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✓PSYLLID CONTROL RECOMMENDATIONS

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With psyllids occurring in epidemic numbers throughout the potato areas of Colorado, Wyoming, and western Nebraska, this is not the time for arguments as to the merits of the various control measures.

Growers with liquid sprayers should follow carefully the standard recommendations. These are:

Liquid lime sulfur, 32° Baume, 2 1/2 gallons to 100 gallons of water. To this may be added either of the regular flea-beetle insecticides, zinc arsenite or basic copper arsenate, at the rate of 5 pounds to 100 gallons of the spray solution.

In many places where liquid lime sulfur is not available, growers are using wettable sulfur. This material should be used at the rate of 10 pounds to 100 gallons of spray solution. Wettable sulfur should be pail-mixed with water, then put into the spray tank after the tank has been two-thirds filled with water, and while the agitator is running. Following these directions will prevent such difficulties as excessive foaming or settling out of the wettable sulfur.

For those using dry lime sulfur, at least 8 to 10 pounds of the dry lime sulfur should be used to each 100 gallons of spray solution.

The same flea-beetle recommendations given under liquid lime sulfur may be used with either wettable sulfur or dry lime sulfur spray.

The three liquid spray recommendations given here have been approved by those connected with the potato experimental and field work at the Agricultural College, and all have been found effective. However, careful application must be made to obtain good control. Attention should be given to cleaning the screens and sediment bowls to prevent clogging. Many growers are using well water to avoid the clogging that frequently occurs from using dirty ditch water.

The first spray should be applied when plants are not more than 6 inches tall, and at the rate of at least 80 gallons to the acre, with pressure of more than 350 pounds. Machines that are capable of developing 500 pounds pressure will give better coverage.

A second spray should be applied in at least 10 days. When psyllid populations are as great as they are this season and if rains have washed the spray from plants, it might be well to spray within a week of the first application. The second spray should be at the rate of 100 to 125 gallons to the acre.

The third spray should be applied within 10 to 14 days after the second spray, and this spray should be at the rate of 125 to 140 gallons to the acre.

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If psyllid populations continue to build up, a fourth and fifth spray may be necessary. The first and second sprays are possibly the most important, but certainly the first three sprays are the ones that will save the potato crop. Unless the first three sprays are carefully applied, losses will occur, regardless of later spraying.

There is considerable discussion among growers as to the merits of spraying and dusting. However, by this time the grower has no doubt decided on the method of control he is going to follow. For those who are going to dust, remember that it is possible to control psyllids with sulfur dusts only when the sulfur is applied carefully, and re-treatment made as soon as the wind or other weather agencies have removed the dust from the plants. It is also necessary to dust as new foliage growth takes place. In most sections, the proper air conditions for dusting will not exist except late in the evening, or at night. From 7 p.m. until 11 p.m. is probably the most favorable dusting period for most sections. Early morning dusting finds air conditions favorable in some sections. Having the foliage of the plant wet on the upper surfaces does not tend to increase the amount of dust that gets on the lower surfaces of the leaf, where the psyllids usually occur.

Seasons of heavy infestation, such as this one, may require that the first 4 dusts be applied every 5 to 7 days. The first application should be at the rate of 25 to 35 pounds per acre. This amount should be increased with each dusting, until a maximum of 40 pounds per acre is reached on the fourth dusting. As the potato plants increase in size, it may be necessary, and it is desirable, to use two dust nozzles to each row.

Many growers have taken up dusting because of the speed with which the operation can be completed. It must be borne in mind that just as much care must be taken to dust when and in such a manner as to completely cover the plants, as in the liquid spray operations. Dust carefully--this means slowly!

✓ SUGGESTIONS FOR POTATO INSECT CONTROL

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Potato growers should give particular attention to early and thorough application of insecticides this year. With a serious epidemic of psyllid yellows developing, every precaution should be taken to obtain complete coverage of the plants with the insecticide used. The first application is very important. In many cases the psyllids are present before control operations are started. The young nymphs are on the leaves close to the ground in sufficient numbers to cause serious disturbance in the plant growth. Practically all fields in northeastern Colorado have adult psyllids. The late fields are beginning to show symptoms.

Where growers are dusting, several suggestions can be made.

1. Begin when the plants are 4 to 6 inches high.
2. Use 25 to 30 pounds of dust to the acre.
3. A straight sulfur dust may be the best for the first application.
4. Dust when the weather conditions are favorable, when there is very little or no wind. Night or early morning dusting have some advantages. The higher humidity and dew in the early morning make for "sticking."

5. The use of two nozzles to the row is suggested. Place the nozzles on each side of the plant and pointed backward, so that the two streams of dust meet in the potato foliage. There is a tendency for the dust to drop onto the foliage, and consequently much better coverage is obtained.

6. Make every effort to direct the dust so that the under sides of the lowest leaves are covered.

7. Dust every week, if possible.

8. The use of a canopy or light cloth or canvas drag, to hold the dust down, is helpful in obtaining coverage.

Growers who have had experience in successfully controlling psyllids in past serious years, know that in the use of the sprayer a pressure of 300 pounds or more is needed. The standard Nixon boom gives much better coverage than does the pendant type boom. The placing of the side nozzles close to the ground and angled so that the lower part of the spray lifts the lower leaves, is desirable. The staggering of the opposing side nozzles produces a tipping and swirling action on the plant that makes for almost complete coverage.

In dusting or spraying, thoroughness and timeliness are of the greatest importance.

Four and five applications are necessary to control flea beetles. Many growers are using two applications of liquid lime sulfur spray followed by three applications of dust.

Should late blight appear, a 4-4-50 bordeaux spray may be needed in addition.

✓ IRRIGATION

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Production of maximum yields and quality of the potato crop grown under irrigation depends largely on the proper application and use of water. The quality of the crop is not injured by water if it is wisely and properly used.

Two types of irrigation are practiced in growing potatoes in Colorado. These systems are generally referred to as sub-irrigation and furrow irrigation. Some lands in the San Luis Valley are sub-irrigated. In other districts of the State the furrow method is followed.

Where sub-irrigation is practiced, ditches are spaced 60 or 75 feet apart. The land between ditches is irrigated by raising or lowering the water table to supply the right amount of moisture for the proper growth of the potato plants and tubers.

Where furrow irrigation is to be practiced, furrows must be made before the water is applied. The type of furrow to be used depends on the type of soil and the slope of the land. Ordinarily, furrows are made by attaching special ditchers to a two-row cultivator. On flat land with heavy soils, the irrigation furrows must be deep and narrow so that the water will reach the top of the ridges before it reaches

the far end of the rows. If the land is steep or of a type that will wash badly, small furrows should be used.

In some districts 3 or 4 applications of water may be sufficient to grow a crop, whereas in another district 5 or 6 or even 10 applications may be necessary. In any district the number of irrigations will vary from year to year with the variation in rainfall and seasonal conditions. As a result of 14 years of study at Greeley, Colorado, of early and late initial irrigation, frequent and infrequent applications, and light and heavy irrigations, it was found that larger yields were consistently obtained when soil moisture was maintained at a level that enabled the plants to make a continuous, vigorous growth up to the time the tubers had reached full size. It was found that frequent, light applications of water (2 to 3 acre-inches) were preferable to infrequent, heavy ones (4 to 5 acre-inches).

Owing to the variation in the water-holding capacity of different soils and the influence of temperature, rainfall, and other seasonal conditions, it is impossible to prescribe a time when the first irrigation should be applied, the number of irrigations, or when the last irrigation should be applied, but it is believed that the following general rule can be followed with good results. Apply the first water whenever the plants seem to require it in order to make a continuous, vigorous growth. After the first irrigation, all the soil except the top of the ridge should be kept moist until the tubers have reached full size. In general, sandy soils hold about $\frac{1}{2}$ to 2 inches of available moisture per foot of soil that the plants can use.

In most of the irrigated districts, water is run in furrows between the rows or between pairs of rows, depending on the slope of the ground, length of row, and type of soil. These furrows should be comparatively deep and narrow so that the water may be applied to the area below the tubers. If deep furrows are used, there is less tendency to pack the soil in the potato rows.

On steep slopes, small streams of water should be used to prevent washing. The length of run should be governed by the type of soil; short runs should be used on lighter soils where the water percolates into the soil more rapidly. As a general rule, it is best to avoid runs of more than 600 or 700 feet because of excess seepage at the upper ends of the rows.

Heavy clay soils are finer in texture and have a higher water-holding capacity, of which 2 to 3 inches per foot of soil is available for plant use. Potato roots take most of their water from the top foot, some from the second foot, and a little from the third foot, except on dry land where roots grow deeper. For rapid growth, moisture must be readily available. When more than 60 or 65 percent of the available moisture in the top foot is removed, the growth decreases. When plants have removed about 2 inches of water, they begin to show the effect of decreasing water supply. In hot weather, large potato plants use about an inch of water in 2 or 3 days. The adequacy of moisture in the soil may be determined by examination of the soil 8 or 10 inches beneath the top of the ridge, by the condition of the plants, and by the color of the foliage. Plants should appear vigorous and have foliage color typical of the variety. Lack of moisture in the soil causes the plants to become a darker green, whereas an oversupply causes the foliage to become a lighter color than is normal for the variety. Infrequent irrigation checks plant growth, causing the formation of cracks and knobs on the tubers. Delaying the first application of water until after tuber set has a tendency to decrease the set and to produce over-sized tubers.

Late blight has made its appearance in some of the irrigated districts in recent years, causing a large amount of tuber decay. There is much evidence to

indicate that where furrow irrigation is practiced, late blight may be much more of a problem than in other late blight districts. This is because spores that drop on the ground may be carried by the irrigation water down the ditches and into the soil where they infect the tubers.

If the crop is nearly made when the disease makes its appearance in the field, it is advisable to suspend irrigation operations for the season. If the tubers are only partially developed and further irrigations are necessary to produce a crop, water should be applied only during the heat of the day. Watering at night, in early morning, or on cool or cloudy days should be avoided.

YOU MAY BE INTERESTED

Field day at the San Luis Valley demonstration farm will be held August 10 this year. Included in the field tours will be: fertilizer, minor elements, sulfur, seed-piece size, spacing, rotation, growers samples, and many other trials on potatoes; fertilizers, minor elements, and seed treatment trials on peas.

Because of the serious psyllid situation this year, most of the July issue of "Spud Notes" is devoted to their control.

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