EVALUATION OF REGISTERED MITICIDES FOR CONTROL OF THE TWO-SPOTTED SPIDER MITE[1/] ON RUSSET BURBANK POTATOES[2, 3/]

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The two-spotted spider mite, Tetranychus urticae Kock, is one of the most difficult potato pests to control in eastern Washington because it develops resistance to insecticides. On green house roses, this mite has developed resistance to such acaricides as Aramite^{R} (2-(p-tert-butylphenoxyl)-1-methylethyl 2-chloroethyl sulfite), chlorobenzilate, tetradifon, tepp, malathion, and schradan (Allen et al. 1964). Also, in recent years, carbophenothion and parathion have not given satisfactory control of the two-spotted spider mite on Russet Burbank potatoes (Powell 1966). Powell and Landis (1966) showed that monocrotophos was highly effective against the two-spotted spider mite on potatoes, but it is not registered for use on this crop. In view of the lack of mite control on potatoes in recent years and the need to protect this crop, we evaluated some of the presently registered miticides alone and in combination for control of mites on Russet Burgank potatoes.

Methods and Materials. --On August 20, 1970, the miscible sprays of phosphamidon, dicofol, dimethoate, and parathion were applied alone or in combination in 10 gal of aerial spray/acre to Russet Burbank potatoes. The rates of actual toxicant/acre for the treatments were: phosphamidon, 1 lb; dicofol, 1.5 lb; dimethoate, 0.5 lb; parathion, 1 lb; dicofol 1.5 lb + dimethoate 0.5 lb; dicofol 1.5 lb + parathion 1 lb; dimethoate 0.5 lb + parathion 1 lb; and untreated check plots. Each plot was 48 ft wide (17 34-in. rows) and 620 ft long. Each treatment was replicated 3 times in a randomized complete block design.

The miticides were applied between 6:00 a.m. and 7:05 a.m. from a Piper Pawnee^{R} 235 agricultural spray plane. The plane was equipped with a 28-ft standard mounted boom with 45 Spraying System Co. Teejet^{R} disc type cone spray nozzles that were spaced nonuniformly to obtain greatest uniformity of application. Each nozzle was fitted with a D8 disc and a No. 56 core. All nozzles were oriented to spray vertically downward. Spray pressure was 40 psi, and no adjuvants were added to the spray solution. Flight speed was 90 mph at a boom height of 5 ft above the plants. Runs were spaced 48 ft on center. Wind speed at the time of spraying was less than 5 mph, and air temperature was 59^{o}F. No measurements of humidity were taken. Subsequent to spraying, air temperature increased to a high of 92^{o} at 3:00 p.m.

Performance data were obtained by collecting 25 compound potato leaves from 2 rows on either side of the center row of each plot on Aug. 24 and 27 and Sept. 1 and 10, that is, 4, 7, 12, and 21 days after treatment, and counting the number of mites on the leaves with the aid of an optical glass binocular magnifier. The data for each sampling date were transformed to log (X+1) and then analyzed as a randomized complete block design. Five mites/leaf were taken as the threshold of economic damage to potatoes. Therefore, the number of potato leaves with 5 or more mites/leaf was tabulated, and the data were analyzed for treatment comparisons.

1/ Tetranychus urticae Koch (Acarina: Tetranychidae).

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

3/ Mention of a pesticide or a proprietary product in this paper does not constitute a recommendatior or an endorsement of this product by the USDA.

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Results. -- The analysis of the log (X+1) tranformed data showed that dimethoate + dicofol was effective for 21 days, dimethoate alone gave quick kill but did not persist to the 21st day, dicofol alone killed slowly but had good residual control, dicofol + parathion gave slow kill but good residual control, parathion + dimethoate was effective for only 7 days, and parathion or phosphamidon alone were relatively ineffective (Table 1).

The log (X+1) tranformation was analyzed as a split plot in time with 4 counting dates, 8 treatments, and 3 replications to provide a comparison of the total number of mites at the end of the 21-day period. This analysis showed that dimethoate was a more effective treatment than dicofol + parathion or dicofol alone, even though the dimethoate-treated plots had more mites during the 21 days than the other 2 treatments. This result is caused by the consistently low number of mites in the dimethoate-treated plots for the 1st 12 days and the ineffectiveness of dimethoate on the 21st day after treatment; in contract, both the dicofol + parathion and the dicofol treatment were slow to reduc the mite populations but maintained a low population for 21 days.

Table 1 also segregates the data in the form of the number of potato leaves with 5 or more mites/leaf. Dimethoate proved to be effective in reducing the number of mites below the economic level, and dicofol was effective in maintaining a low mite population.

Thus, dicofol could be used to prevent a buildup of mites before the population increases on potatoes in the Columbia Basin. Dimethoate may be used to reduce a severe infestation, but it will not give more than 7-10 days of control.

This is a report of research and not a recommendation of any materials tested.

Table 1. Control of the two-spotted spider mite on Russte Burbank potatoes with aerial application of registered miticides singly or in combinations. Quincy, Wash. 1970

Miticide	No. mites/75 compound potato leaves on indicated days after treatment [a] 4 days	7 days	14 days	21days	Total
Dimethoate + dicofol	55 ab	48 a	40 a	156 a	299 a
Dimethoate	28 a	125 ab	187 bc	1243 a	1583 ab
Dicofol + parathion	207 bc	362 ab	80 ab	211 a	860 bc
Dicofol	323 cd	368 bc	280 c	363 a	1334 bcd
Parathion + dimethoate	292 bc	135 ab	680 d	1560 b	2667 cd
Parathion	340 cd	377 bc	666 d	2196 b	3579 de
Phosphamidon	370 d	775 bc	1628 de	2806 b	5579 ef
Untreated check	1107 d	2013 c	3107 a	7599 b	13826 f
	No. compound potato leaves with more than 5 mites/leaf out of 75 leaves examined [b]				
Dimethoate + dicofol	2 a	2 a	1 a	12 a	17 a
Dicofol + parathion	11 ab	16 abc	7 ab	10 a	44 ab
Dimethoate	1 a	5 ab	9 abc	51 b	66 bc
Dicofol	25 abc	25 bc	19 bc	24 a	93 cd
Parathion + dimethoate	23 abc	7 ab	2[illegible] c	59 b	114 d
Parathion	26 abc	34 c	45 d	66 b	171 e
Phosphamidon	33 bc	25 bc	58 de	72 b	188 e
Untreated check	52 c	66 d	66 e	73 b	257 f

a/ Totals followed by the same or common letter are not significantly different based on the analysis of log of (X + 1) transformation and Duncan's Multiple Range Test.

b/ Totals followed by the same or common letter are not significatly different based on Duncan's Multiple Range Test.

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