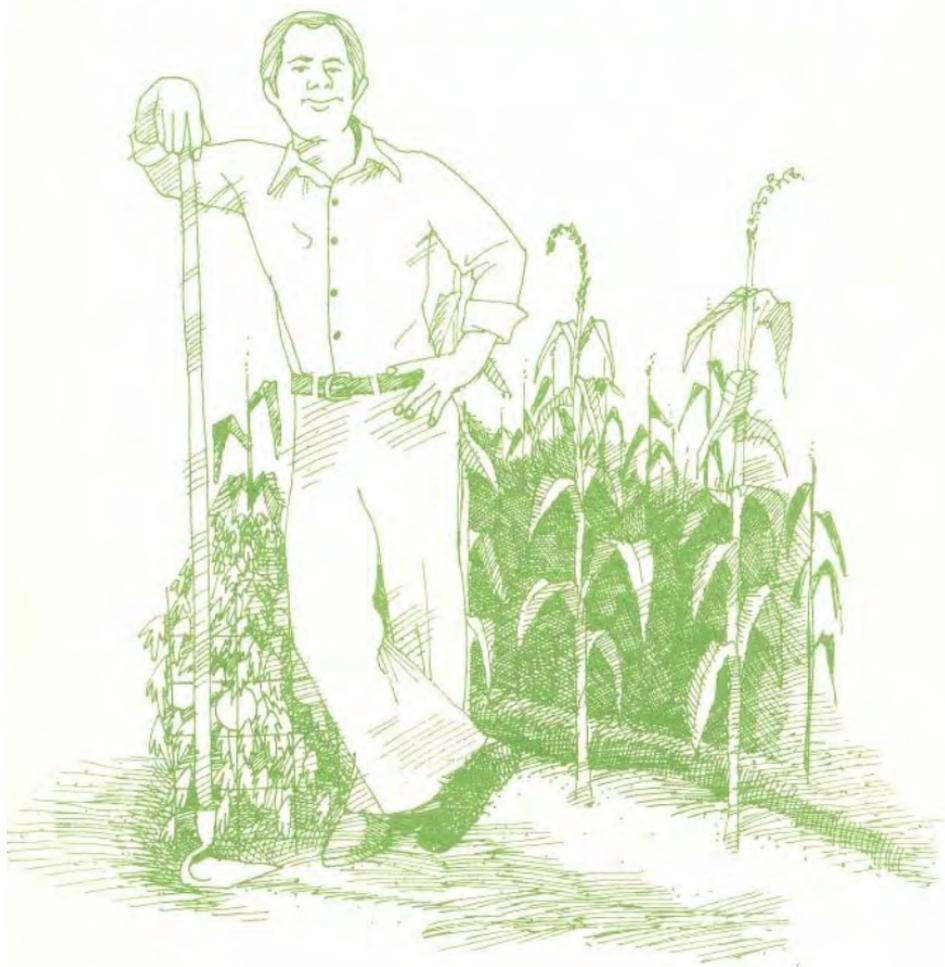


Getting Along with Your Garden



Ezra Taft Benson Institute
Brigham Young University



Mary. Mary,
quite contrary.
How does *your garden grow*? —Old
English Rhyme

Why Garden?

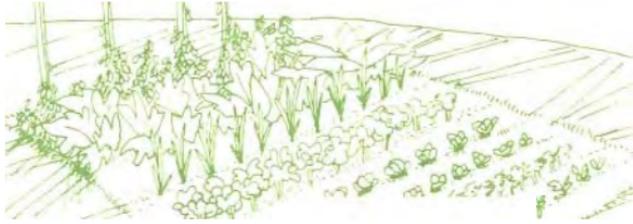
You do not have to be a professional to grow a garden. but you 10 have to be interested and killing to have fun working. Gardening can be an exciting. rewarding experience. Further more. you can produce a lot more food in a small area than you might suspect. (See Table. below.) In addition. there are some valuable by-products from a successful gardening experience. the most important of which is self-con-

fidence. Give gardening a try. You've got nothing to lose and everything to gain!

Where to Garden

There are many ways and many places around a home or in an apartment to grow vegetables. Obviously. because vegetables are living things. there has to be a suitable environment. but you certainly do not need the "ideal" situation to begin. The following are two of the musts for a successful garden. whether you grow it on a small plot of land. on a flower border. or in pots:

Garden sq. feet	Pounds of vegetable produced*	Can provide the following % RDA for a family of 4 of	
		Vit. A	Vit. B
5 x 5	59	7	15
10 x 10	184	35	24
15 x 25	403	217	94
20 x 20	485	99	75
50 x 50	1847	104	240



The garden needs 4 to 6 hours of direct sunlight.

1 The garden, in general, must have four to six hours of direct sunlight daily. Leafy vegetables (lettuce, kale, etc.) can be grown in partial shade but do better in direct sunlight. Those vegetables that bear fruit (tomatoes, squash, etc.) do better in direct sunlight. Do not locate the garden under trees or in the shade of the house.

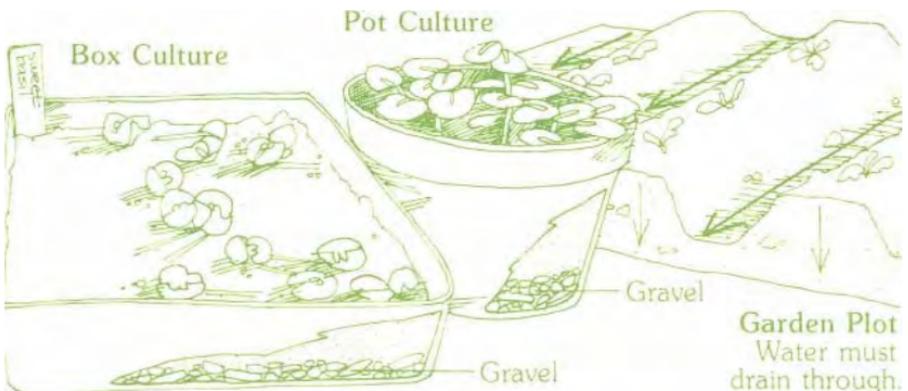
However, since we usually have little choice of a gardening area due to the position of our homes, one factor to remember is that the afternoon sun is better for plant growth than is the morning sun.

2 The soil, or whatever medium

the plants are grown in, must be able to drain so that water will not accumulate. Many first-time gardeners, especially when using pot or box cultures, have a tendency to over-water rather than under-water. Heavy clay soil usually makes a poor gardening area.

What to Grow

While everyone would agree that you ought to grow whatever kind of vegetables you want, there are differences in nutritional value, and a garden ought to provide nutritious food as well as fun. Green leafy vegetables are important sources of vitamins A, C, and folic acid and are rich sources of minerals. In addition, you ought to try



one or two new vegetables each year to become acquainted with the vegetables themselves and how to grow them. It is also a good idea to let the children help. since many times they will eat something new or different if they have been involved in its production.

The most nutritious vegetables

Asparagus	Kale
Snap Beans	Mustard Greens
Broccoli	Onions
Table Beets	Okra
Cabbage	Parsnips
Carrots	Garden Peas
Chard	Sweet Potatoes
Collards	Tomatoes
Cucumbers	Potatoes

How to Do It

Good Seed. You have to start with good seed to get good production. Unfortunately, you cannot always tell good seed from bad seed by the way it looks. In seed lots of less than 1 pound, it is not required in the

United States

to print the



percent germination on the package; therefore, you are aware of poor

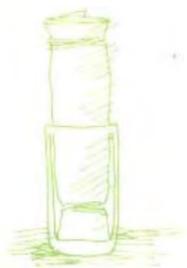
seed only after it has been planted and fails to grow. Most commercial companies, however, are concerned about reputation and, there-fore, try to provide good seed.

Large, plump seeds will usually produce more vigorous plants than small ones. Small, shriveled, wrinkled, or cracked seeds indicate poor quality. Seed handling is also important in maintaining high quality seed. It is important that the seeds not be dropped, because this can cause extensive internal cracking and loss of germination.

You can run your own germination percentage test by putting 10 seeds in a wet cloth or paper towel, rolling them up, and keeping them in a warm place. If you keep the towel moist for two or three weeks, the seeds will germinate and you can judge the seed quality for yourself. In most instances you will avoid seed problems if you purchase seeds from a dealer rather than using home-grown seed.

How to make a seed doll

The seed doll method of germinating is an easy and economical way to test for vegetable seed germination. Take a paper towel and fold it double. In a row, one inch from the doubled edge, place the seeds half an inch or more apart. When the row is set. roll the towel over the seeds. Place the second row of seeds and roll the towel to cover them. Continue until the row is complete. Hold the roll together with a rubber band. Place the roll in a glass with an inch of water. Add water when needed. Take a look in two or three weeks and



is complete. secure
bands and stand in
water in a warm



What most beginning gardeners, and even some accomplished gardeners, do not understand is the way different garden plants will cross pollinate with each other. For instance, cabbage, kohlrabi, kale, collards, broccoli, and cauliflower all intercross freely. Therefore, it is almost impossible to save seed where any two or more of these are grown together in a garden. Sweet corn and field corn will cross with each other. On the other hand, beans, peas, okra, and lettuce are self-pollinating. Incidentally, cucumbers and cantaloupes can be grown together; they do not cross.

You can save seed from these vegetables:

- | | |
|--------------|----------|
| Beans | Okra |
| Tables Beets | Peas |
| Cucumbers | Tomatoes |
| Onions | |

You should purchase new seed for these vegetables:

- | | |
|----------|-------------|
| Cabbage | Broccoli |
| Kohlrabi | Carrots |
| Kale | Cauliflower |

One more tip—do not try to save your own seed from hybrid vegetables for the next year. Hybrids do not produce as well the second year as they do the first.

Good Seed Bed

Fine, crumbly soil



Poor Seed Bed

Too many clod



Good Seed Bed (Soil). After acquiring good seed, you need a good place to put it - a good seed bed.

Most vegetable seeds are small: therefore, they need a fairly level, fine, crumbly seed bed, free of big clods and plant debris. Especially in northern areas it is a good idea to till or spade the garden in the fall. A fall preparation will particularly help gardening areas with clay soils. Sandy soils, however, may not require this early care. You can wait until spring to finish preparing the seed bed. During the winter the soil will be broken into small pieces by the action of freezing, thawing, snow, and water. In the spring it is not necessary to till or spade gardens that have been previously prepared in the fall: just level, rake, and plant them.

When a garden is going to be tilled, spaded, and then planted, it is important that spading not be done while the soil is too wet. This causes the soil to dry into

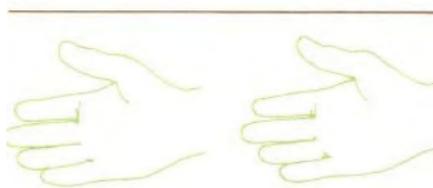
large clods. A good test is to squeeze together a



handful of soil

for approximately 10 seconds. If it

sticks together in a ball and does not readily fall apart under slight pressure from the thumb and finger or when dropped from two or three feet above the ground, it is too wet to be worked. You will also want to check soil moisture three or four inches below the surface. It may be dry enough on top but too wet beneath.



If a clump of earth remains intact when dropped, the soil is too wet for gardening; wait until it shatters (right).

Plant Food. Vegetables, like everything else that lives, grow and need food. The minerals that plants need move into the plant root system with the water. The

Food for plants taken in through:

Roots	Leaves
Nitrogen	Carbon Dioxide
Phosphorus	
Potassium	
Calcium	
Magnesium	
Sulphur	
Iron	
Boron	
Zinc	
Molybdenum	
Copper	
Water	

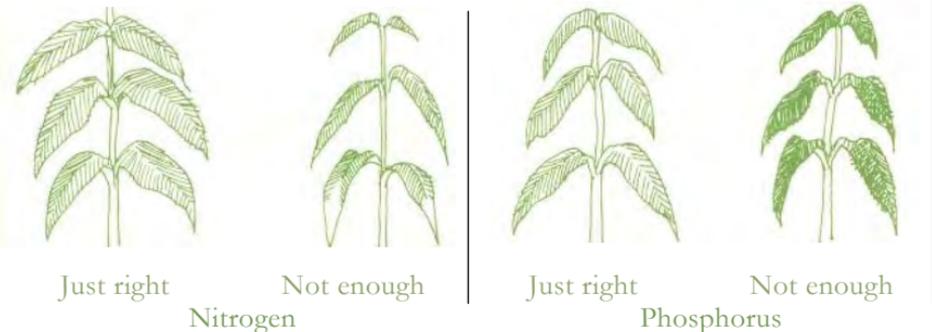
minerals plants require for growth are nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), sulphur (S), iron (Fe), boron (Bo), manganese (Mn), zinc (Zn), molybdenum (Mo), and copper (Cu). In addition, plants require carbon, hydrogen, and oxygen. All of these elements are essential for vegetables and other plants to grow. Many of these minerals are native to the soil; that is, they became part of the soil during its period of formation. Others have been added in

various ways, such as by rain water and decomposing plant and animal tissues. These minerals are used in different quantities by growing plants, and all of them affect plants in different ways.

Nitrogen, for example, is the element most often related to big, healthy, green, vigorous plants. However, you have to be careful not to apply too much nitrogen, or you will have a big, beautiful plant that bears little or no fruit. (Tomatoes and strawberries are good examples of garden crops that develop big, green plants but no fruit when excess nitrogen is applied.) Sweet corn and other grass plants need abundant nitrogen.

Phosphorus aids in helping plants to set fruit. All vegetables need phosphorus, but beans and peas have an unusually large requirement. You can purchase a fertilizer that has only phosphorus in it. (Do not use rock phosphate, however, because plants cannot get enough phosphorus from this source.) Incidentally, a good hint for using phosphorus with beans and peas is to make the seed trench and put a small amount of phosphorus in the bottom of it. Put a little soil over the phosphorus and then plant the beans and peas.

Nitrogen and Phosphorus Effects in Plants

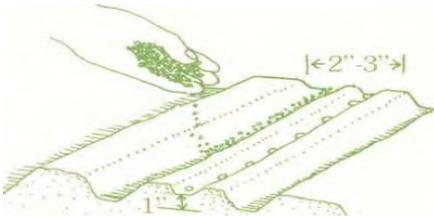


Just right Not enough
Nitrogen

Just right Not enough
Phosphorus

Another method of phosphorus application is to plant the beans and peas and then put a layer of phosphorus beside the row. Locate the phosphorus 2" deep and 2" to the side of the row that has been planted.

Fertilizer handing when planting seeds



Put fertilizer 1 inch below seeds and 2-3 inches to each side of seeds.

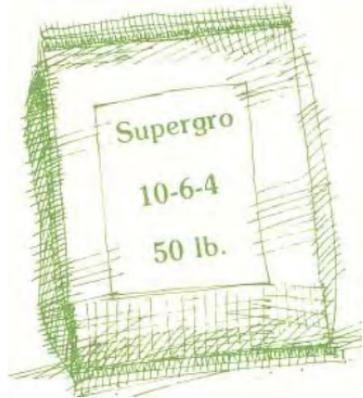
Potassium aids in fruit maturity, quality, and general plant vigor. All of the other mineral elements fill specific nutrient needs in the plant and are just as essential as nitrogen, phosphorus, and potassium for a healthy, fruitful garden.

In many soils there are not enough of these minerals to enable plants to grow and do well, so they must be added to complete the diet of the vegetable plant. These additions are usually made in the form of some kind of fertilizer. If a test is run on the soil in the vegetable garden, it is possible to tell fairly accurately which elements are in low supply and must be added. Experience with gardening has shown that most soils lack sufficient nitrogen, phosphorus, and potassium. These elements can be added in such forms

as animal manures or commercial fertilizers.

At present the cheapest and most readily available nutrient source is packaged commercial fertilizer, which can be purchased from a garden store. The most important thing to check when you purchase any fertilizer is its chemical analysis, located on the package.

The fertilizer analysis tells what is in the package.



10% N or 5 lb. of N in 50 lb. bag
(.10 x 50 = 5)

6% P or 3 lb. of P in 50 lb. bag
(.06 x 50 = 3)

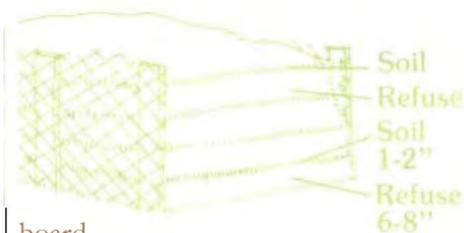
4% K or 2 lb. of K in 50 lb. bag
(.04 x 50 = 2)



21% N or 12.6 lb. in 60 lb. bag
(21 x 60 = 12.6)

0% P (no phosphorus) in bag

0% K (no potassium) in bag

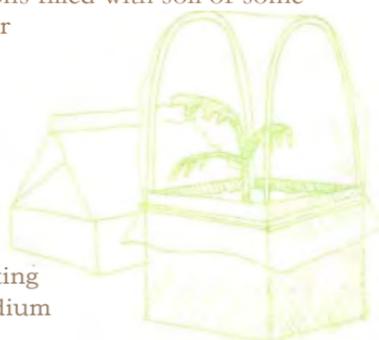


board enclosure to hold the pile upright. Make sure the top of the pile is indented to form a basin for catching water. This moisture is important if the compost pile is to work without an accompanying odor. To ensure this the temperature of the compost pile should be maintained at a temperature between 160^o and 170°F. If the temperature is lower than this, the pile is either too wet or too dry, and the addition or withholding of water should begin immediately. The temperature can be measured with an ordinary thermometer placed down into the top of the compost pile. Practically any kind of plant material may be used to make compost. Woody materials need to be shredded. In fact, shredding will help the decomposition of almost anything from which compost is made. There are, how-

ever, materials that must not be put in a compost pile. Do not use diseased plants, seeds and pits, weeds that have gone to seed, fat, and bones. These do not decompose quickly enough and may draw rodents.

Planting

You will harvest more vegetables from the garden if you plant or transplant at the right times. Do not plant everything at the *same time*. Some vegetables tolerate cold temperatures and can be planted early, while some vegetables do best in warm weather. Obviously, if vegetables are to be set out as transplants, they may be started from seed about six weeks earlier. Milk cartons cut in half or egg cartons filled with soil or some other



Some common vegetable grouped according to the approximate times they can be planted and their relative requirements for cool and warm weather

Cold-hardy plants for early spring planting

Very hardy (plant 4 to 6 weeks before frost-free date)

Broccoli
Cabbage
Lettuce
Onions
Peas
Potatoes
Spinach
Turnips

Hardy (plant 2 to 4 weeks before frost-free date)

Beets
Carrots
Chard
Mustard
Parsnips
Radishes

The law requires it to be there. If the analysis is not on the package or if the nutrient content is very low, the material you are looking at is probably a soil conditioner and, in most instances, will not supply the nutrition needs of the vegetables. Plants need the right kinds of food in sufficient quantity to keep them from starving, just as people do. Feed them what they need. Fertilizer should be added in the spring before planting. If a source of organic matter (manure or compost) was added the previous fall, only half the amount of commercial fertilizer is needed. A complete fertilizer containing nitrogen, phosphorus, and potassium should be used at least every fourth year with the addition of supplemental nitrogen during those years that the complete fertilizer is not used. The required amounts can be found in the table in the back of this bulletin.

Make a Compost Pile. A compost pile in the corner of the garden can be used as a constant source of organic fertilizer. It also provides a place to put such waste materials as lawn clippings, leaves, and vegetable and fruit peelings. A compost pile can be made by spreading out a layer of waste plant materials about 6 inches deep, and adding 1 full cup or $\frac{1}{2}$ pound of commercial fertilizer containing nitrogen for each ten square feet of surface area. You can also use 2 inches of manure if it is available or if you prefer. On top of the fertilizer or manure add one inch of soil and enough water to moisten but not soak it. This process should be repeated until the pile is 4 or 5 feet high. You can put up a wire fence or build a

Organic refuse



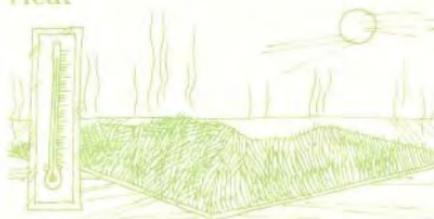
Nitrogen



Moisture



Heat



Air



Decomposition to give compost



Cold-tender or heat-hardy plants for later spring or early summer planting

Not cold-hardy (plant on frost-free date)

Beans, Snap
Okra
Soybean
Squash
Sweet Corn
Tomatoes

Requiring hot weather (plant 1 week or more after frost-free date)

Beans, lima
Eggplant
Peppers
Sweet Potato
Cucumber
Melons

Medium heat-tolerant (good for summer planting)

Beans, all
Chard
Soybean
Squash
Sweet Corn

Hardy plants for late summer or fall planting in the north (plant 6 to 8 weeks before first fall freeze)

Beets
Collard
Kale
Lettuce
Mustard
Spinach
Turnips

make excellent vegetable starting trays. A 1/2-inch layer of sand or fine gravel in the bottom of the milk carton helps you avoid over-watering by providing drainage. Place the carton in a window, keep the soil moist and warm, and watch the plants grow, but make

sure they do not get too cold when there is no sunlight.

Planting Guide. Usually instructions on the seed package explain the depth at which to plant the seed and the width of row spacing. A good rule of thumb for planting

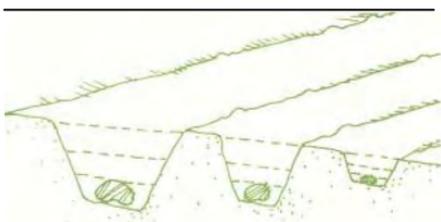
When to **start seeds** indoors

The following chart indicates approximate number of weeks required for vegetables started indoors from seed to develop healthy plants ready for transplanting outdoors in permanent garden location:

Kind	No. of weeks
Broccoli, Brussels Sprouts, Cabbage, Cauliflower	5-6
Eggplant, Peppers	8-9
Tomatoes	6-7
Lettuce	3-4
Vines (cucumbers, squash, melons)	3-4

Vegetable	Distance between Rows	Seed Depth	Distance between Plants
Asparagus	24"	Plants	24"
Beans (Snap)	15"	1 ¹ / ₂ -2"	5"
Broccoli	20"	Plants	20"
Table Beets	15"	³ / ₄ -1 1 ¹ / ₄ "	1 ¹ / ₂ "
Cabbage	15"	Plants	12"
Chard	15"	³ / ₄ -1 1 ¹ / ₄ "	12"
Collards	15"	³ / ₄ -1 1 ¹ / ₄ "	12"
Kale	15"	2"	10"
Mustard Greens	20"	2"	12"
Onions	14"	Sets	2"
Okra	18"	³ / ₄ -1 1 ¹ / ₄ "	12"
Parsnips	14"	³ / ₄ -1 1 ¹ / ₄ "	2"
Sweet Potatoes	20"	Plants	9"
Peas	18"	1 ¹ / ₂ -2"	2"
Tomatoes	24"	Plants	24"

seeds is to plant them no deeper than three times the diameter of the seed. For most vegetables in a home garden, rows 15 inches apart are adequate. Follow seed spacing within the row as recommended on the package. Gardeners have a tendency to plant small seeds thick enough to see



Sow seed at depth 3 times the diameter of seed.



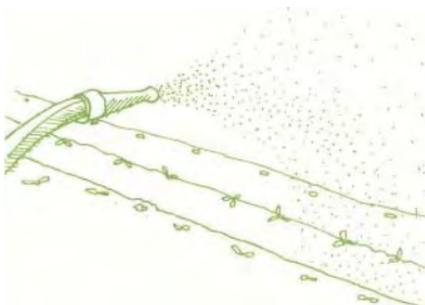
Seed Depth-Determined by Seed Size

Scatter fine seed on top of soil. Press down lightly.

the seed. This wastes seed. In addition, there is so much competition among seedlings that many die, and the plants that do survive are thin and spindly.

Watering. Another reason for garden failure is faulty watering. Vegetable seeds are very small, and when water is applied with a sprinkler that makes large drop-lets, the water beats the soil, causing a hard crust to form as the soil dries, and the new plants cannot get out of the ground. Use a fine spray to get the garden

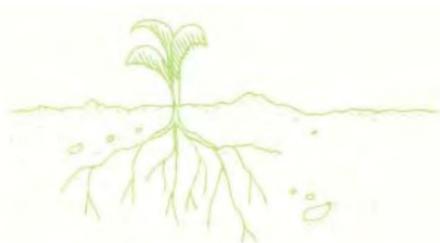
Use a fine spray when starting a garden



Fine drops - no splash

Watering after the garden is up

30 minutes, 3 times per week



Deep watering

How water affects root growth

started, and then water two or three times a week - perhaps more often in sandy soil. The important thing is to water when the plants need it, not when it fits your schedule. It is better to water less frequently and for a longer time than to water frequently in short bursts. This enables the plant roots to grow deeper, producing a bigger and healthier root system which, in turn, will absorb more nutrients to make a healthier plant.

Pest Control. In most cases weeds are the gardener's worst enemy. It is true that insects and disease can kill the plants in the garden, but weeds usually start to grow at the same time or before the vegetables do and, if not controlled, will destroy the garden long before insects or diseases become a problem. And the worst thing that happens is usually not the loss of the garden, but the loss of incentive and enthusiasm to try again.

Mulching. There are several methods for controlling weeds in a home garden, but no matter what the method, there is no way for the gardener to avoid using a hoe. After new seedlings get out of the ground or transplants are set, mul-

15 minutes, 6 times per week



Shallow watering

ches of various kinds can be used—grass clippings, leaves, or plastic strips can be laid beside the rows. However, it is important that one be aware of the problems that may arise from the use of leaves and grass clippings as a mulch. With time these will have a tendency to pack down and will not allow water penetration into the soil. The gardener must also realize that he will still have to hoe or pull the weeds within the row.



Insects. Insects present a different problem because, in most cases, insecticides are the only answer. New laws and changing regulations, however, will not permit the home owner to use all the insecticides he once could. The most recent information can be obtained from the county agent or from pesticide operators. Check with these people before proceeding. There are, however, cultural methods that can be followed to cut down on insect and disease problems for the home grower. *Sanitation* has an important effect on insect and disease problems. Removal of animal breeding and hibernating sites is important. Plant and crop refuse utilization or destruction is a must, along with the proper disposal of waste from the garden. A second method of control is the proper timing of tillage operations to destroy leftover crops, volunteer plants, and weeds.

Seed Storage. You will seldom plant all the seeds in a package in one year. You can save seeds, but not all of them will last the same

Approximate storage time for vegetable seeds

- 1 year - sweet corn, onion, parsley, parsnip
 - 2 years - beet, pepper
 - 3 years - asparagus, bean, celery, carrot, lettuce, pea, spinach, tomato
 - 4 years - cabbage, cauliflower, eggplant, okra, pumpkin, radish, squash
 - 5 years - cucumber, endive, muskmelon, watermelon
-

length of time, even those in an unopened package. Vegetable seeds, as a general rule, should not be stored for longer than five

years, although cool, dry storage will extend this lifetime.

Now That You're Ready

A lot of books have been written about gardening. But everyone knows that experience is the best teacher. Now that you know the basics, get out and give gardening a try. Satisfaction's guaranteed.

Laren R. Robison and C. Frank Williams
Agronomy and Horticulture
Department, Brigham Young University

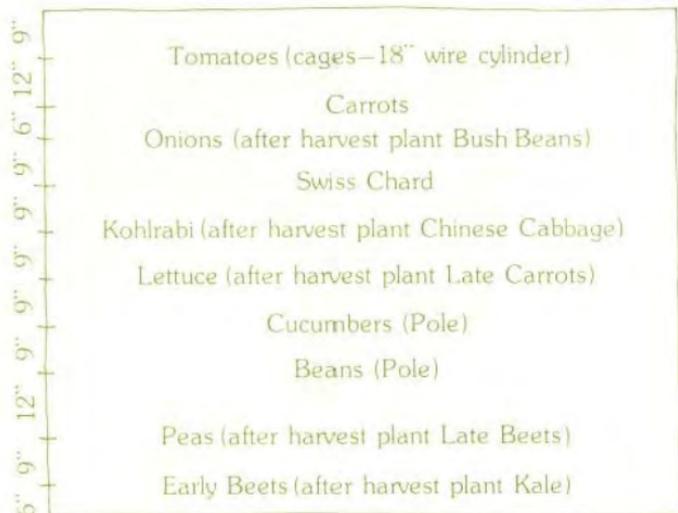
Additional Gardening Information

Suggested Garden Plots

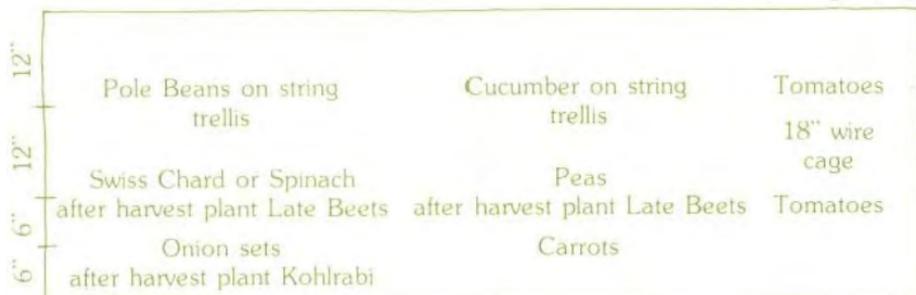
6' x 14'

9"		Tomatoes (in 18" wire cylinders)
21"		Pole Beans (on wood and string trellis)
12"		Cucumbers (on a trellis)
18"		Early Cabbage (after harvest plant Late Beets)
24"		Winter Squash and Summer Squash
18"		Swiss Chard
18"		Peas (after harvest plant Late Cabbage)
18"		Beets (after harvest plant Kale)
12"		Carrots
6"		Carrots

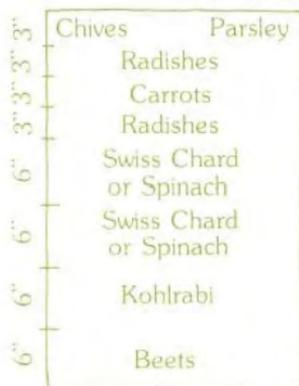
8' x 10'



3' x 9'



2' x 3'



Amount of Commercial Fertilizer to Use in Home Gardens

Gardens Size in feet	Square feet	Amount of 21-0-0 16-16-16, 20-20-20	Amount 10-4-6, 6-10-4
1 x 1	1	.5 tablespoons	1 tablespoons
1 x 5	5	1 ”	2 ”
2 x 5	10	1.5 ”	3.5 ”
3 x 5	15	2.5 ”	5.0 ”
4 x 5	20	3.5 ”	6.5 ”
5 x 5	25	4 ”	$\frac{1}{2}$ cup
5 x 10	50	8 ”	1 cup
5 x 15	75	12 ”	1.5 cups
10 x 10	100	1 cup	2 ”
10 x 20	200	2 ”	4 ”
10 x 30	300	3 ”	6 ”
20 x 20	400	4 ”	8 ”
10 x 50	500	5 ”	10 ”
20 x 30	600	6 ”	12 ”
10 x 70	700	7 ”	14 ”
20 x 40	800	8 ”	16 ”
30 x 30	900	9 ”	18 ”
20 x 50	1000	10 ”	20 ”
30 x 40	1200	12 ”	24 ”
30 x 50	1500	15 ”	30 ”
40 x 40	1600	16 ”	32 ”
40 x 50	2000	20 ”	40 ”
50 x 50	2500	25 ”	50 ”