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UNIVERSITY OF WYOMING AGRICULTURAL EXPERIMENT STATION



VEGETABLE CULTURE AND VARIETIES FOR WYOMING

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†On leave.

Table I. Requirements for an Irrigated Garden to supply sufficient Vegetables for an average family of five persons, (two adults and three children.) Row lengths in dry land gardens should be increased from fifty to one-hundred per cent.

VEGETABLES	Length of row—Feet	Number of plants	Quantity of seed
Asparagus.....	72 to 96	36 to 48	roots
Beans, snap.....	200 to 300	.....	2 to 3 lbs.
Beans, shell.....	100	.....	1 lb.
Beans, lima.....	100	.....	1 lb.
Beet.....	175	.....	2 to 4 ozs.
Broccoli.....	10 to 24	6 to 12	1 pkt.
Cabbage.....	100 to 150	50 to 75	1 pkt.
Carrot.....	150	.....	1 oz.
Cauliflower.....	36 to 48	18 to 24	1 pkt.
Celery.....	25 to 50	50 to 100	1 pkt.
Collards.....	40 to 80	25 to 50	¼ oz.
Corn, sweet.....	300 to 600	.....	¾ to 1½ lbs.
Corn, pop.....	150 to 200	.....	¼ to ½ lb.
Cucumber.....	36 to 48	18 to 24	¼ oz.
Eggplant.....	24 to 48	12 to 24	1 pkt.
Endive.....	25	.....	1 pkt.
Horseradish.....	24 to 48	12 to 24	roots
Kale.....	40 to 80	25 to 50	¼ oz.
Lettuce.....	50 to 75	.....	¼ to ½ oz.
Muskmelon.....	30 to 60	12 to 24	¼ oz.
Onions, seed.....	200	.....	2 ozs.
Onions, sets.....	100	.....	1 lb. sets
Onions, perennial.....	25 to 50	.....	¼ to ½ lb. sets
Parsley.....	5 to 10	.....	1 pkt.
Parsnip.....	50 to 100	.....	¼ to ½ oz.
Pea.....	300	.....	3 lbs.
Pepper.....	24 to 48	12 to 24	1 pkt.
Pumpkin.....	72	24	¼ oz.
Radish.....	25 to 50	.....	¼ to ½ oz.
Rhubarb.....	36 to 54	12 to 18	roots
Rutabaga.....	100	.....	½ oz.
Spinach.....	100 to 200	.....	1 to 2 ozs.
Squash, summer.....	18 to 36	6 to 12	¼ oz.
Squash, winter.....	72	24	¼ oz.
Swiss Chard.....	25 to 50	.....	¼ to ½ oz.
Tomato, fresh use.....	96	24	1 pkt.
Tomato, canning.....	200 to 300	50 to 75	¼ oz.
Turnip.....	50 to 100	.....	¼ to ½ oz.
Watermelon.....	36 to 72	12 to 24	1 pkt. to ¼ oz.

Vegetable Culture and Varieties for Wyoming*

By M. F. BABB AND W. L. QUAYLE

A garden to supply as much as possible of the family food should be the aim of everyone who can get the use of a plot of ground. A well-planned garden produces not only an abundance of nutritious food but it produces it in great variety and for year around use. If properly managed, a vegetable garden will give greater returns than a similar area planted to any other crop.

Vegetables, both in and out of season, because of their mineral and vitamin content, are a requisite for keeping the family in good health. The garden will supply a large amount of the food required, at very little expense other than the labor of planting and caring for it at odd times. Although the food that can be produced in a garden represents a considerable part of the family budget, the more important consideration is that, if there is no home garden, the use of vegetables by the average family will very likely be wholly inadequate for the maintenance of good health.

VARIETAL TESTS

As a result of our varied climatic conditions and soil types, many vegetable varieties that are beautifully portrayed in catalogues and highly recommended by seedsmen in other states prove disappointing under Wyoming conditions. Many of them are too late for some of our areas which have a short season, and some are not well adapted to dry farms.

At high elevations gardening is limited to the growing of the more hardy types of vegetables. Fortunately, however, these include the majority of the vegetable crops, many of which grow much better at high altitudes than in the hotter climate of lower elevations. Furthermore, the flavor and quality of most vegetables grown at the Wyoming high altitude experiment farms are unsurpassed.

*A report of vegetable investigations conducted by the Department of State Experiment Farms, University of Wyoming, under the direction of W. L. Quayle in cooperation with M. F. Babb, Associate Physiologist, U. S. Department of Agriculture, Bureau of Plant Industry, Fruit and Vegetable Crops and Diseases, Cheyenne Horticultural Field Station.

To encourage the growing of home vegetable gardens and to determine suitable varieties for the various altitudes and soil conditions in the state, the Department of Experiment Farms, in cooperation with the Cheyenne Horticultural Field Station of the U. S. Department of Agriculture has tested a number of kinds and varieties of vegetables for the purpose of finding those most suited to Wyoming conditions. The wide distribution of these plantings on Wyoming Experiment Farms† together with additional plantings made by the Cheyenne Horticultural Field Station has made it possible to test vegetable varieties in all of the principal agricultural areas of the state. This work has been the means of accumulating many facts about varieties and methods of culture, and is the basis of the information contained in this bulletin. In addition, these plantings have had a demonstrational value. Many farmers and ranchers in the vicinities of experimental farms where these vegetable experiments were conducted have seen the possibilities of vegetables growing and have become acquainted with new vegetables, many of which have never been known before in the state.

The tests at the different state experimental farms were made over a period of several years. These farms differ widely in their soil and climatic conditions. In the western part of the state, the experiment farms at Afton, Eden, and Lyman are all irrigated and are about 6,500 feet in elevation. Their soils vary from a light sandy loam at Eden to a heavy clay loam at Lyman. Afton has a coarse, dark, gravelly loam. The average frost-free period is 53 days at Afton, 89 at Eden, and 92 at Lyman.

In the eastern part of the state, the experiment farms in general are lower in altitude, varying from 3,700 feet at Sheridan to 6,000 feet at Cheyenne. Dry farming methods are used entirely at Sheridan and Gillette, where the soils are medium loams.

The Torrington and Worland Experimental Farms, where irrigation is used, have elevations of about 4,200 feet, but the soil types are entirely different, Torrington having a very light,

†In addition to the garden variety tests made by the Cheyenne Horticultural Field Station near Cheyenne and at other places in the state, cooperative garden variety tests have been made at the experiment farms located at Afton, Eden, Gillette, Lyman, Sheridan, Torrington, and Worland. Experimental work at Worland was closed November 1, 1939. The Sheridan Station is operated cooperatively by the University of Wyoming and the United States Department of Agriculture.

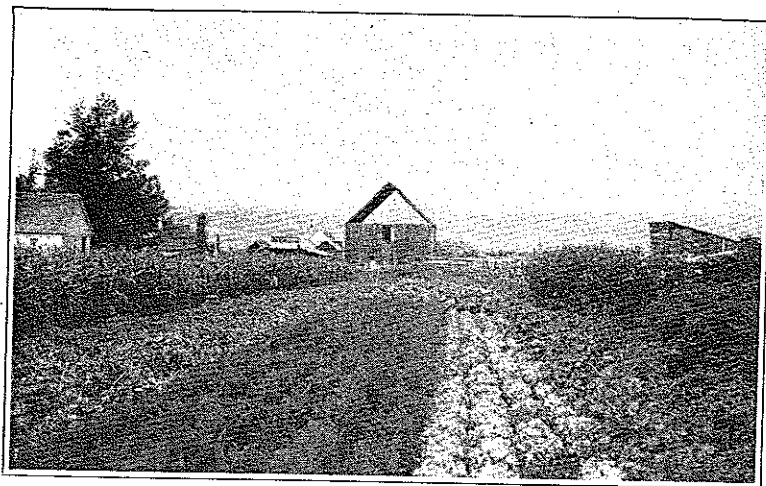
sandy loam, and the Worland station having a heavy, clay loam. These farms in the eastern part of the state have considerably longer growing seasons, the frost-free periods varying from 134 to 140 days. In this part of the state the summers are comparatively hot, a condition which makes the growing of certain cool-season crops a little difficult but which is ideal for many of the more tender crops.

Of course in each of the principal agricultural areas of the state there are places where conditions are not typical of those obtaining on the experimental farm serving that area. Seasons may be longer or shorter and growing conditions may be different due to altitude, canyon breezes, dead air pockets, unusual exposure, soil type, or other local factors. For example, a farmer on the west slopes of the Big Horn Mountains might have a much shorter and much cooler growing season than the experimental farm at Worland. Therefore, results of some of the high altitude stations might be more applicable to his conditions than those of the nearby experimental farm. However, Wyoming farmers and ranchers usually are well acquainted with these local variations and can modify their variety selections and cultural practices accordingly.

GENERAL INSTRUCTIONS

The garden should be located near the dwelling where spare moments can be used in tending the crops and where the various vegetables can be harvested readily when at their best. Land with a slight slope is better than flat land. At low altitudes where summers are hot an eastern slope is best. At altitudes of about 6,000 feet or higher a southern slope is preferred. A sandy loam soil is better for most vegetable crops than the heavier types. However, with good management successful gardens can be grown on all types of agricultural soil.

Windbreaks near the garden may or may not be beneficial. In areas having seasons long enough for tender vegetables to mature before fall frosts, windbreaks are beneficial in protecting plants from a storm damage and from drying summer winds. However, in areas having short growing seasons, windbreaks increase the danger from early fall frosts by preventing free air movement across the garden.



Irrigated garden in Lincoln County conveniently near the dwelling.

In irrigated gardens the rows should be spaced generally from 3 to 3½ feet apart, depending on the cultivating equipment available, except for asparagus, cucumber, muskmelon, watermelon, winter squash, and pumpkin that require about 6 to 7 feet between rows. On farms having tillage implements for narrow rows, such as a beet cultivator, root crops, onions, lettuce, parsley, and spinach may be spaced close enough to permit cultivation with such equipment. For dryland gardens these row spacings may be somewhat increased, but in general it is better to give plants more room by increasing the space between plants in the rows. The distances between plants suggested for various crops in this bulletin are generally those for irrigated gardens; for dryland gardens these distances should be increased from 50 to 100 per cent. An irrigated garden of from one-third to one-half acre should provide sufficient vegetables for an average family of five persons. Because of the greater spacing required between plants and the lower yields expected, a dryland garden should contain from three-quarters to one acre. Because dryland gardens should be planted on summer fallowed ground, an equal area should be summer fallowed for next year's garden.

Soil preparation should follow the best local practices for tilled crops. Barnyard manure is generally beneficial. On irri-

gated gardens it should be applied at the rate of 16 spreader loads to the acre and plowed under. For dryland gardens manure should be applied as a top dressing in spring, preferably in the summer fallow year, and worked into the surface soil with tillage equipment.

Commercial fertilizers are seldom necessary in Wyoming soils and may even do damage. Exceptions to this are found in areas long under cultivation where 50 to 150 pounds of treble-superphosphate per acre may be beneficial. Soil amendments such as lime or sulphur should not be used except on the advice of a soils specialist.

Cultivation is primarily for the purpose of controlling weeds. It should begin early when weeds are just starting and should be repeated whenever necessary to check weed growth. Cultivation should always be shallow.

For starting plants of tomato, pepper, eggplant, cabbage, cauliflower, broccoli, onions, and celery hot beds and cold frames are convenient. Instructions for their construction and operation will be found in U. S. Department of Agriculture Farmers Bulletin No. 1743.

To secure a continuous supply of crops such as corn, cabbage, carrots, etc., it is generally better to plant early, midseason, and late varieties at the same time rather than to make successive plantings of one variety.

Not all crops can be grown successfully under dryland conditions. Those crops generally adapted to dryland culture, where the soil is normally well supplied with moisture, are marked with an asterisk (*).

PERENNIAL VEGETABLES

ASPARAGUS, HORSERADISH, PERENNIAL ONION, RHUBARB

These crops are hardy in all parts of Wyoming and, as they furnish the first green vegetables of spring, they should be a part of every home garden. They should be planted by themselves, either at one side of the garden or in a separate space, where they will not interfere with preparation of the land for the annual crops. Perennial vegetables may be grown with very little irrigation, because they are harvested in early spring when

natural soil moisture is most plentiful. However, irrigation during the summer aids growth and increases yields the following spring.

**Asparagus: (36 to 48 plants or from 72 to 96 feet)¹*

Asparagus may be started from seed or by setting out 1 year old seedling roots purchased from seed houses or nurseries. The later method is usually best for home gardeners. However, if seed is used, it should be sown as early in the spring as possible at one inch intervals. One ounce of seed should produce 800 plants, and it is best to raise from three to four times as many plants as are required for the permanent planting in order that the small roots may be discarded. The seedlings should be left in the ground over winter and set in their permanent places the following spring. Seedlings or purchased roots are set in trenches 6 inches deep and spaced from 2 to 3 feet apart under irrigation or from 4 to 5 feet apart under dryland conditions. About 2 inches of soil should be placed over the crowns as they are set and the trench is gradually filled as the plants develop. No harvest should be made the first spring but during the second spring 2 or 3 cuttings may be taken. In subsequent years the cutting season can be extended, but should probably always cease by the middle of June to give the plants an opportunity to store materials for the following spring's crop. In harvesting, the spears are cut off about 1 inch below the soil surface when they are from 6 to 9 inches in height or before they start to branch.

If plants are purchased it is better to order large one-year-old crowns than two-year-old crowns, as the latter are sometimes injured by standing too long in the nursery row.

Varieties recommended for Wyoming are Mary Washington and Martha Washington, and of these most growers prefer the former variety.

**Horseradish: (12 to 24 plants)*

Horseradish is almost always started from root cuttings or sets taken from mature plants. Such sets may be obtained from seed houses or by digging up old plants and cutting off the side

¹This and similar notations in this bulletin refer to the number of feet of row space or number of plants in an irrigated garden required to supply an average family of five persons (two adults and three children.) For dryland gardens the number of plants or feet of row space will need to be increased from 50 to 100 per cent.

roots. These are usually from one-third to one-half inch in diameter and from 4 to 8 inches in length. They are set in shallow trenches in early spring and spaced about 2 feet apart. The roots are ready for harvesting the following spring and, if the side roots are trimmed off and replanted, a continuous supply of horseradish is assured.

There are not many varieties of horseradish. Most seed houses list only Bohemian (also called Maliner Kren).

**Perennial Onion: (25 to 50 feet)*

Of the perennial onions the Perennial Tree, or Egyptian, and the Potato, or Multiplier, are most common. The Perennial Tree onion is started by planting small onion-like sets or bulblets which are formed in clusters on the tops of the mature plants. These may be purchased from seed houses or secured from mature plants in established plantings. One pound of sets is sufficient for 100 feet of row. They are set from 4 to 5 inches deep and from 2 to 4 inches apart usually in August and will produce tender bunching onions the following spring. A few of these plants left unharvested will produce clusters of bulblets by midsummer and these may be used for planting. These mother plants should be lifted every 2 or 3 years and divided. The mature bulbs formed at the base of the mother plants may also be used in cookery. The Potato, or Multiplier onion, is started from sets which may be purchased or secured by lifting and dividing mature plants. They are planted and grown like Egyptian type but instead of top sets or bulblets the mother plants produce several small bulbs which may be used for eating or replanted to produce green bunching onions for spring use.

There are red and white types of the Perennial Tree, or Egyptian onion, the white type being more popular. Two or three types of Multiplier are known, differing mainly in color, and most seed houses list them as "Multiplier" or "Potato" sets.

**Rhubarb: (12 to 18 plants)*

As rhubarb does not come true to type if seed is used, new plantings should be started from sets or root cuttings. These may be purchased or they may be secured by lifting and dividing

old plants. Sets are planted in early spring in furrows and spaced about 3 feet apart under irrigation or from 4 to 5 feet apart on dryland. The sets should be planted in an upright position and covered with 2 or 3 inches of fine soil. Harvesting should be delayed until the plants are two years old and is accomplished by twisting or breaking (never by cutting) the leaf stalks from the plant. Not more than one-third to one-half of the leaves should be removed at any one time, and the plant should be allowed to recover before subsequent harvests are made.

Of the older varieties of rhubarb, Linnaeus (or Strawberry) is recommended for the home garden. Myatt's Victoria is also perfectly hardy, but not as popular because of its greener color. Of the newer varieties, McDonald is recommended. It produces medium-sized, red colored, stalks and seems well adapted to Wyoming conditions. Ruby, a popular variety in other parts of the country, does not seem to be hardy in Wyoming.

CABBAGE FAMILY

CABBAGE, CAULIFLOWER, BROCCOLI

These crops are started by sowing the seed indoors about 50 days before the average date for the last killing frost. One packet of seed will supply ample plants for a home garden. The seed is sown in shallow drills in boxes and covered tightly with fine soil and watered. Water must be applied carefully to prevent washing out the seed, and it is better to apply sufficient water each time to thoroughly wet all of the soil in the box and not to water again until it is absolutely necessary. This method of watering tends to keep the soil surface dry most of the time and thus prevents the spread of diseases that attack seedlings. The seed box should be placed where there is good light and a temperature of about 70 degrees F. When the first true leaves appear the plants should be transplanted into other boxes and spaced about $1\frac{1}{2}$ by $1\frac{1}{2}$ inches apart or they may be transplanted into tin cans or other containers. From the time they are transplanted until they are set in the garden they should be kept growing steadily and normally in good light and at a temperature between 65 and 75 degrees F. During this period the same care should

be used in watering as during the period when the seeds were germinating. Hardening of the plants is not necessary. Any check in the growth of the seedlings delays maturity and reduces yields. These crops are fairly resistant to frost injury and may be set in the field as soon as danger of severe frosts is past. A cloudy, cool day is best for transplanting to the garden. The plants should be watered as soon as they are set and the wet soil around the plants covered with dry soil to prevent its cracking. In transferring them from the containers in which they have been growing to the garden every possible precaution should be taken to avoid breaking off roots. Plants should be set in the field slightly deeper than they grew in the containers.

*Cabbage: (50 to 75 plants)

Early maturing varieties are usually smaller than late varieties and the plants are spaced from 18 to 24 inches apart under irrigation and from 30 to 36 inches apart under dryland conditions. The late maturing varieties are set from 24 to 30 inches apart under irrigation and from 36 to 42 inches apart on dryland. One packet of seed is sufficient for the average family. Cabbages are greatly benefited by irrigation but water must be applied with great care when the heads are nearly mature as a heavy watering at this time may cause bursting. Harvesting for summer use may be done at any time after the heads become firm. Cabbages may be stored for winter by placing them head down or on their sides in shallow trenches or in pits and covering them with sufficient straw to prevent freezing. Soil should be thrown over the straw to hold it in place. Sometimes alternate layers of straw and soil are used for coverage. Cabbage can also be stored indoors if placed 2 or 3 heads deep on shelves or in open boxes or crates. The storage room temperature should be from 32 to 40 degrees F and the air should be sufficiently moist to prevent wilting, but not so damp as to cause drops of water to gather on the heads as this promotes rotting. House cellars are seldom satisfactory storage places, but dugouts or caves can be made ideal at little expense.

The best early cabbage for all parts of the state is Golden Acre, an early strain of Copenhagen Market. Late set plants of

Golden Acre may be used for storage in such places as Lyman, Afton, and Eden where the later or better storage types do not always mature. All Seasons is also a fairly good storage variety for such areas. Early Jersey Wakefield is slightly later maturing than Golden Acre. It is not so sure heading at low altitudes, and does not store well. For areas such as Torrington and Sheridan, Glory of Enkhuizen is a good midseason variety for late summer and fall use and for making kraut. Danish Ball Head and Hollander are the best late or storage varieties.

Cauliflower: (18 to 24 plants)

One packet of seed is sufficient for the average family. Cauliflower plants are spaced from 18 to 24 inches apart under irrigation and from 30 to 36 inches apart on dryland. However, this crop cannot be recommended for dryland culture unless the soil is exceptionally well supplied with moisture. To produce a good, well-blanching head of cauliflower the head must be protected from the sun. This is done by gathering the leaves together and tying them over the head when it is slightly larger than a silver dollar. After tying, the heads increase in size rapidly until ready to harvest. The heads should be harvested when they reach their full size and before the individual units of which they are composed start to separate from each other.

The greatest difference between cauliflower varieties is in the length of time it takes for them to mature. For places like Torrington, Sheridan, or Gillette a late maturing variety such as Danish Giant (also called Dry Weather) is best because it matures during the cool days of autumn. At higher altitudes, as at Afton, Eden, Lyman, and Cheyenne, lower summer temperatures make it possible to grow both the early and late types and the varieties recommended are Early Snowball and Danish Giant.

**Broccoli: (6 to 12 plants)*

One packet of seed is sufficient for the average family. Plants in the garden are spaced from 18 to 20 inches apart in the rows. A continuous and liberal supply of water greatly increases the growth and quality of broccoli but it can also be grown fairly successfully on dryland. It thrives best in sections

having fairly low summer temperatures. At low altitudes it grows best during the cool months of autumn. The edible portions of broccoli are the immature flower parts which are formed in clusters, first on the central stalk of the plant and, after this is cut, on the lateral branches. Harvesting is accomplished by cutting off these clusters of buds together with a few inches of the stem. This should always be done before the buds start to open. Broccoli is cooked and served much like cauliflower.

Calabrese (Christmas Calabrese) can be grown in all sections of the state. However, if this variety is not available, any of the Italian green sprouting types will be satisfactory.

POT HERBS OR GREENS

COLLARDS, KALE, SPINACH, SWISS CHARD

Seed of these crops may be sown where the crops are to mature and the plants later thinned to the desired spacing. However, collards and kale are sometimes started indoors like cabbage and later transplanted in the garden. Seeding in the garden should be done from 5 to 7 days before the last killing frost. The seed should be sown in drills sufficiently deep so it will contact moist soil and covered with one inch of fine soil. All of these crops respond to irrigation and for best growth they should have a constant supply of water throughout the growing season. However, with the exception of spinach, fairly good crops can be raised under dryland conditions. Spinach is not well adapted to dryland, especially at altitudes under 5,000 feet.

**Collards: (25 to 50 plants or 40 to 80 feet of row)*

If planted directly in the garden collard seed is sown at the rate of $\frac{1}{4}$ ounce per 100 feet of row, and the plants are later thinned to stand from 18 to 24 inches apart. Plants started indoors are treated in all respects like cabbage. The edible part of collards is the leaves, and especially the rosette of leaves which forms at the top of the plants. In harvesting whole young plants are cut when they are about one-fourth grown or the rosette of leaves is cut from the tops of fully developed plants. Sometimes, too, the older side leaves are pulled from the plants. Although collards are edible anytime during the summer, their flavor is

improved by a slight frost, hence the main harvest should be made in the fall.

The variety most commonly listed by seedsmen is Georgia (or Southern), but Louisiana Sweet is supposed to have a somewhat better flavor.

**Kale: (25 to 50 plants or 40 to 80 feet of row)*

When kale is seeded directly in the garden, it should be seeded at the rate of $\frac{1}{4}$ ounce of seed per 100 feet of row. The plants are thinned to stand about 15 inches apart in the row. Kale may be harvested at any time after the plants reach sufficient size. However, best growth is made during the cool fall months and the flavor is improved by light frosts.

Dwarf Green Curled Scotch can be grown in all sections of the state, but Dwarf Curled Siberian is somewhat more heat resistant and is recommended for sections such as Torrington, Sheridan, Riverton, and Lander.

Spinach: (100 to 200 feet)

Spinach is planted directly in the garden at the rate of one ounce of seed per 100 feet of row. The plants are thinned to stand from 3 to 6 inches apart. Harvesting may be done at any time after the plants are large enough to use by cutting off the whole plant at the ground level.

Spinach is not dependable for such areas as Torrington, Sheridan, or Riverton, so no variety can be fully recommended. However, Princess Juliana, Nobel, (also called Giant Thick Leaved), and King of Denmark are as reliable as any. At Afton, Lyman, and Cheyenne, Princess Juliana will be found satisfactory. New Zealand spinach, which is not a true spinach but is commonly used as a substitute, withstands heat better and can be recommended for areas where true spinach does not thrive. However, it requires a long season and does not develop satisfactorily at altitudes above 6,000 feet.

**Swiss Chard: (25 to 50 feet)*

Swiss Chard is usually seeded in the garden at the rate of from $\frac{1}{2}$ to one ounce per 100 feet of row and the plants thinned

to stand about 6 to 10 inches apart. It can be grown in all sections of the state and is especially valuable as a greens crop for those areas where Spinach is not reliable. Removing the outer leaves as needed and leaving the plants to produce more leaves is the most satisfactory method of harvesting Swiss chard. By this method of harvesting one planting will provide a continuous supply of greens all summer and fall.

The most common variety is Lucullus, but Fordhook Giant has darker green leaves and makes somewhat more attractive greens.

SALAD CROPS

CELERY, LETTUCE, ENDIVE, PARSLEY

There are few cultural requirements common to all of these crops. They are grouped together on the basis of a common use. Celery plants are started indoors and the others usually are seeded directly in the garden. All of these crops are greatly benefitted by irrigation. In fact, celery and the heading types of lettuce cannot be recommended as dryland crops.

Celery: (25 to 50 feet)

Celery seed should be sown indoors from 10 to 12 weeks before the plants are to be set in the garden. One packet of seed will provide sufficient plants. The directions given for growing seedlings of the cabbage family also apply to celery, but because celery plants are more delicate even greater precautions should be taken to keep the surface of the soil dry to prevent damping off. After danger of frost is past the seedlings are transplanted to the garden and spaced about 6 inches apart in the row. In recent years green or unblanched celery has been gaining in popularity. However, if blanching is desired it should be started when the plants are about a foot high. This may be accomplished by placing boards along either side of the row and drawing their top edges toward the tops of the plants in the form of an inverted V, in order to exclude as much light as possible. Another method is to wrap individual plants with newspaper or wrapping paper. Tar paper spoils the flavor of celery. Celery may also be blanched by soil, which is drawn carefully

around the plants to exclude light from the stalks. From 2 to 3 weeks are usually required to produce well blanched celery. Plants intended for storage should be only partially blanched before lifting. Celery may be kept for a considerable time, either by leaving it in the field or by placing it in trenches or cellars. If left in the garden, the plants should be covered with straw and soil to prevent freezing. Celery may also be stored by lifting entire plants and setting them close together in a trench, the bottom of which has been wetted. When filled the trench is covered with boards and alternate layers of straw and soil are placed on top to a depth that will prevent freezing. In still another method of storage entire plants are lifted and set close together in a cool cellar. They should be set on moist soil and more water added as required. The air in the cellar should be moist, but not so humid that water collects on the plants.

Golden Self Blanching is recommended as an early variety in all irrigated parts of the state except where summer frosts occur. For lower elevations, such as Torrington, Sheridan, etc., Giant Pascal or the variety, Utah, can also be grown.

**Lettuce: (50 to 75 feet)*

Lettuce may be started indoors, but is usually sown in the garden where the crop is to be grown. It is seeded at the rate of $\frac{1}{2}$ ounce per 100 feet of row. If the crop is to be started indoors, from 35 to 50 days should be allowed for growing the seedlings. The directions given for growing plants of the cabbage family apply equally well to lettuce. Leaf lettuce can be grown either on dryland or under irrigation in all sections of the state. Head lettuce, however, is not as dependable at the lower elevations, although frequent and liberal irrigation does much to insure success. It is better adapted to high elevations, and can be grown fairly successfully on dryland at altitudes above 6,000 feet.

Grand Rapids is the best variety of leaf lettuce for all sections of the state. New York No. 12 is one of the most dependable of the heading varieties of the "Crisphead" or "Iceberg" type. Big Boston is fairly dependable, especially at higher elevations. It belongs to the "Butterhead" class and by many this

type of lettuce is considered superior to all others. White Paris is probably as reliable as any of the Cos lettuces.

Endive: (25 feet)

Endive, one of the richest sources of vitamins, is usually seeded in the garden where the crop is to be grown. From $\frac{1}{4}$ to $\frac{1}{2}$ ounce of seed is sufficient for 100 feet of row and the plants should be thinned to stand from 8 to 10 inches apart. Like most leafy vegetables, it thrives better at the higher elevations in this state, and in such areas it can be grown with fair success under dryland conditions. At lower elevations, such as at Torrington or Worland, and especially under dryland conditions, it is not dependable as it often goes to seed without forming an edible product. In harvesting, the whole plant is usually cut off at the ground level. It is sometimes used as a pot herb or greens crop, but it is more commonly used as a salad like lettuce. It is not usually blanched before use, but if desired the heads may be blanched by gathering up the outer leaves and tying them over the plant to exclude light. From 7 to 10 days are required for blanching, and the plants should be inspected frequently because rots sometimes develop during the process of blanching. Home gardeners should not attempt to save seed of this crop as plants that go to seed prematurely are inferior.

The variety, Green Curled, is the most popular of the cut-leaved type. Broad Leaved Batavian, or Escarolle, with relatively broad, entire leaves is also adapted.

**Parsley: (5 to 10 feet)*

Parsley is included among the salad crops because it is most frequently used for garnishing and in salads, though it is also used for flavoring in cookery. Seed is sown in the garden at the rate of $\frac{1}{2}$ ounce to a 100 feet of row and the plants are thinned to stand from 8 to 10 inches apart. Irrigation is beneficial but not necessary as this crop is fairly well adapted to dryland culture, at least after the plants become established. Parsley can be harvested for home use by simply cutting leaves from the plants and in this way a very few plants provide a continuous supply during the summer and autumn. Plants dug and potted in the

fall may be kept in the house during the winter for family needs.

Moss Curled is recommended for all sections of the state. Plain or smooth-leaved parsley, sometimes listed by seedsmen, is not as popular as the curled-leaved varieties.

ROOT CROPS

BEET, CARROT, PARSNIP, RADISH, RUTABAGA, TURNIP

With the possible exception of parsnips, the root crops listed are adapted to all parts of the state. Parsnips require a longer growing season than is usually found at elevations of about 7,000 feet. Root crops generally should be seeded directly in the open ground from 4 to 7 days before the average date for the last killing frost and covered with from $\frac{1}{2}$ to one inch of finely pulverized soil. Unless the crops are to be "irrigated up" the seeds should be placed in furrows deep enough to bring them into contact with moist soil. All of these crops respond to irrigation, but nearly all can be grown successfully on dryland. Parsnips are not well adapted to dryland culture. Root crops are important vegetables for winter use and the plantings should provide for both a summer and a winter supply. Beets and carrots are frequently canned. All root crops may be kept in storage except the early or summer types of turnips and radishes. Out door pits covered with alternate layers of straw and soil are satisfactory for storing root crops except that it is often difficult to get the vegetables as they are needed during the winter. Cellar storage is preferred wherever possible, and the temperature should not drop below 32 degrees F. or go above 45 degrees F. for any considerable period. To prevent roots from drying out in cellar storage they should be packed in dry sand using alternate layers of sand and roots. Sufficient sand should be used to prevent the roots from touching each other as this prevents spread of rot. Dry soil can be used instead of sand providing it is of a light, somewhat sandy texture. Stored in this manner roots of these crops will retain their garden freshness throughout the winter and even into the spring months. It is not practical for home gardeners to attempt to raise their own seed of these crops.

*Beets: (175 feet)

Beets are usually sown at the rate of from 1 to 2 ounces of seed per 100 feet of row. Some thinning out of the young plants is necessary. When fully thinned the plants should stand from 2 to 3 inches apart. If thinning is delayed until the plants are about 6 inches in height the removed plants make excellent beet greens. Harvesting may be done at any time after the roots reach a usable size and if the larger roots are selected at each harvest those remaining have a better opportunity for growth and the harvesting season is thus prolonged.

The list of recommended beet varieties is practically the same for all parts of the state. Crosby's Egyptian is probably the best early variety and Detroit Dark Red and Perfected Detroit are the best main crop varieties and most commonly used for storage. Half-Long Blood Improved is generally regarded as superior in quality to the round types and is recommended for late fall use and for storage in all parts of the state except those having extremely short growing seasons.

*Carrots: (150 feet)

Carrots are seeded at the rate of about $\frac{1}{2}$ ounce of seed per 100 feet of row. Some early thinning of the young plants may be necessary to avoid crowding of the roots, but the main thinning can be done by removing the larger roots as soon as they reach edible size. In this way the harvest season is extended and the remaining roots have a better chance to develop. The final stand of plants should be spaced from 2 to 3 inches apart.

Red Cored Chantenay is recommended as both an early and main crop variety for altitudes similar to Torrington and Sheridan. For higher elevations like Cheyenne, Laramie, Afton, Eden, and Lyman, Early Scarlet Horn is preferred as an early variety and the former variety for the main crop. Nantes (also called Coreless) is the highest quality carrot, and is recommended as a late fall and storage variety for all parts of the state. Imperator, a relatively new variety, may be grown in all parts of Wyoming as an early to midseason variety, but it is not as good for storage as those already named.

Parsnips: (50 to 100 feet)

Parsnips require the full length of the growing season for development in all parts of Wyoming, and where possible should be seeded somewhat earlier than the date suggested for most root crops. Seed is sown at the rate of from $\frac{1}{4}$ to $\frac{1}{2}$ ounce per 100 feet of row space and the plants should be thinned to stand from 4 to 6 inches apart in the rows. This crop is very sensitive to drought and should have a continuous supply of water for best results. Parsnips may be dug and stored for winter use or they may be left in the ground over winter for spring use. If left in the ground over winter, precautions should be taken to protect them from destruction by rabbits. Contrary to popular opinion, parsnips stored for a month or six weeks at a temperature of from 32 to 40 degrees F. are just as sweet and edible as those that have been frozen. Parsnips dry out more rapidly in storage than most root crops and so should be more thickly covered with sand.

The variety, Short Thick, is the best early variety for all parts of the state where parsnips can be grown and Hollow Crown (also called Guernsey) is the best late or main crop variety. Neither variety develops satisfactorily in areas similar to Lyman, Afton, Eden, etc., except in years with unusually long growing seasons.

**Radish: (25 to 50 feet or smaller succession plantings)*

Radish seed is sown at the rate of from $\frac{1}{2}$ to one ounce per 100 feet of row, and the short season varieties are ready for use in from 20 to 30 days after seeding. In some parts of the state, especially at the higher altitudes, winter radishes can be grown but seeding should be delayed so that the roots will mature just in time for storage. No fixed rule can be given for the date of seeding in all sections of the state, but for most localities it may be done from the middle to the last of July. Winter radishes are stored like other root crops.

Saxa, Early Scarlet Globe, and Sparkler are early red varieties that do well in all parts of the state, but perhaps Early Scarlet Globe is to be preferred as it does not become pithy as

soon as the others. Crimson Giant is about a week later maturing than such varieties as Saxa but can be recommended for its long standing qualities. White Icicle is probably the best of the long rooted, white varieties. China Rose and Long Black Spanish are the recommended varieties of winter radishes.

**Rutabagas: (100 feet)*

Rutabagas are seeded at the rate of from $\frac{1}{4}$ to $\frac{1}{2}$ ounce per 100 feet of row space and the young plants are thinned to stand about 8 inches apart in the rows. Rutabagas require the full growing season and are greatly benefited by frequent irrigation though fairly satisfactory crops can be grown under dryland conditions. On dryland the roots should be spaced at least one foot apart. The roots make their most rapid development during the fall and the crop is better adapted to higher elevations than to such areas as Torrington, Sheridan, and Gillette. Rutabagas should be left in the ground as long as possible without freezing.

American Purple Top (also called Long Island) is a yellow-fleshed variety recommended for such areas as Torrington, Sheridan, Gillette, and Cheyenne, but Early Neckless (also called Golden Neckless) is somewhat earlier maturing and is recommended for areas such as Afton, Eden, Lyman, and Laramie. Of the white-fleshed varieties, Sweet German (also called Sweet Russian) is recommended. It is slightly later maturing than American Purple Top.

Turnips: (50 to 100 feet)

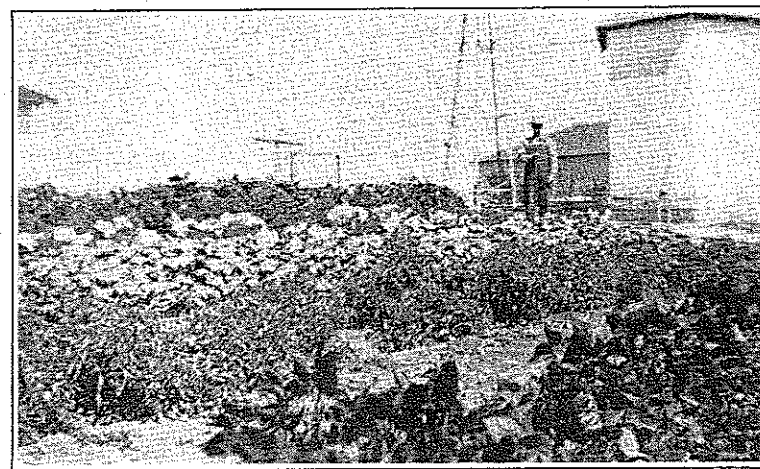
Turnips are seeded at the rate of $\frac{1}{2}$ ounce per 100 feet of row and the plants thinned to stand from 3 to 6 inches apart. The first thinning should remove plant clusters, and the next thinning may be delayed until some of the roots reach edible size. The tops of plants removed in thinning may be used as greens. Succession plantings at about 10-day intervals are possible in all but the highest elevations in the state. Roots from the late seedings can be stored for winter. However, they do not keep as well in storage as rutabagas, and later plantings may run to seed or become pithy. Turnips are not well adapted to dryland culture

unless the soil is exceptionally well supplied with moisture, and even then they generally develop a strong flavor.

Purple Top Strap Leaf, one of the very earliest varieties, can be grown in all sections of the state. However, it quickly becomes pithy under warm growing conditions and so cannot be fully recommended except for localities above 6,000 feet. For lower elevations Purple Top White Globe is recommended as an early variety and is also the best main crop variety for all parts of Wyoming. Cow Horn (also called Long White) produces a long irregular-shaped root but remains in good edible condition longer than other varieties and is also less pungent. Golden Ball (also called Orange Jelly), a yellow-fleshed variety, is well adapted as a fall crop for storage in such localities as Lyman, Evanston, Afton, and Eden.

BEANS

Beans should not be planted until all danger of frost is past. They are seeded directly in the field in drills or hills and should be covered with from 1 to 2 inches of soil. If planted under dryland conditions the drills should be deep enough to bring the seeds in contact with moist soil and this is also good practice even in irrigated gardens as it saves "irrigating up" the crop. Bush beans are seeded at the rate of about one pound of seed per 100 feet of row and pole beans at the rate of about $\frac{1}{2}$ pound per 100 feet of row. When plants of the bush varieties reach a height of about 3 inches they should be thinned to stand about 4 inches apart if grown under irrigation or about 6 inches apart if grown under dryland conditions. Pole types are usually planted in hills 3 by 3 or 4 by 4 feet apart. From 6 to 8 seeds are planted in each hill and later the plants are thinned to 4 plants per hill. Some support is desirable for pole beans. Though highly satisfactory crops can be grown under dryland conditions, irrigation increases yield and quality. For both pole and bush types of snap beans light, frequent irrigations may be given throughout the season or until the plants cease to bear. With limas, however, the supply of water should be greatly reduced as fall approaches because late applications tend to retard maturity. Snap beans of either the pole or bush types can be harvested at



Dry farm garden, Gillette Experiment Farm, with water tank for supplementary irrigation.

any time desired but are usually harvested when the pods are almost full grown and before the beans make any considerable growth. Limas and common beans, grown to be used as shell beans, are harvested when the beans in the pods are almost fully developed but before they start to harden. Frequent picking tends to increase yields and prolong the harvest period. If desired, a portion of the plants may be left unharvested to produce seed.

*Snap Beans: (200 to 300 feet)

There are many varieties of bush snap beans and practically any of them will do well in all parts of Wyoming excepting where hard summer frosts occur. The recommended varieties, therefore, are chosen largely on the basis of quality and earliness.

Green-podded, bush varieties: Tendergreen is one of the best, early, round-podded varieties but Giant Stringless Greenpod or Burpee's Stringless Greenpod can also be highly recommended. Bountiful is perhaps the best adapted of the flat, green-podded varieties.

Wax-podded, bush varieties: Pencil Pod Black Wax is the most reliable of the round-podded wax varieties and Sure Crop

Wax (also known as Bountiful Wax) is a good flat-podded wax variety.

Pole varieties: Blue Lake can be recommended as one of the best pole snap beans, though Kentucky Wonder Pole (also called Old Homestead) has given fairly satisfactory results, except in years of frequent rainfall when it is subject to disease.

**Shell Beans: (100 feet—more for canning)*

Shell beans are not generally adapted for culture in Wyoming but Dwarf Horticultural seems to be the most reliable variety. It is also used as a snap variety but is inferior to the snap beans previously mentioned. French's Horticultural is somewhat similar but seems to be less reliable.

Lima Beans:

All varieties of lima beans require a longer growing season and higher temperatures than common beans. For this reason the range of their culture is more restricted and even the earliest varieties cannot be recommended for climates similar to that of Cheyenne. Early Baby Potato Lima and Henderson's Bush are the earliest and best of the bush varieties for the lower sections of the state. Jackson Wonder is about as early as the other varieties mentioned, but many object to the dark color of the beans and to their rather strong flavor.

PEAS

**Peas: (300 feet for fresh use, more for canning)*

Peas are not easily injured by frost and thrive best under cool growing conditions. They should be planted about five days before the average date for the last killing frost. About one pint of seed should be sown to each 100 feet of row. It is sown in drills of sufficient depth to bring the seed in contact with moist soil and covered with about an inch of soil. If care is taken to sow the seeds from 2 to 3 inches apart, thinning of the plants is not necessary. Peas do well under dryland conditions especially at higher elevations, but irrigation increases yield and quality of this crop. Harvesting should commence when the peas in the pods are nearly full grown but before they start to harden,

because they quickly lose their sweetness after this stage is reached. Frequent harvesting tends to keep the vines bearing and prolongs the harvest season.

In those sections of Wyoming having the lowest elevations, such as Torrington, Sheridan, Gillette, and Worland, and in the sections having high elevations, such as Afton, Eden, Lyman, and Laramie, early maturing varieties of peas are most likely to be successful. In the first case, it is better to have them mature before the hot weather of midsummer and in the second case short growing seasons and low average temperatures make the use of early varieties advisable. Between these two extremes of altitude a greater choice of varieties is possible. Alaska, Carter's Eight Weeks (also called Radio) and Laxton's Superb (also called Early Bird) are smooth seeded extra early sorts that do well in all sections of the state, but their quality is somewhat inferior to that of the wrinkled type. Because of its filling ability, earliness, and quality, Little Marvel, is the best of the early wrinkled-seeded sorts. Thomas Laxton, Laxtonian, World Record, and Gradus (also called Prosperity) are fairly reliable. Alderman, Dwarf Telephone, (also called Daisy), and Stratagem Improved are the best of the midseason to late maturing varieties. Varieties such as Perfection, developed especially for canners, are not well suited to the home garden, as they mature their crop in a relatively short time, thus limiting the harvest period.

TOMATO FAMILY

TOMATO, PEPPER, EGGPLANT

Seed of these crops should be sown from 8 to 10 weeks before the plants are to be set in the garden. Seeding, care of young plants, and transplanting should be done as described for the cabbage family, except that the seedlings should be grown at somewhat higher temperature. These crops are extremely tender to cold and plants should not be set out until all danger of frost is past.

**Tomato: (24 plants for fresh use, from 50 to 75 for canning)*

Tomato plants are set in the garden from 3 by 3 to 4 by 4 feet apart. Training the plants on stakes or trellises in some cases

slightly increases earliness, but the practice is not generally recommended because of probable injury by wind and sunburn. Tomatoes are fairly well adapted to dryland culture, although with irrigation the fruits are larger and firmer. Where tomatoes are grown under irrigation sufficient water should be applied to promote normal, continuous growth until the plants blossom and set fruits, and then the quality should be greatly reduced to hasten ripening of the fruits. This use of water becomes increasingly important as the altitude increases.

For localities having climates similar to Sheridan and Torrington the varieties Danmark and Bison are good early sorts and Bounty, Firesteel, and possibly Speed or Millets Dakota are best for main crop planting. Danmark is especially well adapted to such areas because of its ability to set fruits during the hot weather of early summer. For sections having a climate similar to that of Cheyenne, Danmark and Bounty are recommended and also a small-fruited variety, Farthest North, can be grown. At Lyman, Eden, and Afton, tomatoes are not dependable for the production of vine ripened fruits, but in the average year green tomatoes can be harvested. Part of these can be ripened indoors.

Peppers: (12 to 24 plants)

Pepper plants are set about two feet apart in the garden. They should be given the same care as tomatoes. Sweet peppers used for stuffing are picked while still green and firm. If left on the plants they become red or yellow, depending on the variety. The ripe fruits, frequently used to give color to pickles, have the same flavor as when immature. Pimento peppers have sweet, thick flesh. They are commonly used in cookery, for salads, and for pickling, especially after they turn red. Hot peppers, likewise, may be either red or yellow when mature, but are also pungent when immature or green in color. They occur in a wide variety of shapes.

For locations similar to Sheridan, Torrington, or Worland, the variety, Early California Wonder, is the best general purpose, sweet or stuffing variety. It is earlier than the older strains of California Wonder. Worldbeater is another fairly satisfactory

main crop variety. For places having a climate similar to Cheyenne, Early California Wonder will usually bear well, but earlier varieties such as Harris Earliest, Harris Early Giant, or Neapolitan are more dependable. This crop is not reliable at Afton, Eden, Lyman, and similar locations, although in favorable years the earliest varieties yield some fruits. Sunnybrook (pimento) is a satisfactory variety for lower elevations and even at Cheyenne yields good crops in favorable years. Hot varieties are usually somewhat later maturing than the sweet-fleshed varieties and so only the earliest varieties should be planted. Hungarian Yellow Wax is a good early variety for the home garden and Floral Gem can be grown up to elevations of 6,000 feet.

Eggplant: (24 to 48 feet or from 12 to 24 plants)

Eggplants are set about two feet apart in the row and they require the same care with respect to cultivation and irrigation as tomatoes. The fruits are actually ready for harvest from the time they are the size of an egg until they start to turn soft or mature. They are usually harvested when from $\frac{1}{2}$ to $\frac{3}{4}$ of their full size.

Extra Early Dwarf Purple is a satisfactory early variety for all irrigated sections of Wyoming up to altitudes of about 6,000 feet. New Hampshire Hybrid is a midseason variety for such areas as Torrington, Sheridan, and similar locations, and is the latest maturing variety that can be recommended for the high altitudes. Black Beauty is from midseason to late in maturity and should be grown only at the lower elevations.

CUCUMBERS AND MELONS

CUCUMBER, MUSKMELON, WATERMELON

These crops can be raised from plants started indoors, but in most localities they are seeded directly in the garden. When started indoors, the seeds are sown in soil containers such as tin cans, pots, paper or veneer bands, or strawberry boxes about four weeks before the average date of the last killing frost. The care suggested for tomato seedlings is satisfactory for these crops, but special care should be used to avoid breaking off roots while they are being set in the field because plants of these crops

do not form roots as rapidly as most others. If the plants are started in berry boxes, bands or similar containers there is no need for removing the plants from the containers when they are set in the field, providing holes are made through which the roots can grow. Seeding in the open should not be done until all danger of frost is past. An ample quantity of seed should be sown to allow for some loss of plants by insects. All of these crops can be grown under dryland conditions, but all are benefited by irrigation. When grown under irrigation, the same method of applying water should be used as is suggested for tomatoes. These crops do not cross with each other in the field nor is the flavor of the fruits affected by proximity of other crops. However, varieties of the same crop do cross-pollinate one another, as for instance two varieties of watermelon, so seed should not be saved unless there is only one variety of a crop planted.

**Cucumber: (18 to 24 plants for fresh use, more for canning)*

When cucumbers are started indoors from 5 to 6 seeds are planted in each container. After they are set in the field and are well established, the plants should be thinned to 2 or 3 per hill. The hills should be about four feet apart and the rows six feet apart. If the seed is sown in the garden it is better to plant in drills. One seed every six inches should give a good stand of plants. When well established the plants should be thinned to stand from 18 to 24 inches apart in rows six feet apart. One-fourth ounce of seed is sufficient for 50 feet of row. Cucumbers are harvested by cutting the fruits from the vines. No fruits, whatever, should be allowed to ripen on the vines as this tends to stop production. The slicing types of cucumbers can be harvested when small and used for pickles or allowed to grow larger for slicers. Most of the pickling types are of inferior quality if allowed to develop to the size of slicers.

Practically any variety of cucumber can be grown in all parts of Wyoming up to those altitudes where summer frosts kill the vines. This frequently happens at Afton, Lyman, Eden, and similar places. For short season areas Earliest of All can be grown as a general purpose variety and for areas having longer

growing seasons Straight 8 and Colorado will be found satisfactory. Chicago Pickling is a good pickling variety for all areas and National Pickling and Mincu are also satisfactory.

Muskmelon: (12 to 24 plants)

Muskmelons may be started indoors or seeded directly in the field by the same methods as described for cucumbers. In the field, they require more room than cucumbers and if planted in hills the spacing should be about 6 by 6 feet. When the seeding is done directly in the field the plants should be thinned to stand from 2 to 3 feet apart and the rows should be about six feet apart. One-half ounce of seed is sufficient for 100 feet of row. Muskmelons for home use are best if harvested when the stem separates easily from the fruit. This stage of maturity can be determined by inspection of the fruits or by gently pulling on the stem with a twisting motion.

In Wyoming, muskmelons are not a dependable crop at altitudes greater than about 6,000 feet. Occasionally at higher elevations they may ripen a few fruits in very favorable locations, but only the earliest varieties such as Extra Early Osage, Extra Early Knight, Extra Early Hackensack, and Golden Champlain should be expected to succeed. In areas such as Torrington, Sheridan, Worland, and similar places, later maturing, higher quality melons can be grown. Such varieties are: Hales Best No. 36, Imperial No. 45, Hearts of Gold, and Sugar Rock (also known as Honey Rock).

**Watermelon: (12 to 24 plants)*

Watermelons can be started by the same methods described for cucumbers but they need more room for development in the field. Under hill culture the spacing should be at least 8 by 8 feet and when grown in rows individual plants should be spaced at least three feet apart. One ounce of seed is sufficient for 100 feet of row. Watermelons are not well adapted to dryland conditions, but are more drought resistant than muskmelons and can be grown with fair success on land naturally well supplied with moisture. When thumped or snapped with the fingernail a mature melon gives a deep, hollow sound whereas one that is not mature

has a sharper, higher pitched sound. Watermelons may be stored from one to several weeks in a cool, dry place.

Like muskmelons, watermelons are not a dependable crop in Wyoming at altitudes greater than 6,000 feet. However, for this altitude certain varieties are more dependable in producing ripe fruits than any known variety of muskmelon. Thus, at Cheyenne varieties such as Arikara, Earliest & Sweetest, Luscious Golden Sweet, and Sweet Siberian usually produce ripe fruits. At lower elevations such varieties as Early Kansas and Kleckly Sweet can be grown, but varieties much later maturing than Kleckly Sweet cannot be recommended even for the lower elevations.

SQUASHES AND PUMPKINS

WINTER SQUASH, SUMMER SQUASH, PUMPKIN

These crops have the same cultural requirements as melons and cucumbers. Where grown under irrigation the same method of applying water should be used as was suggested for tomatoes. However, for all except the lowest elevations in the state the selection of proper varieties of winter squashes and pumpkins is of greater importance than any cultural requirement.

*Winter Squash: (24 plants)

One-fourth ounce of seed should provide sufficient plants for the average family. All varieties of winter squash require a long growing season in which to mature. The plants are tender to frost and so this crop cannot be recommended for such areas as Afton, Lyman, or Eden, and even at Cheyenne crop failures are rather frequent.

For Cheyenne or similar locations, Banquet is recommended as the best of the first early winter squash varieties, but Buttercup and Arikara are also worthy of a trial. However, none of these keep as well in storage as Golden Hubbard, which is the earliest variety of the Hubbard group and the only one of this group that can be recommended for localities similar to Cheyenne. The same varieties are also recommended for such areas as Torrington, Sheridan, Worland, and like places, where, in addition, such varieties as Improved Green Hubbard and Blue Hubbard can be grown.

*Summer Squash: (6 to 12 plants)

One-fourth ounce of seed should be sufficient to supply the needs of the average family. The cultural requirements of summer squashes are like those of the melon crops. However, the summer squashes mentioned here have bush type plants and can be planted in rows from 3 to 3½ feet apart instead of the greater distances recommended for the vine types of winter squashes and pumpkins. The plants in the rows should be spaced about three feet apart. Summer squashes are used in an immature condition or at any time before the shells of the fruits start to harden. No fruits should be allowed to ripen on the plants as this seriously reduces yields. Summer squashes are usually prepared for the table by slicing and frying or by boiling or steaming. Because the fruits are picked while immature, they may be kept for only a few days. Seed of these crops will very likely be mixed if more than one variety is grown in the garden or if certain winter-type pumpkins are grown near them.

As all varieties of summer squashes are used before the fruits are mature they can be grown in any part of Wyoming up to those altitudes where summer frosts kill the plants. Recommended varieties are Early Yellow Bush Scallop, Early Prolific Straightneck, Yankee Hybrid, and Cocozelle Bush. The last named is sometimes listed as Italian Vegetable Marrow. It is rapidly becoming the most popular of all the summer squashes.

*Pumpkin: (24 plants)

Pumpkins are grown, harvested, and stored by exactly the same methods used for winter squashes.

Unless special protection is provided for the plants, pumpkins cannot be recommended for localities such as Afton, Lyman, or Eden. In average years the variety, Early Cheyenne, matures its fruits at Cheyenne and as it is also adapted to low elevations it can be recommended as the earliest variety for all sections where pumpkins can be grown. Small Sugar (also known as New England Pie) is somewhat later maturing than Early Cheyenne but usually matures its fruits at elevations up to 6,000 feet. Winter Luxury is about as early as Small Sugar but it does not

keep well in storage. Connecticut Field is a large-fruited, rather late maturing variety, suitable for such locations as Torrington, Sheridan, or Worland. Table Queen (or Acorn) requires about the same length of season as Small Sugar to mature its fruits. This variety is also used as a summer squash, but is included with the winter pumpkin because most people prefer to store the fruits for winter use.

CORN

SWEET CORN, POP CORN

Corn is usually seeded directly in the field but plants may be started indoors and set in the field after danger of frost is past. When plants are started indoors the cultural directions given for tomatoes can be used. Seeding in the garden is usually done at about the average date for the last killing frost. If grown in hills they should be spaced about three feet apart. From 5 to 6 kernels are sown in each hill and the seedlings are later thinned to three plants per hill. It is better, however, to sow the seed in drills and thin the plants to about one foot apart. The rows should be spaced 3 or $3\frac{1}{2}$ feet apart. One-fourth pint (or one-fourth pound) of seed is sufficient for 100 feet of row space. The seed should be planted from 1 to 2 inches deep. To secure well filled ears, sweet corn should be in a block rather than in a long planting of 1 or 2 rows. Thus, if 600 feet of row space is to be planted it is best to plant six rows of 100 feet across the end of the garden. Corn is well adapted to dryland conditions but yield and quality are increased by irrigation. Under irrigation sweet corn should have a continuous and liberal supply of moisture at all stages of growth. Late irrigations delay maturity but add greatly to the succulence of the ears. For this reason it is important to select varieties that are sufficiently early in maturing to make irrigations possible. With pop corn the supply of water should be greatly reduced after the ears begin to fill in order to hasten ripening. The practice of saving corn seed cannot be generally recommended, though there are conditions under which it may be safely done. With sweet corn it is safe to gather seed if only one variety of the older types, such as Golden Bantam or Country Gentleman, is grown. Seed of the newer hybrid



New garden vegetables introduced, Eden Experiment Farm.

varieties should not be saved even if only one variety is grown because such seeds "break up" into various types the second year and so are worthless.

*Sweet Corn: (300 to 600 feet)

Sweet corn reaches its highest quality and should be harvested when the kernels are in the late milk stage or when on pressing the kernels with the thumb nail their contents come out as a soft doughy mass. After this stage has been reached corn rapidly loses its sweetness through a changing of the sugars to starch. This same change is also very rapid in harvested ears but keeping them in a cool storage retards the process.

By selection of suitable varieties, sweet corn is a fairly reliable crop even at altitudes such as those of Afton, Lyman, and Eden. Moreover, at lower elevations in the state the harvest period for this crop can be greatly extended by seeding early, midseason, and late varieties at one planting. For areas as high or higher than Cheyenne, Pickaninny is a desirable variety and about the earliest true sweet corn. The plants are very dwarf and the ears small, but it is one of the sweetest varieties. Golden Early Market is slightly later maturing and produces larger ears.

It is also one of the highest in quality. Sunshine and Spancross 4.13 are third early, golden-kerneled types. They are very reliable at elevations such as that at Cheyenne. Spancross 4.13 is one of the new hybrid types and for home garden use has only one serious fault. Practically all of the ears mature at one time, thus greatly shortening its harvest season. Early Mayflower is a second or third-early white sweet corn of fairly good quality. Golden Cross Bantam can be used as a late maturing variety for elevations such as that of Cheyenne but is a midseason to late variety for lower elevations. For locations such as Sheridan, and Torrington, Stowell's Evergreen and Country Gentleman are late white varieties of high quality.

**Pop Corn: (150 to 200 feet)*

Pop corn is not a reliable crop for locations having the elevation of Cheyenne, but it can be successfully grown at lower elevations. Japanese Hull-less (also known as Australian) and White Rice are recommended. South American (T. N. T.) is a late maturing variety which can be recommended only for the very lowest elevations in the state.

ONIONS

The common onion is grown from either seeds or sets and there are but few cultural directions in common. However, all onions respond to frequent cultivation and where they are grown under irrigation they should have a liberal, continuous supply of water. They may be harvested for immediate use at any time, but for storing, harvesting should be delayed until the tops of the plants begin to wither and fall down. They may then be pulled and left on the ground or placed in an open building to dry. When the tops are perfectly dry they are twisted from the bulbs and the latter may be stored in a cool dry place.

**Onions from Seed: (200 feet)*

In the lower sections of the state, onions can be raised by seeding directly in the field. Onions are fairly hardy and the seed should be sown as soon as danger of severe frosts is past. Seeding evenly and rather thinly will avoid much thinning of

the plants. After the plants are well established they should be thinned to stand from 2 to 4 inches apart in the row. From this point on their culture is the same as that given to onions raised from transplanted seedlings or from sets. Even at the lower elevations, however, it is better for the home gardener to start his plants indoors and transplant the seedlings to the field soon after the average date for the last killing frost. To do this the seeds should be sown thinly in boxes or other containers about 8 to 10 weeks before the plants are to be set in the garden. Unlike other crops, onions are not transplanted into other containers but are grown continuously in the original seed box until they are as thick as a lead pencil, when they are ready to set in the field. Two hundred feet of row requires about one ounce of seed. Until they are transplanted to the garden onion seedlings should receive the same care as other crops. They are set in the field from 2 to 4 inches apart in shallow furrows and the soil is tightly packed about their roots.

Early Grano is the best first-early variety for all parts of Wyoming. Though it does not make as large bulbs as many other varieties, it is of the so-called "Spanish" type and very mild flavored. It does not keep in storage as well as some other varieties, but well-matured bulbs stored in a cool, dry place can be kept in good condition until January or February. Early Yellow Sweet Spanish is a little later maturing than Early Grano but when raised from seedlings is very reliable about maturing its bulbs at Cheyenne and usually does so at Afton. The Utah strain of Yellow Sweet Spanish ranks third in earliness. It usually matures its bulbs at Cheyenne. These latter two varieties produce bulbs of medium to large size, depending mainly on the spacing distances between plants. They are mild flavored and well matured bulbs keep fairly well in storage. Mountain Danvers appears to be about the earliest maturing of the American type of onions, but is not as reliable at Cheyenne as the three varieties previously mentioned. Yellow Globe Danvers and the red, white, and yellow varieties of Southport Globes cannot be recommended except for the lowest elevations in the state.

**Onions from Sets: (100 feet)*

Onion sets can be purchased from most seed houses and one pound of sets is sufficient for 100 feet of row. Light frosts do not injure them, so they may be planted in the spring as soon as danger of severe freezing is past. They are planted from 2 to 4 inches apart in shallow furrows and covered thinly with soil. Under good growing conditions they are ready for use as green onions in a few weeks, but if they are to be stored they should not be harvested until the tops wither and fall down.

Onions from sets can be grown in practically all parts of the state. They have been grown to maturity at all of the high altitude Experiment Farms and can be grown for use as green bunching onions at even higher elevations. Usually onion sets are listed as white, red, or yellow and some seedsmen list the variety, Ebenezer. The white sets are the earliest maturing but do not keep as well in storage as onions raised from the red or yellow sets. Ebenezer requires the longest season of all, but it is the best for storage.

The following publications of the Wyoming Experiment Station may be had upon request: (Revised list, January, 1941).

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