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GROW BETTER POTATOES

STOP THE LEAKS IN CROP PRODUCTION

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SELECTION OF SEED IN THE SPRING

Select potatoes that show vigor, health, and high yielding qualities. Superior strains have been developed in some varieties of potatoes as a result of careful selection; such strains show uniformity, vigor, and health. It does not pay to attempt to build up a poor strain by selection.

If the strain grown is unsatisfactory, get a better one. The past performance of a strain is a good indication as to what it will do in the future.

Do not introduce disease into the soil with the seed. Consider disease when selecting potatoes; treat the seed.

Discard, for seed, tubers showing rots or brown discolorations, either within the tuber or at the stem end. Such tubers, as well as knobby, irregular, "off shape," and very small tubers, can be eliminated in the process of sorting, racking, and cutting. It may not be practicable to select individual choice tubers for the general field, but this should be done for the seed plot.

TREATMENT

Tubers showing scab or black scurf on the surface should be treated with formaldehyde or corrosive sublimate. Treatment is valuable because it cleans the seed. Corrosive sublimate is ordinarily recommended, but on account of its high price this year, it may be advisable to restrict its use to potatoes for the seed plot, using formaldehyde for the general field.

Table I gives the results at University Farm summarized for three years, considering particularly black scurf (Rhizoctonia).

TABLE I. TREATMENT OF SEED POTATOES AND RESULTS OBTAINED AT UNIVERSITY FARM FOR THREE YEARS

Treatment	Strength	Time—Hours	Av. percentage of crop free from black scurf
Copper sulphate.....	3 pounds to 50 gallons water..	2	57.9
Corrosive sublimate.....	4 ounces to 30 gallons water..	2	52.0
Formaldehyde solution..	1 pint to 30 gallons water..	2	45.9
Lime sulphur.....	1:40.....	2	37.7
Lime sulphur.....	1:30.....	2	26.5
Check, no treatment....	.....	..	25.1

Treatment with copper sulphate solution offers promise. It gave good results also as to yield. It is worthy of trial, altho it is desired to carry on

further experiments before recommending the solution for general use. It is hoped that copper sulphate treatment may lessen somewhat the danger of infection from the soil.

Barrels may conveniently be used for treating potatoes. Make holes near the bottom to draw off the solution when through treating.

Make formaldehyde solution by mixing one pint of formalin (40 per cent) with 30 gallons of water. Soak the seed in the mixture about two hours. The mixture may be used four or five times.

Make corrosive sublimate solution by mixing four ounces of the sublimate with 30 gallons of water. Dissolve first in a small quantity of hot water, then add it to the remainder of the water. Keep treated potatoes away from livestock, as corrosive sublimate is a deadly poison.

Do not allow metals to come in contact with corrosive sublimate solution, for it injures them. Soak the seed for about an hour and a half. Use the solution three or four times.

Dry the potatoes after treatment. Seed potatoes are sometimes injured by being allowed to remain wet after treating. The seed may be cut at once and then allowed to dry, or the seed may be cut first, then treated, then allowed to dry or planted at once.

Use clean bins, sacks, baskets, or other containers to avoid contamination after the potatoes are treated or cut. The bin should be scrubbed out with a disinfectant (1 pint formalin to from 10 to 15 gallons of water; or copper sulphate solution, 1 pound to 10 gallons water.)

For small plots, sun-sprouted seed may be used, that is, plots that may be planted by hand. Seed potatoes are put where the sun or bright daylight will strike them until short, tough, green sprouts are formed, which come through the ground sooner. Discard tubers that do not show vigorous sprouts.

CUTTING

Cut the seed by hand. Discard diseased and undesirable tubers when cutting. To avoid spreading rots and other diseases with the cutting knife, two knives may be used, one kept in a solution of poison until a rotted tuber is cut into with the other.

Sulphur dusted over cut seed aids in drying the pieces and is of some value as a disinfectant. Put cut seed only in a clean bin; allow it to dry off soon; shovel it over; spread it thin. With careful handling, seed may be kept from one to three weeks after cutting.

ROTATION

Rotate crops. This is important; it avoids the accumulation of disease in the soil.

Potatoes grown on the same soil at University Farm for three successive years gave the following results:

Third year ..... 96.6 per cent germination, yield per square rod, 28 lbs.
In rotation ..... 96.6 per cent germination, yield per square rod, 41.8 lbs.

The decreased yield was largely due to diseases present in the soil.

A legume (clover, alfalfa, etc.) in the rotation enriches the soil, and when plowed under lessens the danger from scab and other diseases.

CULTURAL PRACTISES

Plow deep for potatoes. The plants can not grow vigorously without plenty of loose soil. Do not, however, add more than an inch to the depth of plowing each year.

Do not plant too early. Cold, wet soil may cause the seed to rot.

Practice clean cultivation. More vigorous plants result. The absence of weeds means better air circulation and less danger from blights.

THE SEED PLOT

Demonstrations carried on in Minnesota show the value of establishing and maintaining a seed plot. Table II shows what can be done by a little attention to seed selection and disease control.

TABLE II. RESULTS OF SEED SELECTION AND DISEASE CONTROL

County	Date	No. of plots	Average yield of plots per acre	Average yield of fields per acre	Average increase in yield per acre
			Bu.	Bu.	Bu.
Clay	1914	6	194	126.0	68.0
Clay	1915	10	130	86.0	44.0
Clay	1917	6	101	72.0	24.0
Hennepin	1915	9	192	162.5	28.5
Otter Tail.....	1916	9	118	95.0	23.0

Altho some of the individual differences were small, the tubers produced on the seed plots were in all cases of much better quality and more true to type and were less affected by disease.

Similar results can be obtained by establishing and maintaining a potato seed plot. Select a piece of ground in which potatoes have not been grown before. Select the seed to be used in this plot carefully with regard to type and freedom from disease.

By careful selection, control of diseases, and good cultural practices, and by growing varieties best suited to local conditions, an increase in yield of from twenty-five to fifty per cent, and a great improvement in quality may reasonably be expected.

Keep up the practice of growing a seed plot every year. It is preferable to select the seed for the seed plot at digging time because then the kind of stock the seed tubers come from is known. However, in order to get a start this year, bin selection must be resorted to. Select only sound tubers, true to varietal type, free from bruises and diseases, and weighing from six to eight ounces. If wilt was present in the field where the tubers were grown last year, cut off the stem end of every tuber to be planted in the seed plot, as this disease may be carried over in the tuber in the form of a brown ring discoloration. This precaution is necessary because there is no indication of the disease on the outside of the tuber.

Avoid using any tubers that show a tendency to "run out." It is a good policy to discard all such stock and to obtain seed from some grower who has a good, heavily producing strain of the desired variety. Treat the selected tubers in a solution of formaldehyde or corrosive sublimate as described under "Treatment."

Rogue the seed plot carefully at blossoming time. This means remove all undesirable plants, such as varietal mixtures, weak and diseased plants.

Spray the seed plot thoroly.

SPRAYING

Write to the State entomologist, University Farm, St. Paul, for Circular 47, Some Insects Injurious to the Potato, by S. A. Graham.

Spray with Paris Green, about 1 or 2 pounds to 50 gallons of water; or with **lead arsenate,** about 1½ pounds of powdered or 3 pounds of paste to 50 gallons of water, for beetles ("bugs").

Spray with Bordeaux mixture to avoid blight and to increase yield. The following results obtained for the last nine years show that spraying pays. The time of spraying is not so important as keeping some of the Bordeaux present on the leaves. In 1917, three thoro sprayings were given, July 20, August 9, and August 21.

1909-1915 results, total increase in yield per acre, bu.		441.0
1916 results (2 sprayings)		
Early Ohio, increase per acre, bu.	24.0	
Rural New Yorker, increase per acre, bu.	38.3	
Average increase per acre, bu.		31.1
1917 results (3 sprayings)		
Early Ohio, increase per acre, bu.	46.0	
Rural New Yorker, increase per acre, bu.	35.4	
Average increase per acre, bu.		40.7
Total increase, 1909 to 1917, bu.		512.8
Nine-year average annual increase per acre, bu.		57.0

Neither 1916 nor 1917 was particularly favorable for potatoes, 1916 being hot and dry, and the early frost of 1917 cutting the yield of the sprayed plots, particularly by killing the vines prematurely, altho no late blight was present either year.

Spraying with Bordeaux mixture was beneficial. Bordeaux mixture having been shown to give the best results in spraying, tests of different strengths were made in 1917 to determine if a weaker solution would give good results in Minnesota. The results are given in Table III with "Tonicide," lead arsenate, and Paris green sprays as checks.

TABLE III. RESULTS OBTAINED FROM SPRAYING POTATOES WITH VARIOUS MIXTURES

Treatment	Average yield, early and late varieties, bu. per acre
5–5–50 Bordeaux mixture	144.4
4–4–50 Bordeaux mixture	126.0
3–3–50 Bordeaux mixture	125.4
2–2–50 Bordeaux mixture	115.7
12–50 Tonicide	127.5
2–50 Lead arsenate	106.0
1–50 Paris green	103.7

Bordeaux mixture prevents or lessens blights (early and late) and tip burn. Its use pays, even if disease is not present, for the leaves remain green and vigorous longer in the fall.

Make Bordeaux mixture from 5 pounds of copper sulphate, 5 pounds of lime, and 50 gallons of water. Dissolve the copper sulphate by hanging 5 pounds in a sack near the top of 25 gallons of water over night; slake the lime in a little water, and add enough to make 25 gallons; stir the two solutions, pour together, and use the same day. On a larger scale, use stock solutions.

Spray with Bordeaux about three times, beginning late in July or early in August. Use any sprayer that gives a high pressure and a fine spray.

Paris green or lead arsenate may be mixed with Bordeaux, if potato beetles are still prevalent.

SELECTION OF SEED

Select seed for next year's seed plot at digging time when the yield from each hill can be easily determined. This should be done by hand, only the tubers from high-producing vines being kept for the seed plot. After sufficient seed has been selected for next year's seed plot, the rest of the tubers should be kept for general planting. Avoid injuring or bruising the seed tubers in any way, as bruised potatoes are more likely to rot than sound ones.

STORAGE

Provide a cool, dry, well-ventilated cellar or storage house for potatoes. A warm, damp cellar furnishes good conditions for the development of rots. Keep the seed tubers for next year in separate bins. Keep the temperature as close to 35 or 40 degrees Fahrenheit as possible. A temperature above 40 degrees will cause the tubers to sprout too early, and cause considerable injury to the seed, by the loss of sprouts when handling them.