

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 repellent 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. Westgard 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.



WHEAT AND OAT YELLOW DWARF RESISTANCE

BARLEY YELLOW DWARF is one of the most destructive diseases affecting oats and has also been known to cut yields of wheat by more than one-half. This virus disease is spread by aphids, and spectacular outbreaks of the disease occasionally cause widespread and extensive crop losses. Most notable effects of the disease are pronounced stunting and severe reductions in yield. Resistant varieties offer the best defense against this disease, and a search is underway to find such strains.

None of the oat or wheat varieties commercially grown have shown strong resistance to the disease. Thus far, 5,500 strains of wheat and 1,100 strains of oats obtained from various localities and from cereal collections of United States Department of Agriculture have been tested for disease reaction under local conditions. While none of these strains are completely resistant, a few possess an acceptable level of resistance for use in breeding resistant varieties adapted to this area.

Steps have been taken to transfer the resistance observed in some strains of oats into adapted varieties. This is not complete resistance but is stronger than that in varieties presently grown. None of the observed strains of wheat had resistance comparable to that found in oats, but the search for wheats with a more acceptable level of resistance is also continuing.—*J. C. Williams, Assistant Agronomist, Experiment Station, Department of Agronomy, University of California, Davis.*

INDEX AVAILABLE

A complete index of articles that have appeared in California Agriculture for 1962 is available free on request. Address: California Agriculture, Agricultural Publications, 207 University Hall, University of California, Berkeley 4.

F. P. ZSCHEILE
S. M. HENDERSON
A. S. LEONARD
L. W. NEUBAUER



Double-pane plastic panels were used on roof and sides in latest phytotron modification at Davis, as seen in photo to left. Thin wire-stressed aluminum trusses, seen in photo below, were used to support plastic roof panels with minimum of light loss.

Air is channelled through perforated walls at lower and upper levels and through vertical slots at window height, to flow horizontally from east to west. Adjustments through horizontal channels and directional vanes permit control and variation of the air stream in any part of the room. Temperature and humidity controls were left as originally designed.

This room is now in service for plant science problems and will not be greatly modified except for the possible addition of artificial lighting. The room will be studied during the coming seasons for detailed analyses of such things as sunlight admission, power costs, and plant growth performance. A still more efficient phytotron model that will rotate automatically to follow the sun is also being planned.

F. P. Zscheile is Professor of Agronomy, S. M. Henderson is Professor of Agricultural Engineering, A. S. Leonard is Agricultural Engineer, L. W. Neubauer is Professor of Agricultural Engineering, University of California, Davis.

These continuing studies on design have benefited from excellent cooperation and help of the staffs of the Agricultural Engineering and Plant Service Departments, the Rohm and Haas Co., and the A. E. Lilly Co. and from financial assistance from the National Science Foundation, Facilities and Special Programs. The sugar beet crop was grown by Professor R. S. Loomis and Mr. Gary Ritenour of the Agronomy Department, University of California, Davis. The research program on plants is guided by the Planning Committee for Controlled Environmental Facilities for Plants.

and those of the vertical supports for the walls. An automatic water sprinkler removes dust from the roof twice each day.

Aluminum trusses support the plastic roof and are kept straight by adjusting tension of the steel wires visible in the photograph. These trusses are spaced every 2 feet but block out only 8% of the sunlight intercepted by the roof.

The side windows allow much sunlight to enter during early and late hours of the day when the sun is at lower elevations and are especially effective in winter. At the equinox period the total light reaching the interior of the room at bench level was about 50% of outdoor sunlight energy, averaged over the day. This is 93% more sunlight than was admitted by the glass block design used previously. Shaded portions of the room are equalized from morning to evening so that different quadrants of the area receive nearly the same amounts of light energy. The sugar beets shown in the photo were used to test growth equality in different parts of the room.