of the quote...

-- 1 -- **-- 2 --** **-- 3 --** **-- 4 --**

-- 5 -- **-- 6 --** **-- 7 --** **-- 8 --**

-- 9 -- **-- 10 --** **-- 11 --**

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...the ultimate garden...

Charles VIII, one of the first monarchs of a united France in the latter half of the fifteenth century, conducted an invasion of Italy. He didn't come back having secured Naples, as was his goal, but did bring back many favorable impressions of Italian gardens.

Thus began French domination of world garden style. Castles along the Loire river each built up their grounds with sun-drenched walkways and even rows of trees. Clay and gravel, as well as flowers, were used in intricate "parterres."

Finally, Nicholas Fouquet, Louis XIV's finance minister, set out to build the ultimate garden, using money which he came by through his close association with the king's purse.

Unfortunately for him, the king became suspicious of a courtier who lived in a grander style than he did and so conducted an investigation, the result of which was that the embezzling Fouquet was imprisoned.

Louis then used Fouquet's own architect, AndrΘ Le N⌠tre, to design the magnificent gardens for the palace at Versailles, to which the king planned to move the seat of government.

The development lasted from 1662 through 1668, and when it was completed the gardens sprawled over 15,000 acres and stretched along a great east-west expanse that seemed to disappear into the horizon.

Even after that was accomplished the gardens were not considered complete, and work continued on them for another fifty years.

On either side of this main strip, Le N⌠tre placed carefully designed parterres and buildings. Thousands of trees required for shade along the corridor had to be brought in from far and wide.

The whole concept was organized in precise geometry, as Le N⌠tre was very conscious of lines and form.

Sculpture and fountains were designed by the most expert artists in France. The sun was used as a motif, because Louis XIV was known as the "Sun King." Even the placement of the sculptures, representing Apollo and his entourage, were made deliberately in order of their relation to the sun.

For example, the flower and orange garden, symbolic of Flora, Zephyr, Hyacinth, and Clytie, mythic figures transformed into flowers by Apollo, were placed in the south. Apollo himself has a central place, of course, in a fountain depicting the chariot of the sun flying up from the sea.

The gardens could be used as an escape from court life for the king and his court, or as a place for grand celebrations. Having heard about the procession of Atlas in the Boboli gardens of the Medici, Louis determined to surpass it.

Two years into the building of the gardens he declared a three-day fete in honor of his wife and of his mother, although it was probably more for the pleasure of his mistress, who had just borne him a son.

The comedic dramatist MoliΦre and court composer Lully designed a grand show for the finale, in which the Apollo Fountain became an aquatic theater, and which finished with a bang, literally, as fireworks erupted from the stage.

Poets and philosophers later scorned the strictness of the French garden style, but for many years gardens such as Versailles were considered necessary for any aristocratic dwelling.

Versailles became the model for the gardens of all the other potentates of Europe, but none could surpass the grandeur of the original.

...in harmony with nature...

In contrast to European gardens, in which the landscape artist strives for symmetry, the gardens of the orient are nature in miniature. Instead of being concerned with man's control over his environment, as are the gardeners of the West, the Japanese designer tries to make it appear as if he has relinquished that control.

click here to see picture...

Balance comes, not from symmetrical placement, but from rules governing the balance of opposites. All forms have complements: male to female, dark to light, which must be present in the correct quantities.

This style of gardening was imported to Japan from China about 1000 years ago, and reproduced in a stylized way. Each garden had to be south of the house and have a prescribed layout consisting of a pond with an island. The emphasis on this form was reflected in the very name for garden, "shima," which means island.

Later, creativity took on significance in Japanese design. There were still many rules for garden layout, but they were set up so as to allow the artist freedom within the confines of form.

click here to see picture...

Formations of rocks and bridges took on religious significance from Zen Buddhism and from general superstition: no garden, for instance, whether private or sacred, was considered worthy of the name unless it had three characteristic types of stone: a "guardian stone," a "stone of the two gods," and a "stone of adoration." Every detail was planned, down to minutiae. Sometimes individual needles would be removed from trees to make them just right.

click here to see picture...

There are two main divisions of style in Japanese gardens, and within those styles there are three levels of intricacy. Of the possible combinations, two types of gardens have assumed the most importance in landscaping: the abstract garden and the tea garden.

The first is exemplified by the Ryoan-ji garden in Kyoto, which consists of a flat-raked surface of sand and clumps of rocks irregularly placed. This creates a modern interpretation of the old-style island garden. Tea gardens are quite different and less sparse. They are designed to appeal to the emotions rather than, like the abstract gardens, to the intellect.

click here to see picture...

Taking a stroll through a tea garden is designed to create a humble, contemplative, sensible mood for the following tea ceremony. This is achieved by recreating scenes such as moonlit dusk according to strict guidelines.

But there are also less formal gardens for individual enjoyment all around Japan. Indeed, the importance of nature to the culture is expressed by the utilizing of every bit of space as a miniature garden.

click here to see picture...

Even a few square feet indoors might be room enough for a garden in miniature, including special stunted trees called Bansai, carefully manipulated for years to make them resemble smaller versions of large species.

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...an historic monument...

The Hanging Gardens of Babylon have become as much myth as fact: nothing remains of them because the brick structure upon which they were supported was crumbled by earthquakes, floods, and hostile invasions. Nevertheless, they are counted among the Seven Wonders of the World.

The gardens' great fame caused the early Greek historians Diodorus and Strabo to make detailed investigations of them based on similar extant gardens and what they could discover from written records and local tales.

It is their accounts, differing in some details but in agreement on many points, from which we have most of our information about what the gardens might have been like in all of their ancient splendor.

The Hanging Gardens were built in about 605 BC by the Babylonian king Nebuchadnezzar in order to prove his love for his wife, who missed the tree-covered mountains of her native Persia.

The gardens were based on two features already common in Babylon: a style of gardening invented by necessity by those living on hillsides, and the Babylonian temples.

These temples, called ziggurats, were tall, pyramidal structures built in seven steps, and were supposed to reach toward the heavens. The Hanging Gardens were grown on a giant terraced structure such as this and included waterfalls, fountains, and all manner of trees and flowering plants.

Trees were especially important to the people living between the Tigris and Euphrates rivers because of their many uses. The Lebanese cedars were highly prized, and date trees were used for everything from wine to furniture.

Trees were shown respect, however, not as deities or spirits, but rather in

sincere appreciation for all the good things that they produced. The importance of trees to these early people is clear from the fact that one of the most grievous crimes that could be perpetrated by a conquering army was the cutting down of the loser's trees.

Diodorus and Strabo differ in their explanations of how the water for the fountains was transported to the top of the one-hundred-foot high structure.

Diodorus claimed that there was some kind of machinery in place to accomplish this feat, while Strabo suggested that slaves either hoisted the water aloft by means of a pulley-and-bucket system or turned spiral pumps. But both of the historians agree that, either way, the task must have been imposing and the whole structure awe-inspiring.

Varieties of Trees (Screen 1 of 7)

click here to zoom to the garden show "North American Trees"...

Trees have been around since the formation of our earth and have provided us with food, shelter, supplies, energy, oxygen, and many other necessary and useful things.

A variety of trees is presented here, including pruning tips, information on training and ringing, and many illustrations and examples for taking care of your trees at various stages of their development.

click here to see movie...

Cordon-Shaped Trees

In order to bring a young tree into the cordon shape, all its side branches are shortened back, either to form permanent spurs, as in the case of pears, or to yield annual young shoots, as in peaches and nectarines.

The single-stemmed cordon may be trained horizontally, obliquely at any required angle, or vertically if required, the first two arrangements being preferable.

If a double cordon is required, the original young stem must be headed back, and the two best shoots produced must be selected, trained right and left, and treated as for the single cordon.

Dwarf or Bush Fruit Trees

To form a dwarf or bush fruit tree the stock must be worked near the ground, and the young shoot produced from the scion or bud must be cut back to whatever height it is desired the dwarf stem should be, say 1 1/2 to 2 ft. The young shoots produced from the portion of the new wood retained are to form the framework of the bush tree, and must be dealt with as in the case of standard trees.

click here to see picture...

The growth of inwardly directed shoots is to be prevented, and the center kept open, the tree assuming a cup-shaped outline. The illustration above will give a good idea how these dwarf trees are to be manipulated, (a) showing the first year's development from the maiden tree after being headed back, and (b) the form assumed a year or two later.

Fan-Shaped Trees (Screen 4 of 7)

The forms chiefly adopted for trees trained to walls and espalier rails are the fan-shaped, the half-fan, and the horizontal, with their various modifications.

The maiden tree is headed down, and two shoots led away right and left. Two laterals should be allowed to grow from the upper side of them, one from near the base, the other from near the middle, all others being pinched out beyond the second or third leaf during summer, but cut away to the last bud in winter.

The tree will thus consist of six shoots, probably 3 ft. to 4 ft. long, which are not to be pruned unless they are unequal in strength, a defect which is rather to be remedied by summer pinching than by winter pruning. The second year three young shoots are to be left on each of the six, one close to the base, one about the middle, and one at the point, the rest being rubbed off.

These three shoots will produce laterals, of which one or two may be selected and laid in; and thus a number of moderately strong fertile shoots will be obtained, and at the end of the season a comparatively large tree will be the result.

click here to see picture...

The method of pruning formerly adopted for the formation of a fan-shaped tree was to head down the maiden plant to about two eyes, so placed as to yield a young shoot on each side, the supernumerary shoots being rubbed off while quite young, and the reserved shoots trained against the wall during the summer so as to get them well matured.

The next year they were cut back again, often nearly to the base, in order that the lower pair of these shoots might each produce two well-placed young shoots, and the upper pair three young shoots. The tree would thus consist of ten shoots, to be laid out at regular distances, and then if closely cut the frame-work of the tree would be as in the illustration below.

click here to see picture...

These main shoots were not again to be shortened back, but from each of them three young shoots were to be selected and trained in two, on the upper side, one near the base, and the other halfway up, and one on the lower side placed about midway between these two; these with the leading shoot, which was also to be nailed in, made four branches of the current year from each of the ten main branches, and the form of the tree would therefore be that of the following illustration.

click here to see picture...

The other young shoots produced were pinched off while quite young, to throw all the strength of the tree into those which were to form its basis, and to secure abundant light and air. In after years the leading shoot was not to be cut back, but all the lateral shoots were to be shortened, and from these year by year other shoots were to be selected to fill up the area occupied by the tree.

Half-Fan Trees

The half-fan is a combination of the two forms, but as regards pruning does not materially differ from the horizontal, as two opposite side branches are produced in succession upwards till the space is filled, only they are not taken out so abruptly, but are allowed to rise at an acute angle and then to curve into the horizontal line.

In all the various forms of cordons, in horizontal training, and in fan and half-fan training, the pruning of the main branches when the form of the tree is worked out will vary in accordance with the kind of fruit under treatment.

Thus in the peach, nectarine, apricot, plum and cherry, which are commonly trained fan-fashion, the first three (and also the morello cherry if grown) will have to be pruned so as to keep a succession of young annual shoots, these being their fruit-bearing wood. The others are generally pruned so as to combine a moderate supply of young wood with a greater or less number of fruit spurs.

In the pear and apple the fruit is borne principally on spurs, and hence what is known as spur-pruning has to be adopted, the young shoots being all cut back nearly to their base so as to cause fruit buds to evolve from the remaining eyes or buds. Cordons of apples and pears have to be similarly treated, but cordons of peaches and nectarines are pruned so as to provide the necessary annual succession of young bearing wood.

Horizontal Trees (Screen 6 of 7)

click here to see picture...

In pruning for a horizontal tree the young maiden tree has to be headed back nearly to its base, and from the young shoots three are to be selected, the two best-placed lower ones to form an opposite or nearly opposite pair of main branches, and the best-placed upper one to continue them erect stem.

This upper shoot is at the next winter pruning to be cut down to within about a foot of the point whence it sprung, and its buds rubbed off except the upper one for a leader, and one on each side just below it to furnish another pair of side shoots; these being trained in position, the tree would appear as in the illustration below. The same course is to be followed annually till the space is filled.

click here to see picture...

Sometimes in very favorable soils and with vigorous trees two pairs of branches may be obtained in one season by summer stopping the erect shoots and selecting others from the young growths thus induced, but more commonly the trees have to be built up by forming one pair of branches annually.

The shoots are not at first lowered to the horizontal line, but are brought down gradually and tied to thin stakes; and while the tree is being formed weak shoots may be allowed to grow in a more erect position than it is ultimately intended they should occupy. Thus in four or five years the tree will have acquired something like the following illustration, and will go on thus increasing until the space is filled.

click here to see picture...

Pyramidal Trees (Screen 7 of 7)

In forming a pyramidal tree, the lateral growths, instead of being removed, as in the standard tree, are encouraged to the utmost; and in order to strengthen them the upper part of the leading shoot is removed annually, the side branches being also shortened somewhat as the tree advances in size.

click here to see picture...

In the illustration above, (a) shows a young tree with its second year's growth, the upright shoot of the maiden tree having been moderately headed back, being left longer if the buds near the base promise to break freely, or cut shorter if they are weak and wanting in vigor.

The winter pruning, carried out with the view to shape the tree into a well-grown pyramid, would be effected at the places marked by a cross line. The lowest branch would have four buds retained, the end one being on the lower side of the branch. The two next would be cut to three buds, which here also are fortunately so situated that the one to be left is on the lower side of the branches.

The fourth is not cut at all owing to its shortness and weakness, its terminal bud being allowed to grow to draw strength into it. The fifth is an example where the bud to which the shoot should be cut back is badly placed; a shoot resulting from a bud left on the upper side is apt instead of growing outwards to grow erect, and lead to confusion in the form of the tree; to avoid this it is tied down in its proper place during the summer by a small twig.

The upper shoots are cut closer in. Near the base of the stem are two prominent buds, which would produce two vigorous shoots, but these would be too near the ground, and the buds should therefore be suppressed; but, to strengthen the lower part, the weaker buds just above and below the lowest branch should be forced into growth, by making a transverse incision close above each. (b) shows what a similar tree would be at the end of the third year's growth.

Planting and Transplanting

In preparing a fruit tree for transplantation, the first thing to be done is to open a trench round it at a distance of from to 4 ft., according to size. The trench should be opened to about two spades' depth, and any coarse roots which may extend thus far from the trunk may be cut clean off with a sharp knife.

The soil between the trench and the stem is to be reduced as far as may seem necessary or practicable by means of a digging fork , the roots as soon as they are liberated being fixed on one side and carefully preserved. By working in this way all round the ball. the best roots will be got out and preserved, and the ball lightened of all superfluous soil.

The tree will then be ready to lift if carefully pried up from beneath the ball, and if it does not lift readily, it will probably be found that a root has struck downwards, which will have to be sought out and cut through. Whenever practicable, it is best to secure a ball of earth round the roots.

On the tree being lifted from its hole the roots should be examined, and all which been severed roughly with the spade should have the ends cut smooth with the knife to facilitate the emission of fibers. The tree can then be transported to its new position.

The hole for its reception should be of sufficient depth to allow the base of the ball of earth, or of the roots, to stand so that the point whence the uppermost roots spring from the stem may be 2 or 3 in. below the general surface level. Then the bottom being regulated so as to leave the soil rather highest in the center, the plant is to be set in the hole in the position desired, and steadied there by hand.

Next the roots from the lower portion of the ball are to be sought out and laid outwards in lines radiating from the stem, being distributed equally on all sides as nearly as this can be done; some fine and suitable good earth should be thrown amongst the roots as they are thus being placed, and worked in well up to the base of the ball.

The soil covering the roots may be gently pressed down, but the tree should not be pulled up and down, as is sometimes done, to settle the soil. This done, another set of roots higher up the ball must be laid out in the same way, and again another, until the whole of the roots, thus carefully laid, are embedded as firmly as may be in the soil, which may now receive another gentle treading.

The stem should next be supported permanently, either by one stake or by three, according to its size. The excavation will now be filled up about two-thirds perhaps; and if so the tree may have a thorough good watering, sufficient to settle the soil closely about its roots.

After twenty-four hours the hole may be leveled in, with moderate treading, if the water has soaked well in, the surface being left level and not sloping upwards towards the stem of the tree. In transplanting trees of the ornamental class, less need be attempted in respect to providing new soil, although the soil should be made as congenial as practicable.

Generally speaking, fruit trees are best transplanted when three or four years of age, in which time they will have acquired the shape given by the nurseryman, who generally transplants his stock each autumn to produce large masses of root fibers.

Nowadays, however, quite large trees, chiefly of an ornamental character, and perhaps weighing several tons, are lifted with a large ball of soil attached to the roots, by means of a special tree-lifting machine, and are readily transferred from one part of the garden to another, or even for a distance of several miles, without serious injury.

The best season for transplanting deciduous trees is during the early autumn months. As regards evergreens opinions are divided, some preferring August and September, others April or May. They can be successfully planted at either period, but for subjects which are at all difficult to remove the spring months are to be preferred.

Summer Pruning (Screen 1 of 3)

click here to see movie...

Summer Pruning should be performed while the shoots are yet young and succulent, so that they may in most cases be nipped off with the thumb-nail. It is very necessary in the case of trees trained to a flat surface, as a wall or espalier rail, to prevent undue crowding. In some cases, as, for example, with peaches, the superfluous shoots are wholly removed, and certain selected shoots reserved to supply bearing wood for next year.

click here to see picture...

In others, as pears, the tops of the young shoots are removed, leaving three or four leaves and their buds at the base, to be developed into fruit buds by the additional nourishment thus thrown into them (a). One or two may push out a late summer growth, b; this will serve as a vent for the vigor of the tree, and if the lowermost only go to the formation of a fruit spur, the object will have been gained. They are cut to the last dormant bud in winter.

But summer pruning has been much extended since the introduction of restricted growth and the use of dwarfing stocks. Orchard-house trees, and also pyramidal and bush trees of apples, pears, and plums, are mainly fashioned by summer pruning; in fact, the less the knife is used upon them, except in the necessary cutting of the roots in potted trees, the better.

In the case of orchard-house plants no shoots are suffered to lengthen out, except as occasionally wanted to fill up a gap in the outline of the tree. On the contrary, the tops of all young shoots are pinched off when some three or four leaves are formed, and this is done again and again throughout the season. When this pruning is just brought to a balance with the vigor of the roots, the consequence is that fruit buds are formed all over the tree, instead of a thicket of sterile and useless wood.

Pyramidal and bush trees out of doors are, of course, suffered to become somewhat larger, and sufficient wood must be allowed to grow to give them the

form desired; but after the first year or two, when the framework is laid out, they are permitted to extend very slowly. and never to any great extent, while the young growths are continually nipped off, so as to clothe the branches with fruit buds as closely placed as will permit of their healthy development.

Cutting Technique (Screen 2 of 3)

click here to see picture...

The technique of the cut itself in pruning is of more consequence, especially in the case of fruit trees, than at first sight may appear. The branches should be separated by a clean cut at an angle of about 45°, just at the back of a bud, the cut entering on a level with the base of the bud and passing out on a level with its top (a), for when cut in this way the wound becomes rapidly covered with new wood, as soon as growth recommences, whereas if the cut is too close the bud is starved, or if less close an ugly and awkward snag is left.

click here to see picture...

In the illustration above, (b) and (c), are examples of the former, and (d), (e), (f) of the latter. In fact there is only one right way to cut a shoot and that is as shown at (a).

Root-Pruning (Screen 3 of 3)

Root-pruning is most commonly practiced in fruit-tree cultivation. It is often resorted to as a means of restoring fertility in plants which have become over rank from an excess of nourishment in the soil, or sterile from want of it. The effect of root-pruning in the first case is to reduce the supply of crude sap to the branches, and consequently to cause a check in their development.

In the second case all roots that have struck downwards into a cold uncongenial subsoil must be pruned off if they cannot be turned in a lateral direction, and all the lateral ones that have become coarse and fiberless must also be shortened back by means of a clean cut with a sharp knife, while a compost of rich loamy soil with a little bone-meal, and leaf-mold or old manure, should be filled into the trenches from which the old sterile soil has been taken.

The operation is best performed early in autumn, and may be safely resorted to in the case of fruit trees of moderate, age, and even of old trees if care is taken.

In transplanting trees all the roots which may have become bruised or broken in the process of lifting should be cut clean away behind the broken part, as they then more readily strike out new roots from the cut parts. In all these cases the cut should be a clean sloping one, and made in an upward and outward direction. The root-pruning of pot-plants is necessary in the case of many soft-wooded subjects which are grown on year after year- pelargoniums and fuchsias, for example.

After the close pruning of the branches to which they are annually subjected, and when the young shoots have shot forth an inch or two in length, they are turned out of their pots and have the old soil shaken away from their roots, the longest of which, to the extent of about half the existing quantity, are then cut clean away, and the plants repotted into small pots.

This permits the growing plant to be fed with rich fresh soil, without having been necessarily transferred to pots of unwieldy size by the time the flowering stage is reached.

Ringing

One of the expedients for inducing a state of fruitfulness in trees is the ringing of the branches or stem, that is, removing a narrow annular portion of the bark, by which means, it is said, the trees are not only rendered productive, but the quality of the fruit is at the same time improved.

The advantage depends on the obstruction given to the descent of the sap. The ring should be cut out in spring, and be of such a width that the bark may remain separated for the season. A tight ligature of twine or wire answers the same end. The advantages of the operation may generally be gained by judicious root pruning, and it is not at all adapted for the various stone fruits.

Training (Screen 1 of 7)

What is called training is the guiding of the branches of a tree or plant in certain positions which they would not naturally assume, the object being partly to secure their full exposure to light, and partly to regulate the flow and distribution of the sap.

To secure the former object, the branches must be so fixed as to shade each other as little as possible; and to realize the second, the branches must have given to them an upward or downward direction, as they may require to be encouraged or repressed.

Something of the same vegetative vigor which is given to a plant or tree by hard pruning is afforded by training in an upward direction so as to promote the flow of the sap; while the repression effected by summer pruning is supplemented by downward training, which acts as a check.

One main object is the preservation of equilibrium in the growth of the several parts of the tree; and for this various minor details deserve attention. Thus a shoot will grow more vigorously whilst waving in the air than when nailed close to the wall; consequently a weak shoot should be left free, whilst its stronger antagonist should be restrained; and a luxuriant shoot may be retarded for some time by having its tender extremity pinched off to allow a weaker shoot to overtake it.

By the prudent use of the knife, fruit trees may be readily trained into the forms indicated below, which are amongst the best out of the many which have been devised.

Training of Bush Trees (Screen 2 of 7)

click here to see picture...

When the growth of pyramids is completed, the outline is something like the illustration above, and very pretty trees are thus formed.

It is better, however, especially if the tendency to bear fruit is rather slack, to adopt what the French call *en quenouille* training (see the illustration below), which consists in tying or weighting the tips of the branches so as to give them all a downward curve.

click here to see picture...

Pear trees worked on the quince stock, and trained *en quenouille,* are generally very fertile.

Training of Wall Trees

Wall trees, it must be evident, are placed in a very unnatural and constrained position, and would in fact soon be reduced to a state of utter confusion if allowed to grow unrestricted; hence the following modes of training have been adopted.

Horizontal Training (Screen 4 of 7)

click here to see picture...

Horizontal Training has long been a favorite form. There is one principal ascending stem, from which the branches depart at right angles, at intervals of about a foot. Horizontal training is best adapted to the apple and the pear; for the more twiggy growing slender varieties, the forms shown in the illustration below have been recommended.

click here to see picture...

In these the horizontal branches are placed wider, 18 to 20 in. apart, and the smaller shoots are trained between them, either on both sides, as at (a), or deflected from the lower side, as at (b). The latter is an excellent method of reclaiming neglected trees. Every alternate branch should be taken away, and the spurs cut off, after which the young shoots are trained in, and soon produce good fruit.

Fan Training (Screen 5 of 7)

click here to see picture...

In Fan Training there is no leading stem, but the branches spring from the base and are arranged somewhat like the ribs of a fan. This mode of training is commonly adopted for the peach, nectarine, apricot, and Morello cherry, to which it is best adapted.

Though sometimes adopted, it is not so well suited as the horizontal form for apples and pears, because, when the branches reach the top of the wall, where they must be cut short, a hedge of young shoots is inevitable.

click here to see picture...

A modification of the fan shape is sometimes adopted for stone fruits, such as the plum and apricot. In this the object is to establish a number of mother branches, and on these to form a series of subordinate members, chiefly composed of bearing wood.

The mother branches or limbs should not be numerous, but well marked, equal in strength, and regularly disposed. The side branches should be pretty abundant, short and not so vigorous as to rival the leading members.

Hall-Fan Training (Screen 6 of 7)

The hall-fan mode of training, which is intermediate between horizontal and fan training, is most nearly allied to the former, but the branches leave the stem at an acute angle, a disposition supposed to favor the more equal distribution of the sap.

click here to see picture...

Sometimes, as in the illustration above, two vertical stems are adopted, but there is no particular advantage in this, and a single-stemmed tree is more manageable. The half-fan form is well adapted for such fruits as the plum and the cherry; and, indeed, for fruits of vigorous habit, it seems to combine the advantages of both forms.

Training Materials & Methods

Trees must be fixed to the walls and buildings against which they are trained by means of nails and shreds (neat medicated strips are sold for this purpose), or in cases where it is desired to preserve the wall surface intact, by permanent nails or studs driven in in regular order.

Sometimes the walls are furnished with galvanized wires, but this has been objected to as causing cankering of the shoots, for which, however, painting is recommended as a remedy.

By crossing the tying material between the wire and the wood, however, and so preventing them from coming in contact, there is no danger. If they are adopted, the wires should be a few inches away from the wall, to allow free circulation of air between it and the tree, and thus avoid the scorching or burning of leaves and fruits during the summer months in very hot places.

Care should be taken that the ties or fastenings do not eventually cut into the bark as the branches swell with increased age. When shreds and nails are used, short thick wire nails and "medicated shreds" are the best; the ordinary cast iron wall nails being much too brittle and difficult to drive into the wall.

It must be remembered that nails spoil a wall sooner or later, whereas a wire trellis is not only much neater, but enables the gardener to tie his trees up much more quickly.

Vegetables: An Introduction

click here to see movie...

Under this head are included those esculentz, which are largely eaten as "vegetables" or as "salads." The culinary herbs used for flavoring and garnishing are for the most part dwarf perennial plants requiring to be grown on a rich soil in an open sunny aspect, or annuals for which a warm sheltered border is the most suitable place; and they may therefore be conveniently grown together in the same compartments herb garden.

The perennials should be transplanted either every year or every second year. For winter use the tops of the most useful kinds of herbs should be cut when in flower or leaf and quite dry, and spread out in an airy but shady place so as to part shady with the moisture they contain and at the same time retain their aromatic properties.

When quite dry they should be put into dry wide-mouthed bottles and kept closely corked. In this way such herbs as basil, marjoram, mint, sage, savory, thyme, balm, chamomile, horehound, hyssop and rue, as well as parsley, may be had throughout the season with almost the full flavor of the fresh herb.

Winter Vegetables (Screen 1 of 1)

During the winter season narrow beds are made up of manure, either quite fresh or mixed with old manure, according to the amount of heat required. These beds are covered with a few inches of the fine old mold obtained from the decayed manure of previous years.

In the early stages seeds of carrots and radishes are sown simultaneously on the same beds, and over them young lettuces that have been raised in advance are planted. In this way three crops are actually on the same beds at the same time. Owing, however, to the difference in their vegetative growth, they mature one after the other instead of simultaneously.

Thus with the genial warmth and moisture of the hotbeds, all crops grow rapidly, but the radishes mature first, then the lettuces are taken off in due course, thus leaving the beds to finish up with the carrots by themselves.

Later on in the season, perhaps small cauliflowers will be planted along the margins of the beds where the carrots are growing, and will be developing into larger plants requiring more space by the time all the carrots have been picked and marketed.

So on throughout the year with other crops, this system of intercropping or overlapping of one crop with another is carried out in a most ingenious manner, not only under glass lights, but also in the open air. Spinach, corn salad, radishes and carrots are the favorite crops for sowing between others such as lettuces and cauliflowers.

Summer Vegetables

Although enormous quantities of water are required during the summer season, great care must be exercised in applying water to the winter crops. When severe frost prevails the lights or cloches are rarely taken off except to gather mature specimens; and no water is given directly overhead to the plants for fear of chilling them and checking growth.

They must secure their supply of moisture from the rain that falls on the glass, and flows into the narrow pathways from 9 in. to 12 in. wide between each range of frames. As the beds are only about 4 1/2 ft. wide, the water from the pathways is soaked up on each side by capillary attraction, and in this way, the roots secure a sufficient supply.

Besides an abundance of water in summer there must also be an enormous quantity of good stable manure available during the winter months. This is necessary not only to make up the required hotbeds in the first place, but also to fill in the pathways between the frames, wherever it is considered advisable to maintain the heat within the frames at a certain point.

As it is impossible to use an ordinary wheelbarrow in these narrow pathways, the workman carries a specially made wicker basket called a "hotte" on his shoulders by means of two straps.

In this way large quantities of manure are easily transported to any required spot, and although the work looks hard to an English gardener, the Frenchman says he can carry more manure with less fatigue in half a day than an Englishman can transport in a day with a wheelbarrow.

Perennial Vegetables (Screen 1 of 5)

The larger vegetable gardens need a number of perennials.

Asparagus, horseradish, and rhubarb are the most important, but chives, bottom multiplier onions, and some of the flavoring and condiment plants, chiefly sage and mint, are also desirable.

Unfortunately, asparagus, horseradish, and rhubarb are not adapted to conditions in the lower South.

All the perennial crops should be grouped together along one side of the garden, where they will not interfere with work on the annual crops.

Asparagus (Screen 2 of 5)

click here to see picture...

Asparagus is among the earliest of spring vegetables. An area about 20 feet square, or a row 50 to 75 feet long, will supply plenty of fresh asparagus for a family of five or six persons, provided the soil is well enriched and the plants are given good attention. More must be planted if a supply is to be canned or frozen.

Asparagus does best where winters are cold enough to freeze the ground to a depth of a few inches at least. In many southern areas the plants make a weak growth, producing small shoots. Elevation has some effect, but, in general, the latitude of south-central Georgia is the southern limit of profitable culture.

The crop can be grown on almost any well-drained, fertile soil, and there is little possibility of having the soil too rich, especially through the use of manure. Loosen the soil far down, either by subsoil plowing or by deep spading before planting.

Throw the topsoil aside and spade manure, leaf mold, rotted leaves, or peat into the subsoil to a depth of 14 to 16 inches; then mix from 5 to 10 pounds of a complete fertilizer into each 75-foot row or 20 foot bed.

When the soil is ready for planting, the bottom of the trench should be about 6 inches below the natural level of the soil. After the crowns are set and covered to a depth of an inch or two, gradually work the soil into the trench around the plants during the first season.

When set in beds, asparagus plants should be at least 11/2 feet apart each way; when set in rows, they should be about 11/2 feet apart with the rows from 4 to 5 feet apart.

Asparagus plants, or crowns, are grown from seed. The use of 1-year-old plants only is recommended. These should have a root spread of at least 15 inches, and larger ones are better. The home gardener will usually find it best to buy his plants

from a grower who has a good strain of a recognized variety. In procuring asparagus crowns, it is always well to be sure that they have not been allowed to dry out.

click here to see picture...

Clean cultivation encourages vigorous growth; it behooves the gardener to keep his asparagus clean from the start. In a large farm garden, with long rows, most of the work can be done with a horse-drawn cultivator or a garden tractor. In a small garden, where the rows are short or the asparagus is planted in beds, however, hand work is necessary.

For a 75-foot row, an application of manure and 6 to 8 pounds of a high-grade complete fertilizer, once each year, is recommended. Manure and fertilizer may be applied either before or after the cutting season.

Remove no shoots the year the plants are set in the permanent bed and keep the cutting period short the year after setting. Remove all shoots during the cutting season in subsequent years. Cease cutting about July 1 to 10 and let the tops grow. In the autumn, remove and burn the dead tops.

click here to see picture...

Asparagus loses its quality quickly and should be eaten or processed within a few hours after harvest unless promptly refrigerated. *Asparagus rust* and *asparagus beetles* are the chief enemies of the crop.

Horseradish (Screen 3 of 5)

Horseradish is adapted to the north-temperate regions of the United States, but not to the South, except possibly in the high altitudes.

Any good soil, except possibly the lightest sands and heaviest clays, will grow horseradish, but it does best on a deep, rich, moist loam that is well supplied with organic matter. Avoid shallow soil; it produces rough, prongy roots.

Mix organic matter with the soil a few months before the plants or cuttings are set. Some fertilizer may be used at the time of planting and more during the subsequent seasons. A top dressing of organic matter each spring is advisable.

Horseradish is propagated either by crowns or by root cuttings. In propagating by crowns a portion of an old plant consisting of a piece of root and crown buds is merely lifted and planted in a new place.

Root cuttings are pieces of older roots 6 to 8 inches long and of the thickness of a lead pencil. They may be saved when preparing the larger roots for grating, or they may be purchased from seedsmen.

A trench 4 or 5 inches deep is opened with a hoe and the root cuttings are placed at an angle with their tops near the surface of the ground. Plants from these cuttings usually make good roots the first year.

As a rule, the plants in the home garden are allowed to grow from year to year, and portions of the roots are removed as needed. Pieces of roots and crowns remaining in the soil are usually sufficient to reestablish the plants.

There is very little choice in the matter of varieties of horseradish. Be sure, however, to obtain good healthy planting stock of a strain that is giving good results in the area where it is being grown.

Rhubarb (Screen 4 of 5)

click here to see picture...

Rhubarb thrives best in regions having cool moist summers and winters cold enough to freeze the ground to a depth of several inches. It is not adapted to most parts of the South, but in certain areas of higher elevation it does fairly well. A few hills along the garden fence will supply all that a family can use.

Any deep, well-drained, fertile soil is suitable for rhubarb. Spade the soil or plow it to a depth of 12 to 16 inches and mix in rotted manure, leaf mold, decayed hardwood leaves, sods, or other form of organic matter. The methods of soil preparation suggested for asparagus are suitable for rhubarb. As rhubarb is planted in hills 3 to 4 feet apart, it is usually sufficient to prepare each hill separately.

Rhubarb plants may be started from seed and transplanted, but seedlings vary from the parent plant. The usual method of starting the plants is to obtain pieces of crowns from established hills and set them in prepared hills. Top-dress the planting with a heavy application of organic matter in either early spring or late fall. Organic matter applied over the hills during early spring greatly hastens growth, or forces the plant.

A pound of complete commercial fertilizer high in nitrogen applied around each hill every year insures an abundant supply of plant food. The plants can be mulched with green grass or weeds.

In harvesting, the stalks are pulled, not cut. The leaf blades are removed, and only the fleshy stem, or petiole, is used. Always leave a few stalks on the plant unless the bed is to be discontinued. After 10 or 15 years, the plants become crowded and the leaf petioles small.

Remove seed-stalks as soon as they form. No leaf stems should be harvested before the second year and but few until the third. Moreover, the harvest season must be largely confined to early spring. The hills should be divided and reset every 7 or 8 years. Otherwise, they become too thick and produce only slender stems. Use only the leafstalk as a food. Rhubarb leaves contain injurious

substances, including oxalic acid. Never use them for food.

Sorrel (Screen 5 of 5)

Sorrel is a perennial that is usually started from seeds. It requires a rich, mellow, well-drained soil.

Rows may be of any convenient distance apart. Thin the plants to about 8 inches apart in the rows.

If the leaves alone are gathered and the plants are cultivated to prevent the growth of weeds, a planting should last 3 or 4 years.

Greens (Screen 1 of 11)

Greens are usually the leaves and leaf stems of immature plants, which in their green state are boiled for food.

Young, tender branches of certain plants, New Zealand spinach, for example, are also used this way.

All the plants treated here as greens except New Zealand spinach are hardy vegetables, most of them adapted to fall sowing and winter culture over the entire South and in the more temperate parts of the North.

Their culture may be extended more widely in the North by growing them with some protection, such as mulching or frames.

Chard (Screen 2 of 11)

click here to see picture...

Chard, or Swiss Chard, is a type of beet that has been developed for its tops instead of its roots. Crop after crop of the outer leaves may be harvested without injuring the plant. Only one planting is necessary, and a row 30 to 40 feet long will supply a family for the entire summer.

Chard should be grown more extensively in the home garden. It is one of the few vegetables that can be planted in early spring and will continue to bear from spring to fall. Any good garden soil is satisfactory for chard. Planting can be made when danger of hard freeze is past. Seed is hand sown directly in the rows. Plants are thinned to 10-12 inches apart.

Harvesting can begin anytime after the plants develop 4 or 5 leaves. The full grown leaves are cut 1-2 inches from the ground. During harvesting, care should be exercised to avoid injuring the growing point in the center so that new leaves will continue to form and develop. Old leaves are tough and should be cut and discarded.

Chicory, Witloaf

Witloaf chicory, or French endive, is grown for both roots and tops. It is a hardy plant, not especially sensitive to heat or cold. It does, however, need a deep, rich, loamy soil without too much organic matter. The tops are sometimes harvested while young.

The roots are lifted in autumn and placed in a box or bed of moist soil in a warm cellar for forcing. They must be covered with a few inches of sand. Under this covering the leaves form in a solid head, known on the market as witloaf.

The culture of chicory is simple. Sow the seeds in spring or early summer in drills about 18 inches apart. Later, thin the plants to 6 or 8 inches apart in the rows. If sown too early the plants shoot to seed and are worthless for forcing. The kind known as witloaf is most generally used.

Collards (Screen 4 of 11)

Collards are grown and used about like cabbage.

They withstand heat better than other members of the cabbage group, and are well liked in the South for both summer and winter use.

Collards do not form a true head, but a large rosette of leaves, which may be blanched by tying together.

Cornsalad

Cornsalad is also known as lamb's-lettuce and fetticus. Sow the seed in early spring in drills and cultivate the plants the same as lettuce or mustard.

For an extra early crop, plant the seed in the autumn and cover the plants lightly through the winter.

In the Southern States the covering is not necessary, and the plants are ready for use in February and March.

The leaves are frequently used in their natural green state, but they may be blanched by covering the rows with anything that will exclude light.

Kale (Screen 6 of 11)

click here to see picture...

Kale, or borecole, is hardy and lives over winter in latitudes as far north as northern Maryland and southern Pennsylvania and in other areas where similar winter conditions prevail. It is also resistant to heat and may be grown in summer. Its real merit, however, is that it is a cool-weather, greens vegetable.

Kale is a member of the cabbage family. The best garden varieties are low-growing, spreading plants, with thick, more or less crinkled leaves.

No other plant is so well adapted to fall sowing throughout a wide area of both North and South or in areas characterized by winters of moderate severity. Kale may well follow some such early-season vegetable as green beans, potatoes, or peas.

In the autumn the seed may be broadcast very thinly and then lightly raked into the soil. At other times sow kale in rows 18 t6 24 inches apart and later thin the plants to about a foot apart. This type of planting will facilitate mulch control with garden implements.

Kale may be harvested either by cutting the entire plant or by taking the larger leaves while young. Old kale is tough and stringy.

Mustard (Screen 7 of 11)

Mustard is grown for its leaves. Its cultural requirements and method of planting are similar to those of other leafy vegetables.

Mustard grows well on almost any good soil. As the plants require but a short time to reach the proper stage for use, frequent sowings are recommended. The plants require only 35-40 days to reach proper maturity. They are best adapted to early spring and late July plantings.

Sow the seeds thickly in drills as early as possible in the spring or, for late use, in September or October. The forms of Indian mustard, the leaves of which are often curled and frilled, are generally used.

Parsley (Screen 8 of 11)

click here to see a movie on harvesting and drying parsley...

Parsley is hardy to cold but sensitive to heat. It thrives under much the same temperature conditions as kale, lettuce, and spinach. If given a little protection, it may be carried over winter through most of the North.

Parsley thrives on any good soil. As the plant is delicate during its early stages of growth, however, the land should be mellow.

Parsley seeds are small and germinate slowly. Soaking in water overnight hastens the germination. In the North, it is a good plan to sow the seeds indoors and transplant the plants to the garden, thereby getting a crop before hot weather. In the South, it is usually possible to sow the seed directly in drills.

For the fall crop in the North, row seeding is also practiced. After seeding, it is well to lay a board over the row for a few days until the first seedlings appear. After its removal day-to-day watering will insure germination of as many seeds as possible.

Parsley rows should be 14 to 16 inches apart, with the plants 4 to 6 inches apart in the rows. A few feet will supply the family, and a few plants transplanted to the coldframe in the autumn will give a supply during early spring.

Spinach (Screen 9 of 11)

click here to see picture...

Spinach is a hardy cool-weather plant that withstands winter conditions in the South. In most of the North, spinach is primarily an early-spring and late-fall crop, but in some areas, where summer temperatures are mild, it may be grown continuously from early spring until late fall. It should be emphasized that summer and winter culture of spinach is possible only where moderate temperatures prevail.

Spinach will grow on almost any well-drained, fertile soil where sufficient moisture is available. It is very sensitive to acid soil. If a soil test shows the need, apply lime to the part of the garden used for spinach, regardless of the treatment given the rest of the area.

Spinach is directly seeded by hand in rows and should be planted 1-2 inches deep. When plants are 2-4 inches high, they are thinned to stand 2-3 inches apart in the rows. Seed may fail to germinate well during hot weather. This can be overcome by pregerminating the seeds. Place the seed between 2 pieces of moist blotting paper, paper towels, or cloth and place them in the refrigerator for a week before planting.

The application of 100 pounds of rotted manure and 3 to 4 pounds of commercial fertilizer to each 100 square feet of land is suitable for spinach in the home garden. Broadcast both manure and fertilizer and work them in before sowing the seed.

For tractor cultivation, the rows of the garden should be not less than 24 inches apart; when land is plentiful they may be 30 inches apart. For wheel-hoe or hand work, the rows should be 14 to 16 inches apart.

Spinach may be drilled by hand in furrows about 1 inch deep and covered with fine earth not more than 1/2 inch deep, or it may be drilled with a seed drill, which distributes the seed more evenly than is ordinarily possible by hand. Thin the plants to 3 or 4 inches apart before they crowd in the row.

Spinach can be harvested from the time the plants have 6-8 leaves until the seed stem develops. The entire plant is cut off at the soil level.

Spinach, New Zealand (Screen 10 of 11)

click here to see picture...

New Zealand spinach is not related to common spinach. It is a large plant, with thick, succulent leaves and stems and grows with a branching, spreading habit to a height of 2 or more feet. It thrives in hot weather and is grown as a substitute in seasons when ordinary spinach cannot withstand the heat. New Zealand spinach thrives on soils suitable for common spinach.

Because of their larger size, these plants must have more room. The rows should be at least 3 feet apart, with the plants about 1 1/2 feet apart in the rows. As prompt germination may be difficult, the seeds should be soaked for 1 or 2 hours in water at 120 degrees F. before being planted.

They may be sown, 1 to 1 1/2 inches deep, as soon as danger of frost is past. Successive harvests of the tips may be made from a single planting, as new leaves and branches are readily produced. Care must be taken not to remove too large a portion of the plant at one time.

Harvests can begin when the branches attain a length of 8 to 10 inches. The branches are cut or snapped off 3-4 inches back from the tips. This can be continued throughout the growing season as new branches arc formed. Only a few plants are required for a family.

Turnip Greens (Screen 11 of 11)

Varieties of turnips usually grown for the roots are also planted for the greens.

However, there are some varieties that do not produce roots and are grown for their tops only.

As a rule, sow turnips to be used for greens thickly and then thin them, leaving all but the greens to develop as a root crop.

Turnip greens are especially adapted to winter and early-spring culture in the South. The cultural methods employed are the same as those for turnip and rutabaga.

Salad Crops (Screen 1 of 5)

Salad crops have become increasingly popular in recent years. Their high mineral, vitamin, and bulk content makes a valuable contribution to the family diet.

Lettuce and celery are the most popular salad crops, though endive and parsley are not strangers to most families.

Salad crops thrive during the cool parts of the growing season and, because of their relatively shallow root systems, respond well to irrigation. In many areas of the state, celery and head lettuce cannot be grown successfully without irrigation.

Celery (Screen 2 of 5)

click here to see picture...

Celery can be grown in home gardens in most parts of the country at some time during the year. It is a cool-weather crop and adapted to winter culture in the lower South. In the upper South and in the North it may be grown either as an early-spring or as a late-fall crop. Farther north in certain favored locations it can. be grown throughout the summer.

Celery is one of the most difficult vegetables for the average home gardener to grow since it requires a long growing season with adequate moisture from either rainfall or irrigation. The most common mistake with celery is failure to allow enough time for growing the plants. About 10 weeks are needed to grow good celery plants.

The seed is extremely small and slow to germinate, and the young seedlings are very delicate. A good method is to place the seeds in a muslin bag and soak them overnight, then mix them with dry sand, distribute them in shallow trenches in the seed flats or seedbed, and cover them with leaf mold or similar material to a depth of not more than 1/2 inch.

It is recommended that celery be grown from transplants. Transplants can be set in the garden 6-8 inches apart in a row after the danger of severe freezing is over. Apply water or a starter solution immediately.

click here to see picture...

Celery responds well to 2 or 3 sidedressings of 5-10-10 at the rate of 1 pound to each 25 feet of row at 3-week intervals. For a 100-foot row of celery, 5 pounds of a high-grade complete fertilizer thoroughly mixed with the soil are none too much. Prepare the celery row a week or two before setting the plants.

Keep the bed covered with moist burlap sacks. Celery plants are very delicate and must be kept free from weeds. They are made more stocky by being transplanted once before they are set in the garden, but this practice retards their growth.

When they are to be transplanted before being set in the ground, the rows in the seed box or seedbed may be only a few inches apart. When they are to remain in

the box until transplanted to the garden, however, the plants should be about 2 inches apart each way. In beds, the rows should be 10 to 12 inches apart, with seedlings 1 to 11/2 inches apart in the row.

For hand culture celery plants are set in rows 18 to 24 inches apart; for tractor cultivation 30 to 36 inches apart. The plants are spaced about 6 inches in the row. Double rows are about a foot apart. Set celery on a cool or cloudy day, if possible; and if the soil is at all dry, water the plants thoroughly.

If the plants are large, it is best to pinch off the outer leaves 3 or 4 inches from the base before setting. In bright weather it is well also to shade the plants for a day or two after they are set. Small branches bearing green leaves, stuck in the ground, protect the plants from intense sun without excluding air.

As soon as the plants attain some size, gradually work the soil around them to keep them upright. Be careful to get no soil into the hearts of the plants. Early celery is blanched by excluding the light with boards, paper, drain tiles, or other devices. Late celery may be blanched also by banking with earth or by storing in the dark. Banking celery with soil in warm weather causes it to decay.

Late celery may be kept for early-winter use by banking with earth and covering the tops with leaves or straw to keep them from freezing, or it may be dug and stored in a cellar or a coldframe, with the roots well embedded in moist soil. While in storage it must be kept as cool as possible without freezing.

Blanching of celery is no longer a common practice since people prefer green celery. Celery can be harvested as soon as several petioles attain sufficient size.

Endive (Screen 3 of 5)

Endive is used mainly in green salads. Some people prefer it cooked as greens. There are two types: the curled and the broad leaf (which is sometimes called escarole). The cultural practices for endive and head lettuce are similar.

In the South, it is mainly a winter crop. In the North, it is grown in spring, summer, and autumn and is also forced in winter. Broad-leaved endive is known on the markets as escarole.

Blanching is important when growing the crop for salad. Blanching reduces the bitterness and makes the leaves more tender. When the plants are large, 2-3 weeks before they are to be used, draw the outside leaves over the head and fasten them with a string or a rubber band. For winter use, lift the plants with a ball of earth, place them in a cellar or coldframe where they will not freeze, and tie and blanch them as needed.

Lettuce (Screen 4 of 5)

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Lettuce is grown on almost every type of garden soil, but does best on a fertile soil that is well supplied with organic matter. it is very sensitive to low pH, and lime should be applied to the soil if the pH is below 6.0.

Lettuce is a hardy, cool-season crop best suited for growing in the spring or fall. Seed or transplants can be planted as early as the soil can be worked in the spring.

click here to see picture...

There are 4 types of lettuce available to the home gardener: head, Bibb, loose leaf, and cos. Head lettuce is most likely to form a good head if started from transplants in very early spring and supplied with adequate moisture throughout the growing season. The loose leaf and Bibb have a shorter growing season and are easier to grow. Bibb lettuce has exceptionally good quality, but is difficult to clean.

click here to see picture...

The seed is hand planted in the row at a depth of 1/2 inch. As soon as the young plants have developed 2 or 3 true leaves, they should be thinned to 12 inches apart for head lettuce and 6 to 8 inches for the other types. Thinning should not be delayed, for crowding will produce weak spindly plants with little foliage.

The stage at which lettuce is harvested depends on the type. Head lettuce is ready for harvest when the head becomes firm. Bibb and leaf lettuce are harvested whenever the plants get large enough to use.

Bolting, the premature development of a seed-stalk in young plants, is likely to occur if lettuce is grown in hot weather. By selecting slowbolting varieties this problem can be minimized.

Start spring lettuce indoors or in a hotbed and transplant it to the garden when the plants have four of five leaves. Gardeners need not wait for the end of light frosts, as lettuce is not usually harmed by a temperature as low as 28' F., if the plants have been properly hardened. Allow about 6 weeks for growing the plants. For the fall crop, the seed may be sown directly in the row and thinned; there is no gain in

transplanting.

For tractor cultivation, set lettuce plants 12 to 15 inches apart in rows 30 to 36 inches apart; for hand culture, about 14 to 16 inches apart each way. Where gardeners grow leaf lettuce or desire merely the leaves and not well-developed heads, the spacing in the rows may be much closer. In any case it is usually best to cut the entire plant instead of removing the leaves.

Upland Cress (Screen 5 of 5)

Upland cress, sometimes erroneously called peppergrass, is a hardy plant. It may be sown in all the milder parts of the country in autumn.

In the colder sections it is sown in early spring as soon as the ground can be worked. The seeds are small and must not be covered deeply.

After the plants are well established, thin them to 4 to 6 inches apart in the rows.

This is a short-season crop that should be planted in quick succession to insure a steady supply.

Root Crops (Screen 1 of 12)

Root crops include several different families of vegetables grown for their enlarged fleshy roots. All have similar cultural requirements.

Beets, carrots, and radishes are the important home garden vegetables in this group. Parsnip, turnip, salsify, rutabaga, and horseradish are often found in gardens, but they are not as popular as the first three.

The root crops thrive best in cool weather and are one of the groups of vegetables recommended for early North Eastern U.S. gardens -- midsummer planting permits harvesting until late fall. They tolerate light freezes and can be planted in early spring.

Under proper conditions the root crops can be kept for several months. They are often stored in an outdoor pit, covered with boards and sod, where high humidity and temperatures near freezing can be maintained. The household cellar is often too warm and too dry.

Beets (Screen 2 of 12)

click here to see picture...

Beets are easy to grow, yield heavily, and are rich in vitamins and iron. Seed is hand sown in the row as early as the soil can be worked in the spring. The beet seed or beet ball contains more than one seed. The young seedlings should be thinned to 2 inches apart.

The beet is well adapted to all parts of the country. It is fairly tolerant of heat; it is also resistant to cold. However, it will not withstand severe freezing. In the Northern States, where winters are too severe, the beet is grown in spring, summer, and autumn.

Beets are sensitive to strongly acid soils, and it is wise to apply lime if a test shows the need for it. Good beet quality depends on quick growth; for this the land must be fertile, well-drained, and in good physical condition.

Midsummer heat and drought may interfere with seed germination. By covering the seeds with sandy soil, leaf mold, or other material that will not bake and by keeping the soil damp until the plants are up, much of this trouble can be avoided.

If plants are not thinned, the row will be clumps of plants rather than individual beet plants. Competition with weeds or other beets or prolonged dry weather will cause the beets to become stringy and tough. Good quality is attained when growth is steady through the growing season.

Beets can be harvested when they are 1 to 1 1/2 inches in diameter; this is the most desirable stage if the tops are to be used as greens. Roots can be of good quality up to 2 1/2 to 3 inches in diameter.

Carrots (Screen 3 of 12)

click here to see picture...

Carrots are an excellent source of vitamin A, thiamin, riboflavin, and sugar. A spring and midsummer planting of 10-20 feet of row will supply the family from early summer into winter.

Carrot seed are slow to germinate and need careful attention in planting to assure a good stand. In dry weather the seedbed can be sprinkled each evening for 10 to 14 days. This will help insure a better germination and a good stand.

Another method to obtain a good stand of carrots in dry weather is to make a furrow approximately 2 inches deep. Sow the seed in the bottom of the furrow and cover with about 1/2 inch of soil. Boards or papers laid over the furrows until the seeds germinate give further protection against drying out.

Early thinning and cultivation are essential for a good crop. When the plants are well established or about 2 inches high, they are thinned to stand 1/2 to 2 inches apart in the row. Carrots grow very slowly and compete poorly with weeds. They can be weeded very effectively by spraying with stoddard solvent (undiluted dry cleaning fluid) at a rate of 1 quart for each 100 feet of row.

The spray should be applied when the weeds are very small. To prevent undesirable flavors, the stoddard solvent should not be used after the carrot roots become as large as a pencil. The same spray can be used also on young parsnip and parsley plants.

Carrots are edible as soon as they reach usable size. Normally, harvesting begins when the roots are 1/2 to 1/4 inch in diameter at the upper end.

Because of their hardiness, carrots may be seeded as early in the spring as the ground can be worked. Succession plantings at intervals of 3 weeks will insure a continuous supply of tender carrots. With care in seeding, little thinning is necessary; carrots can stand some crowding, especially on loose soils. However, they should be no thicker than 10 to 15 plants per foot of row. Carrots should be stored before hard frosts occur, as the roots may be injured by cold.

Celeriac (Screen 4 of 12)

Celeriac, or turnip-rooted celery, has been developed for the root instead of the top.

Its culture is the same as that of celery, and the enlarged roots can be used at any time after they are big enough.

The late-summer crop of celeriac may be stored for winter use.

In areas having mild winters the roots may be left in the ground and covered with a mulch of several inches of straw or leaves, or they may be lifted, packed in moist sand, and stored in a cool cellar.

Dasheen (Screen 5 of 12)

The dasheen, a large-growing plant, is related to the ordinary elephant's-ear and looks like it. It is a long-season crop, adapted for culture only in the South, where there is normally a very warm frostless season of at least 7 months. It needs a rich loamy soil, an abundance of moisture with good drainage, and a fairly moist atmosphere.

Small tubers-from 2 to 5 ounces in weight-are used for planting in much the same way as potatoes. Planting may be done 2 or 3 weeks before frosts are over, and the season may be lengthened by starting the plants indoors and setting them out after frost is past. Set the plants in 31/2- to 4-foot rows, about 2 feet apart in the rows. Dasheen tubers may be dug and dried on the ground in much the same way as sweet-potatoes, and stored at 50' F. with ventilation.

Parsnip (Screen 6 of 12)

The parsnip is adapted to culture over a wide portion of the United States. It must have warm soil and weather at planting time, but does not thrive in midsummer in the South.

In many parts of the South parsnips are grown and used during early summer. They should not reach maturity during midsummer, however. Furthermore, it is difficult to obtain good germination in the summer, which limits their culture during the autumn.

Any deep, fertile soil will grow parsnips, but light, friable soil, with no tendency to bake, is best. Stony or lumpy soils are objectionable; they may cause rough, prongy roots.

Parsnip seed must be fresh-not more than a year old-and it is well to sow rather thickly and thin to about 3 inches apart. Parsnips germinate slowly, but it is possible to hasten germination by covering the seed with leaf mold, sand, a mixture of sifted coal ashes and soil, peat, or some similar material that will not bake. Rolling a light soil over the row or trampling it firmly after seeding usually hastens and improves germination.

Parsnips may be dug and stored in a cellar or pit or left in the ground until used. Roots placed in cold storage gain in quality faster than those left in the ground, and freezing in the ground in winter improves the quality.

There is no basis for the belief that parsnips that remain in the ground over winter and start growth in the spring are poisonous. All reported cases of poisoning from eating so-called wild parsnips have been traced to water hemlock (*Cicuta*), which belongs to the same family and resembles the parsnip somewhat.

Be very careful in gathering wild plants that look like the parsnip.

Potatoes (Screen 7 of 12)

click here to see picture...

Potatoes, when grown under favorable conditions, are one of the most productive of all vegetables in terms of food per unit area of land.

Potatoes are a cool-season crop; they do not thrive in midsummer in the southern half of the country. Any mellow, fertile, well-drained soil is suitable for potato production. Stiff, heavy clay soils often produce misshapen tubers. Potatoes respond to a generous use of commercial fertilizer, but if the soil is too heavily limed, the tubers may be scabby.

Commercial 5-8-5 or 5-8-7 mixtures applied at 1,000 to 2,000 pounds to the acre (approximately 71/2 to 15 pounds to each 100-foot row) usually provide enough plant food for a heavy crop. The lower rate of application is sufficient for very fertile soils; the higher rate for less fertile ones. Commercial fertilizer can be applied at the time of planting, but it should be mixed with the soil in such a way that the seed pieces will not come in direct contact with it.

In the North, plant two types of potatoes-one to provide early potatoes for summer use, the other for storage and winter use. The use of certified seed is always advisable.

In preparing seed potatoes for planting, cut them into blocky rather than wedge-shaped pieces. Each piece should be about 1 1/2 ounces in weight and have at least one eye. Medium-sized tubers weighing 5 to 7 ounces are cut to best advantage.

Plant early potatoes as soon as weather and soil conditions permit. Fall preparation of the soil often makes it possible to plant the early crop without delay in late winter or early spring. Potatoes require 2 to 3 weeks to come up, depending on depth of planting and the temperature of the soil. In some sections the ground may freeze slightly, but this is seldom harmful unless the sprouts have emerged.

Prolonged cold and wet weather after planting is likely to cause the seed pieces to rot. Hence, avoid too early planting. Young potato plants are often damaged by frost, but they usually renew their growth quickly from uninjured portions of the stems.

Potatoes can be planted 2 to 3 weeks before the last expected frost. The top portion of the plant may be destroyed by a light frost, but seldom the seed piece that renews growth. Long periods of wet, cold weather after planting may cause the seed piece to rot. The main crop is usually planted in May although early varieties can be planted in April.

Potatoes are one of the few crops that grow well in low pH soils and are less troubled with scab at this pH. In the home garden scab-resistant varieties should be used unless a portion of the garden is maintained at a pH between 5.0 to 5.4.

Small potatoes, from 1 1/4 to 2 inches in diameter, can be planted whole, but larger ones are cut into pieces of approximately 1 1/2 ounces with one or more eyes on each piece. Plant the seed pieces 1 to 3 inches deep and 8 to 10 inches apart in the row. Rows are spaced 2 1/2 to 3 feet apart. Later, to avoid sunburned tubers (greening), hill the soil around the plant during the growing season.

Do not dig potatoes intended for storage until the tops are mature. Careful handling to avoid skinning is desirable, and protection from long exposure to light is necessary to prevent their becoming green and unfit for table use. Store in a well-ventilated place where the temperature is low, 45' to 50' if possible, but where there is no danger of freezing.

Radish (Screen 8 of 12)

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Radishes are one of the more popular vegetables in the home garden because they are easily grown and are ready for harvest in 3 to 6 weeks after planting.

They can be planted in the early spring in all types of soil. A spread in the harvest can be obtained by making 1 or 2 plantings in the spring and again in late summer. Or 2 or 3 varieties with different dates of maturity can be planted all at once.

Radishes are hardy to cold, but they cannot withstand heat. In the South, they do well in autumn, winter, and spring. In the North, they may be grown in spring and autumn, and in sections having mild winters they may be grown in cold-frames at that season. In high altitudes and in northern locations with cool summers, radishes thrive from early spring to late autumn.

Radishes are not sensitive to the type of soil so long as it is rich, moist, and friable. Apply additional fertilizer when the seeds are sown; conditions must be favorable for quick growth. Radishes that grow slowly have a pungent flavor and are undesirable.

Seed should be planted 1/2-inch deep in rows 1-2 feet apart. When the plants are 1 or 2 inches high, they can be thinned to 1 inch apart.

Radishes develop poor shape and go to seed quickly in hot weather; therefore, they should be harvested as soon as roots are of edible size.

The cabbage maggot is the most serious pest of the radish. The larvae (maggot) tunnel into the roots and make them unfit for human consumption. They can be controlled by a soil application of the proper insecticide before planting.

Salsify (Screen 9 of 12)

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Salsify, also commonly known as vegetable oyster because of its flavor, is grown by some gardeners. It is similar to parsnips in its requirements but needs a slightly longer growing season. For this reason it cannot be grown as far north as parsnips. Salsify, however, is somewhat more hardy and can be sown earlier in the spring.

Thoroughly prepare soil for salsify to a depth of at least a foot. Lighten heavy garden soil by adding sand or comparable material. Salsify must have plenty of plant food.

Sandwich Island is the best-known variety. A half ounce of seed will sow a 50-foot row, enough for most families. Always use fresh seed; salsify seed retains its vitality only 1 year.

Salsify may be left in the ground over winter or lifted and stored like parsnips or other root crops.

Sweetpotato (Screen 10 of 12)

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Sweetpotatoes succeed best in the South, but they are grown in home gardens as far north as southern New York and southern Michigan. They can be grown even farther north, in sections having especially mild climates, such as the Pacific Northwest. In general, sweetpotatoes may be grown wherever there is a frost-free period of about 150 days with relatively high temperature.

A well-drained, moderately deep sandy loam of medium fertility is best for sweetpotatoes. Heavy clays and very deep loose-textured soils encourage the formation of long stringy roots. For best results the soil should be moderately fertilized throughout. If applied under the rows, the fertilizer should be well mixed with the soil.

In most of the area over which sweetpotatoes are grown it is necessary to start the plants in a hotbed, because the season is too short to produce a good crop after the weather warms enough to start plants outdoors.

Bed roots used for seed close together in a hotbed and cover them with about 2 inches of sand or fine soil, such as leaf mold. It is not safe to set the plants in the open ground until the soil is warm and the weather settled. Toward the last, ventilate the hotbed freely to harden the plants.

The plants are usually set on top of ridges, 3 1/2 to 4 feet apart, with the plants about 12 inches apart in the row. When the vines have covered the ground, no further cultivation is necessary, but some additional hand weeding may be required.

Dig sweetpotatoes a short time before frost, on a bright, drying day when the soil is not too wet to work easily. On a small scale they may be dug with a spading fork, great care being taken not to bruise or injure the roots. Let the roots lie exposed for 2 or 3 hours to dry thoroughly but not in direct sunlight during the hot part of the day; then put them in containers and place them in a warm room to cure. The proper curing temperature is 85' F. Curing for about 10 days is followed by storage at 55' to 60'.

Turnip and Rutabaga (Screen 11 of 12)

Turnips and rutabagas, similar cool-season vegetables, are among the most commonly grown and widely adapted root crops in the United States. They are grown in the South chiefly in the fall, winter, and spring; in the North, largely in the spring and autumn. Rutabagas do best in the more northerly areas; turnips are better for gardens south of the latitude of Indianapolis, Ind., or northern Virginia.

Turnips reach a good size in from 60 to 80 days, but rutabagas need about a month longer. Being susceptible to heat and hardy to cold, these crops should be planted as late as possible for fall use, allowing time for maturity before hard frost. In the South, turnips are very popular in the winter and spring. In the North, however, July to August seeding, following early potatoes, peas, or spinach, is the common practice.

Land that has been in a heavily fertilized crop, such as early potatoes, usually gives a good crop without additional fertilizing. The soil need not be prepared deeply, but the surface should be fine and smooth. For spring culture, row planting similar to that described for beets is the best practice. The importance of planting turnips as early as possible for the spring crop is emphasized.

When seeding in rows, cover the seeds lightly; when broadcasting, rake the seeds in lightly with a garden rake. A half ounce of seed will sow a 300-foot row or broadcast 300 square feet. Turnips may be thinned as they grow, and the tops used for greens.

Although there are both white-fleshed and yellow-fleshed varieties of turnips and rutabagas, most turnips are white-fleshed and most rutabagas are yellow-fleshed.

Turnip-Rooted Parsley

The root is the edible portion of turnip-rooted parsley. The flesh is whitish and dry, with much the same flavor as celeriac.

Turnip-rooted parsley requires the same climate, soil, and culture as parsley. It can withstand much cold, but is difficult to start in dry, hot weather.

This vegetable may remain in the ground until after hard frosts. It may be lifted and stored like other root crops.

Vine Crops (Screen 1 of 7)

click here to see picture...

The vegetables in this group are often referred to as cucurbits or vine crops. The cucurbits are grown for their fruit. They are warm season crops, which are killed by frost. They are rank growers and occupy a considerable amount of space; however, they respond well to fertile soil, and under favorable growing conditions a few plants will supply a household.

In a small garden, space may not justify growing all members of this family. Success in growing the cucurbits largely depends on controlling the diseases and insects that attack the crop.

Cucumber, squash, and pumpkin seed are commonly sown directly in the garden, but transplants are generally used for muskmelons and watermelons. Plant protectors may benefit all vine crops early in the season. The hill system is commonly used with either transplants or in direct seeding.

When the seedlings in the starting container or the hill are 2 or 3 inches high, all but 3 of the seedlings should be removed. Use small scissors to cut off the extra seedlings. Pulling them will disturb the root systems of the remaining plants.

Many home gardeners will not plant different types of vine crops in the same garden for fear of cross-pollination. Cross-pollination will not occur between cucumbers, muskmelon, pumpkin, squash, and watermelon. There is a minor exception to this rule: certain pumpkins and squash will cross. If seed is saved from this cross, the variety will not breed true the following year.

Black plastic mulch has been used very successfully with the cucurbits. In addition to its keeping the garden weed free and the fruit clean, the yields have often been higher than when the cucurbits are grown on the ground.

Cucumbers (Screen 2 of 7)

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Cucumbers have the shortest growing season of any of the cucurbits (mature in 50 to 70 days) and can be successfully grown in many areas.

Cucumbers are a warm-weather crop. They may be grown during the warmer months over a wide portion of the country, but are not adapted to winter growing in any but a few of the most southerly locations. Moreover, the extreme heat of midsummer in some places is too severe, and there cucumber culture is limited to spring and autumn.

The cucumber demands an exceedingly fertile, mellow soil high in decomposed organic matter from the compost pile. Also, an additional application of organic matter and commercial fertilizer is advisable under the rows or hills. Be sure the organic matter contains no remains of any vine crops; they might carry injurious diseases.

Three or four wheelbarrow loads of well-rotted organic matter and 5 pounds of commercial fertilizer to a 50-foot drill or each 10 hills are enough. Mix the organic matter and fertilizer well with the top 8 to 10 inches of soil.

Cucumbers should be harvested while the fruit are young and green and the seeds are soft. A yellowish color indicates that the seeds are mature and the fruit are beyond the eating stage. Harvests should be made every other day. Overmature or poorly shaped fruit should be removed from the vines to keep plants producing fruit.

For an early crop, the seed may be started in berry boxes or pots, or on sods in a hotbed, and moved to the garden after danger of late frost is past. During the early growth and in cool periods, cucumbers may be covered with plant protectors made of panes of glass with a top of cheesecloth, parchment paper, or muslin. A few hills will supply the needs of a family.

When the seed is planted in drills, the rows should be 6 or 7 feet apart, with the plants thinned to 2 to 3 feet apart in the rows. In the hill method of planting, the hills should be at least 6 feet apart each way, with the plants thinned to 2 in each hill. It is always wise to plant 8 or 10 seeds in each hill, thinned to the desired stand.

Cover the seeds to a depth of about 1/2 inch. If the soil is inclined to bake, cover them with loose earth, such as a mixture of soil and coarse sand, or other material that will not harden and keep the plants from corning through.

Cucumbers require almost constant vigilance to prevent destructive attacks by cucumber beetles. These insects not only eat the foliage but also spread cucumber wilt and other serious diseases.

Success in growing cucumbers depends largely on the control of diseases and insect pests that attack the crop.

Removal of the fruits before any hard seeds form materially lengthens the life of the plants and increases the size of the crop.

Gourds (Screen 3 of 7)

click here to see picture...

Gourds have the same general habit of growth as pumpkins and squashes and should have the same general cultural treatment, except that most species require some form of support or trellis to climb upon.

Gourds are used in making dippers, spoons, ladles, salt and sugar containers, and many other kinds of household utensils. They are also used for birdhouses and the manufacture of calabash pipes. But they are of interest chiefly because of their ornamental and decorative possibilities.

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The thin-shelled, or hard-drying, gourds are the most durable and are the ones that most commonly serve as decorations. The thick-fleshed gourds are more in the nature of pumpkins and squashes, and are almost as perishable.

The thin-shelled gourds of the Lagenaria group are gathered and cured at the time the shells begin to harden, the fruits become lighter in weight, and the tendrils on the vines near the gourds begin to shrivel and dry. For best results, give the gourds plenty of time to cure. Some kinds require 6 months or a year to cure.

The thick-shelled gourds of the Cucurbita group are more difficult to cure than the thin-shelled ones. Their beauty is of short duration; they usually begin to fade after 3 or 4 months.

All types of gourds should be handled carefully. Bruises discolor them and cause them to soften and decay.

Muskmelon (Screen 4 of 7)

The climatic, soil, and cultural requirements of muskmelons are about the same as for cucumbers, except that they are less tolerant of high humidity and rainy weather.

Muskmelons require a long warm season. Sandy or light textured soils that warm quickly in the spring are preferred. In much of upstate New York melons are most likely to produce a satisfactory crop only if the seed is started in pots indoors about 3 weeks before the average date of the last killing frost. After danger of frost is past, set the plants, with the soil intact from the starting container, 3 to 4 feet apart in the row.

Muskmelons benefit by liberal applications of manure or fertilizer. Three to 4 weeks after transplanting, apply a sidedressing of 1/2 to 1 cupful of 5-10-10 or similar fertilizer in a circle around each hill.

During warm weather, daily harvests are necessary since melons pass prime eating quality rapidly. As a muskmelon ripens, the color between the netting changes from a light green to a tan or yellow. A mature melon will easily come from the vine with a gentle pull. This is known as the slip stage. After harvesting from the vine, the melon should be held at room temperature for 1 to 3 days until the blossom end softens.

Where powdery mildew is prevalent, resistant varieties should be grown. The Casaba and Honey Dew are well adapted only to the West, where they are grown under irrigation.

Pumpkin (Screen 5 of 7)

click here to see picture...

Pumpkins are sensitive to both cold and heat. In the North, they cannot be planted until settled weather; in the South they do not thrive during midsummer.

The gardener is seldom justified in devoting any part of a limited garden area to pumpkins, because many other vegetables give greater returns from the same space. However, in gardens where there is plenty of room and where they can follow an early crop like potatoes, pumpkins can often be grown to advantage.

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Pumpkins should be grown in rows 6 to 9 feet apart with plants 2 to 4 feet apart or in hills of 2 or 3 plants per hill, 5 feet apart. Harvesting and storing methods are the same for pumpkins as for winter squash.

Gather and store pumpkins before they are injured by hard frosts. They keep best in a well-ventilated place where the temperature is a little above 50' F.

The pumpkin is one of the few vegetables that thrives under partial shade. Therefore it may be grown among sweet corn or other tall plants.

Squash (Screen 6 of 7)

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Squashes are among the most commonly grown garden plants. They do well in practically all parts of the United States where the soil is fertile and moisture sufficient. Although sensitive to frost, squashes are more hardy than melons and cucumbers. In the warmest parts of the South they may be grown in winter. The use of well-rotted composted material thoroughly mixed with the soil is recommended.

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There are two classes of squash varieties, summer and winter. All the summer squashes and the marrows must be used while young and tender, when the rind can be easily penetrated by the thumbnail. The winter squashes have hard rinds and are well adapted for storage. In other words: summer squash is eaten while immature, and winter squash is eaten when fully mature.

Summer varieties, should be gathered before the seeds ripen or the rinds harden, but the winter sorts will not keep unless well-matured. They should be taken in before hard frosts and stored in a dry, moderately warm place, such as on shelves in a basement with a furnace. Under favorable conditions some varieties may be kept until midwinter.

Culture of squash is similar to that of melons and cucumbers. The seed is usually sown directly in rows or in hills. When the young seedlings are 2 or 3 inches tall, they should be thinned to 12 to 24 inches between plants. Summer squash should be harvested and used while young and tender.

Fruit 6 to 9 inches long and 1 1/2 to 2 inches in diameter are ideal. If the rind of the fruit is too hard to be marked by the thumbnail, it is too old to use. Old fruit should be removed from the plant immediately to permit new flowers and fruit to develop.

Winter squash can be harvested after they have developed the appropriate color for the variety and a hard rind. They should be harvested before heavy frost since they are injured by low temperatures. Cut the stem from the vine since fruit without a stem will not store well. Store the fruit where it is dry and the temperature can be maintained at 50'-55'F or a little higher.

Watermelon (Screen 7 of 7)

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Only gardeners with a great deal of space can afford to grow watermelons. Moreover, they are rather particular in their soil requirements, a sand or sandy loam being best. The culture of the watermelon both in starting transplants and in the garden is similar to that of the muskmelon.

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Hills should be spaced at least 4 to 6 feet apart in rows spaced 6 to 8 feet apart. A sandy or sandy loam soil is desirable. The plan of mixing a half wheelbarrow load of composted material with the soil in each hill is good, provided the compost is free from the remains of cucurbit plants that might carry diseases.

A half pound of commercial fertilizer also should be thoroughly mixed with the soil in the hill. It is a good plan to place several seeds in a ring about 1 foot in diameter in each hill. Later the plants should be thinned to two to each hill.

It is not easy to determine the maturity of a watermelon. Wait until the fruit reaches the size described in the seed catalog before looking for any signs of maturity. When the fruit attains full size, check the color of the rind where it touches the ground. A ripe melon will have a cream or yellow color. Some experts can tell if a melon is ripe by the sound when thumped. A metallic ring indicates immaturity, and a dull or muffled sound, ripeness. Watermelons will not continue to ripen after harvest.

Legumes (Screen 1 of 9)

Peas, snap beans, and lima beans are very popular vegetables for the home garden since they are easy to grow. Snap beans and lima beans are warm-season crops and grow best at temperatures above 75'F. Lima beans should not be grown in the cooler areas of the state. Peas are hardier and grow best under cool conditions, 60'-75'F.

The climate in most areas of New York is favorable for growing .peas and beans. Peas and lima beans are grown for their immature seeds, whereas with snap beans the entire immature pod is harvested.

Losses caused by diseases and insects can be minimized by using a weekly spraying or dusting program, treating the seed with fungicide and insecticide before planting, and rotating the planting site. Planting in well-drained soils and removing all old plant refuse increase yields.

Beans (Screen 2 of 9)

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Green beans, both snap and lima, are more important than dry beans to the home gardener. Snap beans cannot be planted until the ground is thoroughly warm, but succession plantings may be made every 2 weeks from that time until 7 or 8 weeks before frost.

In the lower South and Southwest, green beans may be grown during the fall, winter, and spring, but they are not well adapted to midsummer. In the extreme South, beans are grown throughout the winter.

Green beans are adapted to a wide range of soils as long as the soils are well drained, reasonably fertile, and of such physical nature that they do not interfere with germination and emergence of the plants. Soil that has received a general application of manure and fertilizer should need no additional fertilization. When beans follow early crops that have been fertilized, the residue of this fertilizer is often sufficient for the beans.

On very heavy lands it is well to cover the planted row with sand, a mixture of sifted coal ashes and sand, peat, leaf mold, or other material that will not bake. Bean seed should be covered not more than 1 inch in heavy soils and 11/2 inches in sandy soil. When beans are planted in hills, they may be covered with plant protectors. These covers make it possible to plant somewhat earlier.

White Navy, or pea beans, white or red Kidney, and the horticultural types are excellent for dryshell purposes.

Lima Beans (Screen 3 of 9)

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Two types of lima beans, called butter beans in the South, are grown in home gardens. Most of the more northerly parts of the United States, including the northern New England State:; and the northern parts of other States along the Canadian border, are not adapted to the culture of lima beans.

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Lima beans need a growing season of about 4 months with relatively high temperature; they cannot be planted safely until somewhat later than snap beans. The small butter beans mature in a shorter period than the large-seeded lima beans. The use of plant protectors over the seeds is an aid in obtaining earlier fruiting of the crop.

Lima beans may be grown on almost any fertile, well-drained, mellow soil, but it is especially desirable that the soil be light-textured and not subject to baking, as the seedlings cannot force their way through a hard crust.

Covering with some material that will not bake, as suggested for other beans, is a wise precaution when using heavy soils. Lima beans need a soil somewhat richer than is necessary for kidney beans, but the excessive use of fertilizer containing a high percentage of nitrogen should be avoided.

Both the small- and large-seeded lima beans are available in pole and bush varieties. Pole beans of the kidney and lima types require some form of support, as they normally make vines several feet long. A 5-foot fence makes the best support for pole beans.

A more complicated support can be prepared from 8-foot metal fence posts, spaced about 4 feet apart and connected horizontally and diagonally with coarse stout twine to make a trellis. Bean plants usually require some assistance to get started on these supports. Never cultivate or handle bean plants when they are wet; to do so is likely to spread disease.

Snap Beans (Screen 4 of 9)

Snap beans are the descendants of the string bean. The green and yellow (wax) types have the same cultural requirements.

Snap beans in contrast to peas are a tender crop and are easily killed by light frosts. Since they mature in only 50 to 60 days, they can be grown in all areas of the state.

Snap beans can be planted from May 1 to June 25 in warmer areas and between May 15 and July 10 in others. If the soil temperature is below 60'F, seed germination will be poor and very slow. Successive plantings every month up to the latter part of July will assure a steady supply of beans.

Seed should be sown about 1 to 1 1/2 inches deep in rows 2 to 3 feet apart. Somewhat deeper planting to reach soil moisture may be necessary in dry weather. When the plants are 2 or 3 inches high, thin to 6 to 10 plants per foot of row.

Start harvest when the pods reach full length, but are young and tender. Quality decreases as the seeds become larger. A snap bean ready to harvest should break easily with a snap, as the name implies. Harvests should be made at fairly frequent intervals during warm weather.

Pod set is often poor when temperatures exceed 90'F. Deformed pods can result from lack of moisture, incomplete fertilization, and insect damage during the blooming period.

Soybeans (Screen 5 of 9)

The soil and cultural requirements and methods of growing soybeans are essentially the same as for bush forms of common beans. Soybeans, however, are slower growing than most garden beans, requiring 3 to 5 months for maturity, and warmer weather. They also are taller growing, the larger, later varieties requiring a greater distance between rows than dwarf snap beans.

Small, early varieties may be planted in rows as close as 2 feet, but the larger, later ones require 3 feet between rows. The planting dates given in tables 4 and 5 are for mid-season varieties (about 120 days), neither the earliest nor the latest kinds. Differences in time of development among varieties are so great that the gardener must choose the proper variety and know its time of maturity in making plans for planting in any particular locality.

In cooler sections the rate of development will be slower. Only the early varieties should be grown in the more northerly States, and the medium or late varieties in the South. Plantings should be made principally when tomatoes and other long-season, warm-weather crops are put in the garden.

For use as a green vegetable, soybean pods should be harvested when the seeds are fully grown but before the pods turn yellow. Most varieties produce beans in usable condition over a period of a week to 10 days. The green beans are difficult to remove from the pods unless the pods are boiled or steamed 4 to 5 minutes, after which they are easily shelled.

The yields per unit area of land are about the same as are usually obtained with peas and are thus less than can be obtained with many other vegetables. On this account, they appear of major interest only to gardeners having medium to large gardens.

Peas (Screen 6 of 9)

click here to see picture...

Peas should be planted at a uniform depth of no more than 1 inch. If the soil is dry, irrigate or wait for a rain before seeding. Wet soil and hot weather cause seed rot. Plant enough seed to provide 7 to 8 plants per foot of row. Sow 15 to 25 feet of row at each planting or of each variety.

In the home garden, the dwarf varieties of peas are preferred to the tall-growing varieties. The tall growing varieties need support, which can be obtained from wire netting or chicken wire strung along the row or a trellis made by adding parallel lines of string as the peas grow.

Peas are harvested when the pods are well filled and eaten while the peas (immature seeds) are still tender and sweet. At prime harvest stage the seeds are high in sugar content, but remain in this condition for only a short time. The higher the temperature, the more quickly peas pass the edible stage.

Cowpeas (Screen 7 of 9)

Cowpeas, also known as the southernpeas, are highly nutritious, tasty and easily grown. They are eaten both as fresh shelled green peas or as dry peas. There are three basic types: blackeye, Crowder, and cream seed types. Each type has a distinct appearance and flavor.

Cowpeas are very susceptible to cold and should not be planted until the soil temperatures are at least 70'F. There are many varieties that are resistant or tolerant to several diseases and root-knot nematodes.

Heavy applications of nitrogen fertilizer should not be used for southern peas. Fertilize moderately with a low-nitrogen analysis such as 4-12-12.

For the effort necessary to grow them, few if any other vegetables will pay higher dividends than Southern table peas.

English Peas (Screen 8 of 9)

English peas are a cool-weather 'crop and should be planted early. In the lower South they are grown at all seasons except summer; farther north, in spring and autumn. In the Northern States and at high altitudes, they may be grown from spring until autumn, although in many places summer heat is too severe and the season is practically limited to spring.

A few successive plantings may be made at 10-day intervals. The later plantings rarely yield as well as the earlier ones. Planting may be resumed as the cool weather of autumn approaches, but the yield is seldom -as satisfactory as that from the spring planting.

Some smooth-seeded varieties are frequently used for planting in the early spring because of the supposition that they can germinate well in cold, wet soil. Peas grown on supports are less liable to destruction by birds.

Sugar Peas (Screen 9 of 9)

click here to see picture...

Sugar peas (edible podded peas) possess the tenderness and fleshy podded qualities of snap beans and the flavor and sweetness of fresh English peas. When young, the pods are cooked like snap beans; the peas are not shelled. At this stage, pods are stringless, brittle, succulent, and free of fiber or parchment.

However, if the pods develop too fast, they are not good to use like snap beans, but the seeds may be eaten as shelled peas and are of the best flavor before they have reached full size.

Cole Crops (Screen 1 of 8)

The cole group includes many vegetables that are commonly grown in the home garden. This family is divided into the leaf crops and root crops.

Most leaf crops such as cabbage, Brussels sprouts, mustard, kale, kohlrabi, collards, and Chinese cabbage are grown for their leaves and stems; others, such as broccoli and cauliflower, are grown for their immature inflorescence.

The root crops-rutabaga, turnip, and radish-are grown for their enlarged fleshy roots and are discussed with the other root crops.

The major cole crops are grown from transplants. They are very hardy and develop best quality in moderately cool weather. They can be transplanted as early in the spring as the soil can be worked for an early summer crop or planted in midsummer for a fall crop.

It is important to control insects. Cabbage maggot, aphids, flea beetle, cabbage looper, and imported cabbageworm can destroy a plant in a very short time. A weekly spraying or dusting program is essential.

Broccoli (Screen 2 of 8)

click here to see picture...

Heading broccoli is difficult to grow, therefore, only sprouting broccoli is discussed here. Sprouting broccoli forms a loose flower head (on a tall, green, fleshy, branching stalk) instead of a compact head or curd found on cauliflower or heading broccoli. It is one of the newer vegetables in American gardens, but has been grown by Europeans for hundreds of years.

click here to see picture...

Transplants are set 12-18 inches apart in rows 2 1/2-3 feet apart. The head, the edible part of broccoli, a cluster of green flower buds, should be cut with 6 to 8 inches of stalk before the buds open. The plants are hardy and live until severe freezing weather.

Sprouting broccoli is adapted to winter culture in areas suitable for winter cabbage. It is also tolerant of heat. Spring-set plants in the latitude of Washington, D.C., have yielded good crops of sprouts until midsummer and later under conditions that caused cauliflower to fail. In the latitude of Norfolk, Va., the plant has yielded good crops of sprouts from December until spring.

Sprouting broccoli is grown in the same way as cabbage. Plants grown indoors in the early spring and set in the open about April 1 begin to yield sprouts about 10 weeks later. The fall crop may be handled in the same way as late cabbage, except that the seed is sown later. The sprouts carrying flower buds are cut about 6 inches long, and other sprouts arise in the axils of the leaves, so that a continuous harvest may be obtained.

Brussels Sprouts (Screen 3 of 8)

click here to see picture...

Brussels sprouts are somewhat more hardy than cabbage and will live outdoors over winter in all the milder sections of the country. They may be grown as a winter crop in the South and as early and late as cabbage in the North.

The sprouts, or small heads, are formed in the axils (the angle between the leaf stem and the main stalk) of the leaves. As the heads begin to crowd, break the lower leaves from the stem of the plant to give them more room.

Brussels sprouts require a long growing season and a rigid spray program to control aphids. They should be grown only by an experienced home gardener. Transplants should be set 24-36 inches between plants in rows 4-5 feet apart.

Brussels sprouts can be harvested over a considerable period if the lower sprouts are picked when they become firm. The leaf below each sprout is usually broken off so that the sprout can be picked easily. The plant continues to produce more leaves and sprouts at the top.

Always leave the top leaves; the plant needs them to supply nourishment. For winter use in cold areas, take up the plants that are well laden with heads and set them close together in a pit, a coldframe, or a cellar, with some soil tamped around the roots. Keep the stored plants as cool as possible without freezing.

Cabbage (Screen 4 of 8)

click here to see picture...

Cabbage ranks as one of the most important home-garden crops. In the lower South, it can be grown in all seasons except summer, and in latitudes as far north as Washington, D.C., it is frequently set in the autumn, as its extreme hardiness enables it to live over winter at relatively low temperatures and thus become one of the first spring garden crops.

Farther north, it can be grown as an early summer crop and as a late f all crop for storage. Cabbage can be grown throughout practically the entire United States.

click here to see picture...

Cabbage is adapted to widely different soils as long as they are fertile, of good texture, and moist. It is a heavy feeder; no vegetable responds better to favorable growing conditions.

Quality in cabbage is closely associated with quick growth. Both compost and commercial fertilizer should be liberally used. In addition to the applications made at planting time, a side dressing or two of nitrate of soda, sulfate of ammonia, or other quickly available nitrogenous fertilizer is advisable.

These may be applied sparingly to the soil around the plants at intervals of 3 weeks, not more than 1 pound being used to each 200 square feet of space, or, in terms of single plants, 1/3 ounce to each plant. For late cabbage the supplemental feeding with nitrates may be omitted.

Good seed is especially important. Only a few seed is needed for starting enough plants for the home garden, as 2 or 3 dozen heads of early cabbage are as many as the average family can use. Where cabbage yellows is a serious disease, resistant varieties should be used.

Cabbage plants for spring setting in the North may be grown in hotbeds or greenhouses from seeding made a month to 6 weeks before planting time, or may be purchased from southern growers who produce them outdoors in winter. The winter-grown, hardened plants, sometimes referred to as frost-proof, are hardier than hotbed plants and may be set outdoors in most parts of the North as soon as the ground can be worked in the spring.

Northern gardeners can have cabbage from their gardens much earlier by using healthy southern-grown plants or well-hardened, well-grown hotbed or greenhouse plants. Late cabbage, prized by northern gardeners for fall use and for storage, is grown from plants produced in open seedbeds from sowings made about a month ahead of planting.

Late cabbage may well follow early potatoes, peas, beets, spinach, or other early crop. Many gardeners set cabbage plants between potato rows before the potatoes are ready to dig, thereby gaining time. In protected places, or when plant protectors are used, it is possible always to advance dates somewhat, especially if the plants are well hardened.

Cabbage, Chinese (Screen 5 of 8)

click here to see picture...

Chinese cabbage, is more closely related to mustard than to cabbage. It is variously called Crispy Choy, Chihili, Michili, and Wong Bok. Also, it is popularly known as celery cabbage, although it is unrelated to celery. The non-heading types deserve greater attention.

Chinese cabbage seems to do best as an autumn crop in the northern tier of States. When full-grown, it is an attractive vegetable. It is not especially successful as a spring crop, and gardeners are advised not to try to grow it at any season other than fall in the North or in winter in the South.

The plant demands a very rich, well-drained but moist soil, a cool season, and short days. If planted before July 1, it often goes to seed without heading. When grown quickly, it is a delicious salad crop and often used as a lettuce substitute; or it can be cooked as is common cabbage.

The crop is not easy to transplant and, therefore, does best if the seeds are planted in the row where they are to mature. Plants are thinned to 12-15 inches apart.

Cauliflower (Screen 6 of 8)

click here to see picture...

Cauliflower is a hardy vegetable but it will not withstand as much frost as cabbage. Too much warm weather keeps cauliflower from heading. In the South, its culture is limited to fall, winter, and spring; in the North, to spring and fall. However, in some areas of high altitude and when conditions are otherwise favorable, cauliflower culture is continuous throughout the summer.

Cauliflower is grown on all types of land from sands to clay and peats. Although the physical character is unimportant, the land must be fertile and well drained. Manure and commercial fertilizers are essential.

The time required for growing cauliflower plants is the same as for cabbage. In the North, the main cause of failure with cauliflower in the spring is delay in sowing the seed and setting the plants. The fall crop must be planted at such a time that it will come to the heading stage in cool weather.

Young, small transplants can be set in the garden as early as cabbage, for only the matured heads are not resistant to severe freezes. Transplants should be spaced at 24 inches in rows 2 1/2 to 3 feet apart.

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Cauliflower must be blanched to get the white heads that are preferred, but off-color heads are usable. Blanching is done by tying the outside leaves together as soon as the curd (head) has reached a diameter of 2-3 inches. Examine the heads every few days to determine when to tie and when to harvest. Harvest the curds when they are still compact and fairly smooth.

click here to see picture...

A necessary precaution in cauliflower culture with all varieties, except Purple Head, is to tie the leaves together when the heads, or buttons, begin to form. This keeps the heads white. Cauliflower does not keep long after the heads form; 1 or 2 dozen heads are enough for the average garden in one season.

Collards and Kale (Screen 7 of 8)

Collards and kale are two minor crops that are grown for their foliage. The cultural practices are similar to those for Chinese cabbage, kohlrabi, and mustard.

Collards withstand heat better than most members of this family and can be grown as a spring or fall crop.

Kale does not grow well in warm weather. Seed is planted in July for a fall crop.

Kohlrabi (Screen 8 of 8)

click here to see picture...

Kohlrabi is grown for the turnip-like enlargement of the stem. It is tasty if picked while it is tender and cooked as is cauliflower or sliced and served raw. With a good supply of moisture it is easily grown in either hot or cold weather.

However, kohlrabi must be grown rapidly and harvested when 1 1/2-3 inches in diameter, or it will become tough and stringy. Sow the seed in rows 18-24 inches apart and thin to 6-8 inches apart in the row.

The seeds may be started indoors and the plants transplanted in the garden; or the seeds may be drilled in the garden rows and the plants thinned to the desired stand. Kohlrabi has about the same soil and cultural requirements as cabbage, principally a fertile soil and enough moisture. It should be harvested while young and tender.

In the North, the early crop may be started like cabbage and transplanted to the garden, but usually it is sown in place. In the South, kohlrabi may be grown almost any time except mid-summer.

Bulb Crops (Screen 1 of 7)

The onion is the main bulb crop grown in the home garden. Shallot, leeks, chives, and garlic are quite often grown on a limited scale.

All bulb crops are hardy and can be planted as early as the soil can be worked in the spring. The cultural practices are very similar for all members of this family.

Practically all members of the onion group are adapted to a wide variety of soils. Some of them can be grown at one time of the year or another in any part of the country that has fertile soil and ample moisture. They require but little garden space to produce enough for a family's needs.

Chives (Screen 2 of 7)

click here to see picture...

Chives, unlike other bulb crops, are grown for their leaves, which are used for seasoning.

Chives can be started in the spring with seed or plant divisions from older clumps. Individual plants grow into a compact mass called clumps or tufts. The leaves can be cut as needed.

Chives can be grown in flower beds or for year-round use in larger flower pots.

Garlic (Screen 3 of 7)

click here to see picture...

Garlic is more exacting in its cultural requirements than are onions, but it may be grown with a fair degree of success in almost any home garden where good results are obtained with onions.

Garlic can be grown on a wide range of soil types, and the soil type in your garden should be satisfactory for garlic. Heavy clay soils, which tend to compact, may pre vent uniform expansion of the bulb.

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Garlic is propagated by planting the small cloves, or bulbs, which make up the large bulbs. Each large bulb contains about 10 small ones. Carefully separate the small bulbs and plant them singly.

Garlic is ready for harvest when the tops become partly dry and bend to the ground. When the bulbs are removed from the soil, they should be thoroughly dried. Well dried bulbs stored at cool temperatures and low humidity will last many months.

Garlic, like onions, form bulbs in response to the lengthening days of spring. However, if the propagating stock (cloves) are not exposed to temperatures below 65'F, they may fail to form bulbs. This is a frequent occurrence with home maintained propagating stock.

In the South, where the crop matures early, care must be taken to keep the garlic in a cool, dry place; otherwise it spoils. In the North, where the crop matures later in the season, storage is not so difficult, but care must be taken to prevent freezing.

Mulching with straw or other coarse mulching materials (do not use leaves as they compact) or mounding soil over the rows will help the plants survive severe winter conditions. The mulch and excess soil should be removed in early spring or as soon as growth is evident.

Spring planting often results in small-size bulbs and rather low yields.

Garlic, Elephant (Screen 4 of 7)

click here to see picture...

Elephant garlic, or more appropriately great-headed garlic, *AIlium* ampeloprasum, is gaining in popularity with home gardeners. Elephant garlic is more closely related to leek than it is to garlic.

Great-headed garlic closely resembles robust types of garlic. They can be distinguished by the small exterior bulblets present at the base of the bulb. These small bulblets are not small cloves and are never present in common garlic. Garlic abundantly produces aerial bulblets, a characteristic not found in elephant garlic.

Great-headed garlic may produce a cluster of several large cloves with a central flower stalk or, in non-flowering plants, a single massive clove. The flavor of elephant garlic is intermediate between onion and garlic; however, it tastes so distinctively different from garlic that it has not been widely accepted as a garlic substitute.

Leeks (Screen 5 of 7)

click here to see picture...

The leek resembles the onion in its adaptability and cultural requirements. Instead of forming a bulb it produces a thick, fleshy cylinder like a large green onion.

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Leeks are grown from seed or transplants. For transplants, seed is sown in late January or February in a greenhouse, coldframe, or window box. When the seedlings are 6-8 inches high, they can be planted in the garden. If the weather is unfavorable in early spring, the tops can be cut off to 4 inches and the seedlings held in the starting container until the weather is favorable.

Seed is sown directly in the row in the same manner as for green onions. Leeks are usually blanched to give a long white neck. In blanching, the soil is banked gradually around the basal part of the stems as they are growing. If the plants are banked entirely in one operation while young, they will decay.

Leeks are ready for use any time after they reach the right size. Under favorable conditions they grow to 1 1/2 inches or more in diameter, with white parts 6 to 8 inches long. They may be lifted in the autumn and stored like celery in a coldframe or a cellar.

Onion (Screen 6 of 7)

click here to see picture...

Onions thrive under a wide variety of climatic and soil conditions, but do best with an abundance of moisture and a temperate climate, without extremes of heat or cold through the growing season.

In the South, the onion thrives in the fall, winter, and spring. Farther north, winter temperatures may be too severe for certain types. In the North, onions are primarily a spring, summer, and fall crop.

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Any type of soil will grow onions, but it must be fertile, moist, and in the highest state of tilth. Both compost and commercial fertilizer, especially one high in phosphorus and potash, should be applied to the onion plot. A pound of compost to each square foot of ground and 4 or 5 pounds of fertilizer to each 100 square feet are about right. The soil should be very fine and free from clods and foreign matter.

Onions may be started in the home garden by the use of sets, seedlings, or seed. Sets are planted 1 inch deep with 3-4 inches between sets. Onions will keep well if the necks and skin are allowed to dry thoroughly before harvesting. The tops should fall over by themselves, and the scales on the bulbs should become dry. Pull green onions only when they are to be used immediately.

Small green plants grown in an outdoor seedbed in the South or in a hotbed or a greenhouse are also in general use. The home-garden culture of onions from seed is satisfactory in the North where the summers are comparatively cool.

Sets and seedlings cost about the same; seeds cost much less. In certainty of results the seedlings are best; practically none form seed-stalks. Seed-sown onions are uncertain unless conditions are extremely favorable.

Transplants are used when large bulbs are desired. For example, the large, sweet, Spanish type of mild onions produces a good crop if grown from transplants. Transplants raised commercially can be bought ready to plant, or they can be grown in a greenhouse or cold-frame by seeding in late January or February.

Frequently onions grown from sets and transplants flower and go to seed prematurely. This can happen if sets or transplants are too large or the weather is too cool. Relatively low temperatures of 40'-50'F and to promote seed-stalk development. Onions started from seed seldom develop seed-stalks prematurely.

Shallots (Screen 7 of 7)

click here to see picture...

Shallots are a type of onion. They differ from the common onion in that they produce a cluster of slender underground bulbs from a single bulb, rather than one large bulb. They have a more delicate flavor than most onions. Its growth requirements are about the same as those of most other onions.

In early spring, single bulbs are planted 6-8 inches apart in the row with rows 3-4 feet apart. Other cultural practices for shallot are similar to those for onion. After multiplying and dividing, shallots can be harvested in the green mature stage and used as "green bunching onions," or they can be allowed to mature and used as a substitute for common bulb onion.

The plant is hardy and may be left in the ground from year to year, but best results are had by lifting the clusters of bulbs at the end of the growing season and replanting the smaller ones at the desired time.

Fleshy-Fruited Vegetables (Screen 1 of 4)

Tomatoes, peppers, and eggplant are grown for their fruit. They have very similar cultural requirements and need a relatively long, warm season to produce a good crop.

Since these crops are very tender, they should not be planted until all danger of frost is over. Normally tomatoes, peppers and eggplant are transplanted. The use of a starter solution is highly recommended at transplanting time.

Early tomato varieties, pepper, and eggplant are "heavy feeders." In addition to preplanting fertilizer, some additional fertilizer in the form of a sidedressing is likely to be needed about 3 or 4 weeks after setting.

Fruit Set (article continues)

Gardeners who have grown tomatoes, peppers, or eggplant are occasionally confronted with the problem of poor or no fruit set. Poor setting of fruit and blossom drop can be caused by periods of cold weather with nights below 55'F, abnormally hot weather, warm nights above 75'F, low soil moisture, and excessive shading.

Blossom End Rot

This disorder can be reduced by irrigation and use of organic mulches.

Eggplant (Screen 2 of 4)

click here to see picture...

Eggplant is extremely sensitive to cool temperatures and will not withstand any frost. A growing period of 4 months with daytime temperatures ranging between 60'-85'F is necessary for a good yield.

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In the South, eggplants are grown in spring and autumn; in the North, only in summer. The more northerly areas, where a short growing season and low summer temperatures prevail, are generally unsuitable for eggplants. In very fertile garden soil, which is best for eggplant, a few plants will yield a large number of fruits.

Sow eggplant seeds in a hotbed or greenhouse, or, in warm areas, outdoors about 8 weeks before the plants are to be transplanted. It is important that the plants be kept growing without check from low or drying temperatures or other causes. They may be transplanted like tomatoes. Good plants have stems that are not hard or woody; one with a woody stem rarely develops satisfactorily.

Transplant the seedlings in late May or early June, spacing them 18-24 inches in rows 3 feet apart. In fertile soil, with ideal growing conditions, 2 or 3 plants will yield enough fruit for an average family.

Verticillium wilt is a very serious problem. The organism causing this disease survives in the soil, and eggplant should not be planted in areas of the garden where tomatoes, potatoes, or strawberries have grown.

Fruits should be harvested when they reach a uniformly deep purple color and are properly sized for the variety. Fruit in which the seeds have turned brown are of poor quality and past the edible stage.

Peppers (Screen 3 of 4)

click here to see picture...

Peppers are more exacting than tomatoes in their requirements, but may be grown over a wide range in the United States. Being hot weather plants, peppers cannot be planted in the North until the soil has warmed up and all danger of frost is over.

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In the South, planting dates vary with the location, fall planting being practiced in some locations. Start pepper plants 6 to 8 weeks before needed. The seeds and plants require a somewhat higher temperature than those of the tomato. Otherwise they are handled in exactly the same way.

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The crop responds to a good fertilization program including a sidedressing of nitrogen and additional water when rainfall is inadequate. Transplants can be set at 18-inch intervals in rows 3 feet apart.

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Peppers are usually harvested after reaching full size, while still in the green or yellow stage. They can be allowed to mature (turn red) on the plant.

Tomatoes (Screen 4 of 4)

click here to see picture...
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Tomatoes are an excellent source of vitamin C. A few plants should be in every garden. New varieties make it possible to grow tomatoes in all parts of the state. They are easily grown and can be used fresh, canned, or as juice.

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Tomatoes grow under a wide variety of conditions and require only a relatively small space for a large production. Of tropical American origin, the tomato does not thrive in very cool weather. It will, however, grow in winter in home gardens in the extreme South.

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Over most of the upper South and the North, it is suited to spring, summer, and autumn culture. In the more northern areas, the growing season is likely to be too short for heavy yields.

It is often desirable to increase early fruiting and the total length of the growing season by starting the plants indoors. By adopting a few precautions, the home gardener can grow tomatoes practically everywhere, given fertile soil with Sufficient moisture.

A liberal application of compost and commercial fertilizer in preparing the soil should be sufficient for tomatoes under most conditions. Heavy applications of fertilizer should be broadcast, not applied in the row; but small quantities may be mixed with the soil in the row in preparing for planting.

Start early tomato plants from 5 to 7 weeks before they are to be transplanted to the garden. Enough plants for the home garden may be started in a window box and transplanted to small pots, paper drinking cups with the bottoms removed, plant bands (round or square), or other soil containers.

In boxes, the seedlings are spaced 2 to 3 inches apart. Tomato seeds germinate best at about 70' F., or ordinary house temperature. Growing tomato seedlings, after the first transplanting, at moderate temperatures, with plenty of ventilation,

as in a coldframe, gives stocky, hardy growth. If desired, the plants may be transplanted again to larger containers, such as 4-inch clay pots or quart cans with holes in the bottom.

Tomato plants for all but the early spring crop are usually grown in outdoor seedbeds. Thin seeding and careful weed control will give strong, stocky plants for transplanting.

Tomatoes are sensitive to cold. Never plant them until danger of frost is past. By using plant protectors during cool periods the home gardener can set tomato plants somewhat earlier than would otherwise be possible. Hot, dry weather, like mid-summer weather in the South is also unfavorable for planting tomatoes.

Planting distances depend on the variety and on whether the plants are to be pruned and staked or not. If pruned to one stem, trained, and tied to stakes or a trellis, plants may be set 18 inches apart in 3-foot rows. Unpruned plants grown in 2-foot diameter wire cylinders are planted 2 feet apart, also in 3-foot rows.

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Otherwise, they may be planted 3 feet apart in rows 4 to 5 feet apart. Pruning and staking have many advantages for the home gardener. Cultivation is easier, and the fruits are always clean and easy to find. Staked and pruned tomatoes are, however, more subject to losses from blossom-end rot than those allowed to grow naturally.

If tomatoes are to be pruned and trained to stakes, the plants can be set as close as 2 x 2 feet or 1 1/2 x 3 feet. Without staking, plants of early varieties can be set 2 x 4 feet or 2 x 5 feet, whereas later large-vined varieties are often spaced 3 x 5 feet or 3 x 6 feet. Pruned and staked plants yield over a longer season and have the advantage of ease in harvesting and cleaner fruit, but usually have a smaller total yield.

Staking tomatoes

Stakes from 5 to 6 feet long and 11/2 inches in diameter will serve if each plant has its own stake. Or heavier posts can be set every 10 to 12 feet and a heavy wire stretched across their tops. Heavy strings should lead down from the wire to the individual plants.

A loose loop is tied around the stem just above the ground; and as the plant grows, the stem is twisted around the string at least once a week. Also at this time

all new side branches are pinched out. The leader or main stem and the leaves should not be removed.

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Instead of pruning and training the plants, some gardeners drive in a row of short stakes that stand 10 to 12 inches high and approximately that far each side of the row of plants. They nail narrow boards or slender poles as rails on top of the stakes.

The plants are allowed to grow up between these rails and drape over them. Slats can be tacked across between the rails, 10 to 12 inches each side of each plant, to further help to keep the fruit off the ground.

During warm weather, tomatoes should be harvested twice a week. To obtain good color and flavor, hold partly ripened fruit at 70'F and then place them in a refrigerator. Pick some green tomatoes and store in a cool (55'F), moist, dark place before the first killing frost. When desired, ripen a few fruits at 70F.

Miscellaneous Crops (Screen 1 of 4)

Three crops that don't really fit into a specific category are okra, physalis, and sweet corn. They all require extra special care or a good amount of garden space to cultivate.

With practice and patience the home gardener can grow these varieties to perfection. Browse through the next three screens for details on growing these additional crops.

Okra (Screen 2 of 4)

click here to see picture...

Okra, or gumbo, has about the same degree of hardiness as cucumbers and tomatoes and may be grown under- the same conditions. It thrives on any fertile, well-drained soil. An abundance of quickly available plant food will stimulate growth and insure a good yield of tender, high-quality pods.

As okra is a warm-weather vegetable, the seeds should not be sown until the soil is warm. The rows should be from 3 to 3 1/2 feet apart, depending on whether the variety is dwarf or large growing. Sow the seeds every few inches and thin the plants to stand 18 inches to 2 feet apart in the rows. The pods should be picked young and tender, and none allowed to ripen. Old pods are unfit for use and soon exhaust the plant.

Physalis (Screen 3 of 4)

Physalis known also as groundcherry and husk tomato, is closely related to the tomato and can be grown wherever tomatoes do well.

The kind ordinarily grown in gardens produces a yellow fruit about the size of a cherry.

The seeds may be started indoors or sown in rows in the garden.

Sweet Corn (Screen 4 of 4)

click here to see picture...

Sweet corn is a vegetable that every home gardener should grow if space is available. Its cultural requirements are simple, and the wide selection of varieties available to the home gardener makes it possible for the family to enjoy corn on the cob when it is at the peak of quality.

In the South, sweet corn is planted from early spring until autumn, but the corn earworm, drought, and heat make it difficult to obtain worthwhile results in midsummer. The ears pass the edible stage very, quickly, and succession plantings are necessary to insure a constant supply.

In the North, sweet corn cannot be safely planted until the ground has thoroughly warmed up. Here, too, succession plantings need to be -made to insure a steady supply. Sweet corn is frequently planted to good advantage after early potatoes, peas, beets, lettuce, or other early, short-season crops. Sometimes, to gain time, it may be planted before the early crop is removed.

A continuous supply of corn for the table will be available from midsummer to the first killing frost if an early variety such as Seneca Explorer or Spring Gold is planted in early to mid-May.

Follow in about 2 weeks with a second planting of the early variety plus a mid-season variety such as Northern Belle or Gold Cup and a later variety like Seneca Chief. In areas with a fairly long growing season a favorite mid-season or late variety can be planted in late June and again in early July.

To assure a good pollination and a full set of kernels on the cob, plant at least 3 adjacent rows of each variety at each planting. Plant seed 1 inch deep in rows 3 feet apart and space plants 1 foot apart or leave 3 plants in hills 3 feet apart.

A sidedressing of commercial fertilizer will assure good vigorous growth. When the plants are approximately 4-6 inches high, apply l/4 pound of 5-10-10 fertilizer for each 25 feet of row. Apply the fertilizer in a 2-inch band 6-8 inches away from the corn on one side of the row.

Removal of suckers (side shoots) does little good, may reduce yields, and is time-consuming.

Sweet corn should be harvested when the kernels are plump and in the milk stage, which is about 3 weeks after the first silk appears. At this stage the silks are dry and brown. Carefully examine a few test ears by opening a small window on one side of the ear. Most stalks produce two good ears, and sometimes a sucker will produce an edible ear.

Hybrid sweet corn varieties, both white and yellow, are usually more productive than the open-pollinated sorts. As a rule, they -need a more fertile soil and heavier feeding. They should be fertilized with 5-10-5 fertilizer about every 3 weeks until they start to silk. Many are resistant to disease, particularly bacterial wilt.

There are some sugar-enhanced varieties now in the market which retain their sweetness for a longer period of time than regular sweet corn. Never save seed from a hybrid crop for planting. Such seed does not come true to the form of the plants from which it was harvested.

Intensive Cultivation

This name has been applied to the method of forcing early vegetables and salads during the winter and spring months in the market gardens in the neighborhood of Paris.

The system itself has been practiced for about 300 years in the "marais" gardens round Paris. At one time these gardens were in the center of the city itself, but owing to modem improvements they have been gradually pushed out beyond the city boundaries farther and farther.

Most of these gardens are small-not more than a couple of areas in extent, and the rent paid by the *maraicher,* or market gardener, is very high.

Planting Dates

The gardener naturally wants to make the first planting of each vegetable as early as he can without too much danger of its being damaged by cold. Many vegetables are so hardy to cold that they can be planted a month or more before the average date of the last freeze, or about 6 weeks before the frost-free date.

Furthermore, most, if not all, cold-tolerant crops actually thrive better in cool weather than in hot weather and should not be planted late in the spring in the southern two-thirds of the country where summers are hot. Thus, the gardener must time his planting not only to escape cold but with certain crops also to escape heat.

Some vegetables that will not thrive when planted in late spring in areas having rather hot summers may be sown in late summer, however, so that they will make most of their growth in cooler weather.

A gardener anywhere in the United States can determine his own safe planting dates for different crops determining when the last killing frosts in spring will be and the average dates of the first killing frosts in fall.

Once you've determined these dates, you usually have about a month flexibility to get your plants and seeds in the ground. Each plant is different and you should consult the seed packages for specific weather information, or ask your local greenhouse operator about weather conditions in your area.

ecommendations for late plantings and for those in the South for over-wintered crops are less exact and less dependable than those for early planting.

Factors other than direct temperature effects-summer rainfall, for example, and the severity of diseases and insects-often make success difficult, especially in the Southeast, although some other areas having the same frost dates are more favorable.

A date about halfway between the two shown in table 5 will generally be best,

although in most areas fair success can be expected within the entire range of dates shown.

Along the northern half of the Pacific coast, warm-weather crops should not be planted quite so late as the frost date and table would indicate. Although frost comes late, very cool weather prevails for some time before frost, retarding late growth of crops like sweet corn, lima beans, and tomatoes.

Garden Calendar (Screen 1 of 1)

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

This schedule is for locations with similar climates to the North Eastern United States region.

January

Flower Garden and Greenhouse

Little is to be done in either. In the greenhouse care must be used to protect against frost. Ventilate but little, and with care; raise the ventilating sash only high enough to let the heated air from the greenhouse drive back the outer air so as not to chill the plants.

To destroy the red spider, syringe the plants copiously at night, and splash the paths with water. The aphis, or "green fly," must also be destroyed; tobacco may be used. Various new preparations are coming on the market for the destruction of greenhouse pests. Several new effective preparations of tobacco have been brought into use.

The white-fly is now a common pest in greenhouses, the nymphs being greenish scale-like objects on the under sides of the leaves, and adults very small white flies. The remedy is to spray with kerosene emulsion or whale-oil soap; or if on cucumbers or tomatoes, it is best to fumigate with hydrocyanic acid gas, using one ounce of potassium cyanide to each 1000 cubic ft. of space. (This material is very poisonous.)

Many greenhouse insects can be kept more or less in check by careful and effective hosing of the plants at proper times. At this season roses, grape vines and other plants are often affected by mildew; an effectual remedy is to paint the hot-water pipes with a mixture of sulfur and lime, put on as thick as ordinary whitewash, once each week until it is checked; but care must be taken not to apply it on any surface at a higher temperature than 212.

Hyacinths and other bulbs that have been kept in a cellar or other dark cool place may now be brought into the light of the greenhouse or sitting-room, provided they have filled the pots with roots. If they are not well rooted, leave them until they are, or select such of them as are best, leaving the others.

In the outside flower garden little can be done except that shrubs may be pruned, or new work, such as making walks or grading, performed, if weather permits. See that the ornamental plants and trees are not injured by heavy weights of ice or snow.

Vegetable Garden

Little can be done in the northern states except to prepare manure, and get sashes, tools, etc., in working order; but in sections of the country where there is little or no frost the hardier kinds of seeds and plants may be sown and planted, such as asparagus, cabbage, cauliflower, carrot, leek, lettuce, onion, parsnip, peas, spinach, turnip, etc.

In any section where these seeds can be sown in open ground, it is an indication that hotbeds may be started for the sowing of such tender vegetables as tomatoes, egg and pepper plants, etc.; though, unless in the extreme southern states, hotbeds should not be started before the beginning or middle of February. Make orders for the spring seeds.

February

Flower Garden and Greenhouse

The directions for January will in the main apply to this month, except that now some of the hardier annuals may be sown in hotbed or greenhouse, and also the propagation of plants by cuttings done rather better now than in January as the greater amount of light gives more vitality to the cutting.

Vegetable Garden

Leaves from the woods, horse manure, or refuse hops from breweries, may be got together towards the latter part of this month, and mixed and turned to get "sweetened" preparatory to forming hotbeds. Cabbage, lettuce and cauliflower seeds, if sown early this month in hotbed or greenhouse, will make fine plants if transplanted into hotbed in March.

This is preferable to the use of fall-sown plants. Manure that is to be used for the crop should be broken up as fine as possible, for the more completely manure of any kind can be mixed with the soil the better the crop will be, and, of course, if it is dug or plowed in in large unbroken lumps it cannot be properly commingled.

March

Flower Garden and Greenhouse

The long days and bright sunshine will now begin to tell on the plants under glass. Examine all plants that are vigorous and healthy; if the roots have matted the ball" of earth they must be shifted into a larger-sized pot.

Plants from cuttings struck last month may now be shifted, and the propagation of all plants that are likely to be wanted should be continued. Hardier kinds of annuals may be sown; it is best done in shallow boxes, say 2 in. deep.

Lawns

click here to see movie...

Lawns can be raked off and mulched with short manure, or rich garden earth where manure cannot be obtained. Flower-beds on light soils may be dug up so as to forward the work of the coming busy spring season. Lawns may be benefited by a good dressing, in addition to the manure, of some reliable commercial fertilizer. If the lawn is thin in spots, these places may be raked over heavily and new grass seed sown.

Vegetable Garden

This is a busy month. In localities where the frost is out of the ground, if it is not wet, seeds of the hardier vegetables can be sown. The list of seeds given for the southern states in January may now be used at the north, while for most of the southern states tender vegetables, such as egg plant, okra, sweet potatoes, melon, squash, potatos, tomatos, etc., may be sown and planted.

Hotbeds must now be all started. In March flower seeds and vegetable seeds may be sown in boxes or flats in the greenhouse, or in residence windows, or near the kitchen stove. Unless one has space under glass, or in hotbeds, in which the plants may be transplanted before they are set in the open ground, it is well not to start

the seeds too early, in as much as the plants are likely to become too large or to be pot-bound, or to become drawn.

April

Flower Garden and Greenhouse

Window and greenhouse plants require more water and ventilation. Due attention must be paid to shifting well-rooted plants into larger pots; and, if space is desired, many kinds of hardier plants can be safely put out in cold frames. Towards the end of the month it may be necessary slightly to shade the glass of the greenhouse. All herbaceous plants and hardy shrubs may be planted in the garden. The covering of leaves or litter should be taken off bulbs and tender plants that were covered up for winter, so that the beds can be lightly forked and raked. Sow tender annual flower seeds in boxes inside.

Vegetable Garden

Asparagus, rhubarb, spinach, etc., should be uncovered, and the beds hoed or dug lightly. Hardier sorts of vegetable seeds and plants, such as beets, cabbage, cauliflower, celery, lettuce, onions, parsley, parsnips, peas, potatoes, radishes, spinach, turnip, etc., should all be sown or planted by the middle of the month if the soil is dry and warm, and in all cases, where practicable, before the end of the month.

It is essential, in sowing seeds now, that they be well firmed in the soil. Any who expect to get early cabbage, cauliflower, lettuce, or radishes, while planting or sowing is delayed until the time of sowing tomato and egg plant in May, are sure to be disappointed of a full crop.

Frequent rotation of crops should be practiced in the vegetable garden, in order to head off insects and diseases, and also to make the best use of the land. Every three or four years the vegetable garden should be laid out in some new place; but if this cannot be done, the crops should be rotated on different parts of the old garden.

May

Flower Garden and Greenhouse

Window and greenhouse plants should be in their finest bloom. Firing may be entirely dispensed with, though care must still be exercised in ventilating. If weather is cold and backward, however, and in very northern regions, care must be taken not to stop firing too soon, or the plants will mildew and become stunted.

Every precaution must be used to keep the air moist. "Moss culture may be tried, the common sphagnum or moss of the swamps, mixed with one-twentieth of its bulk of bone dust, being laid as a mulch on the top of the earth of the flower-pots; its effect is to shield the pots from the sun, and at the same time stimulate the roots to come to the surface.

By the end of the month all of the plants that are wanted for the summer decoration of the flower border may be planted out, first loosening a little the ball of earth at the roots. If the weather is dry, water freely after planting.

When the greenhouse is not to be used during the summer months, camellias, azaleas, and plants of that character should be set out of doors under partial shade; but most of the other plants usually grown in the conservatory or window garden in winter may be set in the open border. Flower-beds should be kept well hoed and raked, to prevent the growth of weeds next month.

Pelargoniums, pinks, monthly roses and all the half-hardy kinds of flowering plants should be planted early, but coleus, heliotrope and the more tender plants should be delayed until the end of the month. Annuals that have been sown in the greenhouse or hotbed may be planted out, and seeds of such sorts as mignonette, sweet alyssum, Phlox Drummondii, portulaca, etc., may be sown in the beds or borders.

The china aster is now one of the most popular of summer and fall plants. The seed may be sown in the north as late as the middle of May, or even the first of June, with good results for fall blooming. If the plants are started early in the greenhouse, they are likely to spend themselves before fall, and therefore a later sowing should be provided.

Lawns

Lawns should be mown, and the edgings trimmed.

Vegetable Garden

Attention should be given to new sowings and plantings for succession. Crops sown last month will have to be thinned out if large enough. Hoe deeply all

transplanted crops, such as cabbage, cauliflower, lettuce, etc. Tender vegetables, such as tomatoes, egg and pepper plants, sweet potatoes, etc., can be planted out. Seeds of Lima beans, sweet corn, melon, okra, cucumbers, etc., should be sown; and sow for succession peas, spinach, lettuce, beans, radishes, etc., every ten days.

June

Flower Garden and Greenhouse

Tropical plants can now be used to fill up the greenhouse during the summer months. It should be well shaded, and fine specimens of fancy caladiums, dracaenas, coleus, crotons, palms, ferns and such plants as are grown for the beauty of their foliage, will make a very attractive show. If these cannot be had, common geraniums may be used. The "moss culture" will be found particularly valuable for these plants.

Hyacinths, tulips and other spring bulbs may be dug up, dried, and placed away for next fall's planting, and their places filled with bedding plants, such as coleus, achyranthes, pelargoniums, and the various white and colored leaf plants. It will be necessary to mow the lawn once a week, and sometimes oftener.

Vegetable Garden

Beets, beans, carrots, corn, cucumbers, lettuce, peas, and radishes may be sown for succession. This is usually a busy month, as many crops have to be gathered, and, if hoeing is not promptly seen to, weeds are certain to give great trouble. Tomatoes should be tied up to trellises or stakes if fine-flavored and handsome fruit is desired, for if left to ripen on the ground they are apt to have a gross earthy flavor.

July

Flower Garden and Greenhouse

Watering, ventilating and fumigating (or the use of tobacco in other forms for destruction of aphids) must be attended to. The atmosphere of the greenhouse must be kept moist. Watch the plants that have been plunged out of doors, and see if any require repotting.

All plants that require staking, such as dahlias, roses, gladioli and many

herbaceous plants, should now be looked to. Carnations and other plants that are throwing up flower stems, if wanted to flower in winter, should be cut back. That is, the flower stems should be cut off to say 5 in. from the ground.

Vegetable Garden

The first ten days of this month will yet be time enough to sow sweet corn, beets, lettuce, beans, cucumbers and rutabaga turnips. Such vegetables as cabbage, cauliflower, celery, etc., wanted for fall or winter use, are best planted this month, though in some sections they will do later. Keep sweet potatoes hoed to prevent the vines rooting at the joints.

August

Flower Garden and Greenhouse

But little deviation is required in these departments from the instructions for July. See that sufficient water is applied; the walks may be wet in the houses.

Vegetable Garden

Hoe deeply such crops as cabbage, cauliflower, and celery. The earthing up of celery this month is not to be recommended, unless a little very early supply is wanted. Onions in many sections can be harvested. The proper condition is when the tops are turning yellow and falling down. They are dried best by placing them in a dry shed in thin layers. Sow spinach for fall use, but not vet for the winter crop.

Red top, white globe, and yellow Aberdeen turnips should now be sown; rutabaga turnips sown last month will need thinning, and in extreme southern states they may yet be sown.

September

Flower Garden and Greenhouse

The flower-beds in the lawn should be at their best. If planted in "ribbon lines" or "massing," strict attention must be given to pinching off the tops, so that the lines or masses will present an even surface. Tender plants will require to be put in the greenhouse or housed in some way towards the end of this month; but be careful

to keep them as cool as possible during the day.

Cuttings of bedding plants may now be made freely if wanted for next season, as young cuttings rooted in the fall make better plants for next spring's use than old plants, in the case of such soft-wooded plants as pelargoniums, fuchsias, verbenas, heliotropes, etc.; with roses and plants of a woody nature, however, the old plants usually do best.

Dutch bulbs, such as hyacinths, tulips, crocus, etc., and most of the varieties of lilies, may be planted. Violets that are wanted for winter flowering will now be growing freely, and the runners should be trimmed off. Sow seeds of sweet alyssum, candytuft, daisies, mignonette, pansies, etc. Visit the roadsides and woods for interesting plants to put in the hardy borders.

Vegetable Garden

If cabbage, cauliflower, and lettuce are wanted to plant in cold frames, the seed should be sown from about the 10th to the 20th of this month; but judgment should be exercised, for, if sown too early, cabbage and cauliflower are apt to run to seed. The best date for the latitude of New York is September 15th.

The main crop of spinach or sprouts that is wanted for winter or spring should be sown about the same date. The earth should be drawn up to celery with a hoe preparatory to earthing up with a spade. Onions that were not harvested and dried last month must now be attended to. Turnips of the early or flat sorts may yet be sown the first week of this month in the northern states, and in the south from two to four weeks later.

October

Flower Garden and Greenhouse

In northern sections of the United States, tender plants that are still outside should be got under cover as early as possible. Delay using fire heat as long as possible, unless the nights become so cold as to chill the plants inside the house.

Roses, carnations, camellias, azaleas, pelareoniums and the hardier sorts of plants will do better if placed in a cold frame or pit until the middle of November than they would in an ordinary greenhouse. Look out for insects. Fall buds of all kinds may be planted.

Take up summer flowering bulbs and tubers, such as dahlias, tuberoses, gladioli, cannas, caladiums, tigridias, and dry them off thoroughly, stowing them away afterwards in some place free from frost and moisture during the winter. Before winter sets in see that the lawn is freely top-dressed. Be careful not to mow the grass too short in fall.

Vegetable Garden

Celery will now be in full growth, and will require close attention to earthing up, and during the last part of the month the first lot may be stored away in trenches for winter.

All vegetable roots not designed to be left in the ground during the winter should be dug up, such as beets.. carrots, parsnips, sweet potatoes etc. The cabbage, cauliflower and lettuce plants grown from seed sown last month should be pricked out in cold frames.

If lettuce is wanted for winter use, it may now be planted in the greenhouse or cold frame, shed or cellar for a month or two. It may then be taken into the greenhouse and packed closely together under the stage, and will fit for use from January to March, according to the temperature of the house.

Vegetable gardens often become infested with diseases that are carried over from year to year in the old plants and litter; this is specialty true of water-melons and of some diseases of tomatoes. It is well, therefore, to burn the tops of the plants in the fall rather than to plow them under or to throw them on the compost heap.

November

Flower Garden and Greenhouse

Plants intended to be grown inside should now all be indoors. Keep a sharp look-out for cold snaps, as they come very unexpectedly in November, and many plants are lost thereby. In cases where it is not convenient to use fire heat, 5° to 10° of cold can be resisted by covering the plants over with paper, and by using this before frost has struck the plants valuable collections may be saved.

When fire heat is freely used, be careful to keep up the proper amount of moisture by sprinkling the paths with water. Little can be done in the flower garden, except to clean off all dead stalks, and straw up tender roses, vines, etc., and, wherever there is time, to dig up and rake the borders, as it will greatly

facilitate spring work.

Cover up all beds in which there are hyacinths, tulips and other bulbs with a litter of leaves or straw to the depth of 2 or 3 in. If short, thoroughly-decayed manure can be spared, a good sprinkling spread over the lawn will help it to a finer growth next spring.

Vegetable Garden

Celery that is to be stored for winter use should be put away before the end of the month in all sections north of Virginia; south of that it may be left in most places where grown throughout the winter if well covered up. The stalks of the asparagus bed should be cut off, and burned if there are berries on them, as the seeds scattered in the soil sometimes produce troublesome weeds.

Mulch the beds with 2 or 3 in. of rough manure. All vegetable roots that are yet in the ground, and not designed to be left there over winter, must be dug up in this latitude before the middle of the month or they may be frozen in. Cover up onions, spinach, sprouts, cabbage, or lettuce plants with a covering of 2 or 3 in. of leaves, hay, or straw, to protect them during the winter.

Cabbages that have headed may usually be preserved against injury by frost until the middle of next month by simply pulling them up and packing them closely in a dry spot in the open field with the heads down and roots up. On approach of cold weather in December they should be covered up with leaves as high as the tops of the roots, or, if the soil is light, it may be thrown over them, if leaves are not convenient.

Cabbages will keep this way until March if the covering has not been put on too early. Plow all empty ground if practicable, and, whenever time will permit, do trenching and subsoiling.

Cabbage, cauliflower, and lettuce plants that are in frames should be regularly ventilated by lifting the sash on warm days, and on the approach of very cold weather they should be covered with straw mats or shutters. In the colder latitudes, and even in the middle states, it is absolutely necessary to protect cauliflower in this way, as it is much more tender than cabbage and lettuce plants.

December

Flower Garden and Greenhouse

Close attention must be paid to protecting all tender plants, for it is not uncommon to have the care of a whole year spoiled by one night's neglect. Vigilance and extra hot fires will have to be kept up when the thermometer falls to 34° or 35° in the parlor or conservatory.

It is well to set the plants under the benches or on the walks of the greenhouses; if they are in the parlor move them away from the cold point and protect them with paper; this will usually save them even if the thermometer falls to 24° or 26°.

Another plan in the greenhouse is to dash water on the pipes or flues, which causes steam to rise to the glass and freeze there, stopping up all the crevices. With plants outside that require strawing up or to be mulched, this will have now to be finished.

Vegetable Garden

Celery in trenches should receive the final covering for the winter, which is best done by leaves or light stable litter; in the latitude of New York it should not be less than 12 in. thick. Potatos, beets, turnips or other roots in pits, the spinach crop in the ground, or any other article in need of protection, should be attended to before the end of the month; manure and compost heaps should be forwarded as rapidly as possible, and turned and mixed so as to be in proper condition for spring.

Remove the snow that accumulates on old frames or other glass structures, particularly if the soil which the glass covers was not frozen before the snow fell; it may remain on the sashes longer if the plants are frozen in, since they are dormant, and would not be injured if deprived of light for eight or ten days. If roots have been placed in cellars, attention must be given to ventilation, which can be done by making a wooden box say 6 by 8 in., to run from the ceiling of the cellar to the eaves of the building above.

Fruit Garden Calendar (Screen 1 of 1)

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

The following provides a detailed, month-by-month guide to the growing of fruit outdoors, in a fruit house, and in a grapery.

January

Pruning, staking up, or mulching can be done if the weather is such that the workmen can stand it. In all warm or comfortable days the fruit trees may be pruned.

Grapery

Graperies used for the forcing of foreign grapes may be started, beginning at a temperature of 50o at night, with 10o or 15o higher during the day. The borders must be covered sufficiently deep with leaves or manure to prevent the soil from freezing, as it would be destruction to the vines to start the shoots if the roots were frozen; hence, when forcing is begun in January, the covering should be put on in November, before severe frosts begin.

February

Little can be done in most of the northern states as yet, and in sections where there is no frost in the ground it is likely to be too wet to work; but in many southern states this will be the best month for planting fruit trees and plants of all kinds, particularly strawberries, raspberries, blackberries, pear and apple trees, while grape vines will do, though they will also do well quite a month later. Continue the pruning. Fruit trees for spring planting should be ordered, if not already done.

Grapery

The graperies started last month at 50o at night may now be increased to 60o,

with a correspondingly higher day temperature. Great care must be taken to syringe the leaves thoroughly at least once a day, and to deluge the paths with water, so as to produce a moist atmosphere. Paint the hot-water pipes with sulfur mixture, as recommended in January.

March

In many sections, planting may now be done with safety, provided the soil is light and dry, but not otherwise. Although a tree or plant will receive no injury when its roots are undisturbed in the soil should a frost come after planting, the same amount of freezing will, and very often does, greatly injure the plant if the roots are exposed.

Grapery

The grapery started in January will have set its fruit, which should be thinned by one-third. The temperature may now be further advanced to 70o at night, with 15o higher in the daytime. The same precautions must be used against mildew and insects as given in January. Graperies wanted for succession may be started in February or this month.

April

Strawberries that have been covered up with straw or leaves should be relieved around the plants, leaving the covering between them. Special care must be exercised that the mulch be not left on too long; the plants should not become whitened or "drawn." Raspberries, grape vines, etc., that have been laid down may now be uncovered and tied up to stakes or trellises, and all new plantations of these and other fruits may now be made. Fruit trees may be grafted.

May

The hay or leaf mulching on the strawberry beds should be removed and the ground deeply hoed (if not removed in April in the more forward places), after which it may be placed on again to keep the fruit clean and the ground from drying. Where it has not been convenient before, most of the smaller fruits may yet be planted during the first part of the month.

Tobacco dust will dislodge most of the numerous kinds of slugs, caterpillars, or

worms that make their appearance on the young shoots of vines or trees.

Fruit trees may be planted this month if they were not planted in March or April. If they have been kept fresh and dormant, they should still be in good condition. The broken roots should be cut back to fresh wood, and the tops should be headed back in proportion.

June

The small fruits should be mulched about the roots, if this has not yet been done. If the fruit garden is large enough for horse culture, it is best to keep the bush-fruits well cultivated during the season; this tillage conserves the moisture and helps to make a full crop of berries. In small areas the mulching system is sometimes preferable.

July

If grape vines show any signs of mildew, dust them over with dry sulfur, selecting a still, warm day. The fruit having now been gathered from strawberry plants, if new beds are to be formed, the system of layering the plants in small pots is the best.

In general, field-strawberries are not grown from potted layers, but from good strong layers that strike naturally in the field. In the north, spring planting of strawberries is generally advised for market conditions; although planting in early fall or late summer is successful when the ground is well prepared and when it does not suffer from drought. Where apples, pears, peaches, grapes, etc., have set fruit thickly, thin out at least one-half to two-thirds of the young fruit.

August

Strawberries that have fruited will now be making runners, or young plants. These should be kept cut off close to the old plant, so that the full force of the root is expended in making the crowns or fruit buds for next season's crop. If plants are required for new beds, only the required number should be allowed to grow, and these may be layered in pots as recommended in July.

The old stems of raspberries and blackberries that have borne fruit should be cut away, and the young shoots thinned to three or four canes to each hill or plant. If

tied to stakes and topped when 4 or 5 ft. high, they will form three or four branches on a cane, and win make stronger fruiting plants for next year.

September

Strawberry plants that have been layered in pots may yet be planted, or in southern districts the ordinary ground layers may be planted. The sooner in the month both are planted the better crop they will give next season; and, as these plants soon make runners, it will be necessary to trim them off.

Attend to raspberries and blackberries as advised for last month, if they have not already been attended to. All fruit trees should be gone over for borers before cold weather sets in; they also should have been gone over for the same purpose in May and June.

October

Strawberries that have been grown from pot-grown layers may yet be planted in southern states; keep the runners trimmed off. Fruit trees and shrubs may be set out; but, if planting is deferred to the last of the month, the ground around the roots should be mulched to the thickness of 3 or 4 in. with straw, leaves or rough manure, as a protection against frost.

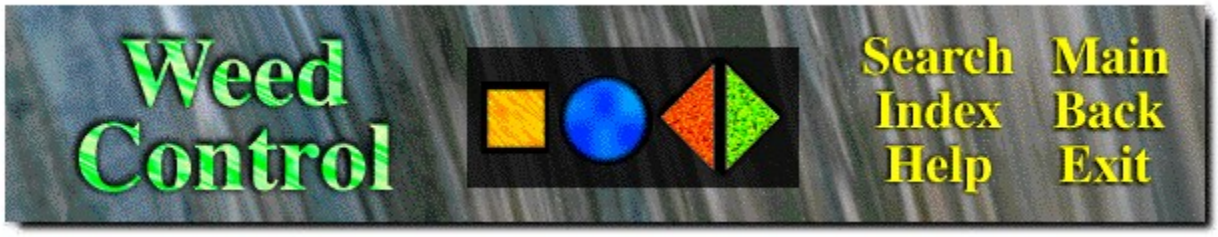
The fruit garden must be protected from the ravages of mice in winter. Mice will nest about the plants if there is straw or other litter around them. Before winter, all tall grass and loose litter should be taken away; if this is not done, then the first snow should be tramped heavily around the plants, in order to destroy any nesting-places.

November

Strawberry beds should be covered (in cold seasons) with hay, straw or leaf mulching, to a depth not exceeding 2 in. Fruit trees and grape vines generally should be pruned; and, if the wood of the vine is wanted for cuttings, or scions of fruit trees for grafts, they should be tied in small bundles and buried in the ground until spring. They may be taken in December or January if preferred.

December

In sections where it is an advantage to protect grape vines, raspberries, etc., from severe frost, these should be laid down as close to the ground as possible, and covered with leaves, straw or hay, or with a few inches of soil. Grapes may be pruned. Fruit trees may be pruned from now till March in the north.



Controlling Weeds (Screen 1 of 1)

click here to see movie...

Weeds can be the gardener's worst enemy. They compete for moisture and nutrients and may harbor insects and diseases. They shade the plants and interfere with air circulation.

Click on any button below to see picture:

Hedge Bindweed	**Purslane**	**Pigweed**	**Chickweed**
Field Bindweed	**Galinsoga**	**Ragweed**	**Quackgrass**
Lambsquarters	**Buckwheat**	**Mallow**	**Crabgrass**

Tall weeds may retard the evaporation of dew and rain from the foliage; and thus, during periods of excess moisture, they may increase the incidence of infection by bacteria and fungi. Some weeds harbor diseases, insects, and nematodes that reinfest garden crops in succeeding years.

Weeds can be controlled by hand weeding, cultivation, mulches, chemicals (herbicides), or a combination of these methods. As soon as the soil can be properly worked after each rain or irrigation, it should be thoroughly hoed or cultivated to kill weeds that have sprouted and to leave the surface in a loose, friable condition to absorb later rainfall.

The primary value of hoeing or cultivating is weed control. This cultivation should be shallow so as to avoid injuring the vegetable plant roots that lie near the surface. Although it is desirable to keep the surface soil loose, there is little to be gained by hoeing or' cultivating oftener than necessary to keep weeds out of the garden.

In small gardens, weeds can be controlled with black polyethylene mulch supplemented by hand weeding such as pulling, hoeing, and wheel hoeing.

Mulching vegetable crops with organic material also is a common practice in small gardens.

The best organic mulches are partially decomposed hay, straw, or grass clippings. The mulch should be applied 4 to 6 inches deep when the plants are about 6 inches tall. Cabbage, tomato, and other transplants usually are tall enough soon after they are set in the garden.

Before applying mulch, hoe out all small weeds. Not only does mulch control weeds, it also conserves moisture, keeps the soil from packing, and increases the humus necessary for vigorous plant growth.

Chemical* Weed Control

** This is a simplified list of chemicals. Many additional excellent compounds are available. However, only the hobbyist or commercial grower who doesn't mind the cost and has the time to learn how to use them should attempt to have all these chemicals on hand.*

Chemicals are sometimes useful for weed control in the home garden. The gardener must be willing to spend considerable time calculating exact dosages, timing, crop tolerances, and so forth before he or she embarks on a control program with chemicals. Used improperly, they may damage the crop or fail to control weeds. Used correctly, they can eliminate many tedious hours of hoeing, cultivating, or hand weeding.

Chemicals are of 2 general types: *preventives,* the more common type, which must be applied to the soil immediately after the existing weeds have been killed by some kind of tillage; and *foliage selective, which* are sprayed over existing weeds and crop to kill the weeds but which leave the crop unharmed.

Only a few foliage selectives have been discovered. They are so specific that a separate chemical is needed for each type of crop. For this reason they are not practical for the average gardener.

Many annual weeds start early in the spring and do not bother plantings made in midsummer. However, some of the most troublesome weeds such as crabgrass, barnyard grass, pussley or purslane, and *Galinsoga* do not sprout until the soil is thoroughly warmed. A preventive-type herbicide controls this group more effectively than does a foliage-selective type applied when the weeds are large.

Dacthal (DCPA) and Treflan (Trifluralin) are two preventive herbicides that are available to the home gardener. Neither herbicide will totally prevent weed growth nor will they totally eliminate weeds. They are recommended for limited use in conjunction with hoeing and mulching.

Dacthal and Treflan are formulated into a number of different products and sold under several trade names. They are available to the home gardener in the granular form, which is convenient for home garden use. They are also available in small consumer-sized units.

Both herbicides are primarily grass preventives and can be used in the home garden where a wide range of vegetable crops are grown in a relatively small area. However, Dacthal and Treflan cannot be used on all vegetable crops. Dacthal cannot be used to control weeds in carrots, and

Treflan should not be used in onions. Neither herbicide should be applied to soil that will be planted to sweet corn, since both chemicals will cause serious stunting of this crop. When employing either chemical, follow the manufacturer's directions on the label. Do not use with crops that are not listed on the manufacturer's label. It is illegal to do so, and crop injury may occur.

Neither herbicide will control weeds that have already emerged nor will they control the annual weeds ragweed, mustard, and Galins*oga* or the perennial weeds quackgrass and nutsedge.

Application of Herbicides (Screen 2 of 3)

In using an herbicide, it is recommended that the garden be measured off into given areas, for example, 10 feet x 10 feet, and that the recommended rates of chemical be weighed out for the given area and then applied. This procedure should be followed until the entire garden area has been treated.

The herbicides should be applied to freshly tilled, well-prepared seedbeds. A simple salt-shaker-type applicator can be made from a capped glass jar in which holes are made in the lid.

The holes in the lid or cap should be small enough to allow controlled application of the granular herbicide. Never store the unused portion of the herbicide in the unlabeled shaker jar. Always return the unused herbicide to the original container.

Dacthal is usually applied to the soil after the crops (either seeded or transplanted) have been planted but before the weeds have emerged. Treflan must be applied to the soil and then roto-tilled or raked into the soil before the vegetables are planted. Rake or roto-till the Treflan into the top 2 inches of soil; deeper tillage may result in loss of effectiveness of the herbicide.

If rain does not occur within 2 days after treating the soil with either herbicide, apply 1/2 inch of irrigation water to the treated area.

The control of perennials such as quackgrass, thistles, and bindweed requires very special practices. As a rule, perennials are best controlled by black plastic mulch (1.5-4 mils thick). Chemicals will work, but most of them can be used only after harvest because they are toxic to almost all vegetables. Chemicals are particularly helpful in preventing the spread of perennials from the edges of the garden.

Most perennials continue to grow well into the late fall. Spraying 2,4-D in gardens in late fall after all crops have been harvested will weaken or

kill all broadleaf perennial weeds. However, 2,4-D does not control perennial grasses, for example, quackgrass. Very small amounts of 2,4-D, a potent herbicide, will damage or kill most vegetables, flowers, and trees. Do not spray on windy days.

A sprayer used for 2,4-D cannot be satisfactorily cleaned for other gardening purposes. Residual 2,4-D in the sprayer will damage plants.

Purchase 2,4-D in small quantities. In storage 2,4-D can vaporize and contaminate stored seeds, fertilizers, and so forth.

Home Garden Herbicides (Screen 3 of 3)

Herbicides are generally not recommended for home gardens; however, trifluralin and DCPA are registered for use in many vegetable crops. If these are used, care must be taken to insure proper application.

Soil fumigants usually kill most of the seeds or vegetative reproductive organs of weeds present.

The non-selective, broad spectrum herbicide glyphosate may be used prior to planting to control many perennial weeds, and many gardeners use it with hand-held weed wipers to selectively control weeds in the garden.

Disease and Insect Control

Home gardeners may be disappointed in their attempts to control diseases if they rely only on spraying or dusting after diseases make their appearance.

From seeding time until harvest, diseases and insects may cause losses to vegetables. Successful control requires a 7-10-day dusting or spraying schedule.

Among the most important disease-control measures is the use of disease-free seeds and plants, and the use of disease-resistant varieties. Great progress has been made within recent years in the development of varieties that are resistant to certain diseases, insects, and nematodes.

Insecticides and Fungicides

Numerous insecticides and fungicides are available to the home gardener. The following chemicals will give excellent control of most garden diseases or insects if applied at 7-10-day intervals, and if label dosage recommendations are observed. Labels should also be checked for interval between last application and harvest.

Malathion

Malathion is generally considered one of the safer insecticides. It is an excellent all-purpose insecticide and controls a wide variety of garden insects, especially sucking insects (aphids). Malathion is available as a dust, a wettable powder, or an emulsifiable liquid.

Carbaryl

Carbaryl (Sevin) is one of the safest materials for home gardeners to use. Carbaryl (Sevin) is effective against many of the leaf-feeding caterpillars, leafhoppers, beetles, and worms. However, Sevin is toxic to bees. Avoid the application of Sevin if bees are active in the garden. Spray in the early morning or late evening when bees are not actively foraging.

Maneb

Maneb (Dithane M-22, Manzate) is an organic fungicide used to control diseases on a wide range of vegetable crops.

All-Purpose Mixtures

Many dual home-garden mixtures are presently on the market. When purchasing one of these dual garden sprays or dust mixtures, read the label and be certain that one or more insecticides such as methoxychlor, malathion, or carbaryl (Sevin) plus a fungicide such as zineb, captan, or

maneb are included.

An excellent dual garden spray can be formulated easily by mixing the following insecticides and fungicides in 1 gallon of water:

Carbaryl (Sevin) -- 50WP -- 2 tbs.

Malathion -- 25WP -- 4 tbs.

Maneb -- 80WP -- 2 tbs.

Use level tablespoonfuls. A heaping tablespoonful may be equivalent to 2 tablespoons. This may result in injury to the plants. Agitate this spray periodically to keep the chemicals in suspension.

Pesticides are poisonous to humans and wild life. Read the precautions and follow the directions on the label.

Method of Application (Screen 3 of 4)

To be effective, chemicals must be distributed over all surfaces of a plant. In general, this objective can be achieved better with sprays than with dusts.

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Dusting is quicker and more convenient, and many gardeners successful , y use this method by frequent and diligent applications. Dust applications made in early morning or late evening, when wind is at a minimum, are more effective than applications made when the plants are dry. Moisture encourages the growth of many pathogens. Apply the chemicals before rainy periods when they are most needed.

Seed Treatment (Screen 4 of 4)

Seed treatment kills disease organisms in or on the seed and prevents seed rot and damping off or rotting of the young seedlings.

Treated seed can now be purchased from reputable seed companies.

The gardening purposes, Residual 2, 4-D in the sprayer will damage plants.

Organic Gardening (Screen 1 of 1)

While many home gardeners rely on the careful use of chemicals to prevent losses from insects, diseases, weeds, and other pests, others prefer to deal with such problems organically. Organic gardening excludes the use of manufactured fertilizers and pesticides, with emphasis placed on the following measures:

Mulches, Composts, and Manures

The use of mulches, composts, and manures to build up the soil. The return of organic matter to the land is an excellent practice, provided no disease organisms or weed seeds ire returned in the process.

Physical and Mechanical Control

Physical and mechanical control measures against pests, such as destroying insect egg masses by hand, hand-picking), potato beetles and tomato hornworms as they appear, and removing,, diseased plants is soon as the first symptoms appear.

Cultural Measures

Cultural measures involving the use of ordinary farming practices before insect or disease damage becomes apparent. Often these may consist merely of variations of routine operations necessary to produce the crop, including rotation of land and crops between seasons.

Biological Control Measures

Biological control measures in which natural enemies of pests are used. Some insects do not damage plant,,; and are beneficial to man because they destroy injurious insects. Important beneficial insects include the lion

(doodlebug), aphid lion (lacewing), assassin bugs, damsel bugs, ground beetles, lady beetles, praying mantids, spiders and certain predaceous mites, and syrphid flies (wasps).

Use resistant varieties. Check seed catalogs for this information. Many new varieties ire disease and insect resistant. Use wood ashes around plants where slugs are a problem.

Natural Insecticides

Two natural insecticides commonly used by organic gardeners are rotenone and pyrethrum. Both insecticides are plant products and have low toxicity. They should be used in strict accordance with directions on the container label.

Many State agricultural experiment stations are publishing information geared specifically to the needs and problems of organic gardeners and farmers. Your State Extension office or county Extension agent can advise you about the availability of such information within your State.