EARLY MULCHED STRAWBERRIES

Early mulching of winter-planted strawberries with clear polyethylene gives gross yield increases

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The fruit yield and performance pattern of winter-planted strawberries in California depends largely on how much the plants grow during the winter months. If they grow considerably, more flower buds are initiated because of the short photoperiod, and the crowns develop sufficiently to support a sizable early crop.

Growth of strawberry plants during the winter months is directly associated with temperature. Strawberry plants grow very little if temperatures average about 55°F or less. Near Santa Ana in southern California, where these experiments were conducted during the 1960–61 season, the average January temperature over the years has been 52.9°F—too low to stimulate much plant growth.

In previous experiments, clear polyethylene mulch applied in February increased the daily maximum soil temperature (at 3 inches) by 8 to 11°F. Night temperatures also increased but much less.

In the experiment reported here, Lassen plants from nine different nurseries and Fresno and Torrey plants from one nursery were compared in a split-plot design with four replicates. Each plot was split, and half of each was covered with the clear polyethylene shortly after planting (early), and the other half was covered with the mulch on February 15 (late). Thus, the "early" high elevation plants (set from Nov. 1 through Nov. 8) were mulched 3 to 3½ months earlier than the comparable "late" mulched plants, and the "early" low elevation plants (set from Dec. 10 through Dec. 12) were mulched for about 2 months earlier than the comparable "late" mulched plants. All the major nursery areas of California were represented in the experiment.

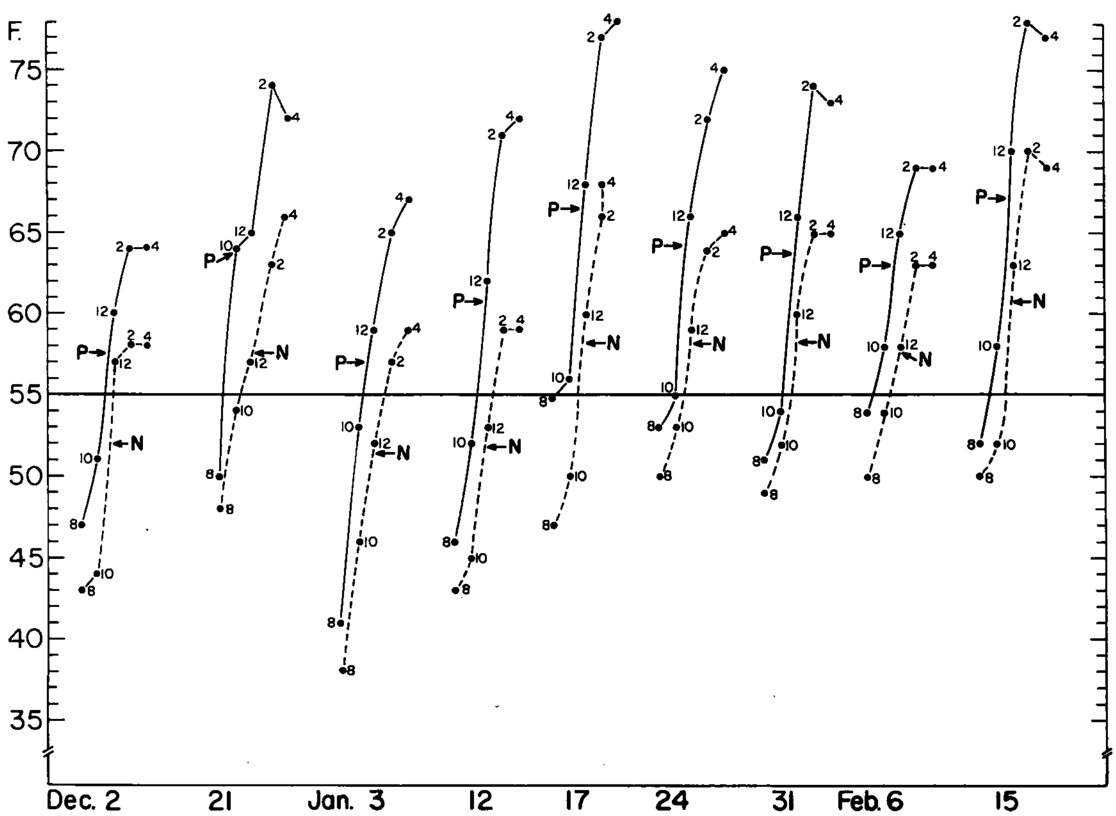
Test data

Yield, fruit size, and runner data were taken for the harvest which began in early March and continued through June. Appropriate temperature comparisons at 3-inch depths were recorded for nine representative days during December, January, and the part of February that the differential continued.

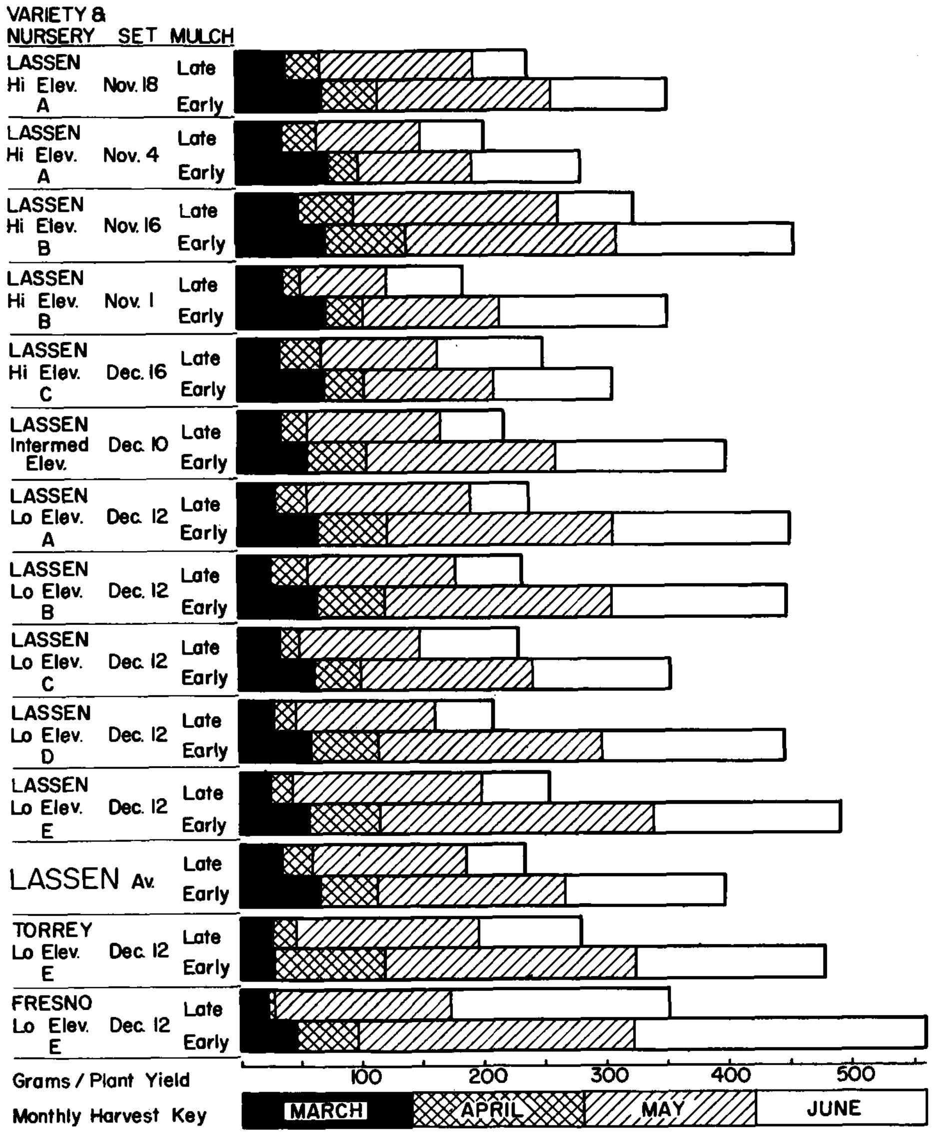
In each of the 13 comparisons (11 Lassen, 1 Fresno, and 1 Torrey), the plants that were mulched early outyielded those that were mulched late. Over all of the comparisons the increase in yield due to early mulching averaged 70 per cent—highly significant according to the analysis of variance. Considered by months, the average percentage yield increase due to early mulching was 90 for March, 97 for April, 52 for May, and 101 for June, reflecting a much larger early crop (March and April), a larger peak crop (May), and a much larger late crop (June).

Average fruit size was 4.4 per cent larger on the early mulched plants, and the difference in fruit size was highly significant. This was primarily a reflection of the larger plant size during the early part of the cropping season.

Runner production averaged 29 per cent greater on the late mulched plants, and the difference was highly significant. This was a reflection of the sustained fruit production of the early mulched plants, during June resulting from the active growth of these plants during the short photoperiod days of January and early February.



Nine daytime 3-inch-depth bed soil temperatures taken at 8, 10 and 12 a.m., and at 2 and 4 p.m., comparing polyethylene mulched beds (P) with non-mulched beds (N) during December, January and part of February, with a base of 55°F (the critical temperature for growth). Arrows by letters P or N designate the average temperature for those hours for that day for each treatment.



Yield by monthly harvests expressed as grams per plant from Lassen plants originating from three high elevation, one intermediate and five low elevation nurseries, and Torrey and Fresno plants from a low elevation nursery set at various planting dates; comparing polyethylene mulch applied at planting time (early) with mulch applied February 15 (late), 454 grams per plant = about 13 tons per acre or about 2,000 twelve-pint trays.

The greater yield and more desirable performance pattern of the early mulched plants can be explained by differences in growing temperatures. During December, the beds then covered with mulch had daytime soil maximum temperatures that averaged 8° higher (70° vs. 62°F) than on the sample dates. During January the difference was 11° (73° vs. 62°F), and during February it was 6° (76° vs. 70°F). As a consequence of the higher temperatures, the early mulched plants grew actively during the coldest part of the winter, developing the crowns and initiating the flower buds essential to good performance of winter-planted strawberries. In contrast, the late mulched plants did not show this performance.

Similar experiments were conducted with summer-planted plants, and highly significant increases in yield were also obtained on plants mulched in October, 1960, as compared with those mulched in February, 1961, but the differences were small, ranging from 3 to 7 per cent. This was predictable because crown development and flower bud initiation are always adequate on these plants since they have ample time to grow under favorable conditions in late summer and fall.

The best projected yields recorded on the early-mulched winter-planted plants were substantially less than those from the best summer plantings for the same harvest season (14 vs. 27, 13.6 vs. 30, and 15.8 vs. 32.5 tons per acre for Lassen, Torrey, and Fresno, respectively). The polyethylene mulch should be applied as early as possible on all winter-plantings where the mulch is used, at least in Southern California.

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QUALITY OF PERCOLATING WATERS

Overpumping ground water for agricultural, domestic, and industrial use has resulted in a lowering water table in many areas of California. The California Water Plan includes delivery of surface water to some of these areas to make up the water deficits and to provide water for future development. Since the amount of surface water available each year is variable, it has been proposed that in years when excess water exists, it be used to recharge the underground water supply.

Ground water recharge is accomplished by percolating the water through the soil mantle overlaying the water bearing aquifers. In arid and semiarid areas the soil mantle often contains appreciable amounts of salts. These salts and the exchangeable ions adsorbed by soil colloids can greatly affect the quality of the water reaching underground storage. Water percolating to the aquifers must not seriously degrade the ground water; therefore, a method for predicting the quality of percolating is essential.

A method has been developed for calculating the change in water quality when a water containing calcium and magnesium salts is percolated through a calcium-magnesium soil which contains an excess of gypsum. Due to the complexity of the soil system, this calculation is lengthy. Therefore, the procedures have been programmed for a high speed digital computer. With this program and the proper measured or assumed variables the quality of percolating waters may be easily calculated for the system described.

This program is being expanded to consider other ions and slightly soluble salts, and shows great promise in predicting the quality of water percolating through several hundred feet of soil.—*Gordon R. Dutt, Assistant Research Irrigationist, University of California, Davis.*