ready at first pick than did the comparable class from the flat grade in the 1960 trials. In trial 2 this difference occurred despite the irregular stand which had resulted from poor germination conditions. No other differences were detected in this trial.

Silking dates were also recorded for all plants in 1960. Earliness of silking was closely related to earliness of ear maturity. This should be expected, since silking occurs only 15 to 18 days before first pick in these winter plantings.

Total yield of marketable top ears was calculated two ways including and excluding late maturing ears (those which matured six days or more after first pick). When late ears were included, there was little difference in yield among the seed size classes. When late ears were excluded, the small seed usually produced the fewest marketable ears.

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Temperature and *Olive Yields*

DILLON S. BROWN · R. C. CAMPBELL · WALLACE R. SCHREADER

Years with January mean temperatures approaching the 50°F level are likely to be years of poor olive production unless the temperatures in the immediate post-January period are cool enough for flower bud development. Intermediate yields can be expected in years with only moderately low January temperatures and moderate to high temperatures in February and early March. Highest olive yields are most likely when both January and February temperatures are cool. In Tehama County, where in most years the January temperatures are cold enough to favor some flower bud initiation in olives, the temperatures of February and early March are also critical in relation to the number of flowers formed and the ultimate yield.

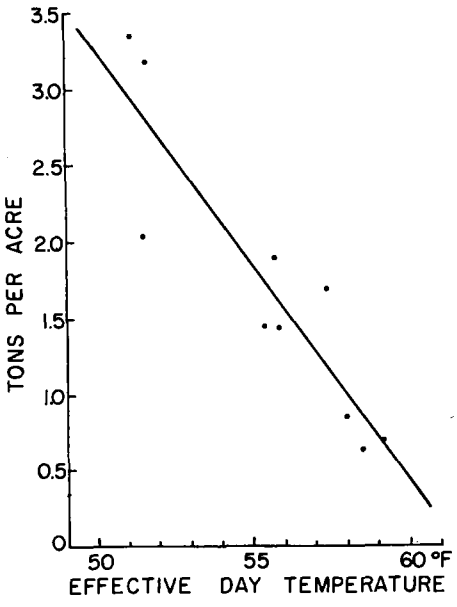
OLIVE PRODUCTION is influenced by climatic conditions, particularly temperatures, throughout the season. Winter temperatures influence the formation of flowers and the number of flower clusters. Temperatures at bloom affect pollination and fruit setting, and later the development of the fruit itself.

Olive yields in Tehama County are frequently low and may vary widely from year to year. Since 1951, the average yield in tons per acre has varied from 0.64 to 3.34. To test for a possible relation of temperatures to this variability in yield, the average yield per acre of olives in Tehama County was correlated with temperatures for different periods during the winter and spring. Temperature records were obtained from U.C. Department of Pomology thermograph stations at Corning and Red Bluff.

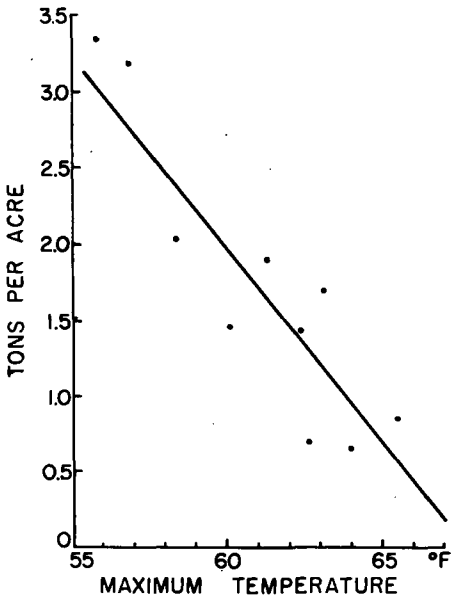
Correlations

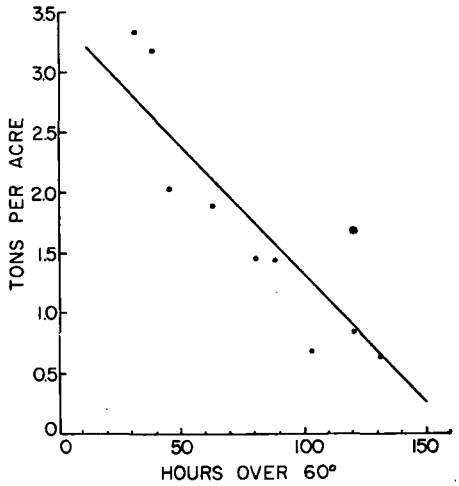
The best correlations of yield and temperature were for the interval of February 9 through March 8—using the average maximum temperature, the effective day temperature and the number of hours over 60°F. The effective day temperature was calculated by subtracting one-fourth of the difference between the average maximum and minimum temperatures from the average maximum. Minimum temperatures or the number of hours at temperatures less than 60° during the

Relation of effective day temperature for the period February 9 to March 8 to olive yields in Tehama County.



Relation of maximum temperature for the period February 9 to March 8 to olive yields in Tehama County.





Relation of the hours of temperatures over 60°F for the period February 9 to March 8 to olive yields in Tehama County.

February 9 to March 8 period did not give satisfactory correlations with yield.

Temperature expressions

The three temperature expressions that correlated well with yield are actually different ways of characterizing or expressing the daytime or maximum temperatures. The correlations were negative in each case, indicating an inverse relation between maximum temperatures and yield, as shown on the accompanying graphs. The dots on the graphs represent the data used to calculate the correlations. The lines are the regression lines that describe the changes in yield expected with a change in temperature. If the correlations were perfect, all of the dots would coincide with the line.

The vertical distance between a dot and the line represents the deviation of the actual yield, for a given year, from the yield that would be expected at the indicated temperature on the basis of the correlation. The yield expected at a given temperature is indicated by the point where a line perpendicular to the temperature scale meets the regression line. For the ten years, deviations of the actual yields from estimates based on the regression lines varied from 0 to 0.7 ton per acre.

Precise estimates of yields from the regressions can not be expected if differences of as much as 0.7 ton per acre between the actual and estimated yields are possible. However, the regressions can serve to indicate the general magnitude of the yield expected—whether it is likely to be low, medium, or high.

The influence of the February 9 to March 8 temperatures on olive yields is possibly an effect on the processes of flower bud initiation and differentiation that are begun in January. Cold temperatures in January are necessary to initiate flower bud development. California olive varieties are non-productive when grown in areas with a January mean temperature over 50°F.

Yield of Olives in Tehama County, 1951–60, and Temperatures in January and from February 9 to March 8

Year	Yield tons/acre	January Mean °F	February 9–March 8		
			EDT* °F	Maximum °F	Hours over 60°F
1951	3.34	42.8	51.2	55.8	30.5
1952	2.02	41.5	51.5	57.3	45.0
1953	0.85	49.8	58.0	65.5	120.5
1954	1.69	45.6	57.4	63.1	120.0
1955	1.43	43.1	55.8	62.4	98.5
1956	3.18	47.2	51.6	56.8	37.5
1957	0.69	42.3	59.1	62.6	103.5
1958	1.45	45.0	55.4	60.1	57.0
1959	0.64	49.7	58.5	64.0	131.0
1960	1.89	45.1	55.7	61.3	62.5

* Effective day temperature.

Critical levels

In 1953 and 1959 in Tehama County, the January mean temperatures, as shown in the accompanying table, approached the critical level of 50°F. The post-January periods in both of these years were also warm. Olive yields in these years were among the lowest of the past 10 seasons. In contrast, in 1951 and 1952, both January temperatures and those of the weeks immediately following were low and yields were among the highest of the decade. January means were intermediate in 1954, 1958, and 1960 with intermediate to high February temperatures following. Medium yields resulted.

In 1957, a low January mean temperature was followed by high temperatures in the February 9 to March 8 period and a low yield resulted. In contrast, in 1956 a fairly high January mean was followed by low temperatures in February and high yields were recorded. In both of these years, the post-January period was evidently the critical time relative to a flower bud development and yield. The 1955 yield was only moderate after a fairly cool January and only moderately high February temperatures.

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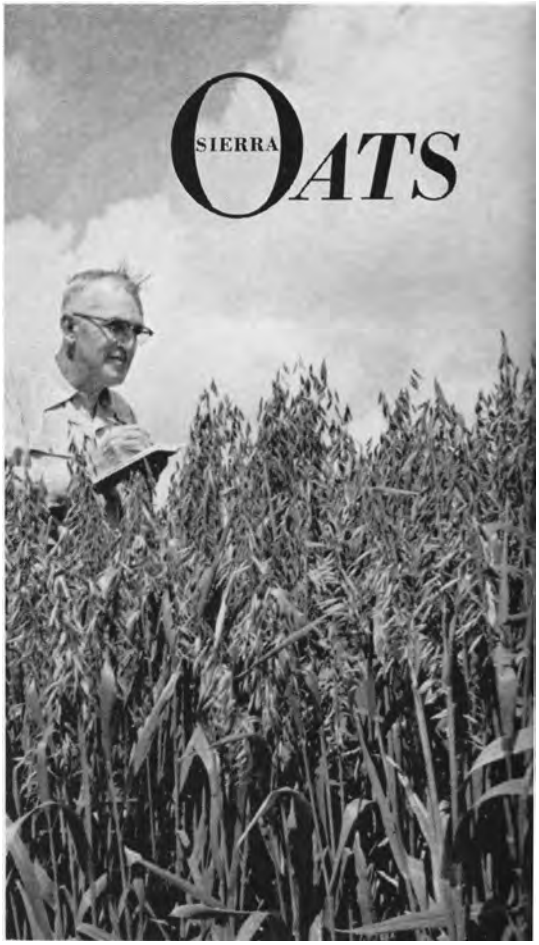

WILD OATS SOWN FOR SCIENCE YIELD THE IMPROVED SIERRA VARIETY

C. A. SUNESON • M. D. MILLER

A WILD OAT plant (*Avena fatua*)—resistant to both crown and stem rusts, and with grey seed, and stiff straw—discovered in 1945, led to the actual breeding of Sierra oats which began in 1947 and was completed in 1960. Foundation seed was produced at Davis in 1961 and was distributed to growers for certified seed production in 1962.

In breeding Sierra oats, an unbalanced chromosome sterility was exploited for the hybridization (pedigree nullisomic × *Avena fatua*. This is a new plant breeding technique which makes crossing easier and brings one whole chromosome with its compliment of genes into the hybrid from the wild parent. From the thousands of combinations from the cross, the unwanted "wild type" characters—all simply inherited—were discarded. Then after an extended scoring program, the "best" single line was named Sierra.

Sierra is more shatter resistant than