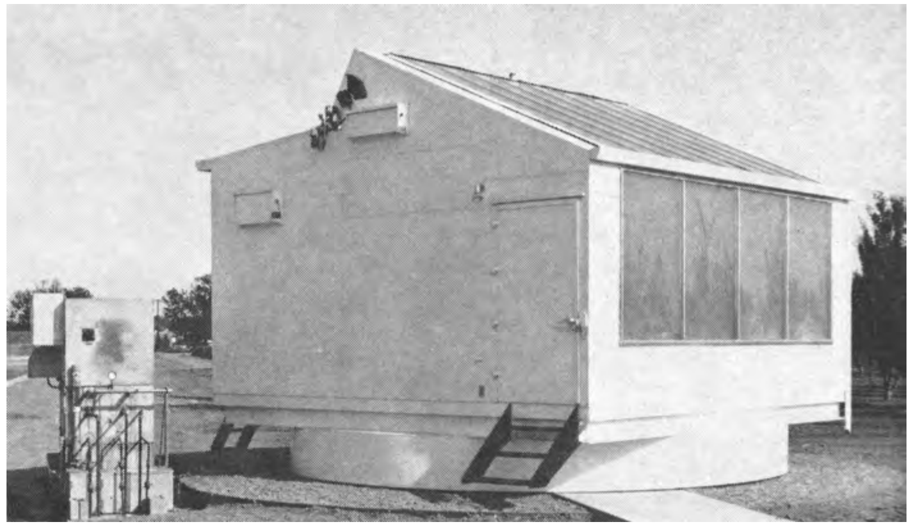
The latest phytotron unit at Davis (a rotating sunlit room that follows the sun) is now in operation, and is expected to be particularly useful for plant growth experiments which benefit from intense sunlight. This 20 × 20 ft room has a roof and front face of double-pane and clear plastic panels with prismatic lower surfaces to direct sunlight downward from the roof. Photocells which trigger an electric motor cause the room to face the sun continuously, receiving strong direct sunlight from dawn to sunset.



ROTATING SOLATRON

receives more sunlight for plant growth

L. W. NEUBAUER · F. P. ZSCHEILE

THE NEW SOLATRON at Davis is actually a combination of special features tested in several units over a period of six years—as reported in *California Agriculture*. A smaller unit, 6 × 8 ft, with glass-block roof and walls, which was turned slowly by an electric motor, at a uniform speed, proved that the principle was favorable for admission of high intensities of sunlight. As expected, the small unit, in rotating uniformly, did not actually face the sun at all times but only at certain hours. To correct this, a photocell or "electric eye" was selected as the most useful and economical system of control for constantly keeping the new solatron facing the sun.

SEASONAL SOLATRON PERFORMANCE AT BENCH LEVEL

Horizontal sunlight intensities averaged over nine positions in room

Season	Total per day	Average over the day	
		Intensity	Percentage of Outdoor sunlight
	foot-candle-hours	foot-candles	
Winter (9.5-hr day)	32,400	3,400	111
Equinox (12-hr day)	60,500	5,000	96
Summer (14.6-hr day)	82,000	5,600	87
Yearly average			97

Another experimental model, 12 × 16 ft in working space, was also built and tested for plant growth. This stationary unit, with four times the area, and with prismatic glass blocks on the roof had excellent light quality for good plant growth; but higher intensities appeared desirable. Heating, cooling, and humidifying mechanisms were designed by Professor S. M. Henderson. Other developments followed, including the use of lightweight improved and enlarged transparent plastic panels on roof and walls. Lightweight aluminum trusses were used to support the roof. This reduced light loss considerably, and light intensity increased by 93%. The new model was planned to utilize these benefits, and to further increase light intensity by accurately timing rotation to continually face the sun.

The solatron moves on a circular railroad rail which is supported by a circular concrete-block silo or basement wall as shown in photo details. The basement contains much of the heavy control equipment and cooling machinery. The total design load of the superstructure, estimated at 30 tons, rests on eight steel wheels running on the rail, as shown in the photo. The heavy steel frame is welded to the wheel bearings, and carries the phytotron unit.

The propulsion system consists of a ½ horsepower, reversible, synchronous electric motor, geared down to a ratio of over one million to one. This includes two worm-gear reducers in series, along with additional belt and chain reductions. This mechanism is shown in the photo.

The final balanced drive is by means of two steel shafts to two wheels on opposite sides of the frame. The other six wheels are idlers.

Outer layers of plastic sheet are clear and smooth. The inner layer on the windows diffuses light and that on the roof has a prismatic lower surface to direct light downward. Shadows of supporting elements are narrow and remain stationary. The back "north wall" is covered with highly reflective chrome-metallized Mylar vinyl laminate.

Finished appearance of the solatron is shown in the photo. The cellar entry is covered by a light plywood door. The wheels are skirted to prevent accidents and to protect them and the basement from the weather. The side walls contain no windows, since the sun never shines on them. Two ventilation ducts can be seen on the "west" wall, to the left of the main door. Near the peak or ridge can be seen the photocell units which trigger the rotation when they "see" the sun, stop the motor when shaded, and reverse the motor at night. At the left is part of the cooling equipment, including water evaporator and the heat-exchanger.

Sunlight distribution

Sunlight is more evenly distributed in this room than in the stationary room, horizontally, vertically, and throughout the day, because only the altitude of the sun changes. Much light reaches plants from the front wall, the roof, and by reflection from the back wall. Seasonal performance is summarized briefly in the table. The average intensity is relatively constant for three fourths of the year, and the average percentage of sunlight admitted approximates 100% over the day. With higher-altitude sun, the noon maxima are reduced. At all seasons the intensities early and late in the day are enhanced in general over outdoor values.

Intensities

Maximum intensities, regardless of angle of light meter with the horizontal, average 113, 118, and 139% of horizontal values in summer, equinox, and winter conditions, respectively; these indicate actual higher total light available to plants than represented by horizontal values. Maximum intensities of about 9,000 foot-candles are obtained in all seasons, with higher values in some locations for short periods of time. Admission of sunlight in this rotating room is considerably greater than in the earlier stationary plastic room (28% more in winter, 67% more in spring and fall, and 102% more in summer), about 66% more over the year. Refrigeration of solar heat in such an insulated room is very economical.

L. W. Neubauer is Professor of Agricultural Engineering, and F. P. Zscheile is Professor of Agronomy, University of California, Davis. *Excellent cooperation and assistance were received from the Departments of Agricultural Engineering and Plant Service, and the Capital Machine and Welding Works, Sacramento. The Rohm and Haas Co. donated many of the plastic sheets in the roof.*

SUNDAR PEACH

This large, late-maturing, white-fleshed, freestone of superior quality, requiring only a moderate amount of winter chilling, is recommended for home use in California's intermediate valleys and southern mesas.

R. L. BALDWIN • L. P. SHARP
M. M. WINSLOW • J. W. LESLEY

SUNDAR (Sanskrit for beautiful) originated in 1940 from four generations of crossing with many different parents in its pedigree—including Elberta, Late Champion, Krummel's October, Luken's Honey, and Peento. The fruit is large, up to 200 grams, with a distinct red blush on a white skin, slightly fuzzy, and without a prominent beak. The flesh is white with much red next to the stone. The aroma is agreeable, as in most white-fleshed varieties, and the flavor sweet with moderate acidity and little bitterness. The flesh is very juicy but rather tender; the skin is tough and semi-adherent. At full maturity the fruit requires careful handling and is rather inclined to drop. When picked just before it softens, the fruit keeps well. The tree grows vigorously. The flower has large petals and is pollen-fertile; and the leaf glands are globose.

Sundar matured about September 7, 1965, at Riverside, a week later at Santa Paula, and even later on the Beaumont mesa (where there is a small commercial planting). Accordingly, it ripens about 10 days later than the Rio Oso Gem. Sundar appears not to be especially susceptible to monilia brown rot. It has produced a crop regularly in the San Bernardino, Hemet, and Santa Clara (Ventura County) valleys, at Saticoy, and east from Santa Paula. The yield at Riverside has been satisfactory in 18 of the past 22 years and very light in 3 years —1958, 1959, and 1961, following extremely mild winters—and was not recorded in one year. At Riverside, about 700 hours of winter chilling are required at or below 45°F.

Production has been irregular on the south coastal plain—near Oxnard and Ventura or within about 10 miles of the coast—owing to insufficient chilling; and in 1961, following an extremely mild winter, it failed completely. Information on commercial sources of nursery stock or of scion wood may be obtained by writing to R. L. Baldwin, Farm Advisor, Agricultural Extension Service, 684 Buena Vista Street, Ventura, California 93001 or J. W. Lesley, Department of Horticultural Science, University of California, Riverside, California 92506.

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