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Department of Entomology
University of Nebraska
Lincoln, Nebr.

NEBRASKA FARM *Vegetable* GARDENS

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THE UNIVERSITY OF NEBRASKA
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LINCOLN, NEBRASKA

A GARDEN is a good investment financially. A half acre may easily return $75 to $125 for the labor and seed. On the other hand it is possible to waste energy and to lose money in gardening. Gardeners who have kept records and showed profits have been good managers.

The garden is also valuable as a protector of health. Green, leafy vegetables like lettuce, cabbage, and greens are good sources of certain minerals and vitamins. Tomatoes are rich in vitamin C and when canned can be used throughout the year. Peas and beans are good sources of protein. The careful homemaker will learn the nutritive values of the various vegetables and use them wisely.

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Extension Service of the University of Nebraska College of Agriculture
W. H. Brokaw, Director, Lincoln, Nebraska
United States Department of Agriculture cooperating

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Nebraska Farm Vegetable Gardens

E. H. HOPPERT

THE FARM VEGETABLE GARDEN should be large enough to provide an ample supply of vegetables for the family during the growing season and enough in addition for canning and for storage for the winter months. An area 100 feet by 150 feet should take care of the needs of a family of five, but size should be varied according to geographical location. On the back page of this circular is a garden plan adapted to such an area. The rows are 3¼ feet apart so that two-horse cultivating tools may be used. If the garden is to be cultivated with one-horse tools, the distance between rows may be reduced to 2½ feet and then the width needed will be about 80 feet. If the garden is to be irrigated, the rows may be spaced 16 to 18 inches apart and the space between the rows kept free from weeds with a hand hoe or a wheel hoe and the width of the garden reduced accordingly. If the family consists of more than five persons, this same plan may be used but the length of the rows should be increased 25 feet for each additional person.

This garden area does not provide for sufficient potatoes or navy beans for the family. The latter might be included if the space is available but it is better to plant potatoes in an area apart from the vegetable garden. Ground that is used for potatoes one year should not be planted to potatoes again for five years.

This home garden near Crete, Nebraska, was grown in 1938. Plot 50 x 90 feet. Total value of produce (fresh, canned, and stored), $76.88. Cost of seed and poison: $6.55. Returns less expense, $70.33. Labor income (30 minutes per day for six months), 78 cents per hour.

Location of the Garden

On most of the older farms the garden site has been made permanent. However, if there is a choice of locations or if a change is contemplated the following points should be considered:

1. The garden should be close to the house so that it will be handy to care for and gather the crops.

2. Since moisture plays such an important part in the success of the vegetable garden—(a) locate the garden where it can be irrigated; (b) protect it against hot, south winds with a grove, an orchard, a set of buildings, or a hill; (c) if there is higher ground adjoining, distribute the run-off water through the vegetable garden.

3. A deep rich loam soil is best adapted for vegetables since it holds moisture well and contains an abundance of plant food. The factors mentioned above are much more important than soil in making a choice of locations, since the soil, whether it be light or heavy, can be improved easily with deep fall plowing and liberal applications of well rotted manure.

Garden windbreak of chokecherry on the Henry Gotte farm near Kimball in western Nebraska. It not only protects the garden but also produces fruit regularly.

Windbreak Reduces Water Requirements

Most vegetables have tender succulent tops which suffer quickly from hot southerly winds even though the garden is irrigated. A good windbreak on the south and west sides of the garden is a great help in reducing the amount of water evaporated through the leaves, thereby decreasing the danger of sunburn on the fruits of the tomato, pepper, and eggplant, tipburn on the margins of the leaves, and blasting of blossoms.

Windbreaks are effective for a lateral distance approximately ten times their height. A windbreak 10 feet high will give protection to small plants a hundred feet to the north; but if those plants are three to four feet high the windbreak should be 13 to 14 feet high to be effective at that distance. Obviously the only satisfactory windbreak for such a situation would be trees like Russian olive, apricot, red cedar, etc. Trees of this height will sap the ground for a distance of 10 or 12 feet unless they are kept sheared on the side toward the garden, or unless the roots are cut once in several years by means of a ditch or a subsoil chisel.

A good plan would be to lay out the garden so that it is not more than 50 or 60 feet wide north and south and make it as long east and west as is necessary to supply the needed vegetables. Then large bush-like fruit plants such as chokecherries or June berries can be used for the windbreak. These are not only effective as a windbreak but they furnish fruit for jam, jelly, and pies. Ornamental shrubs like Persian lilac, mock orange, honeysuckle, or tamarix also serve the purpose and might be preferable where the garden is adjacent to the yard. The tenant farmer will probably be more interested in quick-growing annual crops like tall varieties of sweet corn, Atlas sorgo, or cultivated sunflowers. Two or three rows of any one of these will be quite effective for the late summer crops.

The windbreak doesn't have to be a living, growing type. It may consist of a board fence or a slatted snow fence or bundles of fodder leaned against a barbed wire fence. If the garden is too wide to be protected by a single barrier like this, another one may be placed at the center of the garden.

Use of Manure

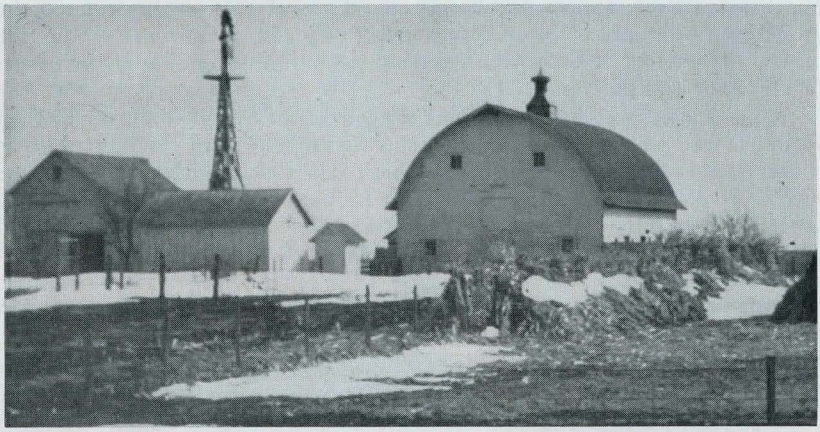
Most vegetable gardens will profit greatly from the liberal application of manure. It increases the fertility of the soil, adds to the water holding capacity, and improves the physical condition of the soil. The manure should be well rotted. Fresh manure has a tendency to cause the soil to dry out and the plant food contained in fresh manure is not all readily available to plants. Furthermore, weed seeds are more likely to have been killed while the manure is rotting.

Manure should be used generously on the irrigated garden each year at the rate of 30 to 40 tons per acre where ordinary barnyard manure is available. If sheep or poultry manure is used, 15 to 20 tons per acre is sufficient. Coarse manures should be applied before plowing. The finer manures may be applied in the spring as a top dressing. For unirrigated gardens 5 to 10 tons per acre is sufficient in most years.

Soil Preparation

The garden should be plowed 8 to 10 inches deep if the soil is heavy; a depth of 6 or 7 inches will do if the soil is sandy. The plowing should be done late in the fall just before hard freezes generally occur. In this way cutworms and other insects are brought to the surface, exposed to natural enemies, and killed by cold weather. The surface of the soil is left rough to catch the snow and to increase the mellowing effect of freezing and thaw-

ing. Where the soil is sandy and likely to blow the plowing should be delayed until early spring unless steps are taken to prevent wind erosion. These might consist of a light top dressing of manure following plowing or a windbreak on the north and east.



Corn fodder and cane used as a snowbreak on the north side of a farm garden in York county. The additional moisture stored in this way means better crops of midsummer vegetables.

Seed

When buying seeds it pays to get good seed and good varieties. The table on page 31 of this circular gives the amount of the different kinds of seeds that are needed for the garden as planned for a family of five. In the back of this circular are names of the varieties that have been found adapted to Nebraska conditions:

The following vegetable seeds can be grown at home:

Peas	Eggplant	Peppers	Beets
Beans	Cucumbers	Onions	Carrots
Tomatoes	Muskmelons	Spinach	Parsnips
Sweet corn	Squash	Lettuce	Radishes

It is not practical in Nebraska to raise seeds of cabbage, cauliflower, kohlrabi, rutabagas, turnips, and celery. When producing seed at home, plants should be chosen that are most representative of the desired type. Beans and peas are allowed to mature on the vines. The most desirable specimens of the root crops and onions are saved and stored over winter. The following spring, they are planted and allowed to go to seed. Carrots may be left where they grew in the garden. In October the tops are cut off an inch or two from the crown and the crowns covered with 6 inches of straw. The mulch should extend two feet on each side of the crowns to prevent the frost from penetrating to the crowns from the sides. In the case of fleshy fruited vegetables like tomatoes and cucumbers, the fruits are allowed to ripen thoroughly and

the pulp left in a pan to ferment. Then the pulp is washed from the seeds and the seeds spread out to dry. Seeds should be stored in a dry room in tight containers such as glass jars or tin cans with tight fitting lids. Most seeds will not retain their vitality and vigor more than two or three years. Fresh onion seed and parsley seed should be secured every year.

Raising Plants

Some vegetables like tomatoes, eggplant, and celery require a long growing season. Tomatoes and occasionally eggplants may be secured from the florist or professional plant grower, but such plants are not always satisfactory. A hotbed or cold frame may be used to grow these plants and others like cabbage and cauliflower. Early vegetables such as lettuce and radishes may also be grown to maturity in the hotbed or cold frame. Extension Circular 1208 describes methods of making a hotbed.

Planting the Garden

After the seedbed has been prepared in the spring, the "frost hardy" vegetables may be seeded. Such vegetables as beets, cabbage, carrots, kohlrabi, lettuce, onions, turnips, parsley, peas, radishes, rutabagas, and spinach are not injured by light frosts and may be sown late in March or in April, depending on the season and the section of the state. The rows are marked out with a line and a hoe or with a marker built on the principle of a big hand rake. In the spring when the soil is moist, the seeds are planted 1 to 2 inches deep, but later on when the soil is likely to be dry they should be sown an inch deeper. If the ground is very dry, a person can mark out the rows fairly deep and turn the water from a well or an irrigation ditch into these furrows until the ground is well soaked. Then the seed is planted on the moist soil and covered with dry soil. Soaking large seeds like beans and peas in warm water overnight will insure better germination if the soil conditions are unfavorable.

Plenty of seed should be used to insure a perfect stand. It is better to sow seed generously and thin out the plants than to sow sparingly and have many vacant spaces in the row. It is a good plan to sow radish seed, which germinates quickly, with some of the slow-germinating seeds like carrots and parsnips to mark the rows for early cultivation.

Transplanting

The best time for transplanting young plants into the garden is on a cloudy day or toward evening of any day. The plants will establish themselves more readily than if transplanted during a hot, windy day. Plants that have many leaves should have several of the older leaves pinched off to reduce the requirements for moisture. It is important that the plants be set an inch or two deeper than they were growing in the hotbed or cold frame. The soil should be packed tightly about the roots. If the soil is dry or if the weather is hot and dry, artificial watering will be advisable. A pint of water per plant is not too much. The dry earth is pulled over the moist dirt about the plant to prevent baking and cracking. Newly transplanted plants may be protected from the midday sun with boards or shingles. A piece of paper

wrapped around the stem of each plant and extending an inch above and below the ground will protect the plant from cutworms.

Care of the Garden

As soon as the seed rows can be seen, cultivation should begin. It kills the weeds while they are small and keeps the soil in good condition. Every week or ten days the cultivation should be repeated. Weeds that start between the plants in the row should be pulled out or hoed out before they become large. The plants in the row may also require thinning. Especially is this true with the root crops. When they are a few inches tall they should be thinned to about an inch apart. Later as the roots develop the large ones may be pulled up and used.

Irrigation pays large dividends in gardening. In the foreground are unirrigated onions—yield 40 bushels per acre. In the background are the same variety, irrigated—yield 240 bushels per acre.

Water for the Garden

Vegetables require a great amount of water in the course of their development. Experiments with potatoes, for example, have shown that in a hot windy period they will use as much as a third of an inch a day. Six days of such weather would remove nearly all of the available moisture from the first foot of soil and part of the stored moisture in the second foot. If this moisture is not replaced at that time by rainfall or irrigation, the plants will undoubtedly suffer a setback. Shallow-rooted plants like onions are likely to suffer even more from such a dry spell.

In nine years out of ten vegetable crops maturing in late July, in August, or in early September, would be greatly improved in quality and yield by proper irrigation. Frequently, too, early maturing crops like early cabbage, table beets, carrots, etc., would show a decided improvement if irrigated once

or twice. The ideal arrangement would be to have the garden located near a good well or other water supply that could be depended upon to furnish two to three inches each week for the entire garden. On some farms on the table land in central and western Nebraska the expense of a separate well and windmill driven pump for the vegetable and fruit garden would be justified by the additional returns from these crops. Details of the garden layout for irrigation and suggested methods of irrigating may be found in Nebraska Extension Circulars 769 and 770.[1]

On other farms it might be possible to dam up a small stream or a canyon to store water for summer irrigation. In some parts of the state the wells barely furnish enough water for family and livestock during the summer. Here the garden could be soaked up in late fall or early spring when the livestock needs are not so urgent as in midsummer. Water from snow could also be stored by erecting a snow fence at the north side of the garden. The soil south of the windbreak could be covered with straw to prevent freezing of the soil, thereby aiding in the rapid absorption of water from the melting snow. Deep-rooted, tender, long-season vegetables like tomatoes, sweet corn, and squash had best be planted here. They need additional moisture more than do the early cool-season vegetables, and by the time the season for planting them has arrived the ground will no doubt be dry enough to receive them. On western dry-land farms, summer fallowing is another method used to insure fairly adequate moisture supply for sweet corn, Irish potatoes, sweet potatoes, tomatoes, and other long-season vegetables.

Mulching Conserves Moisture

Mulching the soil between the rows with straw conserves moisture for use by the vegetables. The mulch material prevents runoff and increases the proportion of water absorbed during heavy rains. Furthermore, it reduces the amount of moisture that evaporates directly into the air. The soil under the mulch is seldom dry, not because it draws moisture toward the surface (as some people explain it) but rather because drying winds cannot pick up the moisture unless the soil is exposed to the wind.

When the soil is cultivated the surface three or four inches dry out very rapidly and the roots in this area dry up or are cut off by cultivating tools. Before the active roots of the plants can benefit from rainfall this dry layer must first become saturated. It takes about one-fourth inch of rain to do this. When a greater amount falls and is absorbed it penetrates to the area where the vegetable roots can get it.

To be sure, the mulching material will absorb some of the moisture that falls. In regions where summer rains tend to be light, the mulch, too, should be rather light, merely heavy enough to prevent runoff and not heavy enough to prevent weed growth. Here the weeds can be controlled with a duckfoot cultivator which leaves the mulch on the surface. In eastern Nebraska where moisture is usually more plentiful, the mulch may be four or five inches deep, which is usually sufficient to prevent weed growth. However, straw that contains grain or noxious weed seeds should not be used.

[1] Copies may be had free of charge from the Agricultural Extension Service at Lincoln or from your county Agricultural Agent.

At the Experiment Station at Lincoln mulching has increased the yields of Irish potatoes, sweet potatoes, tomatoes, eggplant, and peppers from 25 to 35 per cent. Crops which have not been benefited are cabbage, beets, carrots, turnips, radishes, lettuce, sweet corn, peas, and onions.

In southern and eastern Nebraska where early potatoes are grown for home use some folks leave the tubers in the ground until fall before digging and storing them. If the season has been hot and the soil unmulched there is usually a complaint by the housewife about the poor cooking quality of such potatoes. Mulched potatoes are not seriously affected in this way. The reason for this difference is found in the lower soil temperature under the mulch.

The proper time for applying the mulch varies with the crop to be grown. Potatoes should be mulched soon after the sprouts have come through the ground. By that time the soil has warmed up sufficiently to encourage rapid development of the top. Sweet potatoes are mulched just before the vines start to run. With tomatoes, eggplants, and peppers the mulching is delayed until the plants have become well established and are growing well. Usually this is about the middle of June in the central and eastern part of the state.

Asparagus and Rhubarb

Asparagus and rhubarb are perennial vegetables. They live over from year to year and therefore should be planted at the edge of the garden where they will not interfere with plowing. Both are ready to use early in spring soon after the early annual vegetables are planted. Both may be grown from seeds or from roots bought from the nurseryman or seedsman. They need protection from hot winds and should therefore be planted just north of the windbreak.

Asparagus roots are planted in a shallow trench about 18 inches apart in rows 4 feet apart. This trench need not be deeper than 6 inches and during the first year's cultivation it is gradually filled in until the ground is level. In the fall, cut the tops and burn them and apply a coat of well rotted manure. If the plants make a strong growth, some asparagus may be cut the next spring but the cutting period should not exceed two weeks. The second year the cutting may continue for four to six weeks and in subsequent years for eight weeks or more. Manuring is not necessary every year but the plants respond well to it if plenty of moisture is available. In Nebraska common table salt is not necessary as a fertilizer for asparagus but this crop will do well where the salt concentration is too strong for weed growth.

Rhubarb is a great favorite with many families early in spring for sauce and pies. It may be mixed with strawberries, raspberries, or cherries without spoiling the flavor. Its large leaves are easily injured by hot winds and lack of moisture. Mulching around the plants with strawy manure is a fair substitute for irrigation but protection from hot winds is essential in all cases. About once in five years the crowns should be divided and replanted. Fresh rhubarb may be enjoyed in winter if you dig up several clumps of roots late in the fall, allow the clumps to freeze and set them in moist sand or soil in a corner of the cellar.

Cabbage, Cauliflower, Brussels Sprouts, Kohlrabi

These crops are all related and are known as the crucifers. They are cool-season crops, being planted early in April for early summer use or in late July or early August for fall use and storage. In most of Nebraska late crops of these vegetables are generally difficult to start but in seasons when the weather is favorable in mid-summer, good results may be secured.

Early varieties of cabbage generally give the best results both for the spring crop and for the fall crop. Varieties like Golden Acre, Marion Market, Jersey Wakefield, or Copenhagen Market should be chosen. If there has been difficulty with yellows (*i.e.*, the plants turning yellow and dying before making heads), strains resistant to this disease should be insisted upon. In growing, the spring crop plants are either bought or grown in flats in the house or in a hotbed and transplanted into the garden by April 15th. They are set 8 to 10 inches apart in the row. For fall use the seed is usually sown sparsely in the row and the young plants thinned to 8 inches apart. Late varieties of cabbage can be grown successfully in western Nebraska in most years, being seeded directly in the field the middle of May. They are usually better for winter storage than the early varieties.

Kohlrabi is a member of the cabbage family that is coming to be more popular. When peeled and eaten raw it tastes like tender cabbage heart. When cooked it is somewhat like turnips without the strong turnip flavor. It is seeded early, two or three seeds per inch of row, and later thinned to three inches between plants.

Cauliflower and Brussels sprouts have been so disappointing during the recent hot dry seasons that most gardeners have given up trying to grow them. They are better adapted for northern and western Nebraska than for the rest of the state but even here they are too uncertain to be recommended generally.

Beans (Greenpod, Waxpod, Field, Lima, Soybeans)

Beans are very tender to frosts but more resistant to heat than many other vegetables. They should not be planted so early that the tops appear above ground while there is still danger of frosts. In southern Nebraska the usual planting date is May 10 to 20; in western and northern Nebraska, May 20 to June 1. Additional plantings of greenpod and waxpod beans may be made later to extend the harvest season into September. However, picking the immature beans every week will in itself extend the season several weeks.

In a small garden where space is limited they may be planted after early harvested crops like peas, lettuce, radishes, early cabbage, etc. Bacterial blight has caused serious losses of bush beans primarily on early plantings. Cultivating and picking should be done only when the foliage is dry to avoid spreading this and other diseases. Stringless Greenpod and Refugee Wax are less susceptible to this disease than most of the other common sorts but at present there are no truly resistant varieties. In choosing plants from which seed is to be saved select those that are relatively free from disease.

There has been a growing interest in Lima beans in recent years, primarily because they have given a good account of themselves in several dry seasons. The small bush Limas like Early Baby Potato and Woods Prolific are well adapted for the small vegetable garden. The Hopi is a trailing sort that may

be planted in the place of corn in two or more rows at the time late plantings of corn are made. Hot winds seldom interfere with fruiting because the blooms and pods are formed beneath the protection of the outer foliage. The beans may be used green or they may be allowed to ripen on the vine, in which case the entire plant is pulled up in the fall and tied by the stem to rafters in the barn or tool shed. Then the dried beans are picked and shelled as needed during the winter.

Field beans for home use may be grown among late planted corn. If the small navy beans are desired the seed may be placed in the planter boxes and planted in the place of two corn rows. In this way no special care is required until harvest time. At that time the stems are cut or the plants pulled and thrown into a single windrow to dry out. Then they are loaded onto a hay-rack and taken to the barn where they may be flailed out. Where large quantities are grown a threshing machine is used or they are combined from the windrows.

Recently some interest has developed in garden varieties of soybeans. They are prepared like green Lima beans and taste somewhat like them, but are much more difficult to shell. Soybeans are planted in rows 12 to 18 inches apart and about 2 inches apart in the row. The plants are not subject to blights like green or wax beans but rabbits and grasshoppers are very fond of them. The ripe pods break open very easily and the seeds shatter to the ground.

Greens (Spinach, Swiss Chard, New Zealand Spinach)

Spinach is a cool-season crop that may be planted long before freezing weather is over, in fact just as soon as a seedbed can be prepared. Usually it is planted too thick and because of the competition among the plants it is not ready for use as quickly as if it were thinned to about 2 inches between plants. As soon as hot weather comes the plant goes to seed and its usefulness is over. Spinach may also be grown as a fall crop, seeded in late August.

If greens are relished all summer, Swiss chard or New Zealand spinach may be planted about the middle of May. Here again the plants should be thinned this time to about 6 or 8 inches. The outer leaves of Swiss chard are broken off at the crown and new leaves develop from the center, thus producing a continuous supply of greens for the table. In the case of New Zealand spinach the outer clusters of leaves are cut off and used, these being replaced by new shoots and leaves which can be cut later on.

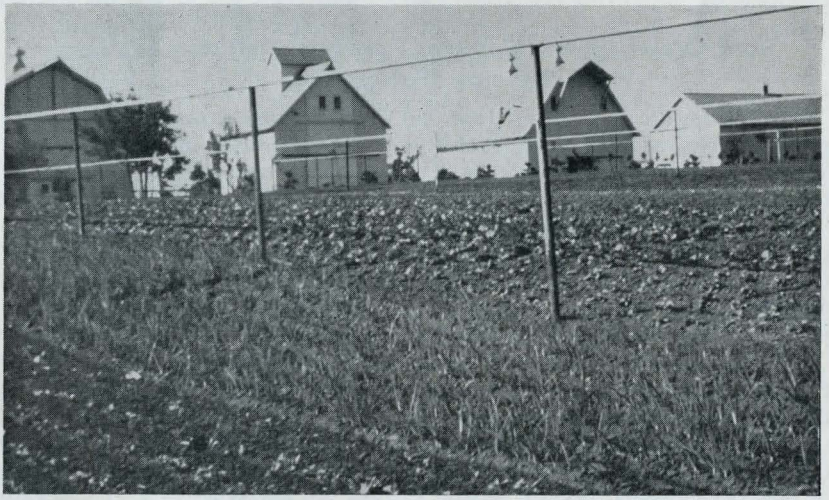
Salad Crops (Celery, Lettuce, Chinese Cabbage, Parsley)

Celery is a rather difficult crop to grow in the open garden in most seasons. It requires a rich soil and water every 5 or 6 days in midsummer. But more than that it requires protection from hot winds and direct sunshine. Perhaps the best way to grow it for home use is inside a wooden frame 20 to 24 inches high. An old wagon box without a bottom or two "third wagon boxes" one on top of the other make an ideal frame for such protection. On hot windy days the top may be covered with muslin or "tobacco cloth." [2] On cloudy or rainy days the cover should be removed.

[2] A special type cloth used for covering tobacco plants.

Such a frame will hold about 100 plants, four rows of 25 plants each, the rows being eight inches apart and the plants six inches apart in the row. Plants may be bought locally or one can raise them in hotbeds or in a flat in the house, planting the seeds about March 20 for transplanting May 20. It is a lot easier to prepare the soil and set out the plants before placing the frames over them. Plow or spade the soil ten inches deep, incorporating three or four bushels of well rotted manure in the soil at this time.

This area will need about 20 gallons of water weekly during the hot weather if it is to produce its maximum. The water should be applied directly to the soil in furrows between the rows and not sprinkled on the leaves because sprinkling tends to spread leaf diseases.



Growing vegetables in quantity and of good quality is accomplished at Boys Town with overhead irrigation.

The simplest way to store the celery for winter is to leave it in the frame, cover the top with woven wire or chicken wire and then with 8 or 10 inches of straw. Then bundles of fodder are placed on the straw to hold it in place. This storage place can be opened on mild winter days by pushing aside the straw at one end and rolling back the wire.

Leaf lettuce is one of the easiest vegetable crops to raise. Simply sow the seed early in spring, cover with a little dirt and in 3 or 4 weeks it is ready to use. Good head lettuce, however, is difficult to raise in most years. Plants must be grown in the hotbed in February for transplanting to the garden by March 25th to April 5th. Mulching the soil about the plants with straw induces good heading. However, excessively hot weather tends to produce loose heads and seed stalks. Leaf lettuce may also be grown as a fall crop by sowing seed in late August.

Another good salad crop that deserves some attention is Chinese cabbage. It makes rather long, narrow, compact heads. The leaves make an excellent

salad when cut up like cabbage. The fleshy leaf stems may be cut up and cooked like cabbage or celery. Chinese cabbage does best as a fall-maturing crop, being sown in rows in late July and when three inches high the young plants are thinned to 15 to 20 inches between plants. As a spring crop it usually produces seed heads and is considered worthless. It is subject to the same insect pests affecting cabbage, plant lice or aphids being particularly annoying. The variety Chihli is most likely to succeed.

Parsley is used primarily for garnishing but it has real value in flavoring soups, meats, cottage cheese and salads. It likes cool weather, a rich soil, and plenty of water. Seeds are sown out of doors in late March or early April. The outer leaves are used as soon as they are large enough. In the fall several plants may be potted up and taken into the house for use during the winter.

Root Crops (Beets, Carrots, Parsnips, Radishes, Salsify, Turnips, Horseradish)

Root crops are cool-season crops and can withstand frosts; hence they are planted early in April. They must grow rapidly to be crisp and tender. Therefore a deep, mellow, rich soil is best suited for them. Beets, carrots, and turnips can be grown for fall use and storing, the first two being seeded in late July or early August and turnips in late August. The young tender roots produced in the cool fall weather are much more palatable than are those that have developed throughout the hot summer weather. However, parsnips and salsify require the entire season for development and must therefore be planted in the spring.

Beets are sown 2 or 3 seeds to the inch. When they are 3 inches high they should be thinned to an inch apart. Further thinning is necessary but this is done as soon as a few are ready to use.

Carrots are slow to germinate and develop. In spring, weeds develop quickly and need to be subdued even before the carrots have begun to show. A few radish seeds dropped in the shallow furrow will mark the row to facilitate early cultivation. When the largest carrots are ½ to ¾ inch in diameter some of these should be pulled up and used, to thin the stand. Carrots may be stored for winter use without being dug. The leaves are simply cut off to within an inch of the crowns before freezing weather comes and the crowns covered with 4 or 5 inches of straw to prevent freezing and thawing. The protective mulch must extend about 2 feet on each side of the row to prevent the frost penetrating to the crowns from the side. The row or rows of carrots for this type of winter storage should be placed at one side of the garden, together with parsnips and salsify, so as not to interfere with fall plowing.

Carrots may be sown in early August for a fall crop and for winter use. A fine seedbed is first prepared and shallow furrows made where the rows are to be. If the soil is dry, water is applied to these furrows. In a day or two the seed is planted and covered with burlap or a light application of straw. As soon as the young seedlings appear the cover is removed.

Parsnips and salsify are sown in April. Parsnip seed loses its germinating power after a year of storage. Therefore only fresh seed should be used. Thin the young plants to 3 or 4 inches as soon as possible. These crops are not in-

jured by freezing and may be left out all winter without protection. However, it is helpful to mulch them with straw at the time the carrots are mulched to facilitate digging as needed in midwinter. If home-grown seed is desired, 3 or 4 roots of each of the above may be left in the ground the following season.

Radishes are usually grown for early spring use but they may also be grown in the fall. The winter varieties may be grown by sowing the seed the latter part of July or the first week in August. If root maggots have been troublesome the late crop should not follow a related early crop.

Turnips are treated like beets and may be grown either in spring or fall.

Rutabaga, known also as Swede turnip, is not particularly well suited to Nebraska except in the extreme northern or western parts. It is a long-season crop that requires fairly cool conditions throughout its growing season and we don't have such conditions in most seasons.

Potatoes

The garden plan on the back page of this circular does not provide for sufficient potatoes for the family needs throughout the year. Provision has been made for only one row across the length of the garden, and this will supply the family for two or three weeks in the early summer. The rest of the potatoes should be grown elsewhere on the farm, since a long-time rotation is best, to avoid trouble from scab and other soil-borne diseases to which the potato is subject. For best results, potatoes should not be planted on ground that has had potatoes during any of the preceding five years.

Under dry-land conditions, it takes from one-fourth to one-third of an acre to provide the amount of potatoes needed by a farm family of five persons. The potato patch should be located where it will be convenient to cultivate or where it is convenient to mulch it with straw. Under irrigation, potatoes should be planted on ground that has been in sweet clover or in alfalfa a year or two before. In the dry-land sections of central and western Nebraska, it will pay to summer fallow the area to be devoted to potatoes the next year.

Varieties: In the eastern, central, and southern parts of the state, potatoes do best as an early crop to mature ahead of hot weather. Here the Irish Cobbler is the popular variety for the main crop, but the White Warba and Red Warba mature about ten days earlier than does the Cobbler and may therefore be used to supply the table with early potatoes. The Warba variety, like the Early Ohio, is subject to cracking and knobbing and only a small part of the season's needs should be devoted to these sorts. Tubers of the Warba tend to sprout if left in the ground more than three or four weeks after maturity.

In western Nebraska and in the northernmost counties the Cobbler is used as an early sort but may also be used for fall maturity and harvest. The principal late potato for western Nebraska, however, is the Red Triumph. Several new white varieties are being introduced in both regions, the Mesaba being an early sort, the Chippewa being a medium early sort, and Katahdin a late sort. These are still in the testing stage, however, and should be used only for part of the crop for the time being.

Preparing the seedbed: The ground should be plowed deeply in late fall and left rough to hold the snow. Fall plowing tends to destroy the white grub which may seriously damage the tubers. Disking the soil early in the spring and then harrowing it several times makes the soil mellow.

If the soil cannot be plowed in the fall the work should be done early in the spring. Late-spring plowing may result in low yields. If manure is to be used it should be applied in the fall previous to plowing. Well rotted manure is best; fresh manure applied in the spring may promote the development of scab.

Kind of seed to use: The use of inferior seed usually results in low yields and poor quality. The so-called "running out" of potatoes is due usually to a virus disease called spindle-tuber. The disease causes the tubers to become elongated and cylindrical. The eyes on infected tubers are shallower, smaller, and usually more numerous than is typical for healthy tubers. Plants that are infected have a more erect habit of growth than normal plants and the leaves are smaller and narrower than normal leaves. In eastern and central Nebraska, the conditions are so favorable for the disease that it generally pays to use new northern seed or northwestern Nebraska seed each year, particularly if the field is to be cultivated.

It pays to use certified seed if it can be secured. To be sure it is more expensive than ordinary seed but the additional cost is usually justified since it is true to name and is practically free from diseases like mosaic, spindle-tuber, and ring rot. Small or rough potatoes from certified fields are cheaper than the best grade of certified seed and practically as good but require a little more care in cutting to secure uniform-sized seed pieces.

Small uncertified seed is much less desirable even though readily available in every small community. This special pack consists of the small potatoes culled out of the table-stock grade. Many of these small potatoes probably were produced by plants affected with spindle-tuber or mosaic, which greatly reduce plant vigor and yield. Not only will the tubers from such plants transmit the diseases to the new plants but if such tubers are cut the diseases are carried to healthy tubers cut immediately afterward. If certified seed cannot be secured the next best method is to select large, well formed, smooth potatoes from northern or western table stock.

Seed treatment: Potato scab is a tuber-borne disease that reduces the yield and lowers the quality of the crop. Black scurf or Rhizoctonia (which shows up as little black spots on the skin of the potato) kills young plants by girdling the stem underground. Both these diseases may be controlled by seed treatment. When relatively small quantities are to be planted the simplest method is to dissolve one of the mercury compounds like Semesan-Bel in water according to the manufacturer's directions and dip the uncut potatoes into this solution until the skin surfaces have been thoroughly wet. The excess liquid is allowed to drain back into the container, the potatoes are poured out into a shallow pile to dry, and the process is repeated until all the seed has been treated.

For large quantities of seed potatoes the hot formaldehyde treatment described in Extension Circular 1204 is generally preferred. Even certified seed should be treated because small amounts of these two diseases are toler-

ated. Seed treatment is simply insurance of a good stand at a low premium cost.

Cutting the seed: Seed potatoes should be cut into blocky pieces that average 1½ to 2 ounces in weight. Each piece should have at least one good eye. It is generally best to cut the seed just before planting and after it has been treated. Potatoes that show discoloration in the flesh should be discarded. Cut seed will keep in a cool place if spread out in a shallow layer. If the pieces are put in large piles or in sacks, overheating is likely to take place and the sprouts may be injured.

Potatoes mulched with straw yield more and retain good cooking quality longer than do clean-cultivated unirrigated potatoes in southern, eastern, and central Nebraska. (A scene from Seward county.)

Planting: In the eastern half of Nebraska, potatoes planted early in April or late in March generally give the highest yield. In western Nebraska, best results are secured by planting from June 10 to June 25. The seed pieces are generally planted 3 to 4 inches deep. Where there is no potato planter available, a furrow is thrown out with a lister and the seed pieces placed in the bottom of the furrow. Then the seed is covered by harrowing down the ridges or by using a shovel cultivator. In light soil the seed pieces are planted deeper than in heavy soil, 5 to 6 inches being about right in the light sandy soils of western and central Nebraska. The seed pieces are placed about 18 inches apart in the row in dry-land sections and as close as 12 inches where irrigation

is given. The rows under the former conditions are spaced 3 or 3½ feet apart, depending upon the kind of tools to be used in cultivation. Under irrigation the rows are put closer together since the potatoes may become excessively large and perhaps hollow if they are planted too far apart.

Cultivation: The potato field should be harrowed a time or two before the plants are up to check the growth of weeds and grass and then cultivated after the plants are well above ground. The first cultivation may be deep but after that shallow cultivation is advisable to prevent root injury. At the last cultivation some soil may be thrown over the row to retard late growth of weeds and to protect the potatoes near the surface from sun and frost injury. The last cultivation should be given just before the potatoes come into bloom.

A straw mulch may be substituted for clean cultivation in eastern, southern, and central Nebraska. The field is covered with 6 to 8 inches of loose straw as soon as the plants have reached a height of 4 to 6 inches. In three years out of five, this method of culture has produced larger yields of better-quality potatoes than has clean cultivation. Grown under straw, the tubers are less likely to produce knobs and growth cracks. Another advantage of this method is that the potatoes produced are much better for seed since the conditions are less favorable for the spread of spindle-tuber.

Sweet Potatoes

Sweet potatoes require about 120 frost-free days for maturing the crop. The northern and western parts of the state, therefore, are not as well suited for this crop as is the southern half. In the less favored regions a site which slopes to the south will be more likely to give better results than will a north or east slope. Sweet potatoes are started in the garden by setting out plants after the danger of frost is over.

The plants can usually be secured locally from professional plant growers but they may be grown at home with very little work. If there is a hotbed available, several small old potatoes are placed on a thin layer of sand and then covered with 3 to 4 inches of moist sand. If they are to be raised in the home, they are simply planted 3 or 4 inches deep in moist sand in a box and kept in a warm sunny room. This is done about April 15th. About May 20th the new shoots that are 8 inches high are carefully broken off and transplanted. As additional shoots develop to transplanting size they are used in the garden.

Generally sweet potatoes are planted on top of a lister ridge, the rows being about 3½ feet apart and the plants set 18 inches apart in the row. Irrigation increases yields greatly in practically every season; mulching does so in most seasons. Cultivation is similar to that for Irish potatoes until they begin to produce vines. Then the vines are permitted to cover the ground and cultivation stops.

Cutting the vines or lifting them to prevent rooting are two practices which have no value and in fact may reduce yields. As soon as the vines are frosted the potatoes are dug carefully to avoid cutting and bruising. The cut and bruised specimens are sorted out for immediate use or for canning. The sound potatoes are cured by placing in a warm, dry place for about two or three weeks. A rack may be built near the furnace for this purpose for curing

four or five bushels. For larger quantities a farm smoke house heated with an oil burner might be used. A brooder house and burner would be suitable for curing quantities of 50 bushels or more. The temperature is held at about 85° F. for 10 or 12 days. Thereafter they may be stored in a dry place where the temperature will not drop below 45° or 50° F. Roots should not be exposed to light during storage.

Bulb Crops (Onions, Leeks, Garlic, Chives)

Bulb crops grow best during cool moist weather. That makes them adapted as an early planted crop in Nebraska. They have rather shallow roots; therefore the surface eight or ten inches must be rich and moist. Irrigation certainly pays big dividends with these crops. The plants may be close together because the tops are rather small. A lot of hand work is necessary to control weeds.

Onions are by far the most important of the bulbs. They may be grown in four different ways: (1) from sets, (2) by seeding directly in the garden, (3) by transplanting seedlings from the hotbed, and (4) by transplanting southern plants.

The surest, easiest, and quickest way of producing good bulbs is from sets. Sets ½ to ¾ inch in diameter give the best results. They are planted very shallow 3 to 4 inches apart in rows 14 to 18 inches apart. The original cost of the sets is high but this is offset by lower labor cost for weeding. Furthermore the crop matures quickly and there is less danger of injury from hot weather and onion thrips. Large sets (over ¾ inch in diameter) are likely to produce seed stalks instead of good bulbs. They may be used to produce green onions, however.

Direct seeding in the garden is the cheapest method of growing onions provided the season is favorable. It is necessary to seed very early, however, to take advantage of cool, moist spring weather. The distance between rows depends upon the tools to be used in cultivation. For hand hoeing or wheel hoes the rows are spaced 12 to 18 inches apart. Where horse tools are used 24 to 30 inches is a better distance. The seed is covered with a half inch of dirt in heavy soils and with 1 inch of dirt on sandy types of soil. The plants are thinned to 3 inches at the first hand weeding.

The transplanting or "green set" method is one used most frequently by gardeners who have a hotbed for growing the plants. By this method the crop reaches maturity more quickly than it does by direct seeding but not quite as quickly as by using sets. The seed is sown by February 1st in shallow boxes (approximately 18 inches long, 12 inches wide, 4 inches deep) called "flats." The flats may be piled one on top of the other in an out-of-the-way corner in a heated room of the house.

In ten days the young seedlings have started developing and the flats are placed in the hotbed. The plants are transplanted about the 20th to the 25th of April, 3 to 4 inches apart in the row. By this method the thinning operation is avoided and a crop or two of early weeds can be controlled in preparing the soil for transplanting. The least desirable method of starting onions is by transplanting southern plants. Too often the bundles of plants have either dried out or have become overheated before the gardener secures

them. Then, too, there is danger of bringing in onion thrips in these southern plants.

Varieties: The best all-round type for home use is the Yellow Globe Danvers. It is productive, rather mild in flavor, and stores well. Red Wethersfield matures a little earlier but is stronger in flavor and does not store quite so well as Yellow Globe. The best sweet Spanish-type onion so far tested is

This well kept garden in Merrick county has produced profitable crops regularly in spite of hot winds and drought. It is protected by a sheared Chinese elm windbreak and irrigated with a small centrifugal pump.

Riverside. It yields heavily and is fine for use during the summer, fall, and early winter, but does not store as well as Yellow Globe Danvers. The Early Grano variety is a very good sort to grow from seed in the northern and western parts of the state.

Irrigation is necessary to insure good quality, quick maturity, and high yields. In a dry spring, watering may be necessary before planting the seed or transplanting the plants. The upper foot of soil should always be moist until the crop is made. This means weekly applications of about an inch when the weather turns hot and dry. The water may be applied in furrows between the rows or by overhead sprinklers.

Harvesting, curing, and storing: The bulbs should be allowed to become fairly mature in the field. Then they are pulled in two or three days, the tops broken off or cut off, the diseased and thicknecked specimens culled out, and the remainder stored in crates in a corncrib or other well aired building for further curing. For over-winter storage a cool dry place is selected. If the onions are growing late they are sometimes pulled and thrown into

shallow piles and left to dry out for four or five days and then handled as suggested above.

The onion thrip is a tiny sucking insect that is very injurious to onions in dry weather. It lives over winter on weeds and grasses. It is difficult to control because it can slip between the central leaves where it is difficult to reach with a contact spray. Recently a poisonous spray has been found effective, namely tartar emetic, 1 tablespoonful of which is dissolved in a gallon of water, together with 2 tablespoonfuls of brown sugar. Thorough dusting with a ¾ per cent rotenone dust is partially effective.

The leek is an onionlike vegetable produced largely for its broad flat leaves, the lower parts of which are eaten raw or used for flavoring. It is produced either by direct seeding or by transplanting seedlings as described for onions. However, it is spaced 4 to 5 inches apart in the row because the plants attain a larger size than do onions.

Garlic is also used in flavoring. It is grown from the cloves or small sections of the bulb. These are planted 1 to 2 inches deep, 4 to 6 inches apart in the row early in spring. In the fall the plants are pulled up, the leaves braided together with the bulbs on the outside, and hung up to cure in a well ventilated shed or barn. Methods of growing and storing are similar to those for onions.

Chives belong to the onion family but are perennial in nature; that is, the clump will remain in the garden year after year. The slender hollow leaves are used in imparting a mild onion flavor to salads, cottage cheese, etc. The bulbs are not eaten. A clump may be lifted, potted, and brought into the house for use during the winter. In spring the clump of bulbs may be divided and replanted in the garden. The clumps that are left in the garden should be divided and replanted every three or four years.

Peas

Peas are a very desirable garden vegetable, being rich in proteins and high in vitamins A, B_1, and C. In most seasons only the early varieties give good returns and then only if planted very early in the season. Hot weather blasts the blooms and stunts the plants. The pea louse is more likely to be serious when early varieties are planted late or when late varieties are used. If the soil is fall plowed, disking and planting may be done in late February or early March in some years. Late freezes do not seriously affect them. They may be planted along the edge of the oats field at the time early oats are drilled. The same drill can be used. In the garden the seed is planted in rows 12 to 18 inches apart or two rows are planted 6 to 8 inches apart and then a space of 18 inches left and two more rows are planted close together. This system is usually termed "double row" system.

The soil for peas should be rich and mellow. Heavy, poorly drained soils are likely to give trouble from root rot. Most garden soils are rich enough but if peas are to be planted along the side of an oats field a heavy coating of well rotted manure should be applied prior to fall plowing.

Early varieties like Alaska or Little Marvel are dwarf, smooth varieties that are productive but rather poor in quality. Surprise and Eclipse are only a few days later and better in quality. The two varieties that are rapidly replacing

the above sorts are Progress (Laxton Progress) and Hundredfold. The vines are about 20 inches long and mature within a day or two of Alaska. The pods are larger and easier to pick and open. The peas are much better for canning or freezing.

Tomatoes, Peppers, Eggplants

The tomato is second only to the potato in popularity and value among the vegetables grown in the United States. The housewife uses it in a great variety of ways to make the family meals more appetizing and wholesome. She is interested in having fresh tomatoes from her garden for as long a period as possible and a surplus for marmalade, juice, and canned tomatoes. Fortunately this crop can be grown in every county of the state if adapted varieties are selected and proper methods are used.

The determinate-vine type tomato.

The tomato tribe needs warm weather and a fairly long season for results. Cool, cloudy weather slows up the ripening of the fruits and frosts kill the plants. Therefore the plants are usually started in a hotbed or in flats in the house and are transplanted when the danger of frost has passed. Hot winds at blossoming time will usually interfere with setting a crop and later hot winds may sunburn the fruits. Some sort of protection from the south and west is desirable. Irrigation increases yields greatly. Mulching with straw gives better yields than clean cultivation where irrigation is not possible.

In the past considerable difficulty was experienced in some parts of the state with the common varieties like Stone, John Baer, Marglobe, etc. When these varieties were planted on rich garden soils and rainfall seemed ample for good growth, they would grow luxuriantly and were slow to bloom; when

the weather became hot and dry, the plants would begin to bloom but many or all of the flowers failed to set fruit and dropped off. With the development of such new varieties as All Red, Victor, Firesteel, Ruby, Bounty, etc., most of these difficulties were overcome and besides much earlier production was secured. Where the old varieties have not been satisfactory in the past few years, one or more of these newer sorts should be tried. They generally produce ripe fruit a week or two earlier than do the old sorts. The All Red has a tendency to stop leaf growth until its first cluster of fruit has been picked, thereby delaying the production of later clusters. This habit can be changed somewhat by picking off half the fruits of the first cluster when still very small and at the same time applying irrigation water to induce new leaf and flower shoots. It is a good plan to use several varieties, a few very early like All Red, more of the medium-early like Victor, Bounty, and Firesteel, and possibly a few late plants like Marglobe and John Baer—or successive plantings may be made of medium-early varieties.

There are several methods of growing tomatoes outdoors, the most common one being to transplant plants about the middle of May. The plants may be grown in the home in flats or in a hotbed, the seed being sown about the middle of March. When the young plants are about two inches high they are transplanted into other flats about two inches apart each way or they may be planted in small paper cups placed in a flat. This latter method disturbs the roots very little at transplanting and there is no perceptible check in plant growth. This is a much better method than leaving the plants crowded together in the first flat and pulling the plants up at transplanting time. When this is done the small tender roots usually die and the young plants stand still until new roots have developed from the stem. This is the type of plant one usually receives from the south.

It is possible to grow plants from seeds directly where they are to stand in the garden and these will produce fruit as quickly as the pulled-up plants. Three or four seeds are simply planted in hills 4 feet apart each way about April 20 to 25. A handful of straw or grass clippings or a small piece of burlap is placed over the seeds to keep the soil from drying out. When the seedlings appear the covering is removed and when they are 4 or 5 inches tall only one plant is left in the hill, the others being used elsewhere if needed.

For very early tomatoes a few plants may be grown to the fruiting stage in the house in gallon tin buckets. When warm weather comes they may be set out in the garden after the bottoms are cut out of the buckets.

Pruning and staking are not necessary with tomatoes. However, where there is good protection from southwest winds and where irrigation water is to be used and space is very limited, this method will give greater total production for a given area but the production per plant will generally be reduced. Only the taller of the new varieties, however, like Bounty or Firesteel, should be used. All Red and Victor do not grow vigorously enough for staking. Here the plants are set 18 inches apart in rows 2 feet apart and trained to single stems and tied on stakes. In wet seasons loss from rotting (where the fruits touch the ground) may be prevented by placing straw or lawn clippings around the base of the plants, or branches or laths may be used to make a support.

When using several varieties or even a desirable single variety, it is well to observe which plants produce outstanding yields of desirable fruits. Several of these fruits should be saved for seed. The ripened fruits are squashed and allowed to ferment for 48 to 56 hours. Then the seeds may be washed free from the pulp and dried on newspapers and stored in labeled bottles.

Home-grown fresh tomatoes may be enjoyed for a month after the first killing frost by picking a bushel or two of green tomatoes just before the frost and storing in a cool, dark place. Some of these may be wrapped in paper for long keeping. Ripening may be hastened by placing several in a warm room four or five days before they are needed.

Tomato hornworm, corn-ear worm, psyllid, and red spider are the insects most commonly affecting the tomato. Lead arsenate is used for the first two and sulfur for the last two. All four pests may be controlled simultaneously by thoroughly mixing 1 pound of lead arsenate and 10 pounds of dusting sulfur and dusting the plants and fruits with the mixture. The sulfur is also useful in controlling various leaf spots. Potatoes can also be dusted with this mixture to control psyllids and potato bugs.

Eggplants and peppers require much the same culture as tomatoes except that they are planted closer together. Potato bugs are very fond of eggplants, particularly when the plants are young and tender. The sulfur-lead-arsenate dust is effective against this pest. Flea beetles, those shiny, black, jumping bugs that eat small holes in the leaves, are another serious pest of eggplants. They may be controlled by spraying or dusting with zinc arsenite. The spray consists of 3 tablespoons of this material to 1 gallon of water. The dust is made by thoroughly mixing 1 pound of zinc arsenite with 10 pounds of hydrated lime. An application of one of these should be made soon after the plants are set out and at two-week intervals until the fruits are the size of an average lemon. This material will also control potato bugs.

The Vine Crops (Cucumbers, Melons, Pumpkins, Squash)

The vine crops belong in the warm-season class which cannot stand freezing temperatures. They like rich, well manured, moist soils. Irrigation is very helpful; mulching with straw about May 10 to 20 also gives good results. Generally the seeds are planted directly in the field or garden or in a low part of the corn field right among the corn stalks. Earlier production may be secured by planting two or three seeds in each of a number of tin cans or old berry boxes filled with soil and placed in the hotbed. This is done about April 20th.

When the danger of frost is past they are transplanted, after the bottoms of the containers have been carefully removed. In field seeding, cucumbers, muskmelons, and summer squash (like crookneck or patty pan) are planted in hills 4 x 5 feet apart; the larger-vining watermelons, pumpkins, and winter squash are planted at least 6 x 8 feet apart. Three or four seeds are planted in a place and the young seedlings thinned to two to the hill. Pumpkins and squash may be stored for winter use in a moderately cool (40°–55° F.), dry place, requiring about the same conditions as onions.

In saving seeds from home-grown vine crops it is necessary to know something about cross pollination. Briefly stated, cucumbers cross with cucumbers,

muskmelons with muskmelons of any other type, watermelons with watermelons and citrons, but none of these cross with pumpkins and squashes. The so-called summer squash varieties like Scallop, Crookneck, or Straightnecks, which are in reality pumpkins, will cross with other pumpkin types such as Sugar, Table Queen, or Acorn, Field, Cheese, Japanese Pie, and Sweet Potato pumpkins, and each of these will cross with every other of those mentioned but none of these will cross with the Hubbard group, golden, green, blue, etc., so that any one of the latter may be planted beside any one of the former group without danger of cross pollination. If the first group of pumpkins and summer squashes is to be kept true to type, each member of the group must have a space of 40 rods between it and every other member of the group.

The striped cucumber beetle attacks all of the vine crops and is their most serious pest. The beetles attack the young plants very early and continue throughout the summer to feed on stems and leaves. The female beetles lay eggs on the stems near the ground. These eggs hatch into little white worms which feed on the underground stems and roots, causing the plants to wilt and die. Dusting early and repeatedly with a mixture of 1 pound of calcium arsenate and 10 to 20 pounds of gypsum is an effective control as is also a ¾ per cent rotenone dust.

These sucking insects are particularly bad on cucumbers and melons though they may attack the other vine crops. Dusting with nicotine dust or with rotenone is effective but it must be done before the leaves curl and three or four times at weekly intervals.

The squash bug is a large sucking insect (also known as stink bug) and is one of the most difficult to control. Cleaning up and burning weeds and plant parts in the fall will help to control it. Dusting beneath the plants with a 15 per cent Pyrocide dust will give effective control but this material is expensive.

The squash vine borer is a long white borer with brown head found burrowing in the wilting stems of Hubbard and other varieties of squash. One method of control is to slit the infested stem with a sharp knife and remove the culprits. Another way of avoiding serious damage is to cover each vining stem with dirt about two or three feet from the base to induce rooting along the covered part. Still another way is to plant summer squash nearby to attract the adults for egg laying. When the first borers show up in the stems these plants may be pulled and burned.

Insects and Their Control

Insects with chewing mouth parts: Belonging to this class are leaf-eating insects like the cabbage worm, potato bug, and striped cucumber beetle. In general the leaf-eating insects are controlled with stomach poisons like lead arsenate, calcium arsenate, or Paris Green. The poisons may be applied either in the dry form as a dust mixed with hydrated lime or flour, or they may be mixed with water and applied. Lead arsenate is most commonly used because it kills the insects, adheres well to the foliage, and does not cause burning. The usual strength of the liquid spray is 2 to 3 tablespoonfuls of lead arsenate

to 1 gallon of water. As a rule, the dusts do not adhere as well but are more convenient to apply.

A very good method of applying the dust is to place a mixture of 1 pound of lead arsenate with 10 pounds of hydrated lime in a burlap sack. The sack is shaken over each plant a time or two when leaf-eating insects first appear. This is generally done in the morning when there is dew on the leaves.

For the striped cucumber beetle, calcium arsenate is used instead of lead arsenate, and it is mixed with gypsum instead of lime, the proportion being 1 part by weight of calcium arsenate to 15 parts by weight of gypsum.

Cutworms are controlled with a poison bran mash made by mixing 1 quart of bran, 1 teaspoonful of Paris Green, and 1 tablespoonful of molasses with enough water to moisten the mixture. This is scattered near the plants. When this is used, poultry should be kept away from the garden. Fall plowing just before the ground freezes will help to kill white grubs, cutworms, wireworms, and stalk borers.

Insects with sucking mouth parts: Plant lice and squash bugs belong to this class. Plant lice can be controlled with nicotine sulfate either in solution or in dust form. A teaspoonful of the nicotine sulfate is mixed with a gallon of water in which has been dissolved an ounce of laundry soap. This mixture is applied as a spray to the under sides of the leaves, and should hit the insects. Merely covering the foliage with the spray will not kill the lice. On cucumbers and melons, the lice cause a curling of the leaves so that a spray will not reach them. When this has taken place, a nicotine dust is more effective than the spray. The dust is made by mixing one part by weight of nicotine sulfate with 20 parts by weight of hydrated lime and then working it through a sieve. The material must be used immediately or kept in sealed jars till used or it will lose its strength. It should be applied when the temperature is above 80 degrees and when there is no wind. It may be applied with a baking powder can into the lid of which several holes have been punched.

The squash bug is very difficult to control with sprays or dusts. In the fall shingles or boards may be placed near or under the squash plants. The bugs will congregate under these boards on cool nights. Early in the morning the boards are lifted and the bugs shaken off into a pail containing kerosene. The latest effective insecticide for this pest is Pyrocide, a pyrethrum dust. The 15 per cent strength is needed to be sure of a good kill. For most other insects, both sucking and chewing, a ¾ per cent rotenone dust can be used effectively.

More complete information on garden insect control is contained in Nebraska Extension Circular 1512, "Pests of the Vegetable Garden" which may be obtained from your County Agent or from the Nebraska Agricultural College at Lincoln.

List of Vegetables Adapted to Nebraska Conditions

The varieties named are those that have been found to be most satisfactory, and, with the exceptions noted, are suitable for general use in Nebraska. With some vegetables, differences between varieties are very slight; in others, it is very important to select the variety with care. Quality has been considered as

the factor of first importance in developing this list. It pays to depend upon proved varieties rather than new and untried or freakish sorts.

ASPARAGUS

Mary Washington—Produces large thick spears; does *not* bolt early,—resistant to rust.

BEANS—

Stringless Greenpod—green podded, bush bean.
Golden Wax and **Saddle Back Wax**—wax podded, bush bean.
Kentucky Wonder—pole bean.
Robust—white field bean.

LIMA BEAN—

Wood's Prolific—bush type.
Early Baby Potato—bush type.
Hopi—vining type.

BEETS—

Crosby's Egyptian—grows rapidly, small tops, roots thick, flesh blood-red with very little light zoning.
Detroit Dark Red—most commonly used for late planting and canning; globe-shaped roots, dark red zoned with lighter shade of red.

CABBAGE—Early Varieties

Marion Market—very early.
Wakefield, Jersey, and **Charleston**—pointed heads.
Copenhagen Market—heads slightly flattened, globe shape, very solid.

CABBAGE—Late Varieties

Danish Ball Head—medium size, round, solid heads; good for storage.
Late Flat Dutch—very large, flat heads, very heavy yielders, very subject to cracking; not recommended for storage.

CARROTS—

Chantenay—very generally grown, half long type of root; bright orange-scarlet root, core large and definite.
Nantes—long, cylindrical roots, core small, skin smooth; very good quality.

CAULIFLOWER—

Dwarf Erfurt and **Snow Ball**—both early.
Dry Weather and **Veitch's Autumn Giant**—recommended for only cooler portions of the state.

CELERY—

Golden Self-Blanching — yellowish green leaves, heart large, easily blanched, quality fair.
Giant Pascal—leading late variety, dark green, erect, compact growth, blanches slowly, quality very good.

CHARD—

Lucullus—extra large leaves.

CHINESE CABBAGE—

Chihli—elongated, compact head, large light colored midrib.

CUCUMBER—

Chicago Pickling—for pickles.

Arlington White Spine—for slicing.

Mincu—best for pickles.

EGGPLANT—

Black Beauty—large fruited, dark purple.

Early Long Purple—suitable for cooler regions. Fruit about 6 inches long and 2 inches in diameter.

KOHLRABI—

White Vienna, Turnip, White Milan and **White Egg.**

LETTUCE—

New York Improved—(also called "Los Angeles" and "Wonderful"), large growing, dark green; most likely of all varieties to produce heads.

Iceberg—heading variety, withstands heat and heads fairly well. Leaves tinged with red to purple.

Early Curled Simpson—a very good loose-leaf type.

MUSKMELON—

Pollock—(salmon tint) fruit medium size, rounded oval, heavily netted.

Osage, Miller's Cream, Emerald Gem—fruits large, skin dark green. Late maturing, pink flesh, good flavor but soft; not used for shipping.

Honey Dew—distinct type of melon of Casaba group. Fruit ivory white, smooth skin, thick greenish flesh, weighing three to five pounds.

ONION—For Seeding Outdoors

Yellow Globe Danvers—dark yellow, medium to small, globe-shaped; matures fairly early, most generally grown storage onion.

Red Wethersfield—outer scales purplish red, flesh tinged with red; matures earlier than Globe varieties; flat bulbs, fairly good storage variety.

ONIONS—For Transplanting

Prizetaker—very heavy yielder, strawcolored; globe shaped; very poor keeper, mild flavor.

Riverside—yellow globe type, heavy yielder, poor for winter storage, may also be grown from seed.

PARSNIP—

Hollow Crown.

PEAS—(wrinkled peas are of better quality than smooth peas.)

Alaska—smooth, early, ripens all of crop in short time; small pods, fair quality, vines about 20 inches.

Blue Bantam—small vine (18 to 20 inches) large podded, wrinkled, early. Matures all of crop within a short time. Very good variety.

Progress (Laxton's Progress)—large podded, high quality, for freezing or canning, wrinkled.

Gradus—a well known, second-early variety of wrinkled peas. Vines about three feet high.

Thomas Laxton—ripens crop over long season, wrinkled, good quality; vines about three feet high.

PEPPERS—

Chinese Giant—very large, blocky fruits; not recommended for cooler portions of the state.

Sunnybrook—sweet, prolific, pimento pepper; bright scarlet fruit, flesh thick.

Early Neapolitan—earliest mild red pepper, bears for long season.

POTATO—Irish

Irish Cobbler—early variety with thick, blocky, creamy white, deep-eyed tubers; good producer, good cooking quality.

Early Ohio—early, not as popular as Cobbler. Not suitable for irrigation. Tubers subject to growth cracks and knobbiness.

Warba—white or red, earlier than Cobbler, yielding as well or better. Tubers subject to cracking. If left in soil till fall tubers apt to start growing.

Triumph—round, red, and early. Most popular variety in western Nebraska under irrigation and dry land. Early strains being used under irrigation in central Nebraska. Very susceptible to heat injury in southern and eastern counties, with low yields and poor cooking quality the rule.

New Varieties for trial: **Mesaba**—white, very early. **Chippewa**—white, medium early. **Katahdin**—white, very late; for trial in western Nebraska only.

RADISH—

French Breakfast, Scarlet Turnip, White Tip—mature quickly, in edible condition only short time.

White Strasberg, White Icicle—summer varieties, larger size and in edible condition longer than early varieties.

RUTABAGA—

Purple Top, Yellow, and **White Fleshed Neckless.**

SPINACH—

Bloomsdale Savoy—leaves much crumpled, one of earliest and most attractive varieties; withstands handling and shipping well. Shoots to seed early and is light yielder.

Juliana—long petrioled, dark green leaves; grows slowly, stands long time without forming flower stalks; plants small.

Long Season—leaves short, thick, narrow and pointed; slow growing; medium size; forms flower stalks late in spring.

New Zealand—not true spinach, but will furnish excellent greens from August until winter; plant in May.

SQUASH—

Early White Bush—scalloped summer variety.

Vegetable Marrow—used only in immature condition, earlier than Scallop.

Table Queen—winter squash, small acorn-shaped fruit, of good quality.

Buttercup—a new winter squash, fine quality, little waste.

Green Gold—an improvement over Buttercup.

Hubbard—large, dark green, hardshelled fruit; standard winter variety.

SWEET CORN—

Golden Bantam—best quality early variety. Yellow kernels, 8 rows, high sugar content, remains in good condition for long time; susceptible to smut.

Country Gentleman—main or late season, very good quality; kernels long, white, narrow, not in rows; much used for canning.

Stowell's Evergreen—late market variety, main canning variety; kernels large, deep, white, on large ears; stalks very tall.

Sweet Corn Hybrids—Hundreds of sweet corn hybrids are available on the seed market. Most of these produce greater yields than do the regular varieties but not all are adapted to Nebraska conditions. In the Nebraska tests the following yellow kernel hybrids have been found to have superior merit:

For first early—**Marcross 6-13** or **13-6,** and **Marcross 39.**

Early—**Tendergold, Spancross 2, Sencross.**

Midseason to late—**Gold Cross** (leading yellow hybrid), **Iogold** (some earworm resistance).

Late—**Aristigold, Ioana.**

SWEET POTATOES—

Yellow Jersey—long spindle-shape roots, flesh dry and mealy, quality fair, storage quality fair; leading shipping variety; vines small.

Nancy Hall—excellent for storage; roots white, irregularly over-spread with pink; pink flesh, soft and plastic when cooked; roots likely to be large and rough; vines more vigorous than Yellow Jersey.

Porto Rico—roots copper red in color; flesh orange, soft, very good quality; vines extremely vigorous, heavy producer.

TOMATOES—

Very Early—**All-Red**—weak grower, fruit good, very prolific.

Next Early—**Victor, Bounty, Firesteel**—good producers, fruit red, moderately vigorous plants. Will fruit well on rich ground and better with irrigation than without. **Ruby** is an early pink variety but rather rough, plants medium in vigor.

Medium Early—**Penn State Earliana**—uniform in size and color, medium in vigor.

Medium Late—**Marglobe, Pritchard, Rutgers, John Baer**—vigorous growers, red, meaty fruits, have done only fairly well in hot season.

Late—**Pearson**—new, outstanding variety, large, deep red, roundish smooth fruits, plants vigorous, foliage noticeably dark green, sets fruit better in hot weather than other late varieties. **Stone**—red fruited.

Very Late—**Ponderosa**—purplish colored fruits, very rough but meaty.

WATERMELON—

Klondyke—oblong rounded, pink flesh, very high quality, not suited to shipping because rind is not hard.

Kleckley Sweet—fruit oblong, large, flesh bright red. Very good for home use, not used for shipping.

Tom Watson—large, long, cylindrical, dark green. Good shipper. Most common commercial variety.

Irish Grey—long cylindrical light yellowish green. Good shipper. Attaining more popularity than Tom Watson.

PLANTING TABLE FOR THE FARM VEGETABLE GARDEN

Kind of vegetable	Feet of row	Distance apart in row	Depth of planting	Amount of seed *
Asparagus	150	2 ft.	5–6 in.	75 roots
Beans—greenpod	100	3 in.	1–3 in.	1 lb.
Beans—wax	150	3 in.	1–3 in.	1½ lb.
Beets	150	4–5 in.	½–1½ in.	1½ oz.
Cabbage early	50	18 in.	½ in.	1 pkt.
Cabbage midseason	50	18 in.	½ in.	1 pkt.
Cabbage late	150	2 ft.	½ in.	1 pkt.
Carrots early	75	3–4 in.	½–¾ in.	¼ oz.
Carrots late	75	4–6 in.	½–¾ in.	¼ oz.
Cauliflower	50	18 in.	¾ in.	1 pkt.
Celery	150	6 in.	¼ in.	½ oz.
Cucumbers	38	5 ft.	1–2 in.	1 pkt.
Eggplant	75	18 in.	½ in.	1 pkt.
Horse radish	19	18 in.	4–6 in.	10 roots
Kohlrabi	150	4–6 in.	½–1 in.	⅛ oz.
Lettuce	75	6 in.	½–¾ in.	½ oz.
Muskmelon	50	5–7 ft.	½ in.	1 pkt.
Onions early (seed)	150	3 in.	2–3 in.	3 lbs. sets
Onions late	150	3 in.	½ in.	1½ oz.
Parsley	10	3–6 in.	¼ in.	1 pkt.
Parsnips	75	6 in.	½–1 in.	½ oz.
Peas, early	75	1–2 in.	1–3 in.	¾ lb.
Peas, medium	75	1–2 in.	1–3 in.	¾ lb.
Peas, late	150	1–2 in.	1–3 in.	1½ lb.
Peppers	38	18 in.	½ in.	1 pkt.
Potatoes, early	150	8–15 in.	3–4 in.	15 lbs.
Radishes	75	2–3 in.	½–1 in.	¾ oz.
Rhubarb	102	2 ft.	5–6 in.	50 roots
Salsify	65	4–6 in.	½–1 in.	¾ oz.
Spinach	150	6 in.	1–1½ in.	1½ oz.
Squash, summer	50	10 ft.	1–2 in.	½ oz.
Squash, winter	50	10 ft.	1–2 in.	½ oz.
Sweet corn (drilled)	900	8–12 in.	1–2 in.	2 lbs.
Swiss chard	50	6–12 in.	½–1½ in.	2 pkt.
Tomatoes	150	4–5 ft.	¼ in.	1 pkt.
Turnips	200	4–6 in.	½–¾ in.	2¼ oz.

* These seed quantities, except with potatoes, onion sets and perennial crops, are somewhat excessive when soil conditions are ideal and the seed germinates well.

PLAN FOR VEGETABLE GARDEN—100x150 Ft.

Permanent vegetables	Asparagus			
	Herbs	Rhubarb	Horse radish	Winter onions
	Parsley	Salsify	Parsnips	
Plant April 1-15	Spinach			
	Lettuce	Radishes		Follow with beans
	Carrots	Beets		
	Turnips	Kohlrabi		
	Early cauliflower	Early cabbage	Swiss Chard	
	Early peas	Late peas		
	Early potatoes			
	Onions (field-sown or sets)			
	Onions			
	Late cabbage			
	Peas			
Plant May 1-15	Beets	Carrots	Kohlrabi	
	Sweet corn			
	Sweet corn			
	Wax beans			
	Green beans	Midseason cabbage		
	Tomatoes			
Transplant May 15-31	Eggplant	Sweet peppers	Cucumber	
	Kohlrabi	Rutabagas		
	Turnips			
Plant July 15-Aug. 1	Carrots	Beets		
	Celery			
Plant June 15	Sweet corn			
	Sweet corn	Watermelons in corn		
	Sweet corn			
	Sweet corn			
	Summer squash	Winter squash	Muskmelons	