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POTATO FLEA BEETLE CONTROL

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The potato flea-beetle, Epitrix cucumeris Harris, can be controlled by a well-executed dusting program. The information as to what material to use, when to apply it, and how much to use as based on experiments conducted to date will be found in the following pages.

Calcium Arsenate is Most Efficient Poison:

A dust containing 20% calcium arsenate and 3% powdered sugar is suggested. The following is the most consistently efficient formula found:

Calcium arsenate	20 pounds
Powdered sugar	3 pounds
Diatomaceous earth	10 pounds
Talc	67 pounds

Insecticides other than calcium arsenate have given good results but are not recommended because they are more expensive and have proven no more effective. Some of these are: rotenone, cryolite, copper arsenate, sodium fluosilicate, and Paris green.

Sprays containing calcium arsenate or the other aforementioned substances are as effective as the dusts containing these insecticides. They, however, are more expensive to apply because of the much greater cost of spray machines and the time required in refilling the tank.

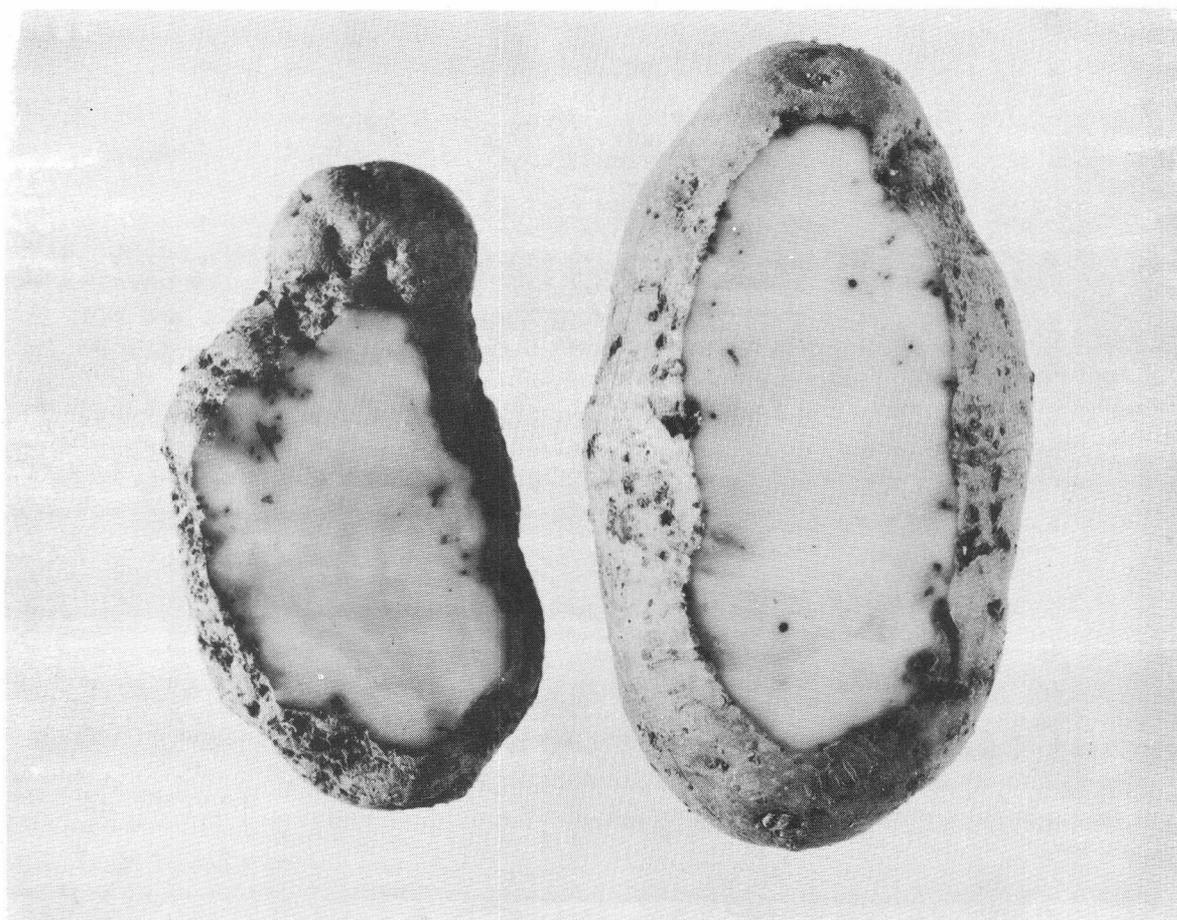
Caution. Calcium arsenate is poisonous to man and animals as well as flea-beetles and for that reason must be handled with care to prevent accidental poisoning.

Laboratory and field tests both indicate that hydrated lime is an inferior carrier for calcium arsenate when used to combat flea-beetles.

Time of Applications is the Most Important Factor:

1. Potatoes Up Before May 15 Do Not Require Dusting before May 15 to 20.

The potato flea-beetle does not begin leaving hibernation in numbers until about the middle of May. A short period, five to seven days, is required between the time they leave winter quarters and egg laying begins. It is suggested, therefore, that dusting be begun between May 15 and 20 and be continued at five to seven day intervals until about June 25. By that time the peak of emergence is past and



**This Potato Flea-Beetle Damage May be Prevented by a  
Carefully Executed Dusting Program.**

the interval between dustings may be spread to ten to fourteen days. If the plants are still green the last of July and early August, dusting again at the short interval may be required. Dusting need not be done closer than two weeks of digging time.

2. Potatoes Up Between May 15 and June 25 Require Greatest Amount of Dusting for Flea-Beetle Control.

Potatoes planted so that they come up during the period of from May 15 to June 25 are green and succulent during both periods of major flea-beetle emergence. For this reason a complete dusting program under these conditions would be: Apply the first dust to the entire field when one-half to two-thirds of the plants are up (dust the field before hilling if the plants have appeared above ground). Apply the succeeding dusts at five to seven day intervals to all parts of the field showing the presence of beetles until about June 25. The interval between dustings may then be spread to ten to fourteen days until about July 25. Again reduce the interval to five to seven days until about August 20. The remainder of the dustings may be applied with safety at ten to fourteen day intervals. Dusting should continue as long as the vines are green and beetles are present, or until about two weeks of digging time.

3. Potatoes Planted to Come up After June 25 Escape One Major Beetle Emergence.

It is necessary to dust late potatoes first when they are nearly all up. The whole field should be treated at this time. The dusts may be applied at ten to fourteen day intervals until about July 25, when the interval should be reduced to five to seven days until about August 20. The remaining applications should be made at ten to fourteen day intervals as long as the plants remain green and beetles are found or until about two weeks of digging time.

The two most important dusting periods are from about May 20 to June 25 and from about July 25 to August 20. The first period, May 20 to June 25, corresponds to the time when the beetles are leaving hibernation and beginning egg laying. The second period, July 25 to August 20, corresponds to the time when the first generation of beetles are emerging in the potato fields and beginning egg laying. These dates cannot be considered exact because of seasonal variation. However, the peak of emergence of the beetles has occurred each year for the past five years between these dates.

It is only in cases of heavy infestation that the program as outlined for potatoes coming up from May 15 to June 25 would have to be followed completely. Thorough dusting during the first of the season prevents the necessity for the intensive dusting program during July and August. Also careful dusting during late May and June prevents the beetles spreading over the entire field. Thus, it is possible to obtain good control by dusting only the outside 75 to 150 feet of the edge of the field after the first application. This is true only in eastern Oregon. In western Oregon it is necessary to dust the entire field each time until about July 1. The reason for this is that the beetles overwinter in the fields in western Oregon and are, therefore, apt to be in the field even before planting time. The whole field must be dusted in this case to destroy the beetles before they can deposit eggs.

Dusting Should Best be Timed by Actual Beetle Counts:

It is not possible to determine the correct time for dusting to control flea-beetles by looking at the calendar. This can best be done by careful observation in the field. As the plants first come up (one-half to two-thirds showing) the pests can be detected best by the small holes eaten in the leaves. At this stage they are not eaten clear through but can be seen by holding the leaves up to the light. The holes are about the size of an ordinary pin head. They are always round and even, never irregular and rough. The volunteer potatoes are a good place to look because they have been up longer and will have attracted beetles if there are any. These holes in the leaves will serve as a guide to the presence of beetles and their location in the field until the plants are five or six inches tall. Holes in the new leaves (those formed since the last dusting) indicate the presence of beetles. One or more holes in the leaves at this stage of growth are too many.

An insect net is the best tool for locating flea-beetles. (These may be obtained through your county agent or local seed and feed dealers). By means of a net it is possible to determine which sides of the field are infested and how far into the field the beetles have spread. The method used is to take ten sweeps hitting five or six plants per sweep in the two or three outside rows, count the beetles, then move down the rows about 100 yards and repeat the process. This is done around the entire field. Wherever beetles are found additional sweeps should be made eight to ten rows in, then eighteen to twenty rows in, and so on until no beetles are found, or the center of the field is reached. Always move parallel to the edge of the field while sweeping. The net should be dipped into the plants as deeply as possible without collecting clods and swung vigorously enough to cut off two or three leaves in the ten sweeps.

Two beetles found in ten sweeps are enough to require dusting in that vicinity.

By repeating this sampling at intervals of five to seven days, it is possible to determine exactly when and where to dust the field. For this reason the insect net will save the grower both time in applying and the cost of dust used where it is not needed. Also it will prevent failures to dust when and where it is required and save the loss of part of the crop.

Dust is Applied at the Rate of 20 Pounds Per Acre:

The most efficient amount of dust to apply appears to be 20 pounds per acre per application. Ten pounds per acre may be applied with safety for the first application where hand dusters are used. This is not advised for power or wheelbarrow dusters because they cannot give undivided attention to the plants as can a careful operator with a hand duster.

Dusting Equipment to Fit all Needs is Available:

Hand dusters, wheelbarrow dusters, and power dusters are available and have been found satisfactory for flea-beetle control. Hand dusters of the fan type give a more even coverage than do the bellows type. They sell for \$10 to \$20 and are satisfactory for growers of up to four or five acres of potatoes. They have the disadvantage that they must be operated only when there is little or no wind, in order to spread the dust evenly over the leaves.

Wheelbarrow dusters with hoods built over the nozzles to cover two rows have proven to be most useful to growers of up to 20 acres of potatoes. They sell complete with hoods for \$45 to \$50. These dusters may be pushed by hand or horse-drawn, will cover two rows at a time, and when fitted with hoods, may be operated in winds up to ten miles per hour. They have the real advantage over heavier traction dusters or power dusters in that they may be turned around in the field without doing damage to the crop. Thus it is possible to dust 50 or 100 feet of the ends of a field without running the full length of the rows.

Power dusters or large traction dusters which cover from three to twelve rows at a time are available. These are useful to the grower of large acreages or to those doing commercial dusting. These should be equipped with hoods in order that they may be operated in wind up to ten or fifteen miles per hour.

The Timing of Dust Applications for Control of the Potato Flea-Beetle are Based Entirely on Its Seasonal History:

The potato flea-beetle spends the winter in the soil along the ditch banks and in brushy areas in eastern Oregon and in the fence rows, brushy areas, in the fields, or nearly anywhere in western Oregon. They leave hibernation in both sections of the state from May 10 to July 1. The bulk of them emerge the last week of May and the first week in June. Eggs are laid in the soil around the plants. Egg laying begins five to seven days after a beetle leaves hibernation, if potatoes are available, and continues until mid-July, unless cut short by poison or other accident. The eggs hatch in about ten days. The larvae feed on the roots and tubers for about twenty days. They then pupate and remain thus for about twelve days when they change to adults and again appear above ground to repeat the process. From forty to fifty days is required to pass these immature stages. The first beetles resulting from the eggs laid about June 1 begin emerging from the soil about July 15 to 20. Eggs laid from this time on result in beetles in September and October. These then go into hibernation and wait for next season's potatoes.

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