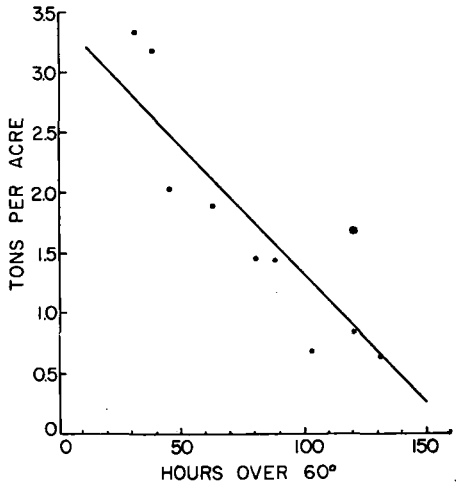

Relation of the hours of temperatures over 60°F for the period February 9 to March 8 to olive yields in Tehama County.

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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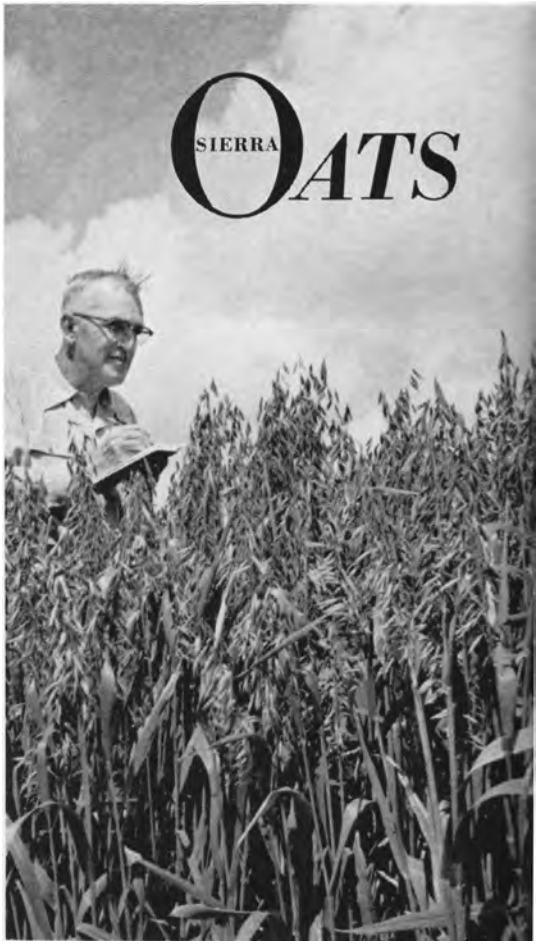

WILD OATS SOWN FOR SCIENCE YIELD THE IMPROVED SIERRA VARIETY

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

any other oat ever grown in this region. This means that windrowing will not generally be necessary for grain harvest. Both plant and seed are distinctive in appearance and the name choice was mindful of both its history and appearance. Farmers cooperating in the testing program generally have been enthusiastic about its potential for hay or grain production.

The leaves are large and broad, stems large and strong, and panicles compact. Plants are generally similar to those of Ventura in height and maturity. They mature with, and support, purple vetch better than Kanota. Sierra has grey seeds, shorter and wider than other California varieties, with test weights only slightly higher than those of Indio. Crown and stem rust resistance of Sierra is genetically different from that in the other California oat varieties. This helps insure against a general rust epidemic on all our varieties at the same time. Yellow dwarf virus resistance is not equal to that of Kanota, our oat variety with the highest degree of tolerance.

Sierra oats produced 30 per cent higher grain yields than either Kanota, Ventura, or California Red in state-wide California tests, 1958–61 with local farm advisors cooperating. Hay yields, although not significantly better than these other varieties, have been more consistent. The statewide tests have shown it to be adapted wherever oats generally are adapted. Whereas the Curt variety is primarily a grain type, Sierra will be useful for forage or feed grain.

OAT VARIETY GRAIN YIELDS— 37 TESTS (1958–1961)

Variety	Yield as per cent of Kanota
Kanota	100
Sierra	138
Curt	132
Ventura	108
California Red	99

Many useful characters in Sierra obviously came from its wild oat parent—indicating that perhaps the best hope for the increased adaptation of oats to the arid regions of the world lies in other similar species crosses.

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A progress report from Project 176 (U. S. Department of Agriculture and the California Agricultural Experiment Station cooperating).

PEAR DECLINE RESEARCH

W. H. GRIGGS · K. RYUGO · R. S. BETHELL · K. URIU

High summer temperatures appear to be an important contributing factor—in combination with psylla feeding—adding to tree losses from pear decline. Thus far, none of the sprays, ground applications, injections, or scoring treatments have had any discernible effect on the progress of pear decline. None of the treated or control trees improved, a few apparently held their own, but most have deteriorated.

THE DEVELOPMENT of pear decline was studied during 1960–61 in 627 trees in three orchards. The orchards were in the Sacramento River district near Ryde, and in the Sierra-Nevada foothills near Gold Hill and Camino. Before the onslaught of pear decline, each orchard was outstanding for its district and had a long record of consistently high yields. The trees in each orchard were known to be on oriental rootstocks, and many had typical *Pyrus pyrifolia (serotina)* root suckers for verification. Various stages of decline were found in all three orchards at the beginning of the study (October 1960), but very few had died in the Camino orchard.

Trees were indexed for amount of terminal growth (1 to 4, normal to none), amount of crop (1 to 4, heavy to poor), reddening of foliage (0 to 3, none to most leaves red), the presence of a brown line on the cambial face of the bark at the graft or bud union, and date of collapse if tree died.

Treatments were applied to normal-appearing trees as well as trees in various stages of decline. Some were given dilute

PROGRESS OF PEAR DECLINE IN MATURE BARTLETT TREES ON PYRUS PYRIFOLIA (SEROTINA) ROOTSTOCKS, 1960–61.

	Trees with brown line at graft union October 1960							Trees with no brown line at graft union October 1960							
	Number of trees	Growth Status[a] Oct. 1960	Growth Status[a] Oct. 1961	Crop[b] July 1961	Leaf color[c] Oct. 1960	Leaf color[c] Oct. 1961	Trees dead Oct. 1961 (%)	Number of trees	Growth Status[a] Oct. 1960	Growth Status[a] Oct. 1961	Crop[b] July 1961	Trees with brown line Oct. 1961 (%)	Leaf color[c] Oct. 1960	Leaf color[c] Oct. 1961	Trees dead Oct. 1961 (%)
Ryde Elev. 19 ft.	37	3.5	4.0	3.7	..	1.6	48.6	142	1.8	2.0	2.2	35.9	..	0.4	13.4
Gold Hill Elev. 1900 ft.	117	1.3	1.9	2.7	..	0.9	26.5	36	1.3	1.6	2.3	50.0	..	0.0	11.1
Camino Elev. 3000 ft.	185	1.9	3.1	3.4	1.8	2.0	1.1	110	1.8	2.1	2.7	36.4	0.4	0.6	0.0

[a] 1, normal growth; 2, reduced terminal growth; 3, two to four inches of terminal growth; 4, no terminal growth.
[b] 1, heavy crop; 2, good crop; 3, fair crop; 4, poor crop.
[c] 0, green leaves; 1, some red leaves; 2, more red leaves; 3, most leaves red.

AVERAGE MAXIMUM TEMPERATURES AT STATIONS NEAR ORCHARDS UNDER STUDY[a]

Station	June 1960	June 1961	July 1960	July 1961	August 1960	August 1961	September 1960	September 1961
Walnut Grove (near Ryde orchard)	90.5	90.2	93.4	94.0	92.2	91.3	87.5	85.4
	4*	8*	9*	8*	2*	4*	0*	0*
Placerville (near Gold Hill orchard)	92.6	90.6	97.5	96.1	93.2	92.0	88.4	82.9
	6*	10*	9*	8*	8*	2*	0*	0*
Camino (near Camino orchard)	85.2	83.8	90.1	88.3	87.3	85.5	79.8	76.8
	0*	1*	1*	0*	0*	0*	0*	0*

[a] From climatological data of the U. S. Dept. of Commerce Weather Bureau and University of California, Department of Pomology.
* Number of days temperature reached 100° F. or higher.