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GARDENING ANSWERS



A Storey Country Wisdom Bulletin

*The mission of Storey Communications is to serve our customers
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independence in harmony with the environment.*

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Gardening Answers

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Introduction

Seed companies are well aware of the itchiness that gardeners develop as snow drifts deepen, and they time delivery of their catalogs to coincide with the onset of cabin fever. A common reaction to the glossy pictures and glowing praises of each new variety is to overreact and order more seeds than the entire neighborhood could use. To avoid this, plan your garden carefully.

Decide on the size garden you want. The information contained in this bulletin can be applied to any size area.

Next, determine what vegetables your family enjoys. If just one person enjoys rutabagas, does it make sense to plant an entire row of them?

Also, consider the local climate. Eggplant may be a great delicacy, but are chances for success with this vegetable good in an area with a short growing season?

Table 1 indicates how much seed or how many plants of most popular vegetables are needed to plant a 50-foot row and to produce a season's supply of each vegetable for one person. Distances between rows are also suggested.

1

GARDEN PLANNING CHART

Vegetable	Seeds or Plants for a 50' Row	Distance Between Rows in Inches	Feet of Row per Person	Spacing Between Plants in Inches
Beans, dry	4 oz.	18	20-30'	6-8
Beans, shell	4 oz.	18	30'	8-10
Beans, snap	4 oz.	18	30'	2-4
Beets	½ oz.	12	10-15'	2-4
Broccoli	25 plants	24	5 plants	12-24
Brussels sprouts	25 plants	24	5 plants	12-24
Cabbage	25 plants	24	10 plants	12-18
Cauliflower	25 plants	24	5 plants	14-24
Carrots	⅛ oz.	12	10'	1-3
Corn	1 oz.	24	25'	9-15
Cucumbers	¼ oz.	48	10-15'	12
Eggplant	25 plants	24	5 plants	18-36
Endive	⅛ oz.	18	10'	8-12
Kale	⅛ oz.	18	12'	18-24
Kohlrabi	⅛ oz.	18	10'	3-6
Lettuce, head	⅛ oz.	15	5-10'	10-15
Lettuce, leaf	⅛ oz.	12	5-10'	10-12
Muskmelons	12 plants	48	3 plants	12
Onion sets	1 lb.	12	10-20'	2-4
Parsnips	¼ oz.	18	5-10'	3-6
Peas	8 oz.	24	50-100'	1-3
Peppers	33 plants	18	5 plants	12-24
Potatoes	33 plants	30	50'	9-12
Pumpkins	¼ oz.	60	1 hill	36-60
Radishes	½ oz.	12	5'	1-2
Salsify	½ oz.	18	5'	2-4
Spinach	½ oz.	15	20'	2-6
Squash, summer	¼ oz.	60	1 hill	24-48
Squash, winter	½ oz.	60	3-5 hills	24-40
Swiss chard	¼ oz.	18	5'	3-6
Tomatoes	12-15 plants	30	5 plants	12-24
Turnips	¼ oz.	15	10'	2-6
Watermelon	30 plants	72	2-3 hills	72-96
Zucchini	¼ oz.	60	1 hill	24-48

Draw up a plan for your garden on a piece of graph paper. Locate the tallest plants near the northern edge of the garden so that they will not shade shorter neighbors.

The row spacing in Table 1 is the minimum. If your garden soil is rich, the plants will probably be crowded and it would be advisable to increase the distance between rows by about 30 percent.

When making out your garden plan, also consider what type of cultivating equipment you will use. If you plant to use a hoe, rows may be spaced irregularly. If you intend to use a rototiller, plan your rows so the machine will fit between them and won't disturb the plants once they have begun to grow.

Soil Types

Soils are classified by the size of their particles. Generally, they range from coarse to fine or from light to heavy. Here are some soil types:

<i>Type</i>	<i>Characteristics</i>
Sandy Sandy loam Loam	Easily tilled Well drained Warms quickly Poor nutrient retention
Silty loam Clay loam Clay	Hard to work Slow drainage-great moisture retention Warms slowly Excellent nutrient retention

The coarser the soil, the earlier it warms in the spring and the earlier it can be worked. Coarse particles of sand retain less moisture than fine particles of clay. Coarse soils require less spring sunshine to reach a temperature suitable for seed germination.

Delay working the soil until it is dry enough so that a compressed ball of soil will break apart when dropped from the height of your hip. Soil that is worked when too moist forms compact clods and makes root growth difficult.

Soil Analysis

The ideal garden soil is rich in organic matter, well drained, slightly acid, and replenished with plant nutrients. How good is your soil? The amount of nutrients and the level of acidity can be determined by soil tests.

These tests are performed by the Extension Service at little or no charge. Or, you can do your own test, using a kit purchased through the mail, or at better garden and hardware stores.

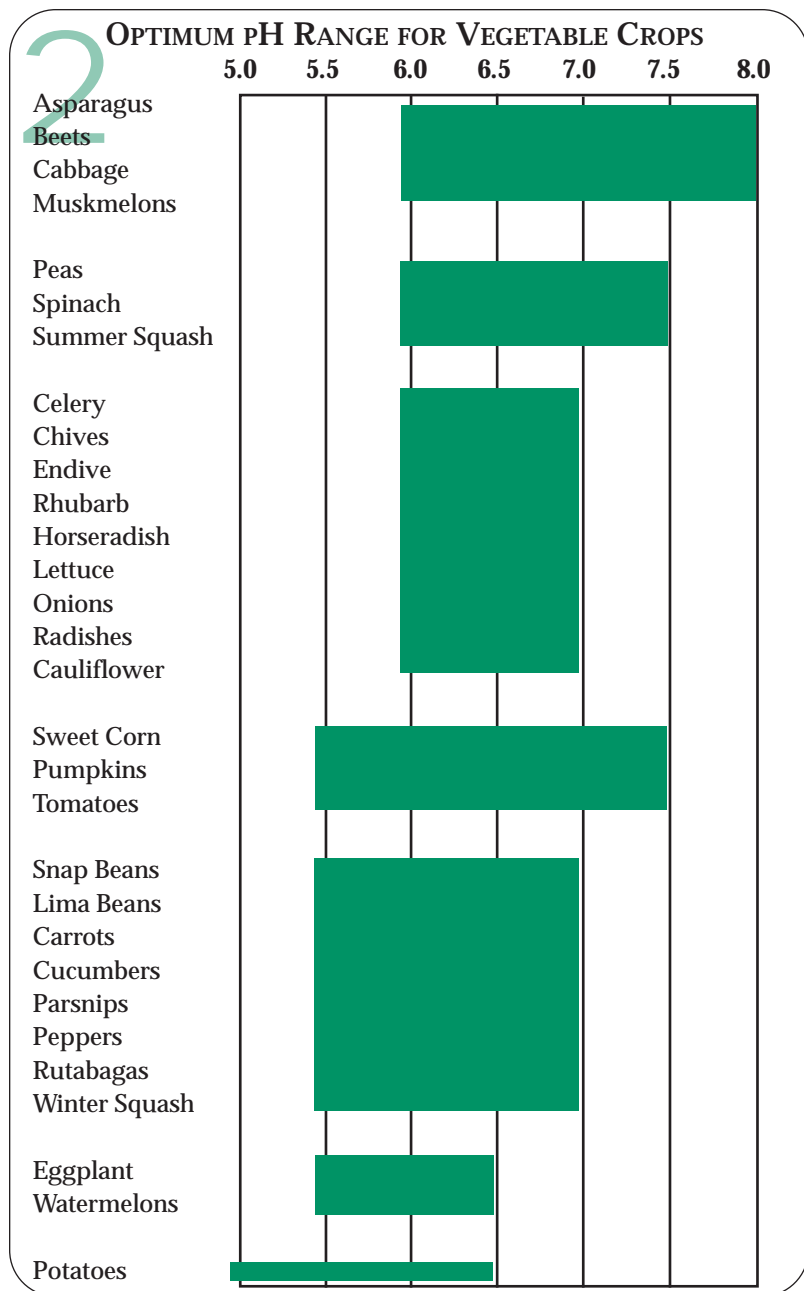
If you use the Extension Service, contact the nearest office and request specific instructions. In general, these are the guidelines many Extension Service offices recommend:

- Use a trowel to recover small amounts of soil at a depth of about six inches.
- Take several samples from across the garden. Mix these in a bucket to get an accurate indication of average soil conditions.
- Avoid soil where peas, beans, or other nitrogen-fixing crops have been grown in previous years.
- Dry two or three handfuls of the soil from the bucket at room temperature. Drying with a stove can lead to a false indication of the need for lime. Send a small plastic bag of dry soil to the nearest Extension Service office.

Another tip: Do your soil test in the fall. Extension Service offices are often swamped with requests in the spring, causing delays of up to a month. By having the soil test results on hand early, you will be able to purchase the necessary fertilizers during the winter. And, you'll be gardening in the first good spring weather, rather than fighting crowds at the local garden supply store.

The acidity or alkalinity of the soil (the pH level) is an important factor. Most plants have a specific pH range within which they thrive and outside of which they perform poorly, if at all. A pH level of 7 represents neutrality, when the soil is neither acid nor alkaline. Levels higher than 7 indicate alkalinity, while numbers below 7 indicate an acid state.

Table 2 indicates the optimum pH range for various popular vegetables.



Adjusting Soil pH

Excessive soil acidity is usually corrected by adding lime, in one of three forms: ground limestone (the most commonly used form), burned lime (not recommended), and hydrated lime. The latter two are derived from the first.

Ground limestone is calcium carbonate (CaCO_3). When burned, the carbon dioxide is driven off, resulting in burned lime (CaO). The volume of the ground limestone is reduced by 44 percent, but its neutralizing value is unimpaired. Hydrated lime is made by adding water to burned limestone.

You may adjust the pH of your soil, if necessary, by applying lime or other materials as suggested in Table 3. Spread the material as evenly as possible and work it into the top three or four inches of soil uniformly. (If you should need to substitute one form of lime for another: 100 pounds of ground limestone equals 74 pounds of hydrated lime.)

3 TO RAISE SOIL ONE UNIT OF pH

	<u>Hydrated Lime</u>	<u>Dolomite</u>	<u>Ground Limestone</u>
Light Soil 100 sq. ft.	1½ pounds	2 pounds	2½ pounds
Heavy Soil 100 sq. ft.	3½ pounds	5½ pounds	6 pounds

TO LOWER SOIL ONE UNIT OF pH

	<u>Sulphur</u>	<u>Aluminum Sulphate</u>	<u>Iron Sulphate</u>
Light Soil 100 sq. ft.	½ pound	2½ pounds	3 pounds
Heavy Soil	2 pounds	6½ pounds	7½ pounds

Note: The amount of lime you use doesn't have to be as precisely measured as this chart suggests.



Fertilizers

Most fertilizers contain varying amounts of the three essential plant foods: nitrogen, phosphorus, and potassium. On the label of commercial fertilizer bags, the elements are listed in the order given above. A bag of fertilizer listed as 10-15-20, for example would contain 10 percent nitrogen, 15 percent phosphorus, and 20 percent potassium.

Fertilizers are also available in organic forms, that is, derived from animal, vegetable, or mineral sources. Commercially prepared organic fertilizers tend to be more expensive than chemicals and slower acting, but they provide a more sustained feeding of the plants and generally improve the soil condition.

Fertilizing elements have different effects upon plants. Table 4 indicates what aspect of plant growth is governed by each of the major elements and gives sources for each, and signs of deficiency and excess.

4

PRIMARY PLANT FOOD ELEMENTS

<u>Element Symbol</u>	<u>Function in Plant</u>	<u>Deficiency</u>	<u>Excess Symptoms</u>	<u>Sources</u> <u>Symptoms</u>
Nitrogen N	Gives dark green color to plant. Increases growth of leaf and stem. Influences crispness quality of leaf crops. Stimulates rapid early growth.	Light green to yellow leaves. Stunted growth.	Dark green. Excessive growth. Retarded maturity. Loss of buds or fruit.	Urea; Ammonia; Nitrates
Phosphorus P	Stimulates early formation and growth of roots. Gives plants a rapid and vigorous start. Is important in formation of seed. Gives hardness to fall-seeded grasses and grains.	Red or purple leaves. Cell division retardation.	Possible tie up of other essential elements.	Super-phosphate; Rock phosphate
Potassium K	Increases vigor of plants and resistance to disease. Stimulates production of strong, stiff stalks. Promotes production of sugar, starches, oils. Increases plumpness of grains and seed. Improves quality of crop yield.	Reduced vigor. Susceptibility to diseases. Thin skin and small fruit.	Coarse, poor colored fruit. Reduced absorption of Magnesium and Calcium.	Muriate or Sulphate of Potash

Manures

The most common organic fertilizers are manures. Table 5 shows the approximate nutrient contents of different types of manures and natural fertilizers. The age of the manure, its state of decomposition, and the diet of the animal from which it comes affect its nutrient content. Figures indicate percentage by weight.

5

APPROXIMATE COMPOSITION OF NATURAL FERTILIZER MATERIALS

Material	Nitrogen (N)	Phosphorus (P)	Potassium (K)
Manures			
Bat guano	10.0	4.5	2.0
Cow manure, dried	1.3	.9	.8
Cow manure, fresh	.5	.2	.5
Hen manure, dried, with litter	2.8	2.8	1.5
Hen manure, fresh	1.1	0.9	.5
Horse manure, fresh	.6	.3	.5
Pig manure, fresh	.6	.5	.4
Sheep manure, dried	1.4	1.0	3.0
Sheep manure, fresh	.9	.5	.8
Vegetative and Animal Concentrates			
Bonemeal, steamed	2.0	22.0	—
Castor pomace	6.0	1.9	.5
Cocoa shell meal	2.5	1.5	2.5
Cottonseed meal	6.0	3.0	1.0
Dried blood meal	13.0	1.5	.8
Fish meal	10.0	6.0	—
Fish scrap	5.0	3.0	—
Garbage tannage	1.5	2.0	.7
Hoof & horn meal	12.0	2.0	—
Sewerage sludge	2.0	1.4	.8
Sewerage sludge, activated	6.0	3.0	.1
Soybean meal	7.0	1.2	1.5
Wood ashes	—	1.8	5.0

6

SECONDARY PLANT FOOD ELEMENTS

Element	Symptoms of Deficiency	Symptoms of Excess	Sources
Magnesium	Loss of yield. Chlorosis of old leaves.	Reduced absorption of Calcium and K.	Magnesium; Sulphate (Epsom Salts); Dolomite is 1/3 Magnesium.
Manganese	Mottled chlorosis of the leaves. Stunted growth.	Small dead areas in the leaves with yellow borders around them.	Manganese; Sulphate (Tecmangam)
Copper	Multiple budding. Gum pockets.	Prevents the uptake of iron. Causes stunting of roots.	Copper Sulphate; Neutral Copper
Zinc	Small, thin, yellow leaves. Low yields.	None known.	Zinc Sulphate
Iron	Yellowing of leaves, the veins remaining green.	None known.	Iron; Sulphate (Copperas); Chelated Iron
Sulphur	Looks like Nitrogen deficiency.	Sulphur burn from too low pH.	Sulphur; Superphosphate
Calcium	Stops growing point of plants.	Reduces the intake of K and Magnesium.	Lime; Basic Slag; Gypsum
Molybdenum	Symptoms in plants vary greatly.	Poisonous to livestock.	Sodium; Molybdate
Boron	Small leaves. Heart rot and corkiness. Multiple buds.	Leaves turn yellowish red.	Borax

Conversions

Manufacturers of fertilizers and other garden or farm materials sometimes suggest that these materials be applied by the *ton* to an acre of crops. For small gardeners, these figures are often meaningless. Here are some guidelines to follow, when reducing large application rates:

- For each ton recommended per acre, apply 4¾ pounds per 100 square feet.
- For each 500 pounds recommended per acre, apply 1¼ pounds per 100 square feet.

Table 7 provides some additional helpful conversions.

7

CONVERTING FERTILIZER APPLICATION FROM POUNDS PER ACRE TO POUNDS PER SQUARE FEET

Fertilizer to apply, where amount to be applied per acre is:

Area in Sq. Ft.	100 lbs.	400 lbs.	800 lbs.
100	.25	1	2
500	1.25	5	10
1,000	2.50	10	20
1,500	3.75	15	30
2,000	5.00	20	40

POUNDS PER ACRE TO POUNDS PER ROW

Fertilizer to apply, where amount to be applied per acre is:

Distance Between Rows in Feet	Row Length in Feet	100 lbs.	400 lbs.	800 lbs.
2	50	0.25	1.0	2.0
2	100	0.50	2.0	4.0
2½	50	0.30	1.2	2.4
2½	100	0.60	2.4	4.8
3	50	0.35	1.4	2.8
3	100	0.70	2.8	5.6

Planting Dates in Relation to Frost

Table 8 indicates the sensitivity of certain vegetables to frost and suggests their planting times in relation to frost.

8

PLANTING DATES IN RELATION TO FROST

Hardy
Plant as soon as ground can be prepared.

Semi-Hardy
Plant 1-2 weeks before average date of last frost.

Tender
Plant 1 week after date of last frost.

Very Tender
Plant 2 weeks after average date of last frost.

Asparagus
Beet
Broccoli
Cabbage
Chard
Carrot
Kale
Lettuce
Onion
Parsnip
Pea
Radish
Spinach
Turnip

Cauliflower
Potato

New Zealand spinach
Snap Bean
Sweet Corn
Tomato

Cucumber
Eggplant
Lima Bean
Muskmelon
Pepper
Pumpkin
Squash
Watermelon



9

SOIL TEMPERATURE CONDITIONS FOR VEGETABLE SEED GERMINATION¹

Crop	Minimum, °F	Optimum Range, °F	Optimum, °F	Maximum, °F
Asparagus	50	60-85	75	95
Bean	60	60-85	85	95
Bean, lima	60	60-85	85	85
Beet	40	50-85	85	95
Cabbage	40	45-95	85	100
Carrot	40	45-85	80	95
Cauliflower	40	45-85	80	100
Celery	40	60-70	70 ²	85 ²
Chard, Swiss	40	50-85	85	95
Corn	50	60-95	95	105
Cucumber	60	60-95	95	105
Eggplant	60	75-90	85	95
Lettuce	35	40-80	75	85
Muskmelon	60	75-95	90	100
Okra	60	70-95	95	105
Onion	35	50-95	75	95
Parsley	40	50-85	75	90
Parsnip	35	50-70	65	85
Pea	40	40-75	75	85
Pepper	60	65-95	85	95
Pumpkin	60	70-90	95	100
Radish	40	45-90	85	95
Spinach	35	45-75	70	85
Squash	60	70-95	95	100
Tomato	50	60-85	85	95
Turnip	40	60-105	85	105
Watermelon	60	70-95	95	105

¹ Compiled by J.F. Harrington, Dept. of Vegetable Crops, Univ. of Calif. at Davis.

² Daily fluctuation to 60° or lower at night is essential.

Transplants

Plants started in the home or greenhouse offer a gardener a chance to harvest early, have a succession of ready crops, and harvest vegetables that could not usually be grown in his climate. Normally, transplants are started several weeks prior to outdoor planting. Table 10 indicates the number of weeks needed to grow plants before setting them in the ground outside.

10

VEGETABLES SUITABLE FOR TRANSPLANTING AND METHODS OF SOWING SEED

**Easy to transplant.
Can be sown in flats in
rows and transplanted
bare root.**

**Must be started in
individual containers and
transplanted
without disturbing roots.**

Broccoli (5-7)
Brussels sprouts (5-7)
Cabbage (5-7)
Cauliflower (5-7)
Celeriac (7-12)
Celery (7-12)
Chinese Cabbage (5-7)
Collards (5-7)
*Eggplant (6-8)
Lettuce (5-7)
Onion (8-10)
Parsley (8-10)
*Peppers (6-8)
Sweet Potato (3-4)
(start from tuber
and not seed)
*Tomato (6-8)

Cantaloupe (3-4)
(all muskmelons) (3-4)
Cucumbers (3-4)
Squash (3-4)
(summer & winter)
Watermelon (5-7)
†

* Sometimes sown in flats and then transplanted into individual containers before transplanting to garden.

† Many vegetables like corn, beans and beets can be started early in pots and flats, but seldom are because the large number of pots needed is impractical.

() Number in parentheses is approximate time (weeks) from sowing seed to transplanting to garden.

Response to Transplanting

Transplanting checks growth. The severity of the checking depends on the vegetable planted, the number of times the vegetable is moved, causing roots and root hairs to break, and the plant size. The larger the plant, the greater is the check in growth.

Other factors include the length of time the plant has a reduced water supply due to root damage; the conditions that affect transpiration from the leaves until root replacement occurs; the damage to the root system and rate at which new roots are formed; and the rate of growth. Slow-growing plants suffer less than rapidly growing ones. See Table 11 for a classification of selected vegetables according to their response to transplanting.

11

VEGETABLE RESPONSE TO TRANSPLANTING

Easily Survive Transplanting

Beet
Broccoli
Brussels sprouts
Cabbage
Cauliflower
Chard
Lettuce
Tomato

Require Care in the Operation

Carrot
Celery
Eggplant
Onion
Pepper
Salsify

Not Successfully Transplanted by Usual Methods

Bean
Corn
Cucumber
Lima bean
Muskmelon
Pea
Turnip
Watermelon

* The crops in the last group will usually suffer a very serious check if the roots are disturbed. The cucurbit members of this group can be seeded in a row and then placed in containers before the first true leaves have appeared.

Leftover Seeds

In case you have seeds left over, Table 12 shows which ones will germinate after a given amount of time. In general, vegetable seeds should be stored in a cool, dry, dark location.

12

AVERAGE SEED STORAGE TIMES

Dependable 1 Year

Onion
Sweet corn
Parsley
Parsnips

2 or 3 Years

Asparagus
Peas
Beans
Carrots
Peppers

4 or 5 Years

Beets
Cabbage
Cauliflower
Cucumber
Eggplant
Lettuce
Muskmelon
Pumpkin
Spinach
Squash
Turnip
Tomato
Watermelon



Cultivation and Care

- Cultivate early. One hour of weeding in late May is worth a full day in August. The best time to kill weeds is when they sprout.
- Don't weed right after a rainstorm. Weeds on moist ground will re-root rapidly. Wait until the soil is workable and dry.
- Thin ruthlessly. If your beets, carrots, or lettuce are to grow well, they must have room. Leave enough space between plants so they can mature easily.
- Be careful around the plants. One careless swipe of the hoe can destroy a lot of work and future vegetables.
- Stay out of a wet garden. Rust disease of beans and other diseases are easily spread when a picker goes through a row of wet plants.
- Water the ground, not the plants. Wet foliage can cause fungus diseases. Apply water to the base of the plant at sundown, so the heat of the day will not deplete its moisture. The garden should receive an inch of water per week.
- Keep weeds under control by tillage or mulching. Weeds take moisture, light and nutrients away from vegetable plants. Be systematic about weeding; set aside some time each day so the weeds don't get ahead of you.

Mulching

You may want to lay mulch between the rows and around the plants to keep the ground cool in hot weather, conserve moisture, prevent the possibility of erosion and help control weeds.

Table 13 lists common mulching materials and mentions benefits and disadvantages of each.

13

MULCHING MATERIALS

<u>Material</u>	<u>Pro</u>	<u>Con</u>
Straw/Hay	Cheap; generally available; adds organic matter	Can contain weed seed, insects and/or disease
Leaves	Readily available; generally free; rich in nutrients	Can mat down or be too acid for some plants
Grass clippings	Easy to get and apply; good source of nitrogen	Can burn plants; may contain weed seeds
Pine needles	Attractive; easy to apply	Large quantities hard to collect; may be too acid
Wood shavings	Weed and disease free; easy to apply; available	Can be acid; tends to tie up nitrogen in soil
Manure	Great source of fertility and organic matter	Should be well-rotted; expensive to buy; usually contains weeds
Newspaper	Easy to get and apply; earthworms thrive in it	Decomposes very fast; must be weighted down
Plastic	Total weed control if opaque is used; warms soil for early start; heavy plastic can be used more than one season	Expensive, unattractive; adds nothing to soil; must be weighted down and cleaned up in the fall

Composition of Organic Mulchers

Table 14 gives the approximate percentage composition of selected organic mulches.

14

APPROXIMATE COMPOSITION OF BULKY ORGANIC MULCHES

<u>Material</u>	<u>Nitrogen (N)</u>	<u>Phosphorus (P)</u>	<u>Potassium (K)</u>
Alfalfa hay	2.5	.5	2.0
Bean straw	1.2	.3	1.2
Grain straw	.6	.2	1.0
Olive pomaces	1.2	.8	.5
Peanut hulls	1.5	—	.5
Peat	2.3	.4	.8
Sawdust	.2	—	.2
Seaweed (kelp)	.6	—	1.3
Timothy hay	1.0	.2	1.5
Winery pomaces	1.5	1.5	.8







Insects

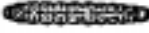




Your garden is an artificial environment with row on row of delicacies that insects love. Table 15 lists common vegetables and the pests which regularly afflict them. Check with your local extension agent for availability and legality of these insecticides.







15

VEGETABLE INSECTS

<u>Insect</u>	<u>Crop</u>	<u>Dust Formula</u>	<u>Spray Formula</u>	<u>Remarks</u>
 Aphid*	Cabbage Cucumbers Melons Peas Potatoes Tomatoes	5 percent malathion	2 tsp. 50-57 percent emulsifiable malathion <i>or</i> 1 tsp. 64 percent emulsifiable dibrom in 1 gal. water	Apple on foliage when aphids appear. Repeat weekly as needed.
 Blister beetle	Potatoes Corn Tomatoes Beans	5 percent sevin	2 tb. wettable sevin in 1 gal. water	
 Cabbage worms	Broccoli Cabbage Cauliflower Greens	4 percent dibrom	1 tsp. 64 percent emulsifiable dibrom in 1 gal. water <i>or</i> <i>Bacillus thuringensis</i> biological insecticide	Thorough treatment is necessary. Repeat weekly as needed. Begin treatment when worms are small.
 Corn earworm (2/3 nat. size)	Sweet corn Tomatoes	5 percent sevin	Inject 1/2 medicine dropperful of mineral oil into silk channel as silks start to dry <i>or</i> 2 tb. wettable sevin in 1 gal. water	Dust or spray silks with sevin every other day for 10 days. Dust or spray tomatoes with sevin 3 to 4 times at 10-day intervals; begin when first fruits are small.

* Where two drawings are shown, the smaller one is the natural size.

<u>Insect</u>	<u>Crop</u>	<u>Dust Formula</u>	<u>Spray Formula</u>	<u>Remarks</u>
European corn borer 	Sweet corn	5 percent sevin or 5 percent sevin granules	2 tb. wettable sevin in 1 gal. water or 2 tb. 25 percent diazinon in 1 gal. water	Apple insecticide four times at 5-day intervals beginning with egg hatching near mid-June. Avoid early spring plantings. On late corn dust as for corn earworm.
Striped cucumber beetle 	Cucumbers Melons Squash	5 percent sevin	2 tb. wettable sevin in 1 gal. water	Treat as soon as beetles appear. Repeat when necessary.
Cutworm 	Most garden crops	—	2 tb. 25 percent diazinon in 1 gal. water	At transplanting, wrap stems of seedling cabbage, pepper, and tomato plants with newspaper or foil to prevent damage by cutworms.
Flea beetle 	Most garden crops	5 percent sevin	2 tb. wettable sevin in 1 gal. water	Apply as soon as injury is first noticed. Thorough application is necessary.
Grasshopper 	Most garden crops	5 percent sevin	2 tb. wettable sevin in 1 gal. water	Treat infested areas while grasshoppers are still small.

Hornworm (1/2 nat. size) 	Tomatoes	5 percent sevin	2 tb. wettable sevin in 1 gal. water	Ordinarily hand-picking is more practical in the home garden.
Leafhopper 	Beans Carrots Potatoes Cucumbers Muskmelons	Use sevin dust or 5 percent methoxy-chlor dust	2 tb. wettable sevin in 1 gal. water	Spray or dust once a week for 3 to 4 weeks, beginning when plants are small. Apply to underside of foliage.
Mexican bean beetle 	Beans	5 percent sevin	2 tb. wettable sevin in 1 gal. water	Apply insecticide to underside of foliage. Also effective against leafhoppers on beans.
Potato beetle 	Potatoes Eggplant Tomatoes	5 percent sevin	2 tb. wettable sevin in 1 gal. water	Apply when beetles or grubs first appear and repeat as necessary.
Squash bug 	Squash	5 percent sevin	2 tb. wettable sevin in 1 gal. water	Adults and brown egg masses can be hand picked. Trap adults under shingles beneath plants. Kill young bugs soon after they hatch.
Squash vine borer 	Squash	5 percent sevin	2 tb. wettable sevin in 1 gal. water	Dust or spray once a week for 3 to 4 weeks beginning in late June when first eggs hatch. Treat crowns of plants and runners thoroughly.

The plants listed in Table 16 help prevent the presence of various destructive insects.

16

INSECT DETERRENT PLANTS

Asters	Most insects
Basil	Repels flies and mosquitoes
Borage	Deters tomato worm — improves growth and flavor of tomatoes
Calendula	Most insects
Catnip	Deters flea beetle
Celery	White cabbage butterfly
Chrysanthemum	Deters most insects
Dead Nettle	Deters potato bug — improves growth and flavor of potatoes
Eggplant	Deters Colorado potato beetle
Flax	Deters potato bug
Garlic	Deters Japanese beetle, other insects and blight
Geranium	Most insects
Horseradish	Plant at corners of potato patch to deter potato bug
Henbit	General insect repellent
Hyssop	Deters cabbage moth
Marigold	The workhorse of the pest deterrents. Plant throughout garden to discourage Mexican bean beetles, nematodes and other insects
Mint	Deters white cabbage moth and ants
Mole Plant	Deters moles and mice if planted here and there
Nasturtium	Deters aphids, squash bugs, striped pumpkin beetles
Onion family	Deters most pests
Petunia	Protects beans
Pot Marigold	Deters asparagus beetles, tomato worms and general garden pests

Peppermint

Planted among cabbages, it repels the white cabbage butterfly

Radish

Especially deters cucumber beetle

Rosemary

Deters cabbage moth, bean beetle and carrot fly

Rue

Deters Japanese beetle

Sage

Deters cabbage moth, carrot fly

Salsify

Repels carrot fly

Southernwood

Deters cabbage moth

Summer Savory

Deters bean beetles

Tansy

Deters flying insects, Japanese beetles, striped cucumber beetles, squash bugs, ants

Tomato

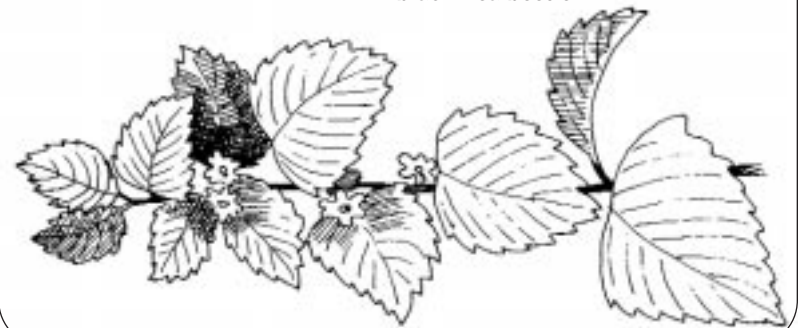
Asparagus beetle

Thyme

Deters cabbage worm

Wormwood

Carrot fly, white cabbage butterfly, black flea beetle



Beneficial Insects

Lest the entire insect kingdom be given a black eye, it should be pointed out that several bugs are on your side. Two of these, the lady bug and the praying mantis, can be purchased through some of the larger garden supply houses.

17

BENEFICIAL INSECTS

Insect

Benefit

Braconid Wasps

Females lay eggs in body of tomato hornworm which the larvae then consume as their first meals.

Lace Wing Fly

Thrives on aphids. Pale green, fly-like bug.

Calosoma Beetle

Hard-shelled, 2-inch long, loves to eat caterpillars.

Hover Fly

Larvae of this four-winged fly feed on aphids and scale insects.

Ichneumon Fly

Lays eggs in caterpillars and their pupae, which the young flies then consume.

Lady Bug

Eats its weight in aphids daily.

Praying Mantis

Up to three inches long; feasts on pests, including mosquitoes.

Spiders

Many arachnids subsist on garden pests.

Wheel bug

Gray, 1½-inch long, preys on soft-shelled pests; in profile it looks as if a cogged wheel were attached to its back.



Garden Problem Guide

Symptoms of common garden problems and their possible cures are given in Table 18.

18

GARDEN PROBLEM GUIDE

Symptoms

Possible Cause

Possible Cures

Dying young plants

Fertilizer burn

Mix fertilizer thoroughly with soil.

Disease (damping-off)

Treat seed; don't over-water.

Stunted plants
pale to yellow

Low soil fertility

Soil test for fertilizer recommendations.

Low soil pH (too acid)

Soil test for lime recommendations.

Poor soil drainage

Drain and add organic matter.

Shallow or compacted soil

Plow deeper.

Insects or diseases

Identify and use control measures.

Nematodes

Soil test for treatment recommendations.

Stunted plants
purplish color

Low temperature

Plant at recommended time.

Lack of phosphorus

Add phosphorus fertilizer.

Holes in leaves

Insects

Identify and use control measures.

Hail

Be thankful it was not worse.

Spots, molds,
darkened areas on
leaves and stems

Disease

Identify, spray or dust, use resistant varieties.

Chemical burn

Use recommended chemical at recommended rate.

Fertilizer burn

Keep fertilizer off plants.

Wilting plants	Dry soil	Irrigate if possible.
	Excess water in soil	Drain.
	Nematodes	Soil test for treatment recommendations.
	Disease	Use resistant varieties if possible.
Weak, spindly plants	Too much shade	Remove shade or move plants to sunny spot.
	Too much water	Seed at recommended rate.
	Plants too thick	Avoid excess fertilization.
Failure to set fruit	Too much nitrogen	
	High temperature	Follow recommended planting time.
	Low temperature	Follow recommended planting time.
	Too much nitrogen	Avoid excess fertilization.
Tomato leaf curl	Insects	Identify and use control measures.
	Heavy pruning in hot weather	Don't.
Tomato leaf curl	Disease	Identify and use control measures.
	Low soil calcium	Add liming material.
Dry brown to black rot on blossom end of tomato	Extremely dry soil	Irrigate.
Misshapen tomatoes (catfacing)	Cool weather during blooming	Plant at recommended time.
Abnormal leaves and growth	2, 4-D weed killer	Don't use sprayer that has previously applied 2, 4-D. Don't allow spray to drift to garden.
	Virus disease	Remove infected plants to prevent spreading. Control insects that transmit.

Tomato Varieties

19 SELECTED TOMATO VARIETIES

This is only a sampling of tomato varieties. See your local extension agent for the best varieties for your area.

<u>Variety</u>	<u>Days to Maturity</u>	<u>Comments</u>
Beefeater	60	Meaty; short season areas
Better Boy	72	All purpose northern variety; needs staking
Bonny Best	74	Acid flavor
Burpeeana	58	Good yields, mild flavor
Campbell 1327	69	A good canner from the soup company
Coldset	68	Seed will sprout at 50°F
Crimson Giant	90	Canning and slicing, good size
Dwarf Champion	73	Can be grown in tubs
Globemaster	65	Resists cracking
Golden Boy	80	Low-acid, yellow fruit
Hastings Brimmer	83	Pink, often seedless
Heinz 1439	75	Fleshy, good processing fruit from the ketchup kings
Marglobe	73	Sweet, all-purpose
Ottawa	78	Does well in clay soil
Pixie	52	A good early tomato
Rocket	50	A hardy Canadian variety
Roma	76	Tops for paste
Snowball	70	A novelty type with white skin and low acid content
Sub-Arctic	56-64	Several varieties, very early, good in cold climates
Sweet 100	60	A cherry type that grows fruit in grapelike clusters
Tropic	80	Firm, resistant to disease and hot growing conditions
Ultra Boy	72	Large, juicy type for the northern gardener
Veaset	66	Good canner
Wisconsin Chief	80	Mature fruit can be left on vine 2 weeks

Harvesting

Table 20 gives average harvesting times which you can adjust according to your local conditions and preference.

APPROXIMATE DAYS FROM PLANTING TO MATURITY			
Crop	Early Variety	Common Type	Late Variety
Bean, broad	...	120	...
Bean, bush	46	...	65
Bean, pole	56	...	72
Bean, lima, bush	65	...	78
Bean, lima, pole	80	...	95
Beet	50	...	80
Broccoli, sprouting ¹	70	...	150
Broccoli raab	...	60	...
Brussels sprouts ²	90	...	100
Cabbage ²	62	...	110
Carrot	60	...	85
Cauliflower			
snowball type ²	55	...	65
Cauliflower,			
winter type ²	120	...	180
Celeriac	...	110	...
Celery, green ²	98	...	130
Chard, Swiss	50	...	60
Chervil	...	60	...
Chicory	65	...	150
Chinese cabbage	70	...	80
Chives	...	90	...
Collard	...	75	...
Corn	70	...	100
Cucumber	60	...	70
Eggplant	70	...	85
Endive	80	...	100
Florence fennel	...	110	...
Kale	60	...	90
Kohlrabi	55	...	65
Leek	...	150	...

Lettuce, cos	...	70	...
Lettuce, head	60	...	85
Lettuce, leaf	40	...	50
Melon, casaba	...	120	...
Melon, honey ball	...	105	...
Melon, honey dew	...	115	...
Melon, Persian	...	115	...
Muskmelon	83	...	90
Mustard	40	...	60
New Zealand spinach	...	70	...
Okra	50	...	60
Onion	85	...	120
Parsley	70	...	85
Parsnip	100	...	130
Pea	58	...	77
Pepper, hot ²	70	...	95
Pepper, sweet ²	60	...	80
Potato	90	...	120
Pumpkin	110	...	120
Radish	22	...	40
Radish, winter type	50	...	60
Rutabaga	...	90	...
Salsify	...	150	...
Sorrel	...	69	...
Southern pea (Cowpea)	62	...	80
Spinach	40	...	50
Squash, bush	50	...	68
Squash, vining	80	...	120
Sweet potato ³	120	...	150
Tomato ²	65	...	100
Turnip	40	...	75
Watercress	...	180	...
Watermelon	75	...	95

¹ For a direct-seeded crop. Transplanting may delay maturity by a few weeks, depending on environmental conditions.

² For a transplanted crop additional time needed from seed sowing to transplanting.

³ Under good growing conditions enough roots may have reached number 1 size by 120 days after field seeding to justify harvesting for an early high priced market.

Selecting Seeds

Seeds are available from a number of sources, and since the federal government has laws regarding purity and germination, any dealer working interstate must meet high minimum standards.

Seed catalogs are fun to browse through, and once you order from one company you will probably receive catalogs from others, as many sell their mailing lists among themselves.

The following list of seed suppliers is not intended as an endorsement or advertisement for these companies. Rather, it is a list of those with interesting catalogs, good reputations, and, by and large, good merchandise.

Businesses relocate frequently. We try, but it is not always possible to keep our lists up-to-date. See your local extension agent for additional sources.

Vegetable Seeds

Alberta Nursery and Seeds, Ltd., Box 20, Bowden, Alberta, Canada. Hybrid seeds and perennial plants adapted to short-season areas.

Burpee Seed Co., Warminster, PA 18974 (home office); Clinton, Iowa 52732; Riverside, CA 92502. The granddaddy of the seed companies with one of the largest selections anywhere. Published biannually.

Comstock, Ferre, and Co., 263 Main Street, Wethersfield, CT 06109. Catalog of herb, flower, and vegetable seeds.

Gurney Seed and Nursery Co., Yankton, SD 57079. Vegetable and flower seeds, fruit and nut trees; novelty items, including blue potatoes. Published biannually.

Harris Seeds, 60 Siginaw Drive, Box 22960, Rochester, NY 14624. Vegetable and herb seeds.

H.G. Hastings Co., P.O. Box 1, Atlanta, GA 30310. Vegetable and herb seeds, shrubs, bulbs, berries, and trees for Dixieland.

Le Jardin du Gourmet, St. Johnsbury, VT 05873. Herb, vegetable, and flower seeds.

Johnny's Selected Seeds, Albion, ME 04910. Organically grown seeds of standard vegetable varieties, stressing adaption to the north.

Kilgore Seed Co., 1400 W. First Street, Sanford, FL 32771. Flower, herb, vegetable and grass seeds adapted to the tropics.

D. Landreth Seed Co., P.O. Box 6426, Baltimore, MD 21230. George Washington bought seeds from this 194 year old firm.

Mellinger's, 2310 West South Range Road, North Lioma, OH 44452. Fruit and nut trees, berries and vines, vegetable, flower and tree seeds.

George W. Park Seed Co., Box 31, Greenwood, S.C. 29647. Features a huge selection of seeds, plants, bulbs, and gardening projects.

Redwood City Seed Co., Box 361, Redwood City, CA 94064. Catalog of vegetable, nut, fruit, and herb seeds.

Stokes Seeds Co., Box 548, 737 Main Street, Buffalo, NY 14240. Huge selection of vegetable seeds, with tips on how to grow them.

Thompson and Morgan, P.O. Box 1308, 220 Faraday Ave., Jackson, NJ 08527. European vegetable and flower seeds and unique garden supplies.

Herb Seeds

The following companies specialize in herb seeds and offer advice on the culture of herbs.

Caprilands Herb Farm, Coventry, CT 06238. Herb seeds, plants, and products.

Nichols Garden Nursery, 1190 No. Pacific Highway, Albany, OR 97321. One of the most extensive selections of herb seeds.