obtained from several commercial orchards. It was observed that commercial orchards located in areas near abandoned orchards were more rapidly reinfested after pesticide treatment for psylla control than commercial orchards located in areas where abandoned orchards had been removed.

Reinvasion possibilities

It has been shown in these tests that abandoned orchards are capable of supporting large numbers of the pear psylla. It was also indicated that summer movements out of these neglected areas do occur. In view of these findings it could be assumed that commercial orchards located near these sources would be more subject to quick reinvasion following pesticide treatment than those located in areas free of abandoned trees. If this assumption were true, the removal of abandoned orchards would be of immediate importance in reducing the pest reportedly responsible for the pear decline disease.

To check this point, five orchards were studied in the Placerville area. Three were in close proximity to abandoned orchards, and two were in areas free of neglected trees. All five orchards were treated by the growers with Guthion for psylla control, and in all orchards but one, two foliar applications were made. All three of the orchards located near abandoned trees had persistent but low psylla numbers throughout the season, which are believed to have originated from immigrating individuals. This was in contrast to the total absence of psylla recorded from the two orchards in the area free of abandoned trees.

Nymphal population in reinvaded orchards was low, probably because of the toxic residue of Guthion on the foliage. Thus, the effect of immigration from abandoned orchards may be minimized by application of an effective, long-residual pesticide. However, judging by the number of compounds to which the pear psylla has become resistant in the states of Oregon and Washington, there is little chance of maintaining the current effectiveness of materials such as Guthion.

PEAR DECLINE RESEARCH

H. F. MADSEN · P. H. WESTIGARD

CONTROL OF PEAR PSYLLA

with Oils and Oil-Pyrethrins

Oil sprays show promise for pear psylla control, but the addition of pyrethrins offers little advantage.

PEAR PSYLLA can be readily controlled in California at the present time with several of the organic phosphate insecticides, as well as dieldrin and Dilan. Some of the organic phosphates (malathion and Diazinon, principally) have failed to give adequate control, however, and it is probable that resistance will become an important factor in the near future, especially if an intensified program of control is continued. The extensive resistance problem reported in Washington is perhaps a preview of what may soon occur in California.

Since an intense screening program on new insecticides is underway in the Pacific Northwest, it was decided to limit the 1962 studies in California to an investigation of petroleum oils and pyrethrins. Three oils with a wide range of viscosity were applied, alone and in combination with pyrethrins. The oils used were: Pennsalt Superior oil (viscosity 70–75, U.R. 96.0), Moyer oil 94 (viscosity 507, U.R. 92.0), and Moyer oil 97 (viscosity 1035, U.R. 91.2).

A plot was established in an isolated section of an abandoned orchard at Danville. For each material, plots consisted of single trees with five replications in a restricted, randomized design. The sprays were applied with a conventional power sprayer and hand guns. Approximately five gallons per tree were used at each application.

The plots were evaluated by collecting five basal leaves and five terminal leaves from each replicate and examining them for pear psylla nymphs and eggs—with the aid of a binocular microscope. The

SUMMARY OF 1962 OIL AND PYRETHRIN PLOTS FOR CONTROL OF PEAR PSYLLA

Materials	Dosage per 100 gallons*	Nymphs per 50 leaves										
		May 31	June 5	June 18	July 2	July 18	July 26	Aug. 2	Aug. 8	Aug. 21	Sept. 6	Sept. 18
Pennsalt Superior oil	1 gallon	395	9	12	4	42	35	57	25	14	3	20
Moyer oil 94	1 gallon	253	61	32	3	8	16	1	6	3	4	21
Moyer oil 97	1 gallon	228	41	43	1	25	11	15	6	4	1	6
Pennsolt Superior oil + pyrethrins	1 gallon + 2 pints 2%	252	16	13	1	49	24	16	45	8	3	10
Moyer oil 94 + pyrethrins	1 gallon + 2 pints 2%	214	9	15	6	20	18	5	10	5	1	5
Moyer oil 97 + pyrethrins	1 gallon + 2 pints 2%	386	28	10	0	12	30	10	18	0	4	7
Pyrethrins	2 pints 2%	215	50	158	19	35	156	9	149	91	–	–
Check	no treatment	266	116	129	8	90	70	80	362	141	120	33

*Materials applied Moy 31, July 26.

P. H. Westigard is Assistant Entomologist, Oregon State University, formerly Junior Research Entomologist in the Experiment Station, University of California, Berkeley; and H. F. Madsen is Associate Professor and Associate Entomologist in the Experiment Station, U.C., Berkeley.

materials used, dosage, and pear psylla counts are summarized in the table.

Natural factors played a role in the results of the oils and oil-pyrethrin combinations. The drastic reduction shown in the July 2 count was due to a period of hot weather in late June when temperatures rose to above 100°F for two days. After this period, it was no longer possible to ascertain the effects of the treatments. The psylla then increased, and a second application was made on July 26. In late August, there was another steady decline of psyllid nymphs in both treated and check plots. The explanation for this is not clear, as temperatures were generally moderate. It is possible that the decline in psylla numbers was due to the poor condition of the abandoned trees. By August, growth had ceased, and the leaves were small and yellowish green.

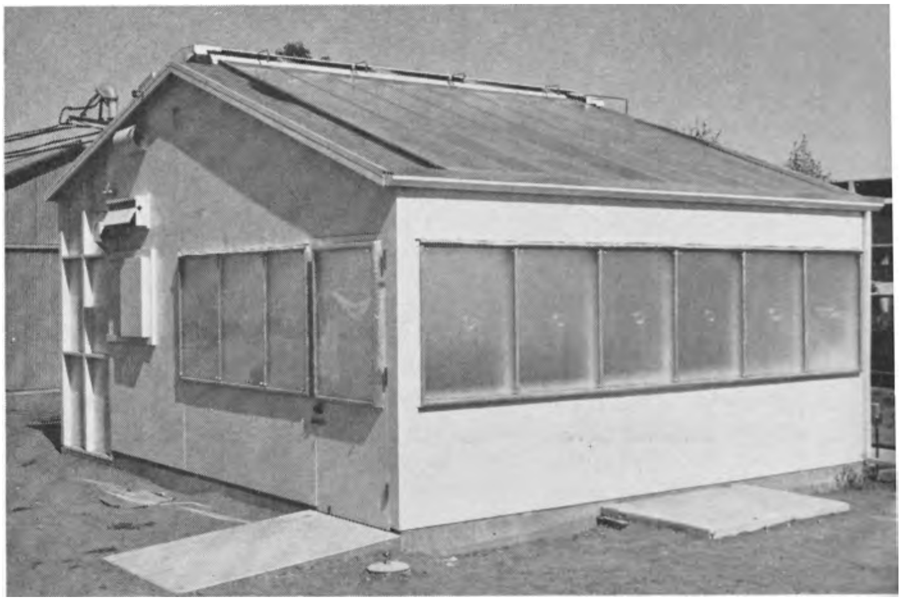
Good reduction

The oils and oil-pyrethrins gave good initial reduction of pear psylla nymphs; but because of the natural factors, it was not possible to determine the residual action. There were no significant differences between the oils of various viscosities or between the oils alone and the oils when combined with pyrethrins. It was evident that pyrethrins alone gave an initial reduction, but a rapid increase soon followed.

Phytotoxicity was not observed on any of the plots, but the trees were in such poor condition that no definite conclusions on this point could be made. From laboratory observations, it seems that the oils kill both nymphs and eggs. After application, many nymphs were dead both within and outside of the honeydew droplets.

It can be concluded that oils show promise for pear psylla control, but the addition of pyrethrins offers little extra effect. No counts of adults were made, but it was evident that some kill was obtained. Egg counts showed significantly fewer eggs deposited on the treated foliage, but it could not be determined if this was due to adult kill or repellant action of the oils. As a result of the 1962 plot work, studies will continue with foliage oils, both alone and in combination with insecticides.

H. F. Madsen is Associate Professor and Associate Entomologist in the Experiment Station, University of California, Berkeley; and P. H. Westigard is Assistant Entomologist, Oregon State University, formerly Junior Research Entomologist in the Experiment Station, University of California, Berkeley.



Phytotron Modification

Admits More Sunlight Through Plastic Panels

Use of double-pane, clear plastic panels with prismatic lower surfaces to direct sunlight downward from the roof, and patterned for diffusion of light from side panels, allowed 93% more sunlight for plant growth than the glass block design used previously in phytotron tests at Davis.

THE LARGER "phytotron" room for plant experimentation at Davis, described a year ago in *California Agriculture* has been remodeled to admit more sunlight than was permitted by the glass blocks formerly used in the horizontal roof. The new design was developed from experiments with a smaller model described earlier that had a sloping roof and three sides of glass blocks. Experiments with plastic materials led to a design that is more efficient in transmitting sunlight, and uses lighter weight materials offering less danger of breakage.

The present remodeled plastic room has a useful floor area of $12\frac{2}{3} \times 16\frac{3}{4}$ feet. The transparent roof slopes at a 23 degree angle from 13 feet at the north down to 9 feet 2 inches at the south end. Clear Plexiglas panels $14\frac{1}{2} \times 2$ feet, of double-pane construction (for thermal insulation) were used for the roof covering. Prismatic surfaces on the lower side of each layer of plastic direct the sunlight downward toward the plants. Three walls (east, west, and south) are also double-pane plastic; the outside layer is clear, and the inside layer is patterned with pyramids to diffuse light. The resulting light in the room has only the narrow shadows of the 2-inch-wide roof supports

Sugar beets in containers show good growth from uniformly high quality light admitted through plastic panels in recent phytotron modification at Davis.