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SPUD NOTES

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THE RING-ROT SITUATION

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Five years ago a potato disease new to Colorado laid waste the Olathe and Montrose potato-growing areas. It has since made its appearance in all the potato-growing regions of the state. In the history of the industry in Colorado the destructiveness of the ring-rot disease has not been paralleled. Because of continued effort on the part of growers, the Colorado Potato Exchange, county agents, Extension specialists, and Experiment Station workers, ring-rot has been controlled.

Although ring-rot is no longer the major potato problem in Colorado, it has cost the potato growers and the State treasury too many dollars to dismiss it as a problem which is no longer of any consequence. To prevent further destructive outbreaks of ring-rot, continued vigilance on the part of all of us is necessary. Consequently, it would be well to review the ring-rot situation occasionally, summing up all control methods which are practical for the potato grower. Ring-rot cannot be cured; it can be prevented.

Facts about Ring-rot

The ring-rot bacteria do not live over in the soil from year to year. Consequently, the chief way in which ring rot is introduced into a field is by diseased seed. Although seed which is diseased may show the rotting vascular ring characteristic of ring-rot infection, some infected seed may appear healthy. The answer is to plant certified seed or the best seed available, and use all possible precautions at planting time.

No seed is certified which was harvested from a field in which any ring-rot was detected. There is a good reason for this regulation. We know that diseased plants usually wilt. Under certain conditions, however, a plant may be infected and yet show no recognizable symptoms, and fields showing a few obviously diseased plants usually have many more infected plants which cannot be detected.

It is impossible to obtain any quantity of certified seed at the present time. It is therefore very essential that all seed be cut with a disinfected knife,* and that use of a picker planter be avoided. A picker planter will spread ring-rot since the planter picks will stab ring-rot bacteria from diseased potatoes into many healthy seed pieces. Where seed growers have access to the standard ultra violet light, its use in examining seed is recommended. Tubers which show a fluorescence of the vascular ring should be discarded. This lamp is generally not practical for table-stock growers, since each seed potato must be cut and examined separately.

The thing that makes ring-rot so dangerous is that the ring-rot bacteria are present by the millions in diseased tubers. They are easily spread from tuber to tuber through wounds caused by knife or picker planter. It has been found that ring-rot bacteria do not enter uninjured seed pieces so that well-healed seed pieces are seldom infected. Treatment of cut seed as a substitute for knife disinfection is not effective except to prevent contact spread. When the bacteria are

*A rotary knife disinfected with boiling water is best. Information regarding knife disinfection will be covered in detail by D.F.Click in the next issue of Spud Notes.

in the seed piece, seed treatment will not destroy them. Seed treatment is discussed in another article in this issue of Spud Notes.

There is some evidence that insects can transmit ring-rot bacteria from a diseased to a healthy plant. However, this does not seem to be an important factor in field spread of ring-rot, since we have found that the ring-rot bacteria move so slowly in the potato tissues that it is very unlikely if insect-spread infection will reach the tubers by harvest time. The serious infection with which the grower should be concerned comes from infected seed and is spread by the cutting knife and picker type of planter.

We have two growers, Mr. X. Jones and Mr. Z. Smith. Both have the same seed in which one potato out of every 100 has ring-rot infection. Mr. Jones uses a disinfected (boiling water) knife, a disinfectant dip to prevent contact spread, and cup type planter. His field shows 1 percent ring-rot at harvest.

Mr. Smith cuts his seed with the old style butcher knife-in-the-block with no knife disinfection. This knife spreads ring-rot infection from one diseased potato to 10 healthy tubers. He uses no dip and ring-rot infection spreads from one diseased potato to four healthy tubers. He uses a picker planter and spreads the infection from one diseased tuber to 10 more healthy potatoes. He has 25 percent ring-rot in his field at harvest. Take your choice; which grower do you wish to be?

POTATO SEED TREATMENT

W.J.Henderson

The purpose of treating potato seed is to destroy the surface-borne organisms which cause such diseases as rhizoctonia and scab, and to prevent and control spread of the bacteria which cause blackleg and ring-rot.

It should be remembered that (1) the causal agencies of fusarium wilt, bacterial ring-rot, late blight, blackleg, and all the virus diseases such as mosaic and leaf roll, are borne inside the tubers and are not destroyed when the seed is treated; (2) although seed treatment prevents the introduction of rhizoctonia and scab organisms into the soil on seed pieces, it fails to protect the plants and new tubers from infection by the soil-borne rhizoctonia and scab organisms; (3) treatments which leave a coating of the materials on the seed prevent re-contamination of the seed surface by bacterial organisms which cause ring-rot and blackleg; (4) seed-treatment materials should be maintained at the recommended strength and properly used to obtain maximum results in disease control and avoid serious injury to germination; (5) potato seed should be treated before the tubers sprout.

There are several potato-seed-treating materials on the market. Of these the Colorado Agricultural Experiment Station and the Colorado Extension Service recommend an organic-mercuric compound* and acid-mercury.

The organic-mercury* dip method of treating potato seed is a quick, easy, effective, and inexpensive way to control surface-borne diseases. Where treating is done on a small scale, a couple of buckets are required. For treating on a larger scale, a half barrel, wire baskets, and a drainboard are needed. Mix with water according to the directions on the container. The potato seed should be put into wire baskets and surged up and down in the treating solution to assure wetting of each seed piece or tuber. Remove the basket of seed and place it on the drainboard while dipping other baskets of seed. After the treated seed has been well drained,

*Trade names cannot be included. The compound referred to here is the standard organic mercury treatment used throughout the State. If in doubt consult your county agent.

spread out in a clean, shaded, well-ventilated place to dry. When the treated seed has dried it is ready to cut or plant. Treat 60 to 80 bushels of tubers for each pound of material in the treating solution. This treating solution is poisonous; therefore, do not allow animals to drink it.

In order to avoid possible injury to germination, it is advisable to treat only whole seed. When whole seed is cut after treating, the cutting operation should be done by the rotary knife disinfected with boiling water. The cut seed should be coated with hydrated lime immediately after cutting with this device. This method of cutting and liming will prevent transmission of ring-rot organisms and spindle-tuber virus by the knife blade, and by contact of cut seed pieces.

Acid-mercury seed-treatment method is the most effective control for surface-borne rhizoctonia. It can either be purchased under several trade names, or mixed at home by the growers. When making the acid-mercury solution (1) dissolve 6 ounces of mercuric chloride (corrosive sublimate) in one quart of commercial hydrochloric (muriatic) acid in a wooden or earthen container (if treating is done when weather is warm, use only 4 ounces of mercuric chloride); (2) add the quart of concentrated acid-mercury solution to 25 gallons of water and stir. Because of Government restrictions it will be difficult if not impossible to purchase mercuric chloride. This solution will corrode metal; therefore use a wooden barrel. The concentrated acid should be handled with care, but the dilute treating solution will not cause injury to the hands; (3) treat only whole tubers by placing them in either a wire basket covered with asphalt paint, or wooden crates, and submerging them in the treating solution for 5 minutes. The tubers should be drained and dried after treating. The solution should be discarded after treating 20 to 30 sacks of tubers. Acid-mercury is very poisonous; therefore, do not allow animals to drink it. Use the same method for cutting acid-mercury treated whole seed as was given for tubers treated with the organic-mercury compound.

SPRAY SCHEDULES

L.B.Daniels

Growers in all Colorado potato districts are urged to continue using the present recommended spray schedule with one or two additional applications later in the season if flea beetles are a problem. It has been demonstrated that additional sprays add 20 to 30 percent more U.S. No. 1 tubers at harvest time by controlling flea beetle damage. This means that four and five applications of spray give protection during the critical "August period" when flea beetles may cause serious damage. Of all materials tested in the 1942 season, the recommended combination lime sulphur and zinc arsenite spray in five applications has given the highest percentage of U.S. No. 1 tubers.

In the late districts, where planting is done in June, the first application of spray is generally put on during the first or second week in July, depending upon the height of the plants. The plants should be first sprayed when they are 6 to 8 inches tall. This has worked out successfully in psyllid control for the past five years. The second and successive sprays should be applied at 10-day intervals. The use of lime-sulphur in each application has been followed by a beneficial effect in that it tends to reduce the amount of early blight. This has been noted during the past three years of experimental work.

The appearance of later blight in some sections during the 1942 season has made it necessary for the grower to acquaint himself with the use of the copper sprays. Bordeaux spray has been shown to control late blight. Should this disease

appear during the coming year, application of a 4-4-50 Bordeaux mixture (4 pounds copper sulphate, 4 pounds lime, 50 gallons of water) should be made immediately. Zinc arsenite can be added to obtain further protection from flea beetles.

Lime-sulphur and the Bordeaux cannot be mixed.

PROFIT BY INCREASED YIELD PER ACRE

A.M.Binkley and J.G.McLean

This year, as never before, there will be need for increased production of potatoes in Colorado and the nation. There will be an increased domestic demand for potatoes and onions, and a larger percentage than last year will be dehydrated and shipped and consumed by our armed forces and our allies.

It is more important than ever that growers increase their per-acre production on an efficient basis. It is necessary that growers make the best possible utilization of labor, equipment and time. Attention to recommended and proved cultural practices is important for the inexperienced as well as the experienced grower. The cost per acre should be held down to a minimum if growers are to realize the greatest net returns per acre under present price ceilings.

The following recommendations are drawn up on the basis of Experiment Station results and the experience of growers in the State. Some are old and some are so new that all growers should consider them. This is old stuff to most of you but will bear repeating.

San Luis Valley:

1. Preparation of land:
   - A. Follow alfalfa, sweet clover, or peas.
   - B. Loosen (chisel) or plow deeply.
   - C. Manure when possible.

2. Seed:
   - A. Discontinue use of "eggs" from commercial table stock fields as source of seed.
   - B. Use more cut seed from acceptable source and handle properly.
   - C. Use rotary knife disinfected in boiling water for cutting.

3. Culture:
   - A. Plant 4 inches deep or less; cover 4 inches deep or less (total not to exceed 7 inches); and on advised dates for variety and location.
   - B. (a) Watch sub more closely; do not water too early.
     (b) Do not allow sub to come above 2½ feet of ground surface.
     (c) Cut sub out earlier; at least 2 weeks before harvest instead of 2 to 3 days.

4. Fertilizer:
   Use complete fertilizer at rates of 150 to 250 pounds per acre; the higher the phosphate analysis the better. (Incomplete fertilizers as 6-30-0; 10-22-0, are not recommended.)

5. A. Undercut vines if necessary to get maturity of crop. Store in bulk and do not field sort. Fall shipments should be hauled directly to sorter and handled carefully.

B. Cut down mechanical injury in handling by picking in half sacks and storing in bulk. Use picking belts or padded baskets.

6. Storage:
Reduce storage rot by careful handling at harvest. Keep storage temperature near 70°F., and humidity high, (85 to 90 percent RH) for 10 days to 2 weeks before lowering temperature.

East and West Slopes:

1. Seed:
A. Use best source of seed obtainable and as free from late blight as possible. Sort out and discard all rotten or discolored tubers when cutting, particularly those showing rusty, red streaks under the skin.
B. Do not allow seed to stand in piles when wet, or where it can heat, especially if there is any late blight present.
C. If late blight is suspected lime seed immediately after cutting and do not allow to stand in layers deeper than 6 to 8 inches.
D. If seed is known to be free of late blight the cut surfaces can be healed by storing at 65° to 70° F. for several days in a humid atmosphere (moist potato cellar). Piles should not be over 6 to 8 inches deep and not allowed to heat. Turning 3 to 4 times during the first 48 hours will afford ventilation and prevent heating. After 2 to 3 days this seed can be stored in bulk bins and held several weeks before planting, thus reducing the number of cutters required.

2. Culture:
A. Follow alfalfa (in 5-year rotation) or sweet clover in shorter rotations in irrigated sections. On dry land fallow ground is best, with corn ground second.
B. Due to possibility of reduced nitrate in fertilizers, manure potatoes when possible, then follow potatoes with sugar beets.
C. Several growers have used equipment to loosen the soil which was packed by the planter shoe. This gives the roots a better chance on heavy ground.

3. Fertilizer:
A. On well-rotated, fertile land, commercial fertilizers have been found to decrease the yield of potatoes. On the lighter, sandy soils of the east slope ammonium phosphate fertilizer, 6-30-0 or 10-22-0; or ammonium sulphate have improved yield. Your county agricultural agent will know about this.

4. Harvest and Storage: See recommendations for San Luis Valley (page 4).

5. Follow recommended practices on cultivation, irrigation, and spraying.

W-A-R-N-I-N-G

Destroy all cull piles in your neighborhood in which the potatoes have not been killed by freezing. If these cull spuds are left to grow, they will raise a nice crop of psyllids or late blight for your field.

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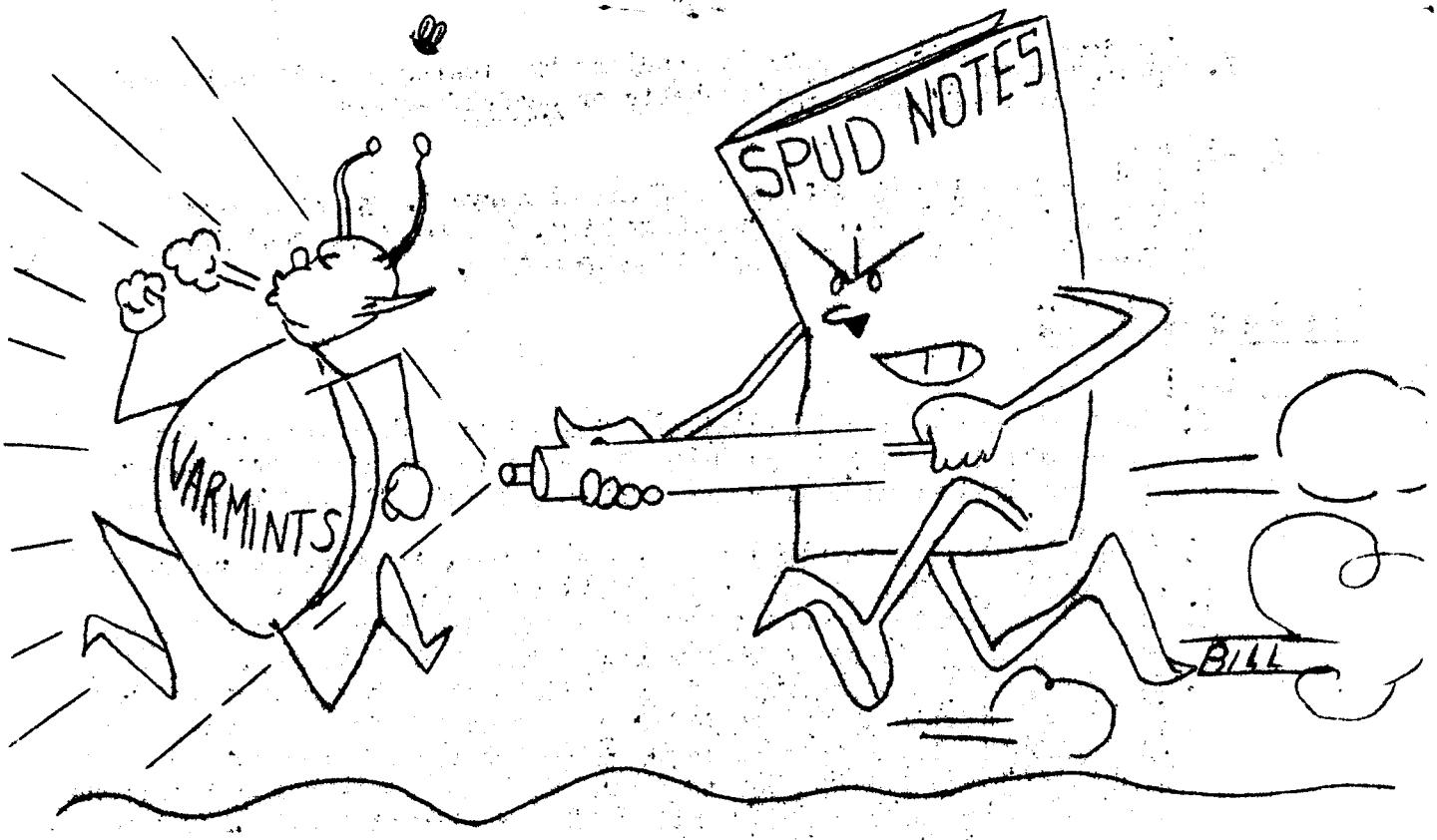

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