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PRELIMINARY RESULTS OF AN AREA-WIDE PROGRAM FOR THE  
CONTROL OF THE GREEN PEACH APHID <sup>1/</sup> ON PEACH TREES IN THE  
COLUMBIA BASIN <sup>2/</sup>

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During the late 1950's, compared with the present, fewer green peach aphids and less evidence of leaf roll disease were apparent on potatoes in the Columbia Basin. The principal reason for these low populations of aphids was the small number of peach trees, the main overwintering host of the aphid. As the Basin developed, farmers planted more and more trees on the old and new farm units, and now these rather uniformly distributed trees provide thousands of overwintering sites for the aphid.

In 1966, 275 square miles of land were selected for a large-scale experiment to determine whether damage to potatoes by aphids and leaf roll disease could be reduced materially by destroying the aphids on peach trees before they migrated to the potatoes. This experimental area extended from Othello, west to the Columbia River and from near the crest of the Frenchman Hills south to the Saddle Mountains [Powell and Mondor 1967]. The present report describes the methods used in the experiment and gives some preliminary data showing the degree of suppression of aphids within the control area in 1966 and 1967.

Materials and Methods: In an intensive survey of the experimental area early in the spring of 1966, all peach trees found were plotted on Columbia Basin Project farm maps. Then a second survey of the area was made in the spring of 1967, some trees that had been missed during the first survey and

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1/ Myzus persicae [Sulzer] [Hemiptera: Aphididae]

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many trees that had been planted in 1966 were added to the maps. Then before any spraying was done, the owners of the trees were asked to sign an agreement allowing us to spray the trees. Thus in April 1966 and again in April and May 1967, all but a few recorded trees in the experimental area were sprayed with an effective aphicide.

One method used to determine the effect of the tree spraying on the control of the aphid was to record the density of aphid flight. Starting in May of each year when the winged aphids usually start leaving the peach trees, 60 yellow aphid traps filled with water were placed at selected locations two miles apart throughout the control area. This trap line was 130 miles long since it criss-crossed back and forth and aphids were collected from the traps twice weekly each year from May to August.

Because some green peach aphids are produced on weeds and annual crops as well as on peach trees, the kind and number of the most abundant plant species within a 1/4-mile radius of each trap were recorded on individual maps in June of each year. These maps were used to determine the probable source of large numbers of aphids taken in certain traps, particularly after the migration of aphids from the peach trees had stopped.

Whether the winged aphids collected in traps developed on peach trees or on annual plants such as weeds can be determined by examining the aphids with a microscope: winged green peach aphids produced on peach trees have short antennae and narrow, cylindrical cornicles [honey tubes]. Winged aphids developing on annual plants have long antennae and slightly swollen cornicles. By looking closely at each aphid collected in the traps in the spring, we could determine how many had developed on peach trees and apparently survived the spray and how many had developed on annual plants during the spring and summer. Therefore, in 1967, the probable source of the winged aphids in the traps was first determined by checking the individual maps to determine the species of plants surrounding the trap and then by examining the antennae and cornicles of each aphid.

We also observed the rate of increase in the population of aphids in a number of potato fields by counting the aphids on 25 compound leaves of potato picked at random once a week from June to August in each of 15 fields in 1966 and in 23 fields in 1967.

Results: The number of urban or rural properties on which we found peach trees varied during the two years. Scale insects had killed or so badly damaged some trees that the growers removed them between the time of the first and second surveys. Also, some peach trees were missed in the first survey [Table 1]. Thus, only 88.7% of the trees actually present were sprayed in 1966. In 1967, 99.3% of the recorded trees were sprayed, including 563 newly planted peach trees.

The data collected from the 60 aphid trap pans showed that 63.5% fewer green peach aphids were in flight in the control

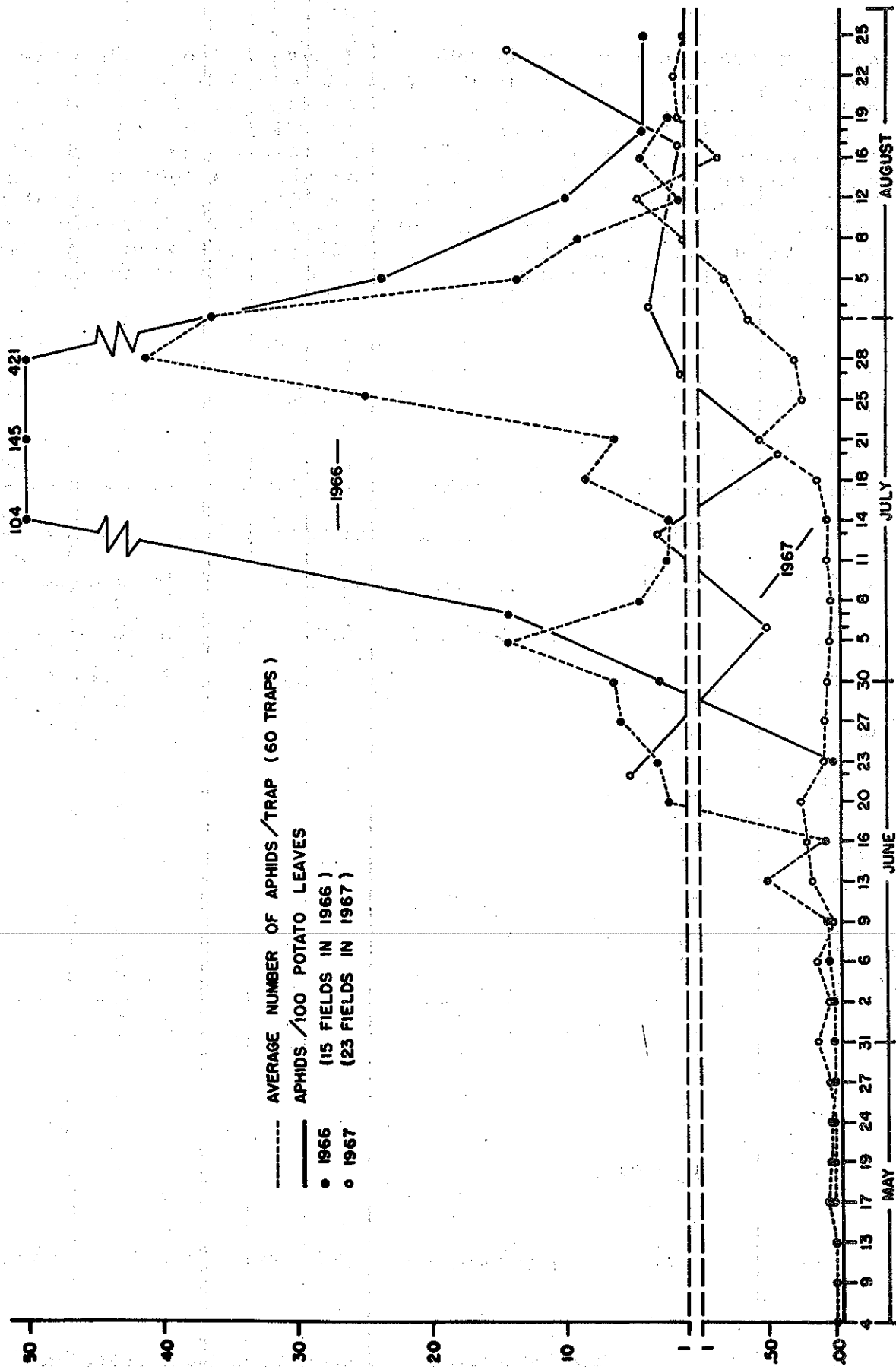
area in 1967 compared with 1966. Figure 1 shows that the number of aphids in flight early in the season was low and occurred at about the same time both years, but after June 20, the two populations progressed in very different ways. In 1966 the population averaged 1 aphid per trap on June 20, 14 aphids per trap on July 5, and 41 aphids per trap on August 1. In 1967, a population of 1 aphid per trap was not reached until August 8, and the greatest seasonal population, 3 aphids per trap, occurred August 12. Also, as might have been expected on the basis of these numbers, the populations on potatoes were 97.2% lower [Figure 1].

Table 1.--The number of properties containing peach trees and the number of peach tree in the control area. 1966-67.

Segment of the control area	Number of properties		Number of trees				New planting
	1966	1967	1966		1967		1967
			Sprayed	U nsprayed	Sprayed	Unsprayed	
Othello, City	144	156	248	4	261	8	67
Royal City, City	14	13	30	1	25	4	0
Blocks 45 and 49, s.w. of Othello	73	67	1196	7	1265	13	0
Blocks 80 to 85, Royal Slope	23	23	809	2	840	2	0
Block 87, Royal Slope	<u>33</u>	<u>41</u>	<u>2601</u>	<u>4</u>	<u>3072</u>	<u>16</u>	<u>496</u>
Total	287	300	4884	18	5463	43	563

Fig. 1.--Seasonal populations of aphids in 1966 and 1967

determined by trap pan collections and counts  
of aphids in commercial potato fields within  
the control area.



The maps showing the species of plants present around each trap and the dates when the aphids were collected in the traps were used as guidelines in estimating the proportions of winged aphids produced on peach trees or on annual plants such as weeds and other cultivated crops. The collections showed that nearly 100% of the winged aphids collected in trap pans within 2 to 5 miles of peach trees until about June 15 had short antennae and slender cornicles, showing that they were produced on peach. The aphids collected in the trap pans after June 15 had long antennae and slightly swollen cornicles, showing that they were produced on herbaceous plants. In areas where there were no peach trees within 5 miles of a trap, we assumed that all the aphids had been produced on weeds or cultivated crops. Although the percentage of aphids produced on peach trees decreased and those on other species of plants increased during the first two weeks of June, the percentage of aphids produced on weeds also decreased and those on some cultivated crops increased as the season progressed.

In 1966, in the Crab Creek area where no peach trees were found, we assumed that the aphids in the traps had developed either on weeds or on cultivated crops. The antennae and cornicles were therefore not examined, and the probable origin was designated either as weeds or cultivated crops depending on the flora surrounding each trap [Table 2]. In 1967, a preliminary separation was made of the winged aphids from all traps on the basis of the plants found around each trap; then each aphid was examined for morphological differences that either confirmed or refuted this preliminary segregation. The correlation between these two methods of identification is shown in Table 3.

Table 2.--Numbers of winged green peach aphids collected in aphid trap pans and percentage that migrated from host plants. Columbia Basin, 1966.

Date	Block 45 <sup>a/</sup>		Blocks 80 to 87 <sup>b/</sup>		Waste lands or bordering waste lands				All areas	
	% Migrating from--		% Migrating from--		% Migrating from-- <sup>c/</sup>		% Migrating from-- <sup>d/</sup>		Avg % Migrating from --	
	Number collected	Peach trees Weeds Crops	Number collected	Peach trees Weeds Crops	Number collected	Peach trees Weeds Crops	Number collected	Peach trees Weeds Crops	Number collected	Peach trees Weeds Crops
May	1	100.0 0.0 0.0	0	0.0 0.0 0.0	1	0.0 100.0 0.0	3	33.3 66.6 0.0		
June 1-15	1	100.0 .0 .0	6	33.3 50.0 16.7	16	.0 100.0 .0	30	10.0 86.7 3.3		
June 16-30	116	33.6 63.8 2.6	191	23.0 55.4 21.4	216	.0 93.5 6.5	631	13.1 78.8 8.1		
July 1-15	137	10.9 39.4 49.6	194	5.1 26.8 68.0	535	.0 83.4 16.6	1029	2.4 75.5 22.1		
July 16-31	101	.0 18.8 81.2	466	.0 8.3 91.7	813	.0 86.4 13.2	2161	0.0 68.5 31.5		
Aug. 1-19	298	.0 22.1 77.9	696	.0 .2 99.8	433	.0 18.8 81.2	1613	0.0 33.2 66.8		

<sup>a/</sup> Area containing cultivated crops; east of sprayed area with few peach trees.

<sup>b/</sup> Royal Slope area containing cultivated crops; all peach trees sprayed.

<sup>c/</sup> Crab Creek area; no farm units, no peach trees.

<sup>d/</sup> Royal Slope area, Highway 26, bordering farm units, no peach trees.

<sup>e/</sup> Percentage migration from hosts for Area 2 only.

Table 3.--Comparison of percentages of green peach aphids migrating from peach trees and from other hosts obtained either by examining the cornicles and antennae of trapped aphids or by reference of the size of populations to the available host plants. 1967.

Date	Number collected	Percentage estimated on basis of--				
		Cornicles and antennae			Available host plants	
		Peach trees	Weeds	Not sure	Peach trees	Weeds Cultivated crops
May	13	84.6	15.4	0.0	84.6	15.4 0.0
June 1-15	40	32.5	60.0	7.5	50.4	49.6 .0
June 16-30	29	13.8	86.2	.0	6.9	34.5 58.6
July 1-15	15	20.0	60.0	20.0	26.7	26.7 46.6
July 16-31	98	14.3	76.5	9.2	18.4	48.0 33.7
Aug. 1-15	401	.0	100.0	.0	.0	24.2 75.8
Aug. 16-25	252	.0	100.0	.0	.0	11.5 88.5

#### Reference Cited

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