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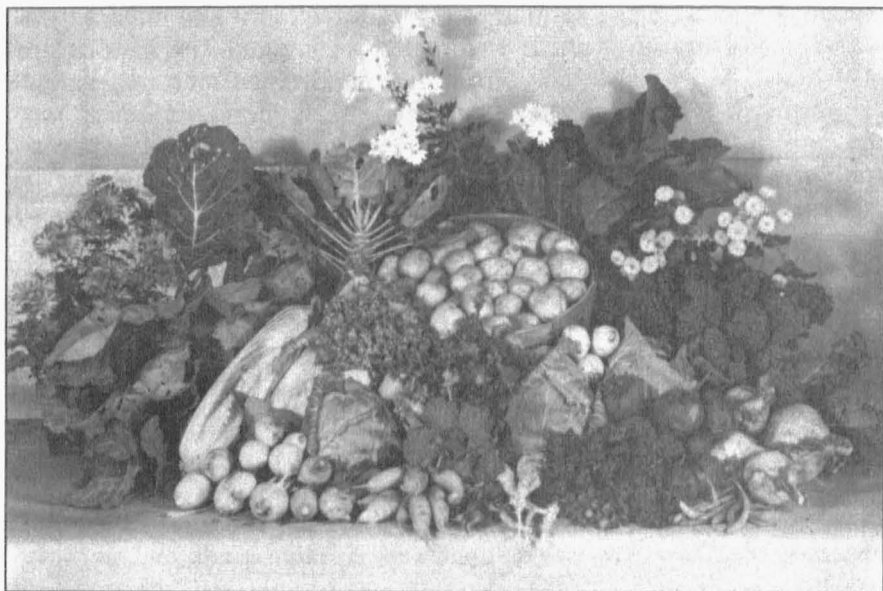
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Plant Late for Fall Vegetables

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Late plantings produce the choicest vegetables like the 19 kinds shown above. Such vegetables are just right for fall use and winter storage. All but two, Brussels sprouts and parsnips were planted after July 1. All were harvested November 3. Other vegetables in the picture are kale, rutabagas, beets, beans, mustard, radishes, lettuce, parsley, carrots, broccoli, endive, turnips, kohl-rabi, cabbage, Chinese cabbage, collards and Irish potatoes.

The full importance of late vegetable plantings in Missouri gardens is seldom realized. Too often the planting season ends about the

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middle of May with the seeding of beans, sweet corn and melons. For a continuous supply of fresh vegetables throughout the fall, careful plans must be made for late plantings. During seasons unfavorable for spring plantings, these late sowings are of increased importance. Frequently the fall garden is more productive than the spring garden. Besides providing a wide variety of vegetables for season use, better quality products can be had for storing and canning. Early spring root crops become overgrown and woody by the time they can be stored successfully. Fall grown vegetables are usually of higher canning quality than those which mature during the hot dry periods of midsummer.

Consider Drought and Frost

In planning the late garden, special consideration must be given to midsummer drought and an early killing frost. The average Missouri gardener can have a continuous supply of fresh vegetables until the first of December. This will require making the most of weather changes, together with a wise choice of suitable kinds and varieties.

Summer drought is the greatest single obstacle. The lack of moisture is most severe during the months of July and early August when it is dry and hot. There are several ways to offset the unfavorable effects of summer weather. Crops which require a long growing season can be planted the last of June. Then there is usually enough moisture in the soil to germinate the seed and permit the young plants to become established before the drought begins. Such plants will survive during the dry weather although making little growth. With good weather, they will complete their growth before frost.

For other vegetables the gardener may wait until fall rains commence; then he can seed those crops which can mature in the

growing season that remains. The hardy short season crops which grow best in cool weather may be planted at this time.

The spring store of soil moisture can be considerably conserved by keeping the land free of all plant growth. Most of the water in the soil is lost through growing plants. It is a good plan to reserve part of the garden from the first of the season for late plantings. If this plot is cultivated at regular intervals to kill weeds it will be ready for planting almost any time during the summer.

Early maturing crops like spinach, lettuce, peas and potatoes may be harvested and the land prepared for later planting. These crops may lower the soil moisture to where it must be replenished before seed will germinate. Nothing can be gained by sowing seed in dry soil. Late vegetable plantings should be delayed until there is enough moisture for germination and the maintenance of growth.

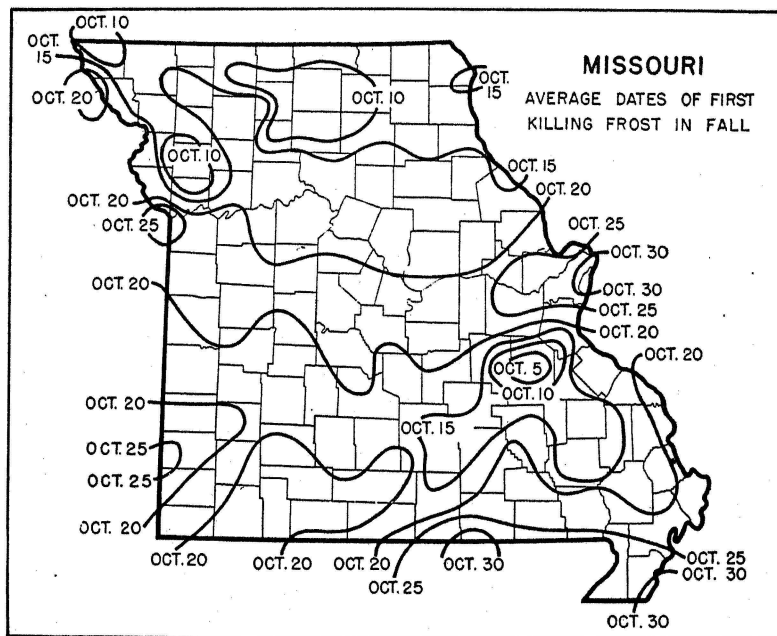


Figure 2.—The average date of the first killing frost in the fall in Missouri varies from October 5 to October 30. (From the U. S. Department of Agriculture Yearbook, "Climate and Man," 1941.)

Determine Length of Growing Season

The number of days left before the average date of the first killing frost in the fall must be considered when making a late planting.

There are a number of hardy vegetables like spinach, kale, turnips and broccoli that are not injured by freezing temperatures. The short days and cool weather prevailing after this date largely prevent further growth of even these crops. They will remain in good condition, however, until damaged by hard freezing weather.

Conditions are most nearly ideal for placing root crops in a pit or cellar storage at this time. Leafy vegetables like lettuce and endive can be shifted to a cold frame where they can be kept until mid-winter.

The map in Fig. 2 shows, in a general way, the average dates for the first killing frost in the fall. Frost can be expected around October 20 in most sections of the State. The exact date of a killing frost cannot be predicted but it rarely happens more than two weeks earlier or later than the average date. In the extreme northern part of the state and in the Ozark highlands, frosts can be expected as early as October 5. The extreme southeastern section of the state has the longest growing season. Frosts are not likely to occur there before November 1. There is a difference of three weeks in the average date of the first killing frost for areas within the state. Consequently, the latest dates at which a given crop can be planted and grown to maturity before cold weather will vary. A planting of snap beans may be made as late as September 1 in the southernmost lowland regions while for north Missouri and the Ozark plateau, a crop planted later than the first week in August would likely be injured. The date for the first killing frost in any locality may be secured by consulting the nearest U. S. Weather Bureau Station.

Plan Ahead for Late Vegetables

It is advisable to plan the late plantings before the spring garden is made. The easiest way is to set aside part of the garden for these late crops. Land heavily fertilized and manured before plowing for the early garden and then kept free from weeds by cultivation or mulching is in excellent condition for planting anytime during the summer. An application of a complete fertilizer such as 4-12-4, 5-10-5 at the rate of 600 to 1000 lbs. an acre broadcast and plowed under will provide sufficient plant food for the late crops. When handled in this manner the soil will hold the maximum amount of plant food and moisture at planting time. A firm, fine seed bed can be readily prepared any time on such land.

When land intended for late plantings has just produced a crop of vegetables, careful preparation is required to grow good late crops. Any crop or weeds should be mowed and removed before plowing. Turning under excessive vegetation just before planting leaves many air pockets which cause much loss of moisture. The layer of vegetable matter also tends to keep the plowed portion from contact with

the rest of the soil. This prevents the plant roots from penetrating to moisture in the soil below. Late plowing should as a rule be more shallow than that done in spring or winter. To prevent loss of valuable moisture, the soil should be leveled and compacted immediately after turning.



Figure 3.—Late vegetables planted in central Missouri after July 10. Picture taken September 5, 1945.

Provide Plenty of Plant Food.—Land heavily manured and fertilized in the spring will require little additional plant food. A well balanced fertilizer carrying 4 per cent nitrogen, 12 to 16 per cent phosphorus, and 4 per cent potassium is satisfactory for most vegetable crops under average conditions in Missouri. For the late planting the fertilizer may be broadcast and plowed under or placed in the bottom of the furrow as the land is plowed. Where this is not possible, it should be placed as deep as possible in bands alongside the row. Fertilizers applied as a top dressing or broadcast on the surface after plowing will not benefit the plant because they remain outside the reach of plant roots. Large applications of fertilizers placed too near the plants may cause serious damage when the moisture supply is low.

A fertilizer analyzing 4-12-4 may be used at the rate of 400 to 600 lbs. an acre in most gardens. This is equivalent to 10 to 15 lbs. per 1000 sq. ft. of garden area or 3 to 4 lbs. per 100 ft. of row when the spacing is 3 feet between rows.

CALENDAR FOR LATE PLANTINGS IN THE VEGETABLE GARDEN

For planting between June 15 and July 10 - 100 growing days to frost*

Vegetable	Suggested Varieties	Seed or plants for 100 ft. of row	Distance between rows+	Plants apart in rows	Depth to plant	Day from seeding to harvest
Beans						
Pole Snap	Kentucky Wonder	1/4 lb.	42 in.	36 in.	1 in.	70
Pole Lima	Carolina Sieva, Florida Speckled	1/4 lb.	42 in.	36 in.	1 in.	80
Bush Lima	Henderson, Thorogreen	1/2 lb.	24 in.	6 in.	1 in.	65
Dry Shell	Navy, Michelite	1/2 lb.	24 in.	2 in.	1 in.	100
Edible Soy	Bansei, Aoda	1/2 lb.	24 in.	2 in.	1 in.	100
*Beets	Detroit Dark Red	1 oz.	18 in.	2 in.	1 in.	60
*Broccoli	Italian Green Sprouting	1/8 oz. or 50 plants	36 in.	24 in.	1/2 in.	
*Cabbage-late	Flat Dutch, Wisconsin Ball Head	50 plants	36 in.	24 in.		100
Mid Season	All season, Globe, Marion-Mkt.	1/8 oz. or 50 plants	24 in.	24 in.	1/2 in.	70-100
Chinese	Chihili,	1/8 oz.	24 in.	18 in.	1/2 in.	75
*Carrot	Red Cored Chantenay, Imp. Nantes	1/2 oz.	18 in.	1 in.	1/2 in.	85
*Celery	Emperor, Utah Pascal	150 plants	36 in.	8 in.		130
*Collards	Cabbage, Louisiana Sweet	1/8 oz.	24 in.	18 in.	1/2 in.	90
Cucumber	National, Chicago Pickling	1/2 oz.	60 in.	36 in.	1 in.	60
Okra	Clemson spineless, White Velvet	2 oz.	36 in.	24 in.	1 in.	60
*Parsnip	Hollow Crown, Guernsey	1/2 oz.	24 in.	2 in.	1/2 in.	95
Pepper	Early Giant, King of the North	1/8 oz.	24 in.	24 in.	1/2 in.	80
Potato, Irish	McCormick, Peach Blow, Triumph	8 lbs.	36 in.	12 in.	4 in.	100
*Rutabaga	American Purple Top	1/4 oz.	24 in.	6 in.	1/2 in.	90
Sweet corn	Golden Cross Bantam, Ill. Golden #10	2 oz.	36 in.	24 in.	1 in.	90
Squash-summer	Early summer Crookneck, Acorn	1 oz.			1 in.	60
Tomato	Bounty, Victor	1/8 oz. 50 plants	36 in.	24 in.		85

For planting between July 25 and Aug. 15 - 70 growing days to frost^x

Vegetable	Suggested Varieties	Seed or plants for 100 ft. of row	Distance between rows	Plants apart in rows	Depth to plant	Day from seeding to harvest
Beans Bush Snap	Tendergreen, Tenderpod, Stringless Green Pod	1/2 lb.	24 in.	3 in.	1 in.	50
*Cabbage-early	Jersey Queen, Racine Mkt.	1/8 oz.	24 in.	24 in.	1/2 in.	70
*Endive	Ruffec, Batavian	1/4 oz.	18 in.	12 in.	1/2 in.	90
*Kale	Blue Curled Scotch, Dwarf Siberian	1/4 oz.	18 in.	12 in.	1/2 in.	60
*Kohlrabi	Early White Vienna, Purple Vienna	1/4 oz.	18 in.	6 in.	1/2 in.	70
Lettuce	Grand Rapids, Black Seeded Simpson	1/2 oz.	12 in.	6 in.	1/4 in.	50
*Mustard	Tendergreen, Southern Giant Curled	1/4 oz.	12 in.	3 in.	1/4 in.	45
*Spinach	Bloomsdale Savoy, Virginia Savoy	1 oz.	12 in.	2 in.	1/2 in.	45
Sweet Corn	Seneca Dawn, Gold Rush, Span Cross	2 oz.	24 in.	24 in.	1 in.	70
*Radish-winter	Chinese Rose, Black Spanish	1 oz.	12 in.	1 in.	1/2 in.	55
*Turnip	Purple top W. Globe, Golden Ball	1/2 oz.	18 in.	2 in.	1/4 in.	55

For planting between Sept. 1 and 10 - 40 growing days to frost^x

Lettuce	Grand Rapids, Black Seeded Simpson	1/2 oz.	12 in.	3 in.	1/4 in.	45
*Onion	Egyptian tree	1 qt. top sets	18 in.	4 in.	1 in.	30
*Radish	Crimson Giant, Scarlet Globe	1 oz.	12 in.	2 in.	1/2 in.	30
*Spinach	Bloomsdale Savoy, Virginia Savoy	1 oz.	12 in.	2 in.	1/2 in.	45

^x Planting dates for sections where first killing frost occurs Oct. 20.

*Crop not injured by hard frost.

+ Distance between rows given for hand cultivation. For horse or tractor cultivation use standard 42 inch row.

A soil with much organic matter is essential for the late garden. This point cannot be emphasized too strongly. Organic matter can be added by applying and plowing under during the previous fall or early spring liberal quantities of barnyard manure, leaves or rotted straw. A green manure crop turned under several months before planting would serve the same purpose. It is not advisable to attempt working these materials into the soil just before planting. If well rotted manure is available it can be used as a light surface mulch between the rows.

Select the Right Kind of Vegetables

Long-Season Crops.—Most vegetables can be planted as late as July 1 with a reasonable assurance of harvesting a fair crop. The long season crops, with proper care, will produce throughout the fall months. Tomatoes, sweet peppers, and eggplant, although started early, should bear until frost. Sweet potatoes and vine crops like watermelons, cantaloupes, pumpkins and winter squash make their normal growth during midsummer. They will not grow and mature satisfactorily during the cool fall months. Lima beans and okra will produce a partial crop when planted as late as the first of July. Garden peas and cauliflower are not dependable fall crops. Onions from seed and plants, intended for winter storage, will not have enough time to mature unless started early in the spring. Onion sets may be planted any time during the summer for green bunching onions. Top sets from winter onions may be planted for fall use. Those not used may be left in the row for spring use.

During late June while growing conditions are still favorable is a good time to plant root crops for storage. Carrots, beets, parsnips, rutabagas and Irish potatoes planted then will reach the best stage of maturity when they may be handled and held safely for later use. Cucumbers planted as late as the first of July will produce a good crop. The early varieties of sweet corn can be planted as late as August 1. Bush snap beans can be planted at intervals of two weeks until the middle of August.

If plants are available, late cabbage, broccoli and celery set in late June will produce good fall crops. Chinese cabbage seed sown at the same time will make sound heads by early fall. Either plants or seed of this crop may be put out as late as the first of August.

Short-Season Hardy Crops.—It is usually best to wait until after the first of August to plant the hardy vegetables. Seeding these cool season crops should be delayed until the soil is amply supplied with moisture and severe hot weather has passed.

Most gardeners plant a late crop of turnips. There are a number of other cool season vegetables that may be grown equally well with a little more care. Spinach, kale, mustard and collards will produce a supply of leafy greens for use until hard freezing weather. Endive and kohlrabi will add variety to the supply of vegetables. After the middle of August spinach, lettuce and radishes may be sown. Spinach planted as late as the first of September will produce a fall crop and may be carried over the winter for spring use in the milder sections of the state.

Sow Seed Carefully.—It is a waste of seed to plant in a dry, loose seedbed. The soil should be well pulverized and free from large open air spaces. No seed should be planted until there is sufficient moisture to germinate the seed and permit the young seedlings to become firmly established. Where water for irrigation is available the furrows to receive the seed may be filled with enough water to soak the soil to a depth of six to eight inches. After the surface has dried sufficiently to permit working the soil the seed may be planted.

In general, seed should be planted somewhat deeper than in the spring. Furthermore, the soil should be thoroughly compacted over the seed in order to bring it into firm contact with the moist soil. In small gardens the rows may be kept moist by covering them with boards until the seeds germinate. Mulching with fine straw or similar materials will prevent a hard crust from forming after heavy summer showers and also reduce the loss of moisture.

Cultivate to Kill Weeds.—The primary object of cultivation in the late garden is to control weeds. More soil moisture is lost through growing plants than from any other cause. Cultivation should be very shallow and only when necessary for weed control. Many gardeners mistakenly believe that stirring the soil and maintaining a fine mulch conserve moisture. Breaking the crust that forms after a rain aids in moisture conservation only by making the soil more receptive for the next rain.

After light rains the soil should not be stirred until the water has had a chance to penetrate, and the plants given time to utilize the moisture. The entire value of a light shower may be lost by cultivating too soon.

Water Thoroughly.—Water should not be applied unless the gardener knows he has an adequate supply available. Approximately 27,000 gallons of water are needed to equal one inch of rainfall on an acre of land. This amount will moisten the average soil to a depth of about eight inches. The use of less water than enough to soak the soil to this depth will probably do more harm than good since it may

cause the roots to concentrate near the surface. It will take at least two hours or longer for most soils to absorb an inch of water. If there is any slope or the soil is very compact, a longer time is required. This explains why most people fail to do a good job of watering by sprinkling with the ordinary garden hose and nozzle.

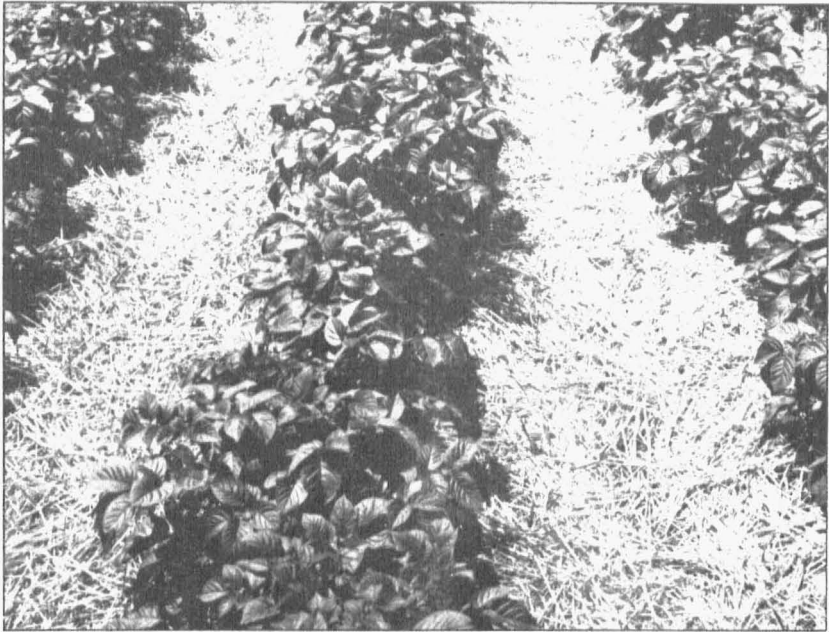


Figure 4.—A straw mulch conserves moisture in the late garden.

A system of overhead sprinklers most nearly approaches natural rainfall in securing an even application of water. Rotary sprinklers are much less expensive but do not apply the water as evenly. The types designed for irrigation do a better job than the ordinary lawn sprinkler. Water applied by allowing the hose or pipe to empty into open furrows is just as beneficial to the vegetables if the gardener has the patience to secure an even distribution and apply enough water to thoroughly soak the soil. The furrow method has the advantage of putting all the water directly in the soil where it is needed. Any irrigation system will be satisfactory if enough water gets into the soil. The water may be applied any time during the day without injury to the plants. The gardener should make actual tests as to the thoroughness of his irrigation. When the water supply is limited, apply it to the most valuable crops rather than attempting to give the entire garden ineffective irrigation.

Mulch to Save Water.—Loss of water can be checked considerably by mulching. Almost any type of organic material such as straw, spoiled hay or lawn clippings may be used. Even a thin layer will shade the ground and prevent evaporation. A layer several inches deep will suppress weeds.

Control Insects and Diseases.—Late vegetable plantings will be troubled by most of the enemies which attack spring sown crops. There is, however, less of a tendency for the seed to rot in the soil and for the young plants to be killed by fungus diseases since growth is very rapid. Such insects as cutworms are not active at this time. The most troublesome pests attacking late sown crops are flea beetles and aphids.

The flea beetles can be controlled by dusting the plants with insecticides. (See Missouri University Experiment Station Circ. No. 226 for further information for controlling these pests and other garden insects). A number of leaf diseases attack garden plants during warm humid weather. Most of these can be largely controlled by applying standard Bordeaux mixture or one of the new fungicides when the disease first appears. Spraying to control diseases on vegetable crops is not always successful since the disease may gain considerable headway before being discovered. Moreover, spraying with materials containing lime during dry weather increases the water loss from the plant. (For further information on the control of plant disease in the garden, consult Missouri University Experiment Station Circular 329.)

Continue to Plant.—During excessive spring rains, the usual early plantings of vegetables may be delayed or actually prevented. Crops already growing may be destroyed by floods, hail or late frost. Often the gardener may be unable to plant in the early spring. A good garden may be grown by starting as late as July 1. Practically all warm or long season crops may be sown at this late date. While these late plantings may not be as productive as those made earlier, they will usually produce a partial crop.

Tomatoes and other crops which are normally transplanted may be seeded directly in rows or hills and the plants thinned to the desired stand. This is a more dependable practice late in the season than attempting to grow the plants and then reset them in the garden. Plants usually secure a set back at transplanting which delays the time of maturity. Only the very early varieties should be attempted as late as July 1. The tomato varieties Bounty, Victor, Red Cloud and Earliana can be seeded at this time with a reasonable assurance that a crop will mature before frost.

A garden producing a good supply of fresh vegetables during the months of September and October is a source of satisfaction and pleasure to its owner. All too often what was once a good spring garden became a weed patch by fall. Seed from these weeds make hard work the next year. If the garden area is not planted to late crops a cover crop should be sown which will help improve the soil. To grow quality vegetables the soil must be maintained in a high state of fertility. This requires considerable expense for fertilizers, lime, manure and labor. To make a profitable return on this investment the garden should be made to produce the maximum amount of vegetables throughout the entire growing season.