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Late Plantings of Vegetables

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Figure 1.—Corn, beans and tomatoes are dependable crops in the late garden.

The full importance of late vegetable plantings in Missouri gardens is seldom realized. Too often the planting season ends 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 the full development of the spring planting plan, these late sowings are of increased importance. Frequently the fall garden is more productive than the spring garden. In addition to providing a wide variety of vegetables for use late in the

season, better quality products can be had for storing and canning. Root crops from early spring seedings 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.

Drought and Frost

In planning the late garden, special consideration must be given to midsummer drought and the event of killing frost in the early fall. The average Missouri gardener should be able to have a continuous supply of fresh vegetables until the first of December. This will require making the most of the changes in the weather, together with an intelligent selection 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 showers are infrequent and high temperatures prevail. There are several ways whereby the gardener can surmount the unfavorable effects of summer weather. Those crops which require a long growing season can be planted during the latter part of June while there is usually still sufficient moisture in the soil to germinate the seed and permit the young plants to become established before the drought period begins. Such plants will survive during the dry weather although making little growth. With the coming of favorable conditions, they will eventually complete their development before frost.

For other vegetables the gardener may wait until the fall rains commence; then he can seed those crops which can develop to maturity 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 if space permits to reserve a section of the garden area from the first of the season for the late plantings. If this plot is cultivated at regular intervals so that no weed growth develops, it will be in condition for planting at almost any time during the summer.

Early maturing crops like spinach, lettuce, peas, and potatoes may be harvested and the land refitted for later planting. These crops may lower the soil moisture to a point where it must be replenished before seed will germinate. There is nothing to be

gained by sowing seed in dry soil. Late plantings of all vegetables should be delayed until there is enough moisture present for germination and the maintenance of growth.

Length of the Growing Season

The number of days remaining before the average date of the first killing frost in the fall must be taken into consideration 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 prevent to a large degree further growth of even these crops. They will remain in good condition, however, until damaged by hard freezing weather.

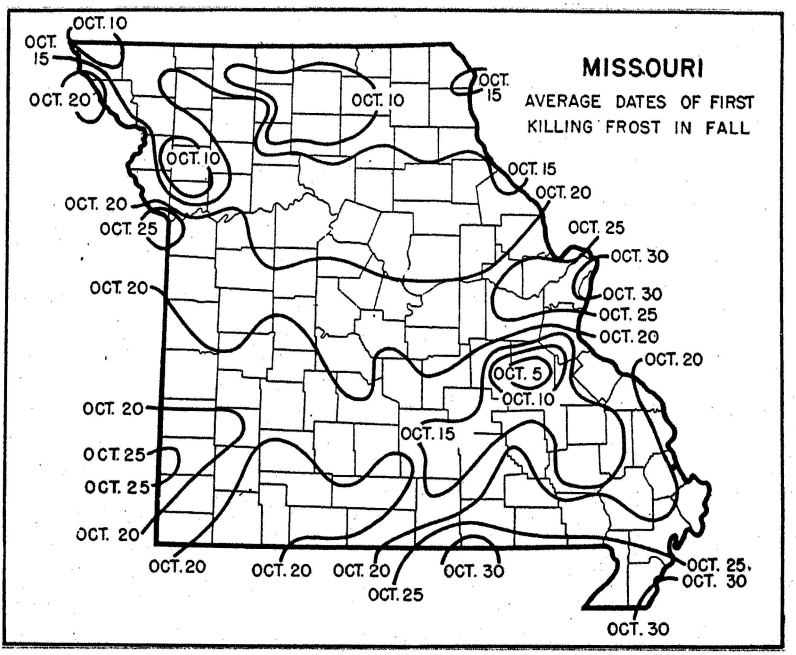

Figure 2.—The average date of the first killing frost in the fall in Missouri varies from October 5 to October 30. (From U. S. Department of Agriculture Yearbook, "Climate and Man", 1941.)

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 their period of usefulness may be extended until mid-winter.

The map in Fig. 2 shows, in a general way, the average dates for the first killing frost in the fall. It will be seen that this

frost can be expected around October 20 in most sections of the State. The exact date when a killing frost will occur 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 in that locality before the first of November. 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 sets in 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.

Vegetables for the Late Garden

Long-Season Crops.—Most vegetables can be planted as late as the first of July with a reasonable assurance of harvesting a fair crop. The long season crops, with proper care, can be maintained in a productive condition throughout the fall months. Tomatoes, sweet peppers, and eggplant, although started early, should bear until frost. The vine crops like watermelons, cantaloupes, pumpkins and winter squash make their normal growth during midsummer, therefore, they will not grow and mature satisfactorily during the cool fall months. Sweet potatoes, 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 at any time during the summer for green bunching onions. Top sets from winter onions may be planted for use in the fall. Those not used may be allowed to remain in the row for use the following spring.

During late June while growing conditions are still favorable is a good time to plant root crops intended for storage. Carrots, beets, parsnips, rutabagas and Irish potatoes planted then will reach the best stage of maturity at a time 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 the first of August. 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 the best policy to wait until after the first of August before planting the hardy vegetable crops. The seeding of these cool season crops should be delayed until the soil has been 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 will add variety to the supply of leafy 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.

Emergency Late Plantings

Occasionally, there are seasons with excessive spring rains. During such years the usual early plantings may be delayed or actually prevented. The planting date of practically all of the warm season crops may be extended until the first of July. While these late plantings may not be as productive as those made earlier, they will produce a partial crop.

Tomatoes may be sown directly in rows or hills and the plants thinned to the desired stand. This is a better practice than attempting to grow plants and then transplanting. The very early varieties such as Bounty, Victor, Red Cloud, and Earliana can be seeded as late as the first of July with a reasonable assurance that a crop can be harvested. Sweet peppers and egg plant may be grown in a similar manner although yields are likely to be low. Sweet potatoes, which produce the best yields when set early, may also be planted later.

Soil Preparation.—Land that has been fertilized, manured, and plowed for the early garden and then kept free of weeds by frequent cultivation is in excellent condition for planting at

CALENDAR FOR LATE PLANTINGS IN THE VEGETABLE GARDEN

For planting between June 15 and July 10 - 100 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						
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, Wong Bok	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
Potato, Sweet	Yellow Jersey, Porto Rico, Nancy Hall	75 plants	36 in.	18 in.		120
*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, Stokesdale, Pritchard	1/8 oz. 50 plants	36 in.	24 in.		85

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
For planting between July 25 and Aug. 15 - 70 growing days to frost[x]						
Beans						
Bush Snap	Tendergreen, Tenderpod, Stringless Green Pod	1/2 lb.	24 in.	3 in.	1 in.	50
*Cabbage-early	Golden Acre, Jersey Queen	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.

any time during the summer. Such soil has become well compacted, is charged with moisture and plant food, but has a loose layer on top which can be made into a seed bed with little labor. When the land intended for the late plantings has not been plowed or has produced a previous crop of vegetables, careful preparation is required if the late crops are to be successful.

With unbroken land any heavy growth of a crop or weeds should be mowed and removed before plowing. It may be composted or returned later as a mulch. The turning under of excessive vegetation just before planting may leave many air pockets which will cause an excessive loss of moisture. The layer of vegetable matter also tends to prevent contact of the plowed portion with the rest of the soil, thereby preventing the plant root from penetrating to the moisture in the soil below. Late plowing should as a rule be more shallow than that done in spring or winter. To prevent a loss of valuable moisture, the soil should be leveled and compacted immediately after turning.

Fertilizers and Manure.—Land that was heavily manured and fertilized in the spring will require very little additional plant food. Where a spring crop of vegetables or weeds has been grown, a liberal application of commercial fertilizer will be profitable. 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 plowed under or placed in the bottom of the furrow as the land is plowed. Where this is not possible, it may be placed as deeply as possible in bands alongside the row. Fertilizers applied as a top dressing or broadcast on the surface after plowing may remain outside the reach of plant roots because of the rapid loss of moisture from the surface layers of soil. On the other hand, large applications of fertilizers placed too near the plants may cause serious damage during periods when the moisture supply is low.

A fertilizer analyzing 4-12-4 may be used at the rate of 400 to 600 lbs. per 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.

A soil plentifully supplied with organic matter should always be used for the late garden. 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 be-

fore planting would serve the same purpose. It is not advisable to attempt working these materials into the soil late in the season. If well rotted manure is available it can be used as a light surface mulch between the rows.

Sowing Seed.—It is a waste of seed to attempt to plant in a dry, loose seed bed. The soil should be well pulverized and freed from large open air spaces. No seed should be planted until there is sufficient moisture present 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 sufficient 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 sown and covered with moist soil.

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 prevented from drying out 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.

Cultivation.—The primary object of all cultivation in the late garden is the control of weeds. More soil moisture is lost through growing plants than from any other cause. Cultivation should be as shallow as possible, and only as often as necessary for weed control. Many gardeners labor under the mistaken belief that stirring the soil and the maintenance of a fine soil 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.

Irrigation.—Water should not be applied unless the gardener has assured himself that he has an adequate supply available. Approximately 27,000 gallons of water are required to supply the equivalent of one inch of rainfall to 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.

Figure 3.—A straw mulch conserves moisture in the late garden.

This explains why it is almost impossible to do a good job of watering by sprinkling with the ordinary garden hose and nozzle.

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 purposes 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 vegetable crops providing 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 system of irrigation will be satisfactory if enough water gets into the soil. The gardener should satisfy himself by making actual tests as to the thoroughness of his irrigation. When the water supply is limited it should be applied to the most

valuable crops rather than attempting to give the entire garden area ineffective irrigation.

Mulching.—The 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 deeper layer of several inches will make the job of cultivation much easier by suppressing weed growth. Asphalt base building papers though expensive have been used as mulches with considerable success.

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 or they may be repelled by spraying with Bordeaux mixture (See Missouri 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 when the disease first appears. Spraying for the control of diseases on vegetable crops is not always successful since the disease may gain considerable headway before it is 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 Experiment Station Circular 238.)