

EVALUATION OF AERIAL APPLICATIONS OF ENDOSULFAN,  
OXYDEMETHON METHYL AND DEMETON FOR CONTROL OF THE GREEN  
PEACH APHID, MYZUS PERSICAE (SULZER), ON POTATOES

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In eastern Washington, nearly all insecticides are applied from airplanes though some are more effective when they are applied with ground equipment. Since poor control of aphids with the recurrent spread of leaf roll cannot be tolerated, it is important to establish the best insecticide to use for this purpose.

Endosulfan (Thiodan<sup>®</sup>), a chlorinated hydrocarbon, has been used successfully since 1958 to control the green peach aphid, Myzus persicae (Sulzer), on potatoes. It is effective when applied with ground equipment, but is more effective when applied by aircraft because the kill, which occurs by contact, is enhanced by the fumigating action of the insecticide (Schopp et al. 1961), and the fumes spread over larger areas. Potato growers were fortunate that this insecticide became available in 1958 because, as Anthon (1955) reported, the green peach aphid apparently became resistant to the organophosphorous insecticides commonly used on peach trees, and Schopp and Landis (1958) found the aphid increasingly hard to kill on potatoes. This increased tolerance to organophosphorous insecticides was also demonstrated by Shirck (1960) who found green peach aphids in Washington harder to kill with malathion than those imported from Nebraska, Illinois, and Maryland. However, endosulfan is less effective for control of aphids during cool weather because there is less fuming. Therefore, since potatoes are often infested with aphids during cool springs and since oxydemetonmethyl (Meta-Systox-R<sup>®</sup>), a relatively new organophosphorous insecticide, showed much promise for aphid control when it was applied during cool weather, it and demeton (Systox<sup>®</sup>) were compared with endosulfan in 2 large experiments in 1968. The purpose of the 1st experiment was to determine which insecticide was more effective when it was applied before an infestation of aphids started and when additional applications were then made at frequent intervals, and the 2nd experiment was made to determine which insecticide was more effective in controlling an infestation of aphids after it had become established.

Methods--The 1st test was made in a 15-acre field of Russet Burbank potatoes near Royal Camp; the 2nd was made in a similar sized field of the same variety near Quincy, Washington. Both crops were being grown

for October harvest, and in both tests, endosulfan was applied at 1 lb, oxydemetonmethyl at 0.5 lb, and demeton at 0.5 lb/acre. Two Pawnee PA 25-235<sup>®</sup> airplanes equipped with similar spraying attachments were used; 1 was owned by the USDA and the other by a commercial applying company. The USDA airplane was equipped with 44 D-12-45<sup>®</sup> nozzles arranged to provide spray coverage that was as uniform as possible. The sprays in each test were released from a height of 10 ft at 30 psi while the plane was flying at 90 mph. Each plot consisted of 2 30-ft-wide swaths that ran the entire length of the 650-ft field. Each treatment and the untreated check were replicated 4 times in each field.

The sprays were prepared from emulsifiable concentrates of the insecticide and contained 2 lb of active toxicant/gal. The area of the 4 plots treated with each of the insecticides was slightly less than 4 acres. Therefore, to apply 10 gal/acre, the sprays were mixed in batches of 40 gal each and contained 1 or 2 gal of the concentrate, depending upon the desired rate of application, plus 38 or 39 gal of water.

Spraying was always done when the wind was blowing at less than 7 mph. Applications were made June 11 and 21 and July 2 and 19 for the 1st test and July 23 and August 2 for the 2nd test. The weather was cool (55°F) when the 1st application was made, but it became warmer and more satisfactory for applications of endosulfan as the season progressed.

The effectiveness of the treatments was determined by collecting 25 or more leaves at random from each plot and counting the living aphids 2 to 3 days after each application. The numbers of aphids found were then recalculated on the basis of 100 leaves/treatment for each sampling date.

Results--Table 1 shows that few aphids moved to the field at Royal Camp during the last half of June and the 1st week of July and that those winged green peach aphids that did visit the plots apparently did not establish colonies. However, starting between July 5 and 18, the winged aphids began colonizing the plants and continued this activity at least through the last sampling, August 22. Untreated plots of potatoes were very heavily infested. All treatments gave some control during, and for at least 4 days after the 4th and last application on July 19. However, 18 days after the last application, the endosulfan had lost much of its effectiveness though the oxydemetonmethyl remained very effective. A month after the last treatment, all the insecticides had lost most of their effectiveness.

Table 2 shows that 3 days after the 1st application of insecticides to the field at Quincy, the endosulfan was the most effective insecticide in reducing the population of aphids; however, 7 days after this 1st application, the population had increased in the plots treated with endosulfan and had decreased in the plots treated with oxydemetonmethyl so the 2 plots then had about equal populations. The same general pattern was apparent after the

2nd application on August 2 though the populations were declining in both the untreated and treated plots.

Discussion and Conclusions--Endosulfan is effective for control of the green peach aphid when it is applied by airplane, particularly when the weather is warm. It kills aphids faster than either demeton or oxydemetonmethyl, but it also dissipates more quickly than either, particularly oxydemetonmethyl. Much of the longer residual activity of these organophosphorous insecticides can be attributed to the systemic action that is lacking in endosulfan.

Results of the 2 tests with insecticides applied aerially indicated that oxydemetonmethyl was effective when the insecticide was applied early in the season and applications were repeated about every 2 weeks. Endosulfan was more effective than either demeton or oxydemetonmethyl in controlling populations of aphids after they became established on potatoes.

#### Footnotes

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- 4/ Mention of a proprietary product does not necessarily imply its endorsement by the USDA.

#### REFERENCES CITED

- Anthon, R. W. 1955. Evidence for green peach aphid resistance to organophosphorous insecticides. J. Econ. Entomol. 48(1): 56-7.
- Schopp, R., and B. J. Landis. 1958. Fumigation effect of Thiodan Against the green peach aphid on potatoes. J. Econ. Entomol. 52(4): 781-2.
- Schopp, R., B. J. Landis, and G. T. Hagel. 1961. Experiments with insecticides for control of the green peach aphid on potatoes. J. Econ. Entomol. 54(5): 1003-7.
- Schirck, F. H. 1960. Response of different strains of the green peach aphid to malathion. J. Econ. Entomol. 53(1): 84-8.

Table 1--Seasonal control of the green peach aphid with 4 applications of 3 insecticides applied as sprays from aircraft. Royal Camp, Washington, 1968.

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Treatments and aphids/100 leaves						
Date	Activity	Check (no treatment)	Demeton	Oxydemetonmethyl	Endosulfan	
		winged wingless	winged wingless	winged wingless	winged wingless	winged wingless
6/11	Sprayed					
13	Sampled	0	12	0	4	0
21	Sprayed					
24	Sampled	0	0	4	0	0
7/ 2	Sprayed					
5	Sampled	0	0	0	0	0
7/18	Sampled	4	12	0	4	4
19	Sprayed					
22	Sampled	4	28	4	4	0
8/ 6	Sampled	0	239	0	20	116
8/22	Sampled	0	119	0	65	158
Total aphids		8	398	12	85	278

Table 2--Control of the green peach aphid with 2 applications of 3 insecticides applied as sprays from aircraft. Quincy, Washington, 1968.

Treatments and aphids/100 leaves									
		Check (no treatment)		Demeton		Oxydemetonmethyl		Endosulfan	
Date	Activity	winged	wingless	winged	wingless	winged	wingless	winged	wingless
7/23	Sprayed								
26	Sampled	2.0	146	2.5	221	1.3	111	0.3	28
30	Sampled	1.0	181	1.8	194	0.8	56	1.8	59
8/ 2	Sprayed								
6	Sampled	5.7	167	3.7	39	2.0	26	1.7	20
9	Sampled	3.0	74	2.0	40	2.0	26	2.3	54
26	Sampled	0	30	0.5	35	1.0	9	0	29
Total	aphids	11.7	598	10.5	529	7.1	228	6.1	190