

SYSTEMIC INSECTICIDES FOR CONTROL OF THE GREEN PEACH APHID  
AND THE COLORADO POTATO BEETLE ON POTATOES<sup>1</sup>

by

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Abstract

The effectiveness of systemic insecticides were evaluated for control of the green peach aphid, *Myzus persicae* (Sulzer), and the Colorado potato beetle, *Leptinotarsa decemlineata* (Say), on potatoes. The most effective systemic insecticide registered for aphid and beetle control on potatoes was aldicarb followed by disulfoton then phorate. The methods of application evaluated were, preplant broadcast (PPBC), planting time furrow (PTF), planting time sidedress (PTSD), plant emergence sidedress (PESD), plant emergence topical (PETOP), layby sidedress (LBSD), layby topical (LBTOP), and layby broadcast (LBBC). The planting date of potatoes was a factor in determining the most effective method of application of systemic insecticides. For early planted potatoes (before April 15 in Washington) the systemic insecticides were most effective when applied by the PESD or PETOP methods. For late planted potatoes systemic insecticides were the most effective when applied at planting time by the PTF or PTSD methods or when applied at 75% emergence by the PESD or PETOP methods of application.

The green peach aphid (GPA), *Myzus persicae* (Sulzer), is a major sucking insect pest and is the most important vector of potato leafroll virus (PLRV). The Colorado potato beetle (CPB), *Leptinotarsa decemlineata* (Say), is the major insect defoliator of potatoes in the Pacific Northwest. On Russet Burbank potatoes the GPA should be controlled each year to reduce the loss in yield and quality due to PLRV net necrosis symptoms in the tubers. Normally control measures applied for the GPA are adequate for control of CPB. The overwintering adults of CPB generally are not numerous enough to cause severe damage. The first generation CPB cause heavy defoliation when control measures are not applied for GPA. A large population of CPB later in the season can completely defoliate the crop.

When properly applied systemic insecticides can effectively control sucking and chewing insects of potatoes and can effectively be integrated into a pest control program on potatoes. Generally, soil systemic insecticides are ineffective contact insecticides. Plants grown in treated soils, take up the insecticide systemically and kill primarily the insects and mites that feed on the plants. Thus, beneficial insect predator and parasites are usually not harmed by systemic insecticide.

This paper is a general discussion on the methods of application of systemic insecticides and the systemic insecticides used on potatoes for control of GPA and CPB. The discussions are based on 20 years experience with systemic insecticides and the data presented in the List of References.

The methods of application of systemic insecticides evaluated were; 1) preplant broadcast (PPBC), where the insecticide granules were broadcast over the soil then worked into the soil before planting; 2) planting time furrow (PTF), where the insecticide granules were

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<sup>1</sup> This paper reports the results of research only. Mention of a pesticide in this paper does not constitute a recommendation for use by the USDA nor does it imply registration under FIFRA as amended. Also, mention of a commercial product in this paper does not constitute an endorsement of this product by the USDA. Received for publication 2/5/81.

placed in the furrow with the potato seed pieces at planting time; 3) planting time sidedress (PTSD) where the insecticide granules were chiselled into the soil about 4 inches to each side and level with the potato seed pieces at planting time; 4) plant emergence sidedress (PESD) where the placement of insecticide was the same as PTSD except applied when 75% of the plants emerged; 5) plant emergence topical (PETOP) where the insecticide granules were placed over the tops of the small potato plants and then the granules were mixed with the soil and the small plants almost covered with soil with a Lilliston<sup>®</sup> cultivator in the hilling operation; 6) layby sidedress (LBSD) where the placement of insecticide was the same as PESD but when the potato plants were 12-15 inches high and large enough to almost close the space between the rows; 7) layby topical (LBTOP) where the placement of insecticide was the same as PETOP and the time of application the same as LBSD; and 8) layby broadcast (LBBC) where the insecticide was broadcast over the tops of large potato plants then watered into the soil.

#### Discussion on methods of application of systemic insecticides:

The systemic insecticide should be in the plants at the time aphids appear in the field. Thus, for best results the method of application of systemic insecticides depends on the time of planting of the potatoes and the time of arrival of aphids in the potato field. In Washington, aphids normally appear in potato fields the later part of May or early June.

For early planted potatoes (before April 15) best results were achieved when insecticides are applied at about 75% plant emergence and then irrigated to activate the insecticide. Best control of GPA and CPB are achieved by the PESD and PETOP method of application. Planting time applications PTF and PTSD were less effective than the PESD or PETOP methods for control of GPA and CPB.

For late planted potatoes (after April 15) the grower has a choice of when to apply the systemic insecticides, at planting time or when 75% of the plants emerge. PTF or PTSD applications and PESD or PETOP applications at 75% emergence all give effect and comparable control of the GPA and CPB.

The other methods of applications, such as, PPBC, LBSD, LBTOP AND LBBC have all been less effective for control of GPA and CPB than PTF, PTSD, PESD and PETOP methods when used as described here for early and late planted potatoes. The reduced concentration of insecticide in the soil near the seed piece and the longer time period between applications and the beginning of plant growth may account for the reduced insect control achieved by the PPBC method at application. Reduced concentration of insecticide in the soil or the inability of the large potato plants to translocate the insecticide may account for the lack of insect control achieved by the LBSD, LBTOP and LBBC methods of application.

#### Discussion on Insecticides:

The results of the research on systemic insecticides during the past several years show that of the systemic insecticides registered for use on potatoes, aldicarb (Temik<sup>®</sup>) is the most effective for control of both GPA and CPB. Disulfoton (Di-Syston<sup>®</sup>), is the second most effective insecticide followed by phorate (Thimet<sup>®</sup>). Disulfoton may be applied as a split application, one as the granular formulation to the soil at planting time or at plant emergence, (but not both) and then again through the sprinkler system, using the emulsifiable formulation when the plants are 6 to 8 inches high but before the leaves begin to senesce. Phorate gives some control of wireworms. Aldicarb and disulfoton will not control wireworms. Other systemic insecticides that have been evaluated are either less effective than these or they are not registered for use on potatoes.

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#### Follow the Manufacturers Label:

The insecticides discussed in this report are not all registered for all the methods of applications described for use on potatoes. Phorate may cause severe phytotoxicity when

applied as PTF with the potato seed pieces. Disulfoton granules may cause foliage phytotoxicity when applied LBTOP. Always follow the manufacturers label as to the rates and the methods of application.

#### List of References

- George, D. A., J. C. Maitles, D. M. Powell, and L. M. McDonough. 1975. Aldicarb residues in potatoes. *Environ Entomol* 4:642-4.
- Powell, D. M. 1978. Soil insecticides for control of aphids and beetles. *Insecticide and Acaricides Test* 3:93.
- Powell, D. M. and W. T. Mondor. 1972. Development of net necrosis in stored Russet Burbank potatoes. *Wash. State Potato Conf. Proc.* 11:9-13.
- Powell, D. M. and W. T. Mondor. 1973. Control of the green peach aphid and suppression of leafroll on potatoes by systemic soil insecticides and multiple foliar sprays. *J. Econ Entomol* 66:170-7.
- Powell, D. M., and W. T. Mondor. 1976. Area control of the green peach aphid on peach and the reduction of potato leafroll virus. *Am. Potato J.* 53:123-139.
- Powell, D. M. and W. T. Mondor. 1978. Comparison of soil treatment for control of M. persicae and L. decemineata. *Insecticide and Acaricide Tests* 3:90.
- Powell, D. M. and W. T. Mondor. 1978. Furrow treatments of systemic insecticides for control of M. persicae and L. decemineata. *Insecticide and Acaricide Tests* 3:90-91.
- Powell, D. M. and W. T. Mondor. 1978. Systemic insecticides for control of M. persicae and L. decemineata on potatoes, 1976. *Insecticide and Acaricide Tests* 3:92-93.
- Powell, D. M. and W. T. Mondor. 1978. Furrow application of systemic insecticides for control of aphids, and beetles, 1977. *Insecticide and Acaricide Tests* 3:93.
- Powell, D. M. and W. T. Mondor. 1980. Soil treatment with systemic insecticide for control of green peach aphids and Colorado potato beetles, Test 2, 1978. *Insecticide and Acaricide Tests* 5:93-4.
- Powell, D. M. and W. T. Mondor. 1980. Soil treatments for control of green peach aphids, tuber flea beetles and Colorado potato beetles, Test 3, 1979. *Insecticide and Acaricide Tests* 5:94-5.
- Powell, D. M. and W. T. Mondor. 1980. Soil treatments with systemic insecticides for control of green peach aphids and Colorado potato beetles, Test 5, 1979. *Insecticide and Acaricide Tests* 5:95-6.
- Powell, D. M., J. C. Maitlen and W. T. Mondor. 1978. Spring migrant green peach aphid: Control on peach and apricot with systemic insecticides and resultant residues. *J. Econ Entomol* 71:192-4.