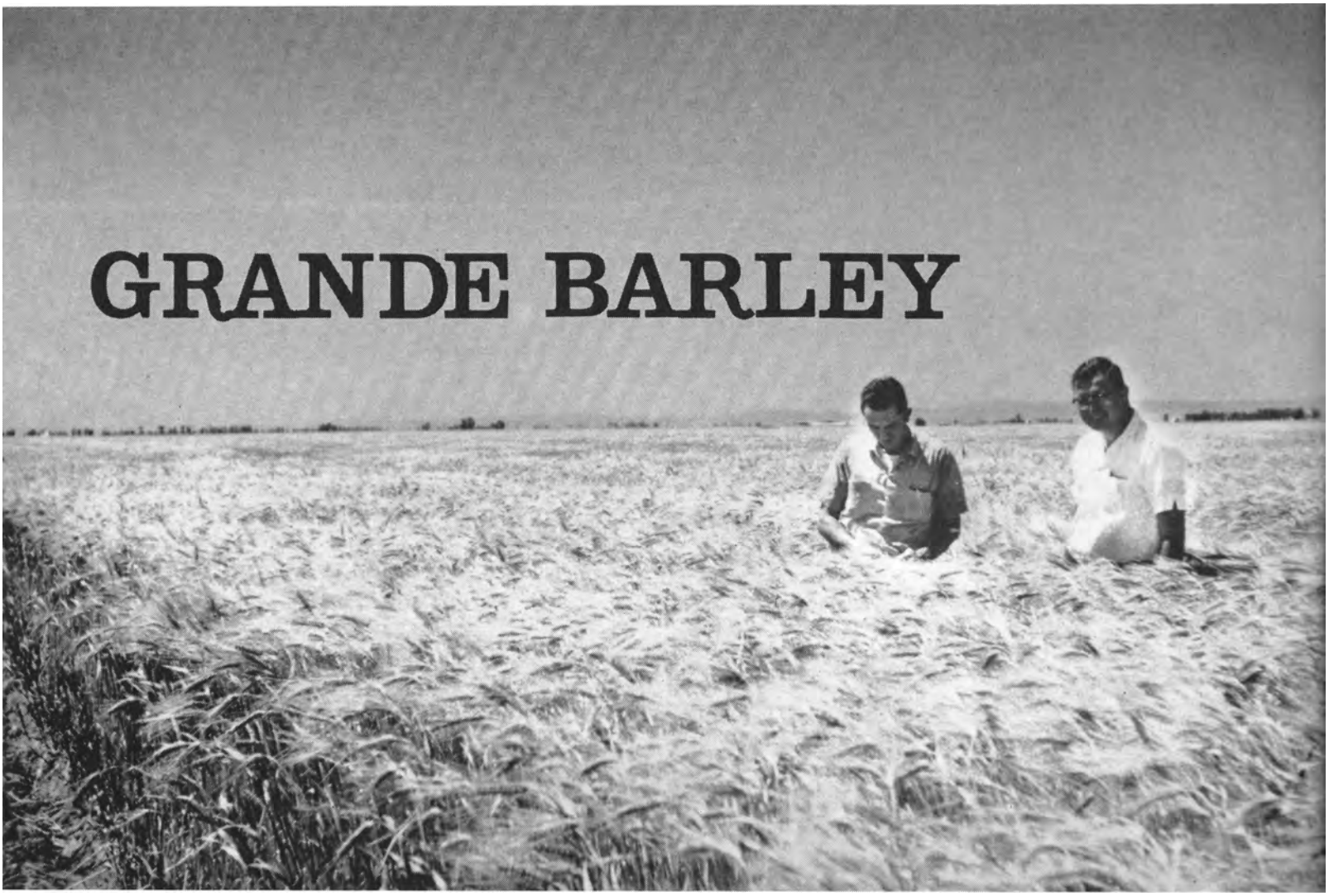
GRANDE BARLEY



Grande barley, grown under irrigation in Glenn County. Note length of heads and how they droop at maturity.

C. A. SUNESON · M. D. MILLER
J. D. PRATO

Grande, a new feed barley, released by the University of California, and ARS, U. S. Dept. of Agriculture offers a yield advantage over the varieties Atlas and Winter Tennessee. In 16 years of testing at Davis and 5 years of tests at many other locations in California, the yield advantage over these two established varieties ranged from an average of 9% over Atlas to 21% over Winter Tennessee. The variety has been equal to Arivat in an average of 57 yield comparisons, as shown in table 2.

Grande is recommended primarily for use in the upper Sacramento Valley and is suitable only for feed grain use. It seems especially well adapted for early sowing on clay textured soils where winter rainfall or supplemental spring irrigation is adequate for medium-late varieties. Because of its lateness, it may be useful in areas where spring frosts frequently cause damage to early heading varieties. It has good tolerance to net blotch, scald, mildew, yellow dwarf, lodging and shattering as compared with currently available commercial varieties in its area of adaptation. Foundation seed should be available to qualified growers in the autumn of 1964. Certified seed should be available after the 1965 harvest. Non-certified common seed of Grande (formerly CAS 1358) is presently available from Sacramento Valley sources.

GRANDE BARLEY (U. C. Experimental No. CAS 1358) has larger heads and seeds than any other commercially grown California variety—lending "eye appeal" and providing the basis for the Spanish name "Grande." Grande usually tillers less than most California varieties. Heads tend to droop at maturity. Kernels are mellow and are deep blue in color.

Grande has good resistance to shattering. Lodging resistance is similar to Atlas 57. Grande is intermediate in height between Arivat and Winter Tennessee. Awns are long and quite rough. The rachilla is long with short hairs.

Disease resistance

Grande has shown a tolerance to several of the barley leaf diseases—powdery mildew, net blotch and scald. It appears more resistant than Winter Tennessee to powdery mildew, and more resistant than Winter Tennessee and Arivat to net blotch. Observations on scald are not extensive, but Grande appears at least as resistant as Arivat or Winter Tennessee.

It is more resistant than Atlas 57 to all three diseases. It has some tolerance to yellow dwarf disease, but it is not resistant. Only Rojo is considered to have a better record for overall disease resistance. A medium late variety, Grande's maturity is between Atlas 57 and Winter Tennessee. Table 1 compares some agronomic characteristics of Grande with other varieties.

TABLE 1. GRANDE BARLEY COMPARISON OF AGRONOMIC CHARACTERS WITH STANDARD VARIETIES

	Grande	Winter Tenn.	Arivat	Atlas 57	Rojo
Bu. Wt. % of Grande	100.0	98.3	99.6	101.3	95.5
Grams/100 kernels 3 locations—1962	5.7	4.2	4.7	4.6	5.0
Average ht.—inches 5 locations—2 years (1961–62)	38.5	39.7	36.2	38.7	37.9
Average % lodged 10 locations	43.8	62.7	29.5	34.6	49.2

TABLE 2. YIELD COMPARISONS, REPLICATED VARIETY TRIALS—GRANDE BARLEY

	County and Regional Trials					Total County and Regional Trials	Davis Trials	Total All Comparisons
	1953	1954	1960	1961	1962			
SUMMARY—STATEWIDE								
Number of comparisons with Winter Tennessee	4	6	5	8	9	32	12	44
Times exceeding Winter Tennessee in yield	2	4	5	4	8	23	10	33
Yield as a percent of Winter Tennessee	102.5	103.6	142.2	102.6	130.4	118.0	127.6	120.8
Number of comparisons with Arivat	8	8	5	12	12	45	12	57
Times exceeding Arivat in yield	3	1	4	4	8	20	8	28
Yield as a percent of Arivat	95.4	95.5	101.9	101.1	104.0	100.6	104.5	101.6
SUMMARY—SACRAMENTO VALLEY								
Number of comparisons with Winter Tennessee	..	2	4	3	8	17	12	29
Times exceeding Winter Tennessee in yield	..	0	4	1	7	12	10	22
Yield as a percent of Winter Tennessee	..	97.3	142.6	100.8	129.4	122.8	127.6	124.8
Number of camparisons with Arivat	1	2	4	3	8	18	12	30
Times exceeding Arivat in yield	0	1	3	0	5	9	8	17
Yield as a percent of Arivat	80.8	98.5	99.4	97.6	100.9	98.9	104.5	101.1

Breeding

Grande originated as a plant selection made in 1946 by C. A. Suneson from Composite Cross II, following 20 years of growing the composite under competitive natural selection. Twenty-eight varieties were used as parents when the composite was originally established by Dr. H. V. Harlan.

Adaptation

Grande is a spring barley best adapted to areas where late rains or high soil moisture holding capacity favor the use of a medium late variety. It appears to be especially well adapted for irrigation on clay textured soils. Production under conditions of moisture shortage, however, has been better than expected. Grande's later maturity suits it to production in areas where spring frosts cause yield losses in early varieties. Grande is particularly adapted to northern Sacramento Valley areas where Winter Tennessee had been used predominantly.

Commercial production of non-certified stocks of early generation Grande has been profitable in the northern Sacramento Valley since 1952. The variety has become prized by the feed dealers as a barley with especially good rolling characteristics. A major reason farmers sought certification of the variety is to provide pure seed of a variety for which there appears to be an expanding commercial demand.

C. A. Suneson is Research Agronomist, Crops Research Division, ARS, USDA; M. D. Miller is Extension Agronomist, and J. D. Prato is Extension Agronomy Technologist, University of California, Davis.

This is a progress report of cooperative investigations of the Crops Research Division, ARS, USDA, and the Department of Agronomy, University of California, Davis.

MAXIMIZING PHOTOSYNTHESIS BY FIELD CROPS

THE AMOUNT OF SUNLIGHT energy available for conversion to chemical energy and the production of dry matter through photosynthesis can often be a major factor limiting crop production. This limitation results most likely from inadequate solar radiation at the earth's surface because of short days, clouds or air pollutants and below optimum interception of light due to inadequate leaf surface in young crops—or an inefficient manner of leaf display in more mature crop foliage canopies.

Particular emphasis is being given to the amount of leaf area of crops in the field and leaf position in relation to maximum interception of sunlight. In current experimentation, a maximum of 460 pounds of dry matter per acre, per day (net photosynthate) was produced over a 12-day period in July by field corn in the pretasseling stage of growth. This was 2.9% utilization of the available, whole-spectrum solar energy. Although seemingly a very low proportion of sunlight, crop production was at very nearly a world-record rate. However, theoretically, it is estimated that a conversion of 5.3% of available solar energy is possible.

Studies are being continued to determine whether leaf display, carbon dioxide supply or some other factor may prevent the attainment of the theoretical maximum. Even where crops can be manipulated to achieve a near-maximum production of plant material, the need for exploitation of the increased production for specialized plant organs useful for food, feed grain, or fiber presents further problems requiring the attention of agricultural scientists today.—*William A. Williams and Robert S. Loomis, Department of Agronomy, Agricultural Experiment Station, University of California, Davis.*