capability of the tensiometer; thus it failed to provide adequate weekly readings that could be plotted without too many assumed values. Excavations in the Tehama soil one day after irrigation showed that the soil surrounding larger alfalfa feeder roots was iron-stained and supersaturated with water; soil 1 to 2 inches away from the roots was more normal in appearance.

Summary

Deeper zones in both soils reached temperature levels that could be unfavorable to alfalfa root growth and to nitrogen fixation by bacteria, and could cause increased fixation and immobilization of phosphorus applied in the zones. Peak soil temperatures exceeded 86° F at the 8-inch depth in September 1973 in the Tehama soil, and for a 42-day period, including part of August and September, the maximum at 8 inches was always above 77° F. The generally cooler Kimball soil never reached 77° F during this same period—ranging from 68° to 75° F.

Water management and short harvest periods appear to be the key to maintaining reduced soil temperatures in northern Sacramento Valley fields of shallow-rooted alfalfa. Because water exerts a cooling effect as it evaporates, the immediate result of an irrigation is reduced soil temperature. Infrequent irrigations, poor water penetration, and low soil moisture-holding capacity reduce plant growth and yield in addition to the problems caused by unfavorable soil temperatures.

The Tehama series reached higher peak temperatures than did the Kimball series and was generally warmer, thus indicating that a soil's physical makeup contributes to its temperature patterns. Shading by both plants and clouds greatly influenced temperatures. After cutting, the rise in soil temperature was influenced by availability of soil moisture. Because temperature rises more rapidly in soil of low moisture content, irrigation should be as near to cutting as practical without increasing soil compaction or delaying hay curing. Midsummer harvest should be accomplished in as short a time as possible to prevent extreme temperature rises in these soils.

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Triticale shows

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The development of triticale, a cross of wheat and rye, has spanned many years. Recently, however, the efforts have been widely publicized, creating interest among agricultural scientists and arousing the curiosity of growers and consumers. In the past 10 years triticale has shown some promise of becoming a crop for California.

Since 1967, when the first modern triticale variety for North America was released by the University of Manitoba, the Department of Agronomy and Range Science at Davis has maintained programs to study its genetics and to develop and evaluate new varieties.

During 1974 and 1975, 11 triticale varieties and experimental lines were evaluated for possible use as a grain crop in the Sacramento and San Joaquin valleys. Entries for these trials were obtained from the International Maize and Wheat Improvement Center (CIMMYT) (Armadillo 107 and Cinnamon), from the University-CIMMYT cooperative triticale breeding project (UC 8567, UC 8614, UC 8825, and UC 56558), and from B. C. Jenkins (JFR varieties, 6TA-204, 6TA-419, 6TA-558, 6TA-565, and 6TA-624). The hexaploid triticales were compared with two of the state's leading wheat varieties—Anza and INIA 66R.

Replicated trials were conducted in the Sacramento and San Joaquin valleys at four locations in 1974 and at five in 1975. The trial sites were in Kings, Fresno, Sacramento, Yolo, and Sutter counties. All trials were grown in irrigated crop areas, but crop irrigations were made only at the Kings, Fresno, and Yolo County locations.

Seed was drill-planted at about 90 pounds per acre in 1974 and at 100 pounds per acre in 1975 in plots 4 feet wide and 24 feet long. Grain yields were obtained by harvesting with a small combine. The planting dates and other cultural practices for each test site were those generally used for wheat culture. These conditions may have had some effect on the relative performance of the two crops, although no strong evidence exists that triticale would benefit greatly from special cultural practices in the trial areas.

Yearly yields are summarized in tables 1 and 2. The results show some limited promise for triticale relative to wheat at individual test sites but, on average, strongly suggest that wheat is more productive. Over the two years the best triticale yielded 22 percent less than the average of the two wheat varieties (table 3), although the yields were somewhat improved over earlier triticale trials reported in *California Agriculture*, September 1969 and February 1972.

Triticale varieties have been improved for bushel weight, reduced plant height, resistance to lodging, and resistance to head snapping and grain shatter-

little potential for central valleys

Kenyon D. Beatty • Sidney W. Kite • Jerry St. Andre • John F. Williams • Jack P. Orr

ing. Even so, the best adapted wheat varieties appeared superior to triticale for all of these traits. Table 4 summarizes observations made on several plant characteristics. Previously all triticales have been classified as resistant to stripe rust. One line was found highly susceptible in the 1974 Sutter County trial.

Although these results do not indicate an economic advantage for triticale as a grain crop in the central valleys, it may have greater potential in other areas of California. For example, triticale's performance relative to wheat has been better in the Tulelake Basin of northeastern California. This area is characterized by relatively high elevation and production based on spring plantings. Continuing improvements in varieties, as well as location differences in performance, make continued evaluation of this crop species necessary. Triticale may find some success as a forage crop and limited use in specialty food products where price premiums paid to growers may offset lower grain production.

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TABLE 1. GRAIN YIELD SUMMARY, 1974 TRITICALE TRIALS

Variety or line	Yield				
	Kings County	Fresno County	Yolo County	Sutter County	Mean
	pounds per acre				
Anza (wheat)	4070	5110	3360	5640	4540
INIA 66R (wheat)	3460	4710	3520	2370	3520
JFR 6TA-565	3610	3760	2880	2510	3190
JFR 6TA-419	3510	3360	2480	2710	3020
UC 8614	2430	3270	2110	3660	2870
JFR 6TA-204	3110	2680	2670	2400	2720
JFR 6TA-558	2950	3160	2420	2120	2660
UC 56558	2740	3130	1960	2720	2640
UC 8825	2340	2630	2290	3000	2560
Armadillo 107	2470	3270	1800	2500	2510
JFR 6TA-624	3020	2640	2710	1450	2460
UC 8567	2140	3130	1150	1730	2040
Mean	2990	3400	2450	2730	2890

LSD (0.05) – variety or line means = 280 pounds per acre.
LSD (0.05) – entry x location interaction = 550 pounds per acre.
C.V. = 13.6%.

TABLE 2. GRAIN YIELD SUMMARY, 1975 TRITICALE TRIALS

Variety or line	Yield						
	Kings County	Fresno County	Yolo County	Sutter County	Sacto. County	Variety or line means 4 locations	Variety or line means 5 locations
	pounds per acre						
Anza (wheat)	6030	5590	5040	5960	4530	5650	5430
INIA 66R (wheat)	4800	5110	5110	4530	4740	4890	4860
UC 56558	5370	4610	3700	4580	2950	4560	4240
JFR 6TA-419	4070	3880	4120	4320	4120	4100	4100
UC 8614	3810	3920	3770	4590	3080	4020	3830
JFR 6TA-624	4710	3600	4060	3860	—	4060	—
UC 8825	3890	4220	3200	4490	3280	3950	3820
Armadillo 107	4030	4200	3470	3980	3040	3920	3740
Cinnamon	4000	3870	4000	3610	—	3870	—
JFR 6TA-558	3860	3730	3350	4230	3670	3790	3770
JFR 6TA-204	3890	3740	3190	4170	4000	3750	3800
JFR 6TA-565	3430	3840	3440	3450	4020	3540	3640
Location means	4320	4190	3870	4310	3740	4180	4120

For 4 location means:
LSD (0.05) – variety or line means = 390 pounds per acre.
LSD (0.05) – entry x location interaction = 770 pounds per acre.
C.V. = 11.5%.

TABLE 3. MEAN GRAIN YIELDS FOR VARIETIES GROWN IN 1974 AND 1975

Variety or line	Pounds per acre	Percentage of the mean of INIA 66R and Anza
Anza (wheat)	4980	109
INIA 66R (wheat)	4190	91
JFR 6TA-419	3560	78
UC 56558	3440	75
JFR 6TA-565	3420	75
UC 8614	3350	73
JFR 6TA-204	3260	71
JFR 6TA-624	3260	70
JFR 6TA-558	3220	70
UC 8825	3190	70
Armadillo 107	3120	68

TABLE 4. OBSERVATIONS ON CHARACTERISTICS OTHER THAN YIELD, 1974 AND 1975

Variety or line	Lodging		Bushel weight	Plant height	Heading date		Stripe rust
	1974	1975		Kings Co.	1974	1975	Sutter Co.
	percent		lb/bushel	inches	April		percent
Anza (wheat)	0	5	60	36	28	28	0
INIA 66R (wheat)	5	5	60	41	15	14	0
Armadillo 107	70	25	51	49	17	14	0
Cinnamon	—	15	—	—	—	16	
JFR 6TA-204	95	85	48	58	28	29	5
JFR 6TA-419	75	65	49	58	28	28	2
JFR 6TA-558	90	95	48	55	28	29	2
JFR 6TA-565	35	45	48	53	28	29	0
JFR 6TA-624	95	45	49	56	28	30	0
UC 8567	35	—	46	42	20	—	80
UC 8614	30	35	50	44	28	27	0
UC 8825	60	45	52	47	28	28	5
UC 56558	5	5	49	46	24	20	0
Number of locations	3	2	4	1	1	1	1