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**MICHIGAN AGRICULTURAL COLLEGE**

EXTENSION DIVISION

R. J. BALDWIN, DIRECTOR

EAST LANSING

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## SUGGESTIONS FOR GROWING POTATOES.

### SOIL.

The ideal potato soil is a sandy loam or clay loam. A heavy clay or a very light sandy soil will not as a rule be satisfactory. The previous treatment of the soil has much to do with the suitability or lack of it for the potato crop. A soil of suitable type which is in a good state of cultivation and is fertile is very desirable. A clover or alfalfa sod on suitable soil is ideal. A grass sod may be satisfactory providing it is not infested with white grubs or wireworms. A quack grass sod should not be used if a better soil is available. Land which has been cultivated the previous season and which was left bare through the winter will not as a rule produce a very satisfactory yield of potatoes.

### PREPARING THE LAND.

For early potatoes fall or early spring plowing is desirable. Fall plowing is more common in the northern than in the southern part of the state, and is better suited to sod than to cultivated land. Fall plowing of sod is one means of controlling the white grub.

For the late crop, the land should be in clover or rye, and these crops should be permitted to grow as much as possible and yet not be allowed to rob the soil of moisture before plowing. If there is an abundance of rainfall the plowing of such land may be delayed with safety much later than when the rainfall is scanty. On the heavier types of soil the plowing should not be delayed until the ground has become hardened. Disking before plowing as well as after will help to make a desirable seedbed.

### FERTILIZERS.

Stable manure is the most economical fertilizer for potatoes. Land on which a good crop of clover or alfalfa grew the previous season may produce a satisfactory yield of potatoes without the application of

fertilizer in any form. However, the yield will be profitably increased on such land if stable manure is applied at the rate of eight to ten tons per acre. For maximum results 200 to 300 pounds of acid phosphate should be applied per acre in addition to the manure.

When the supply of stable manure is not sufficient, commercial fertilizer may be used to furnish needed plant food. Some form of commercial fertilizer may be used profitably on nearly all potato soils. On clover or alfalfa sod land, 250 to 500 pounds of acid phosphate per acre may be used. The heavier applications should be made on the heavier types of soil. For land which has not grown clover or alfalfa the previous season an equal amount of fertilizer containing 2 to 4 per cent nitrogen and 8 to 12 per cent phosphoric acid will be desirable. At times it may be impossible to procure such a fertilizer. If a complete fertilizer, carrying 1 to 2 per cent potash in addition to the nitrogen and phosphoric acid, is the only one available, it will still be more profitable to use such a complete fertilizer than none at all, providing the soil needs additional plant food which is the case with most soils used for potatoes. Unleached wood ashes, used at the rate of 500 to 1,000 pounds per acre, will supply a considerable quantity of potash and a small quantity of phosphoric acid. In a few cases where marl has been applied to the potato soil, the increase in yield has been very marked. Marl does not enhance the development of scab as much as other forms of lime.

*Method of Application.* Stable manure will give the best results when used on sod land if applied in the fall. Unless the manure is to be used on a very heavy sod, it should be applied before plowing rather than after as a top dressing. Whenever applied, it should be spread as it is hauled and not allowed to remain in piles. Only well rotted manure should be used as a top dressing.

To get the best results from the use of commercial fertilizers, they should be so applied that they will be incorporated uniformly with the moist soil. In field operations, this can be done best by applying the fertilizer with a potato planter or a grain drill having a fertilizer attachment. If such a tool is not available, the fertilizer may be spread evenly over the field by hand and thoroughly disked or harrowed into the soil. As a general practice, it is better to distribute the fertilizer evenly over the surface rather than to apply it in the furrows or hills. When 500 pounds or more are used per acre, 200 to 250 pounds may be applied in the furrows or hills and the balance broadcasted. When the application is made in the furrows or hills, the fertilizer should be thoroughly mixed with the soil before the seed is planted; otherwise there is danger of injury to the eyes or tender sprouts.

#### VARIETIES.

*Early:* The *Early Ohio* is a very early pink skinned variety of good quality. It is well suited to the garden when earliness is especially desirable. It is also grown commercially to some extent. *Irish Cobbler* is a white skinned variety a few days later but somewhat more prolific than *Early Ohio*. It is of a good quality and a popular market sort; well suited to garden planting and commercial growing. The *Triumph*

is a red skinned variety of good quality and appearance. It is about as early as the *Early Ohio* and in some cases more productive.

*Late:* Some of the varieties of the Rural group are grown more commonly in Michigan than those of any other group. The *Sir Walter Raleigh*, *Carman No. 3* and *Rural New Yorker No. 2* are the leading varieties of this group. All of the varieties of this group have purple blossoms and purplish stems. The *Russet Rural* or *Late Petoskey* is also a very desirable market variety in this state. Several varieties of the Green Mountain group are popular in sections where severe drouths are infrequent during August and September. The *Green Mountain*, *Delaware*, *Vermont Gold Coin* and *State of Maine* are the leading varieties of this group. All of the varieties of this group have white blossoms and green stems.

### SEED POTATOES.

*The Kind to Use:* First class seed should be free from varietal mixtures, true to type and practically free from disease.

Large seed is more likely to be free from certain diseases than small seed. Potatoes which are a little larger than a medium-sized hen's egg will be satisfactory for seed if taken from healthy, productive hills. While some of the most progressive growers use small-sized potatoes for seed, it is not considered safe to recommend this practice for all growers. In many sections of the state, potato diseases which are transmitted by means of the seed and especially the small tubers are more or less prevalent. A grower who plants small potatoes from a disease infected field will assume the risk of the same disease causing damage to his own crop. To secure a satisfactory crop under the variable and often adverse conditions with which most growers are obliged to contend, the best seed obtainable is none too good.

Tubers grown on plants which were killed by early frosts will not be injured for seed purposes by the frost damage to the vines.

Potatoes which have been frosted in storage are not safe for planting. If there is any question as to whether the potatoes intended for seed may have been seriously chilled, it will be a good plan to place a number of them in a warm, light place and test their germinating ability. If many of the sprouts fail to grow or make a slow weak growth, the potatoes should not be used for seed.

*Green Sprouting or Greening:* Seed potatoes which are exposed to the light for three or four weeks before planting will develop one or more heavy, tough, dark green sprouts, one-half to three-quarters of an inch in length. The plants from seed so treated will come up much sooner and mature a crop several days earlier than the plants from seed which has not been permitted to develop such sprouts before planting. Another advantage of this method of handling the seed is that the tubers will keep in much better condition for seed purposes when so treated than when left in a warm cellar or other storage place where long, tender, white sprouts develop that have to be removed before the tubers are planted. Green Sprouting will also enable the grower to discard all tubers which fail to "germinate" (develop sprouts) properly and which show varietal mixtures. According to some authorities, "Green

Sprouting" of the seed tubers makes the plants which develop from them resistant to certain diseases.

The ideal method of "Green Sprouting" the potatoes when a small area is to be grown, is to select those which are of the proper size to plant without cutting. Expose them to the light in shallow trays one layer deep, seed end up. Tubers which are too large to be planted whole may be "green sprouted" but the eyes at or near the seed end will develop more quickly than those near the stem end. This is especially noticeable with certain varieties such, for example, as the Rural group. The sprouts on some of the early varieties develop more evenly over the entire tuber. Growers who wish to "green sprout" large quantities of potatoes will find the following methods practical. Spread the tubers thinly, preferably one layer deep, on the barn floor or other large space where they will be exposed to as much light as possible. If sufficient floor room is not available, they may be placed in potato crates, one-fourth full, and so stacked that the light will reach all sides of the crates. An empty corn crib is a good place in which to stack the crates. The potatoes should not be placed where the rain will fall on them. They should be treated for scab and black scurf before they are exposed to the light for sprouting.

*How to Cut the Seed:* Potatoes planted whole will be less likely to rot in cold, wet soil than cut seed. Whole seed will also give a better stand on sandy soil than cut seed if the planting is done during hot, dry weather. When large potatoes are cut for seed, a common practice is to leave at least two eyes on each seed piece. The potato plant is dependent upon the seed piece for moisture and plant food for some time after it starts to grow or until a root system has developed. Therefore, the size of the seed piece should be sufficient to give the young plant a good start.

Potatoes large enough to make two pieces should be halved through the seed end. The seed end is the one having the largest number of eyes. When large enough for three pieces, cut one from the stem end about one-third of the length from the stem and divide the remainder of the tuber in halves through the seed end. Four pieces may be made from a potato which is roundish in form by cutting the tuber in halves lengthwise and then transversely, making four blocky pieces. The pieces taken from the stem end of the tuber should be slightly larger than those from the seed end. When the length of the tuber is greater than the width diagonal cutting is frequently practiced.

#### TREATING SEED POTATOES.

*Scab:* To prevent loss from this disease, the seed potatoes should be soaked 15 minutes in a forty percent solution of formaldehyde used at the rate of one pound or pint to 30 gallons of water.

*Black Scurf:* If there is evidence of Black Scurf, the dormant stage of which may be seen on the skin of the tubers in the form of small brownish or, when wet, nearly black spots, soak the tubers in a solution of corrosive sublimate (bichloride of mercury), using four ounces in four gallons of hot water and when this is dissolved, add enough water to make 30 gallons. The seed should be soaked in this solution for one-half hour. Use only wooden vessels for this material.

Corrosive sublimate is a deadly poison and should be kept away from children and live stock. Do not use treated potatoes for eating purposes.

*When and How to Treat:* The potatoes may be treated with either material several weeks, if desired, before planting if care is taken not to re-infect the tubers. Some growers prefer to treat just before planting. It is safest to do the treating before the seed is cut and when the eyes are dormant. When only a few bushels of potatoes are to be treated, they may be placed in gunny sacks and submerged in a water-tight barrel from which the head has been removed. When large quantities are to be treated, a tank should be provided for the purpose. The tank should be wide enough to allow two rows of crates to be placed in it side by side and deep enough so the potatoes, crates and all, can be submerged. It may be made any length desired. As soon as the potatoes are treated, it is a good plan to submerge them in clear water or pour water over them to prevent further action of the material with which they were treated. If the potatoes are to be kept for some time before being planted, they should be spread out and dried before they are sacked or crated.

#### DISTANCES OF PLANTING.

On the lighter, less fertile soils, potatoes are planted, in this state as a rule, thirty to thirty-six inches each way. Rowing the hills both ways enables the grower to cultivate both ways. This is an advantage when it is necessary to control bad weeds or grass, such as quack grass. However, by employing the right method of cultivation (see cultivation) drilled potatoes may be kept free from weeds without much or any handwork being necessary. On the more fertile soils, the more common practice is to space the rows 32 to 36 inches apart and the hills 12 to 18 inches apart in the rows. The more fertile the soil the closer the potatoes may be planted. Early potatoes may be planted closer than late potatoes. Horse planters do not check-row the potatoes but they can be set to plant different distances in the rows.

#### CULTIVATION.

In field operations, a spike-tooth harrow is the best tool to do the cultivating with until the potatoes are high enough to prevent its use. Beginning a few days after the planting is done and continuing every few days until the plants are two or three inches high, the harrow should be run one way and then the other across the field. If there is danger of disturbing the tubers or pulling out the young plants, the teeth of the harrow may be slanted. A garden rake may be used for the same purpose on small patches of potatoes. If this work is done thoroughly, there will be little or no handwork necessary throughout the season, providing the later cultivations are efficient. As soon as the potatoes are high enough to make the rows apparent, the cultivation in the rows should be started. The first cultivation should be deep and close to the hills or plants. Each cultivation after the first should be somewhat more shallow than the preceding one until toward the last of the season, when only the upper inch or two of the soil should be disturbed. A one-horse, home-made, plank drag made just wide enough to work

nically between the rows is an excellent tool to use for the last few cultivations in the potato field. Such a tool may be used after the potato tops are large and spreading without danger of injury either to the tops or roots.

### POTATO SPRAYING.

*Beetles:* To control the Colorado Beetle (common potato bug) in field operations, use  $\frac{1}{2}$  to 1 pound of paris green to 50 gallons of water or bordeaux. Some growers use the paris green much stronger than here recommended but with the present high price and scarcity of this poison, it is especially important not to use it stronger than necessary to be effective. Arsenate of lead is used at the rate of 3 pounds of the paste or  $1\frac{1}{2}$  pounds of the powder to 50 gallons of water. The paris green and arsenate of lead may also be combined, in which case a smaller quantity of each should be used than when they are applied separately. The paris green acts more quickly than the arsenate of lead but the latter sticks to the foliage longer and is less likely to burn it. The poison should be mixed with a small amount of water before diluting. Other poisons which may be used as substitutes for arsenate of lead are: Powdered arsenate of calcium, arsenate of calcium (Kedzie mixture) and arsenate of zinc.

It is frequently more convenient, especially on small areas, to use the poison in powdered form. When so applied, it should be diluted with hydrated or air-slaked lime or land plaster. The amount of diluent recommended varies from five to twenty pounds to each pound of poison. The paris green will stand more diluting than the arsenate of lead.

The dust applications may be made by means of dusting machines or through coarse cloth or doubled mosquito netting. The dusting may be done most effectively when the foliage is moist.

To be most effective, either the liquid or powdered form of poison should be applied as soon after the beetle eggs are hatched as possible. Delay in making the application means greater difficulty in poisoning the larvae and the longer they are permitted to feed the greater the damage to the foliage.

*Aphis:* The potato aphis or louse is most likely to appear during season of excessive moisture and especially after a cold wet spring. This insect can be controlled by the use of 40 per cent nicotine sulphate, applied at the rate of one pint to 100 gallons of water to which is added from 3 to 4 pounds of laundry soap. To be effective, the spray must be so applied that it will come in contact with the aphids which persist in remaining on the under sides of the leaves as they feed on the juices of the plants.

*Diseases:* *Early and Late Blight* of potatoes are preventable to a large extent. Bordeaux mixture is the material used for this purpose. It is made by combining 4 pounds of blue vitriol (copper sulphate), 4 pounds of stone or 5 pounds of hydrated lime to 50 gallons of water. A film of the bordeaux spread over the foliage protects it against an attack of the blight spores. Thus to be effective, the foliage must be covered with bordeaux before the spores of the blight germinate on the leaves and it must be kept covered with bordeaux throughout the season. Bordeaux can be combined with paris green or arsenate of lead. The applications of bordeaux should begin when the plants are five or six inches high.

The first application can often be made at the time when it is necessary to spray to control the potato beetles. Five to seven applications of bordeaux are usually necessary during the season. More frequent applications should be made during a wet season than would be necessary during a dry one.

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This bulletin was written by C. W. Waid, Horticultural Department, Michigan Agricultural College, East Lansing, Michigan. For further information write direct to the Horticultural Department.



