# EVALUATION OF CHEMICAL CONTROL OF THE GREEN PEACH APHID ON POTATOES IN 1972 [1,2/]

by
Donnie M. Powell, W. T. Mondor, and Robert Winterfeld
Yakima Agricultural Research Laboratory, Agr. Res. Serv., USDA, Yakima

For the past 14 or 15 years, potato growers in eastern Washington have depended chiefly upon endosulfan (Thiodan®) for control of the green peach aphid, Myzus persicae (Sulzer), the potato aphid, Macrosiphum euphorbiae (Thomas), and several other insects. Landis et al. (1971), reporting on the successes and failures of endosulfan to control the green peach aphid on potatoes, attributed many of the failures to errors in application or to applications made when the weather was unsuitable. However, during 1970, 1971, and 1972, the number of reported failures increased. Therefore in 1972, we evaluated some of the insecticides presently used for control of the green peach aphid on Russet Burbank potatoes. The results of 5 of these tests are reported here.

Materials and methods. - The insecticides were applied with a PA-25-235 Piper Pawnee® agricultural spray plane that was equipped with a 28-ft standard mounted boom with 45 Spraying System Teejet® nozzles, each with a No. 56 core. The nozzles were spaced nonuniformly on the boom and were oriented to spray vertically downward to obtain the greatest uniformity of application. Spray pressure was 40 psi. No adjuvants were added to the spray solution, which was applied at a rate of 10 gal of spray per acre. The plane flew 5 ft above the plants and at 90 mph. The wind speed at the time of spraying was always less than 5 mph. Each treatment was replicated 3 times in 1- to 2-acre plots or in single plots of 3 or more acres.

Test 1. - The insecticides applied July 14 at Harrah, Washington, were disulfoton (Di-Syston®) at rates of 0.5 and 1.0 lb active ingredient per acre (AI/acre) and endosulfan (Thiodan) at a rate of 1.0 lb AI/acre.

Test 2. - The insecticide applied August 5 at Othello, Washington, was endosulfan at a rate of 1 lb AI/acre in combination with each of the following materials: (1) Volck oil at 2 gal/acre; (2) dimethoate (Cygon®) at 0.5 lb AI/acre plus 0.5 gal of Magnetic 6 sulfur® (3 lb sulfur); (3) phorate (Thimet®) at 0.33 lb AI/acre; (4) phorate at 0.66 lb AI/acre; (5) mevinphos (Phosdrin®) at 0.25 lb AI/acre; and (6) tepp at 0.25 lb AI/acre.

Test 3. - The insecticides applied August 8 at Pasco, Washington were monitor and endosulfan, each at a rate of 1 lb AI/acre.

Test 4. - The insecticides applied August 28 at Ellensburg, Washington were monitor and mevinphos, each at a rate of 1 lb AI/acre.

Test 5. - The insecticides applied September 8 at Ellensburg, Washington were monitor, mevinphos, and 3 formulations of endosulfan (regular 2 lb/gal EC; 3 lb/gal EC; and 2 lb/gal EC with low emulsifier) each at a rate of 1 lb AI/acre.

Performance data were obtained by collecting 25 compound potato leaves from the lower 2/3 of the potato plants from 1 to 4 locations in each plot at various intervals (days) post treatment and counting the number of aphids on the leaves. The mean ($\bar{X}$) number of aphids per compound

---

1/ In cooperation with the College of Agriculture, Research Center, Washington State University, Pullman 99163, and the Washington State Potato Commission.

2/ Mention of a pesticide or a proprietary product in this paper does not constitute a recommendation or an endorsement of this product by the U.S. Department of Agriculture.

leaf plus or minus the standard error of the mean ($\overline{Sx}$) at the 95% confidence limit (t0.05) was calculated from the 25 to 100 leaf samples for each treatment on each sampling date. The $\overline{X} \pm Sx$ . t0.05 is used in determining meaningful differences between treatment means.

Results. - The initial densitites of the aphid population were different for each test. Therefore, to permit discussion of the influence of the treatments on population density, we made the following definitions: Very low populations equaled 0.0 to 1.0 aphids/compound leaf; low populations equaled 1.1 to 2.0 aphids/compound leaf; medium equaled 2.1 to 5.0 aphids/compound leaf; high equaled 5.1 to 10.0 aphids/compound leaf; and very high equaled 10.1 + aphids/compound leaf. The initial populations of aphids for the 5 tests (at the time of spray application) were very high, medium, high, medium to high, and low for tests 1 to 5, respectively.

Disulfoton at 0.5 or 1 lb and endosulfan at 1 lb did not give adequate control of the high population in Test 1 (Table 1, Test 1); the percentages of control ranged between 12 and 61% during the 14-day evaluation period, far below the expected 90 to 100%. Therefore we applied endosulfan in combination with other insecticides in test 2. Endosulfan + mevinphos and endosulfan + phorate gave effective control of the medium aphid population for 7 days (Table 1, Test 2). However, none of the treatments gave the 100% control expected for a population of this size. The counts were not extended to 14 days because a gentle rain occurred in the area the 10th and 11th days post treatment and a parasitic fungus practically eliminated the aphid population.

We applied monitor, which was registered July 28, 1972 for control of the green peach aphid on potatoes, for late-season control of a high population at Pasco (Test 3), for control of a medium to high population at Ellensburg (Test 4), and for control of a low population at Ellensburg (Test 5). It gave good to excellent control of all these populations (Table 1, Tests 3, 4 and 5). Endosulfan gave little control of the high population at Pasco, and mevinphos provided no control of the medium to high population at Ellensburg (Table 1, Tests 3 and 4). The regular 2 EC endosulfan, 3 EC endosulfan, 2 EC endosulfan with low emulsifier formulations and mevinphos (at 1 lb AI/acre, that is, at twice the registered rate) gave fair to good control of the low population at Ellensburg (Table 1, Test 5). The endosulfan low emulsifier formulation was slightly less effective than the regular formulation.

Summary. - Eighteen insecticide treatments were evaluated in aerial applications for late-season control of the green peach aphid on potatoes in Washington in 1972. Monitor was e-evaluated in 3 tests and provided excellent control of high, medium, and low density populations. Endosulfan + mevinphos and endosulfan + phorate (evaluated in 1 test) provided good control of a medium population. Disulfoton in 1 test provided very poor control of a very high density population. Endosulfan, evaluated in 4 tests, provided very poor or no control of low, medium, high, and very high populations though the regular 2 EC, 3 EC, or 2 EC low emulsifier endosulfan formulations in 1 test all provided fair control of a low population. Mevinphos, evaluated in 2 tests, provided no control of a medium to high population and fair to good control of a low population.

## REFERENCE CITED

Landis, B. J., D. M. Powell, and G. T. Hagel. 1971. Successes and failures with endosulfan (Thiodan®) used for control of aphids in eastern Washington. 10th Annu. Proc. Wash. State Potato Conf., Moses Lake, Wash. Feb. 1971, p. 15-21.

Table 1.--Number of aphids per compound leaf and percentage control of the green peach aphid on potatoes with 1 aerial application of insecticides. Washington 1972.

| Insecticide and lb AI/acre | Days post treatment: 1 day $\bar{X}\pm S\bar{x}.t.05$ [a/] | 1 day % Control | 3 days $\bar{X}\pm S\bar{x}.t.05$ | 3 days % Control | 7 days $\bar{X}\pm S\bar{x}.t.05$ | 7 days % Control | 14 days $\bar{X}\pm S\bar{x}.t.05$ | 14 days % Control | 21 days $\bar{X}\pm S\bar{x}.t.05$ | 21 days % Control |
|---|---|---|---|---|---|---|---|---|---|---|
| **Test 1. Harrah. Applied July 14** | | | | | | | | | | |
| Disulfoton 0.5 | | | 33.7±3.4 | 15 | 41.3±3.2 | 12 | 10.8±2.7 | 10 | | |
| Disulfoton 1.0 | | | 23.8±4.0 | 40 | 33.9±4.1 | 27 | 4.7±1.8 | 61 | | |
| Endosulfan 1.0 | | | 19.1±3.6 | 52 | 32.5±4.7 | 30 | 9.4±2.4 | 21 | | |
| Untreated check | | | 39.6±2.9 | 0 | 46.8±1.6 | 0 | 12.0±2.7 | 0 | | |
| **Test 2. Othello. Applied August 5** | | | | | | | | | | |
| Endosulfan 1.0 plus: | | | | | | | | | | |
| Mevinphos 0.25 | | | 0.1± .1 | 96 | .1± .1 | 97 | .3± .2 | - 4 | | |
| Phorate 0.66 | | | .06±.09 | 97 | .28± .22 | 88 | .16± .12 | 33 | | |
| Dimethoate 0.5 + Mag 6 0.5 gal | | | .10±.08 | 96 | .44± .32 | 81 | .10± .10 | 58 | | |
| Phorate 0.33 | | | .08±.08 | 96 | .58± .41 | 75 | .12± .16 | 50 | | |
| Tepp 0.25 | | | .44±.27 | 81 | 1.42± .69 | 40 | .00± .00 | 100 | | |
| Volck oil 2 gal | | | .74±.34 | 67 | 1.78± .73 | 25 | .72± .49 | -200 | | |
| Untreated Check | | | 2.28±1.00 | 0 | 2.37± .88 | 0 | .24± .20 | 0 | | |
| **Test 3. Pasco. Applied August 8** | | | | | | | | | | |
| Monitor 1.0 | 0.4±0.3 | 95 | 0.1±0.1 | 99 | 0.0±0.0 | 100 | 0.04±0.05 | 99 | | |
| Endosulfan 1.0 | 4.5±1.8 | 47 | 15.3±4.2 | -63 | 14.9±5.1 | -141 | 1.60± .60 | 85 | | |
| Untreated check | 8.4±2.4 | 0 | 9.4±2.4 | 0 | 6.2±2.6 | 0 | 10.7± 2.30 | 0 | | |
| **Test 4. Ellensburg. Applied August 28** | | | | | | | | | | |
| Monitor 1.0 | 0.7±0.4 | 86 | 0.7±0.3 | 79 | 0.7±0.5 | 79 | 0.0± 0.1 | 98 | 0.1±0.1 | 93 |
| Mevinphos 1.0 | 2.6± .7 | 49 | 3.7±1.6 | - 7 | 5.3±2.4 | -53 | 5.2± 1.7 | -105 | 2.8± .9 | -238 |
| Untreated check | 5.1± .9 | 0 | 3.5± .8 | 0 | 3.5± .8 | 0 | 2.5± 1.0 | 0 | .8± .3 | 0 |
| **Test 5, Ellensburg. Applied September 8** | | | | | | | | | | |
| Monitor 1.0 | | | 0.0±0.0 | 100 | 0.0±0.0 | 100 | 0.0± 0.0 | 100 | | |
| Mevinphos 1.0 | | | .1± .1 | 94 | .1± .1 | 96 | .0± .0 | 100 | | |
| Endosulfan Reg. 2E at 1.0 | | | .1± .1 | 94 | .4± .5 | 84 | .0± .0 | 100 | | |
| Endosulfan 3E at 1.0 | | | .2± .2 | 89 | .4± .5 | 84 | .1± .1 | 86 | | |
| Endosulfan 2E with low emulsifier 1.0 | | | .5± .4 | 72 | .8± .6 | 68 | .0± .0 | 100 | | |
| Untreated check | | | 1.8± .8 | 0 | 2.5±1.6 | 0 | .7± .5 | 0 | | |

a/ $\bar{X}\pm S\bar{x} \cdot t0.05$ -- mean number of aphids per compound leaf plus or minus the standard error of the mean at the 95% confidence limit. Treatment means outside of these ranges are statistically different from each other.