

4-H

GARDEN



CLUB MANUAL

Montana State College  
Extension Service  
Bozeman

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# 4-H Garden Club Manual

BY

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## Select A Good Location

The factors to consider in selecting a location for the garden are: soil fertility, moisture condition, convenience, and protection.

A rich sandy loam type of soil is best suited to the home garden. It is essential that the soil be well drained, of good depth, and well supplied with decayed organic matter. Good growing conditions are necessary for high quality vegetables.

A garden that is conveniently located is likely to receive better care than one that is some distance from the house. If there is a possibility of irrigating, the garden should be located with that in mind. If irrigation is out of the question it may be a wise move to plant the garden in a coulee where moisture conditions are more favorable even though the location is some distance from the house.

The location that is protected from drying winds is more valuable than one fully exposed, other factors being equal. In the absence of a natural barrier against wind, good shelter can be provided in a few years' time by planting two or three rows of caragana and Russian olive trees around the garden. There are other trees that may be used for this purpose, but caragana and Russian olive are the most practical in Montana. Poplars and cottonwoods are not satisfactory for this purpose. It is essential that the trees be located 20 to 30 feet out from the area to be occupied by vegetables. When planted too close they rob the crops of moisture and plant food.

## A Plan Saves Labor

A well thought out garden plan will save time and labor when planting season arrives. The value of a plan depends upon its accuracy. To make an accurate plan it will be necessary to measure the length and width of the garden, in feet, and draw an outline of the garden on paper. The outline should be drawn

TABLE 1--Planting table and yields

| Crop             | Variety                                                                 | Number of plants or amount of seed per 100-ft. row | Planting distance (in.) |                   |                  |                       | Depth of planting (in.)  | Approximate yield per 100-ft. row |                  |
|------------------|-------------------------------------------------------------------------|----------------------------------------------------|-------------------------|-------------------|------------------|-----------------------|--------------------------|-----------------------------------|------------------|
|                  |                                                                         |                                                    | Between rows            | Horse cultivation | Hand cultivation | Between plants in row |                          | Dry land garden                   | Irrigated garden |
| ASPARAGUS        | Mary Washington                                                         | 65 plants                                          | 48                      | 48                | 18               | 6-8                   | 15 lbs.                  | 25 lbs.                           |                  |
| BEANS, SNAP      | Stringless Greenpod, Bountiful, Roundpod Wax                            | $\frac{1}{2}$ lb                                   | 30-36                   | 24                | 3-4              | 1-1 $\frac{1}{2}$     | 1 bu.                    | 2 $\frac{1}{2}$ bu.               |                  |
| BEANS, DRY SHELL | Great Northern                                                          | $\frac{1}{2}$ lb                                   | 30-36                   | 24                | 3-4              | 1-1 $\frac{1}{2}$     | 4-6 lbs.                 | 8 lbs.                            |                  |
| BEETS            | Crosby's Egyptian, early<br>Detroit Dark Red, late<br>Long Season, late | 1 oz.                                              | 30-36                   | 15-18             | 2-3              | $\frac{1}{2}$ -1      | 50 lbs.                  | 100 lbs.                          |                  |
| CABBAGE          | Copenhagen Market, early<br>Danish Roundhead, late                      | 1 pkt.                                             | 36                      | 24-30             | 18-24            | $\frac{1}{2}$         | 150 lbs.                 | 250 lbs.                          |                  |
| CABBAGE, CHINESE | Wong Bok, Pe Tsai                                                       | 1 pkt.                                             | 30-36                   | 18-24             | 15-18            | $\frac{1}{2}$         | 50 heads                 | 75-90 heads                       |                  |
| CARROT           | Chantenay, Coreless                                                     | $\frac{1}{2}$ oz.                                  | 30-36                   | 15-18             | 2-3              | $\frac{1}{2}$         | 50-100 lbs.              | 200 lbs.                          |                  |
| CAULIFLOWER      | Snowball, Dry Weather                                                   | 1 pkt.                                             | 30-36                   | 24                | 18               | $\frac{1}{2}$         | Uncertain crop           | 40-50 heads                       |                  |
| CELERY           | Golden Plume                                                            | 1 pkt.                                             | 36-48                   | 36-48             | 6-9              | $\frac{1}{4}$         | 100-150 heads            | 150 heads                         |                  |
| CHARD, SWISS     | Lucullus, Fordhook Giant                                                | 1 oz.                                              | 30-36                   | 24                | 8-12             | $\frac{1}{2}$ -1      | 125 lbs.                 | 300 lbs.                          |                  |
| CORN, SWEET      | Sunshine, Golden Bantam                                                 | $\frac{1}{4}$ lb                                   | 36                      | 30-36             | 18-24            | 1-2                   | 65-75 ears               | 150 ears                          |                  |
| CUCUMBER         | Davis Perfect                                                           | $\frac{1}{2}$ oz.                                  | 48                      | 48                | 48               | $\frac{1}{2}$ -1      | 1-2 pecks                | 2-3 pecks                         |                  |
| EGG PLANT        | Black Beauty                                                            | 1 pkt.                                             | 30-36                   | 24                | 18-24            | $\frac{1}{2}$         | 75 fruits                | 125 fruits                        |                  |
| KOHLRABI         | White Vienna                                                            | $\frac{1}{2}$ oz.                                  | 30-36                   | 15-18             | 3-4              | $\frac{1}{2}$         | $\frac{1}{2}$ bu.        | 2 bu.                             |                  |
| LETTUCE, LEAF    | Grand Rapids                                                            | $\frac{1}{4}$ oz.                                  | 30                      | 12-18             | 3-5              | $\frac{1}{2}$         | 25-40 ft. row sufficient | 12-25 ft. row sufficient          |                  |
| LETTUCE, HEAD    | New York Wonderful, Salamander                                          | $\frac{1}{4}$ oz.                                  | 30                      | 18                | 10-12            | $\frac{1}{2}$         | 25-30 heads              | 50-70 heads                       |                  |
| MUSKMELON        | Emerald Gem, Hale's Best, Osage, Golden Champlain                       | $\frac{1}{2}$ oz.                                  | 48                      | 48                | 48               | $\frac{1}{2}$ -1      | 50-75 melons             | 100-150 melons                    |                  |
| ONION, SETS      | Yellow Globe                                                            | 2 qts.                                             | 30                      | 15-18             | 2-3              | 1-1 $\frac{1}{2}$     | 1-2 pecks                | 1 bu.                             |                  |
| ONION, SEED      | Ebenezer, Yellow Globe                                                  | 1 oz.                                              | 30                      | 15-18             | 2-3              | $\frac{3}{4}$         | 1-2 pecks                | 1-1 $\frac{1}{2}$ bu.             |                  |
| PARSNIP          | Hollow Crown                                                            | $\frac{1}{2}$ oz.                                  | 30-36                   | 15-18             | 3-4              | $\frac{3}{4}$         | 50-60 lbs.               | 150-200 lbs.                      |                  |
| PEAS             | Alaska, Laxtonian                                                       | 1 lb                                               | 30-36                   | 18                | 1-2              | 1-2                   | 20 qts.                  | 35-40 qts.                        |                  |
| PEPPER           | California Wonder                                                       | 1 pkt.                                             | 30-36                   | 18                | 13               | $\frac{1}{2}$         | 100 fruits               | 200 fruits                        |                  |
| PUMPKIN          | Small Sugar, Winter Luxury                                              | $\frac{1}{2}$ oz.                                  | 96                      | 96                | 96               | 1                     | 150 lbs.                 | 350 lbs.                          |                  |
| RADISH           | Scarlet Globe, White Icicle, Chinese White, winter                      | 1 oz.                                              | 30                      | 12-18             | $\frac{1}{2}$ -1 | $\frac{1}{2}$         | 1 doz. per 1 ft. of row  | 2 doz. per 1 ft. of row           |                  |
| RHUBARB          | MacDonald, Mammoth Red                                                  | 25 plants                                          | 48                      | 48                | 48               | 2-3                   | 50-100 lbs.              | 100-200 lbs.                      |                  |
| RUTABAGA         | Purple Top Yellow                                                       | $\frac{1}{2}$ oz.                                  | 30-36                   | 18                | 6                | $\frac{3}{4}$         | 100 lbs.                 | 200 lbs.                          |                  |
| SALSIFY          | Mammoth Sandwich Island                                                 | 1 oz.                                              | 30                      | 15-18             | 2-3              | $\frac{3}{4}$         | 50 lbs.                  | 100 lbs.                          |                  |
| SPINACH          | Long Season, King Denmark                                               | 1 oz.                                              | 30                      | 12-18             | 2                | $\frac{3}{4}$         | 1-1 $\frac{1}{2}$ bu.    | 3 bu.                             |                  |
| SQUASH           | Green Hubbard, Table Queen                                              | $\frac{1}{2}$ oz.                                  | 96                      | 96                | 96               | 1                     | 150-200 lbs.             | 300-500 lbs.                      |                  |
| TOMATO           | Earliana, John Baer                                                     | 1 pkt.                                             | 48                      | 36-48             | 18-48            | $\frac{1}{2}$         | 2 bu.                    | 3-4 bu.                           |                  |
| TURNIP           | Purple Top White Globe                                                  | $\frac{1}{2}$ oz.                                  | 30                      | 15-18             | 2-3              | $\frac{3}{4}$         | 50-60 lbs.               | 100 lbs.                          |                  |
| WATERMELON       | Cole's Early, Will's Sugar, Kleckly Sweet                               | 1 oz.                                              | 72                      | 72                | 72               | 1                     | 20-50 melons             | 40-75 melons                      |                  |

| Row No. |                                            |
|---------|--------------------------------------------|
| 1       | Spinach — follow with rutabaga —           |
| 2       | " " " "                                    |
| 3       | Radish — follow with turnips —             |
| 4       | Leaf lettuce 25ft. ; early turnips 25ft. — |
| 5       | Head lettuce —                             |
| 6       | Onion, sets —                              |
| 7       | Onion seed —                               |
| 8       | " " —                                      |
| 9       | Peas, first planting —                     |
| 10      | " 2nd " —                                  |
| 11      | " 3rd " —                                  |
| 12      | Beets —                                    |
| 13      | " —                                        |
| 14      | Carrots —                                  |
| 15      | " —                                        |
| 16      | Parsnips —                                 |
| 17      | " —                                        |
| 18      | Kohlrabi —                                 |
| 19      | Early cabbage —                            |
| 20      | Early cauliflower 25ft. ; chard 25ft. —    |
| 21      | Beans —                                    |
| 22      | " —                                        |
| 23      | Peppers 25ft. ; egg plant 25ft. —          |
| 24      | Tomatoes —                                 |
| 25      | " —                                        |
| 26      | Late cabbage —                             |
| 27      | " " —                                      |
| 28      | Late cauliflower —                         |
| 29      | Cucumbers —                                |
| 30      | Muskmelon —                                |
| 31      | Squash —                                   |
| 32      | Pumpkin —                                  |
| 33      | Sweet corn —                               |
| 34      | " " —                                      |
| 35      | " " —                                      |
| 36      | " " —                                      |

Fig. 1—A plan for a 50x90 ft. garden plot showing arrangement and succession of crops.

to scale by allowing a fraction of an inch to represent 1 foot of garden measurement.

The next step is to make a list of all the varieties of vegetables to be grown and estimate the amount of each to be planted. Table 1 was designed to help in determining the amount of space to allot to each kind of vegetable and the quantity of seed needed.

After having decided upon the kinds of vegetables and the amount of each to be planted, the outline map can be filled in

with lines and the lines labeled to represent the number of rows of each kind of vegetables to be grown.

**Prepare  
Seed Bed  
Carefully**

Most garden crops, especially the root crops, require a deep mellow seed bed. Heavy soils plowed in late fall receive greater benefit from freezing action during the winter than when left unplowed. Fall plowing disturbs the winter quarters of those insects that burrow into the soil and many of them will be destroyed. Land turned over in the fall should be left rough over winter.

It is generally advisable to replot the garden in the spring. Light sandy loam soils on dry land farms may be prepared by thoroughly disking in place of plowing.

Immediately after spring plowing and before the surface has a chance to dry, the soil should be firmed by disking and harrowing. The disk is an excellent implement to pulverize and firm the soil below the surface. The spike-tooth harrow is useful for pulverizing and leveling the surface, and the plank drag serves to smooth and firm the surface. Too much emphasis cannot be placed on a thorough preparation of the seed bed for vegetables.

Of all the suggestions that could be made as to what to do and what not to do regarding the preparation of the seed bed, the most important one to observe is not to work the soil when it is too wet. To determine when the soil is dry enough to work take a handful and squeeze it into a ball. If the ball of dirt can be crumbled easily the soil is dry enough to work.

**A Fertile  
Soil Is  
Necessary**

Garden soils are improved by annual applications of partly rotted manure. Fresh manure that contains a considerable amount of straw or coarse material is not desirable for the garden. Manure that is partly decayed and fairly free from coarse material is preferable. The best time to apply manure is just before plowing in the fall. It may be applied at the rate of 25 to 30 loads per acre on irrigated gardens; 12 to 15 loads per acre will be sufficient on dry land gardens. Lighter applications of well rotted manure may be made just before spring plowing. If manure from the poultry house is used it must be applied sparingly.

Manure adds plant food and humus to the soil. Humus improves the physical condition of soils. It makes heavy soils more mellow and increases the moisture holding capacity of all soils. Soils that are high in humus do not pack so hard or bake so readily as soils without humus.

Soils that are deficient in certain plant food elements will be benefitted by commercial fertilizers carrying those elements. Heavy applications of manure will generally supply a sufficient amount of nitrogen to most soils. A deficiency of phosphates exists in some sections of Montana. Deficiencies are determined by field tests and by laboratory analyses. Increased yields of sugar beets resulting from the use of phosphates indicate that most crops will be benefitted by applications of this fertilizer in those sections. Super acid phosphate may be applied where needed at the rate of 500 to 800 pounds per acre. One-third that amount will be sufficient if the treble form of super acid phosphate is used.

|                                        |                                                                                                                                                                                                                                                                          |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Plant at<br/>the Right<br/>Time</b> | A definite planting date cannot be set that is applicable to all parts of the state. One should be guided by soil and weather conditions. Some vegetables may be seeded as soon as the ground can be prepared in the spring, others require a warm soil for germination. |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

It is essential that the seed bed be finely pulverized, mellow, and in a moist condition for best results. The seed in order to germinate must come in intimate contact with moist soil. A light roller or packer run over the row immediately after covering the seed usually improves the chances for a quick and even germination of seed. Garden drills are equipped with packers.

For hand seeding, trenches can be opened with a small hoe, using a garden line as a guide. After opening the trench the seed should be sown and covered as quickly as possible to prevent the soil from drying.

The depth to plant depends upon the character of the soil, moisture condition, and the kind of seed (see planting table).

With small seeds, like radish, turnip, carrot, and lettuce, it is advisable to plant at the rate of 3 to 4 seeds to the inch. Beans,



Fig. 2—A good 4-H club garden, the result of careful planning and good management.

peas, and corn should be seeded so that thinning is unnecessary. Vine crops may be planted in hills, 10 to 12 seeds to the hill. Cover 1 inch deep. After they have made a good start, thin to 3 plants per hill.

#### **Use Water When Trans- planting**

It is better to do the transplanting on cloudy days or in the evening if possible. Plants that are to be lifted from the hotbed should be thoroughly watered a few hours before moving. When lifting them from the seed bed, handle carefully so that as much soil as possible will adhere to the roots. Firm the soil well but not too hard about the roots in the process of transplanting. Leave a small depression at the surface of the soil for water. Give each plant a cupful of water, and after that has soaked away level off with loose soil. Sometimes it becomes necessary to shade newly transplanted plants. This can be accomplished in different ways. One method is to stick a broad shingle up on the south-west of each plant.

**Hotbeds  
Lengthen  
Season**

The growing season in Montana is too short for some vegetables to be grown from seed planted directly in the garden. Such plants must either be purchased or grown to the proper size for transplanting under glass or started in boxes in the house. The manure-heated pit hotbed is commonly used for this purpose on the farm.

The manure-heated pit hotbed is made by digging a pit 30 inches deep and whatever width and length are needed to fit the sash to be used. The frame may be constructed out of 1- or 2-inch lumber and should be 18 inches high at the back and 12 inches in front.

Fresh horse manure containing straw about equal to a third its total bulk is used to fill the pit to a depth of 24 to 26 inches. It is essential that the manure be firmly packed in the process of filling. Manure for this purpose should be placed in a pile about ten days prior to filling the pit. Turning the manure a couple of times will insure a more uniform fermentation and even heat.

After the pit has been filled with manure to the desired depth the frame is put in place and 6 inches of good garden loam or compost soil is placed on the top of the manure. The frame should be well banked with manure to help hold the heat. The sash is put in place and the bed allowed to stand until the temperature has reached its highest point and receded to about 85° F. before sowing the seed. The time to start the hotbed depends upon the locality. Usually 8 to 10 weeks are required for seedlings to reach proper size for transplanting to the garden.

It is essential that careful attention be paid to ventilation and watering. The amount of ventilation needed depends upon outside weather conditions. It is preferable that water be applied in the morning.

**Cultivate  
To Kill  
Weeds**

Weed control is the most important function of cultivation. Weeds are most easily destroyed just as they are breaking through the soil. Shallow working of the soil is effective while they are small. Weeds rob the growing crop of both moisture and plant food. Timely cultivation checks the loss of plant food and moisture.

Cultivate as often as is necessary to keep down weed growth. There is no need for working the soil in the absence of weeds and when there is a good soil mulch established. Gardens should be cultivated as soon as the ground is dry enough to work after each heavy rain or after irrigating. Vegetable crops are shallow rooted, which makes it necessary to cultivate shallowly.

**Water to  
Keep Plants  
Growing**

Well water that does not contain too much alkali can be used for this purpose. The common way to use well water is to pump it into a tank or reservoir and then apply it in shallow rills alongside each row. Some 4-H club members are installing sub-irrigation systems. Two types of material are used for this, (1) concrete tile, and (2) lath tile. The lath tile is made out of a good grade of plaster lath, nailed together in such a way that there is a joint every 12 inches on one of its four sides. Cypress lath is better than the ordinary lath but is hard to obtain. 4-H club members should see their county extension agent for instructions on making and laying tile.

Plants grow best when the moisture is kept at a point where the soil is in a good workable condition. Irrigate as often as necessary to keep it in that condition.

The moisture situation can be very materially improved on dry land gardens by putting up snow fences in the late fall. Any kind of an obstruction will start snow to piling up. Old boards, brush, and ricks of manure may be used if regular snow fence material is not available. Even farm machinery that is left outside over winter can be put to work by placing it on the north and west sides of the garden. Two or three rows of caragana and Russian olive trees planted so as to enclose the garden will save the necessity of putting up snow fences each fall. A series of low dikes or ridges thrown up with the contour of the land will help hold the water from melting snow on the garden. An ordinary breaking plow can be used in making the dikes. It is necessary that this be done in late fall just before the ground freezes. The dikes should be leveled down when preparing the seed bed in the spring.



Fig. 3—The club tour provides opportunity for exchanging ideas and observing methods which bring results.

### **Simple Insect Control**

Insects must be kept under control, otherwise the garden may be a partial or even a total loss.

Stomach poisons, such as arsenate of lead, Paris green, and calcium arsenate, are used to control the leaf eating insects. Directions for using them are given on the packages.

Plant lice are sucking insects and they often do serious damage in gardens. It is necessary to use a contact spray, such as Blackleaf 40, for the control of sucking insects. Directions for using Blackleaf 40 are furnished with the package. The stomach poisons are not effective for sucking insects.

Care should be exercised in the use of poison sprays or some member of the family may become poisoned. They should not be used on edible portions of plants. There are non-poisonous sprays on the market that can be used on spinach, cauliflower, lettuce, kale, Swiss chard, etc. Pyrethrum powder and powdered hellebore are listed as non-poisonous sprays. There are other non-poisonous sprays available on the market.

When soap is added to liquid sprays it serves as a spreader and improves the sticking qualities. One ounce of soap is sufficient to add to a gallon of spray.

4-H club members should consult their club leaders and county extension agent in case of severe outbreaks of insects.

Plant diseases rarely damage garden plants as seriously as do insect pests. Old plant refuse should be burned in late fall or early spring. This is just an additional measure for control of insects and diseases.

**Vegetables  
For Next  
Winter** Many vegetables can be stored and kept fresh for winter use. Potatoes, root crops, and cabbage require moist cool storage conditions. They require careful ventilation. The temperature of the storage should be held between 32° and 38° F. so far as possible. The outdoor cellar or cave with a good ventilating system offers about the best storage possibilities on the farm for these crops. Products selected for storage should be clean and free from disease and mechanical injury. A raised floor with boards spaced at least 1 inch apart is recommended for potatoes. Cabbage may be stored in narrow bins with raised floors or placed on shelves.

Onions keep best in a dry cool storage place. A temperature range of 35° to 40° F. is satisfactory for onions. They should be well cured and the tops removed before being placed in storage. The outdoor cellar or cave is usually too damp to be suitable for storage of this crop.

Storage of pumpkins and squash should be kept dry with a temperature range between 40° and 50° F. for best results. Select well matured sound fruits for storage.

Green tomatoes harvested just before the first killing frost will ripen when stored in the root cellar or in the basement of the house.

Celery may be stored in cool cellars or pits. It should be lifted with a considerable amount of soil adhering to the roots and reset in soil in the cellar or pit. An occasional watering will be needed to keep the soil in a moist condition. When watering, avoid wetting the tops or crowns. A small amount of head lettuce may be stored by the same method.