



Agronomy Research and Information Center
AGRONOMY PROGRESS REPORT
Agricultural Experiment Station Cooperative Extension



October 2006 – No. 293

**2006 REGIONAL BARLEY, COMMON WHEAT AND TRITICALE, AND DURUM WHEAT
PERFORMANCE TESTS IN CALIFORNIA¹**

L. F. Jackson², J. Dubcovsky³, L.W. Gallagher³, O. Chicaiza⁴, D. Stewart⁴, F.T. Maciel⁴, D. Prato-Mayo⁵, P. Mayo⁵,
D. Kirby⁶, H. Carlson⁷, M. Canevari⁷, B. Marsh⁷, D. Munier⁷, S. Orloff⁷, J. Schmierer⁷, R. Vargas⁷, and S. Wright⁷

University of California Cooperative Extension cereal evaluation tests were conducted in the intermountain valleys of northern California; the Sacramento, San Joaquin, and Imperial Valleys; and in the south central coastal region in 2006. Entries in the tests included standard cultivars, new and soon-to-be released cultivars, and advanced breeding lines from both public and private breeding programs. Fall-sown winter barley (13 entries) was evaluated at three sites; fall-sown spring barley (23 entries), at 7 sites; and spring-sown spring barley (34 entries), at one site. Fall-sown winter wheat and triticale (15 entries) was evaluated at three sites; fall-sown spring wheat and triticale (42 entries total), at ten sites (not all entries were evaluated at all sites); and spring-sown spring wheat (25 entries), at one site. Durum wheat (29 entries) was evaluated at 5 sites.

Tests were conducted at University of California Field Stations or in fields of cooperating growers. Tests were sown at seeding rates of 1.2 million seeds per acre for common and durum wheat tests (equivalent to 85 to 131 lbs/acre for common wheat, and from 93 to 155 lbs/acre for durum wheat, depending on the entry) if irrigation was planned and at 1.0 million seeds per acre for rainfed wheat and all barley (equivalent to 76 to 130 lbs/acre) and triticale (equivalent to 111 to 126 lbs/acre) tests. Randomized complete block designs with four replications were used. Each plot was nine drill rows wide (5 to 6-inch row spacing) and 20 feet long, except at the UC Desert Research and Extension Center (Imperial) where plots were 16 feet long. Grain was harvested with a Wintersteiger Seedmaster Universal 150 plot combine. Foliar diseases were assessed at the soft-to-medium dough stage of growth by estimating the percentages of areas of penultimate leaves (flag-1 leaf) affected. BYD assessments, however, were based on the percentage of plants showing symptoms. Black point was assessed on grain samples of durum wheat after harvest. Yield, test weight, kernel weight, plant height, days to heading and maturity, lodging, shattering, disease reaction, and grain quality were determined as indicated in the tables. Information regarding each site is given in Table 1.

The California small grain crop in 2006 consisted of 495,000 acres of wheat (including 65,000 acres of durum), 110,000 acres of barley, and 250,000 of oat (California Agricultural Statistics Service). Triticale acreage, mostly for green-chop for dairies in the San Joaquin Valley, continues to grow and probably is now over 60,000 acres. The cultivars Summit and Blanca Grande account for over 50% of the wheat (excluding durum) acreage. An extended rainy season caused localized drown-out problems and delayed field work and timeliness of weed control in 2006. Significant freeze injury also occurred when a period of freezing temperatures in mid-February followed very mild conditions in January. Stripe rust, although later to appear in 2006 than in the previous years, reached high severity throughout the Central Valley. The two most widely grown wheat cultivars, Summit and Blanca Grande, now are fully susceptible to the races of the stripe rust pathogen that occur in California. Wheat stripe rust caused an estimated 15% yield loss in California in 2006. Barley stripe rust was found on susceptible cultivars in nurseries throughout the Central Valley, but only in a few commercial fields. The main barley cultivars,

¹These tests were conducted by the UC Davis Department of Plant Sciences and Cooperative Extension. Land for the tests, the grain produced and other facilities were contributed by cooperating growers identified in Table 1. Quality evaluations were provided by the California Wheat Commission (CWC) quality laboratory. The assistance of growers and the CWC quality laboratory is acknowledged with appreciation. The regional testing program is supported in part by funds provided by the California Crop Improvement Association and the California Wheat Commission.

²Extension Agronomist, ³Agronomist, ⁴Staff Research Associates, and ⁵Lab Assistants, Department of Plant Sciences, UC Davis, ⁶Staff Research Associate, UC IREC, Tulare, and ⁷UC Cooperative Extension Farm Advisors in Modoc, San Joaquin, Kern, Glenn, Siskiyou, Colusa, Madera, and Tulare counties, respectively.

UC 937 and UC 933, released in 1999 and 2001, respectively, for stripe rust resistance, still have effective resistance. Although stripe rust was the most severe disease, the long rainy season was favorable for the development of other diseases as well: *Septoria tritici* blotch of wheat, scald and net blotch of barley, and leaf rust of both wheat and barley. Finally, low levels of stem rust and crown rust were detected in oat fields and forage mixes in the Central Valley.

BARLEY

Fall-sown winter barley. The fall-sown winter barley test contained 13 entries (8 cultivars and 5 advanced lines). Entries in the test, type of barley, their backgrounds, and seed sources are shown in Table 2. Yield and agronomic performance data are given in Tables 3-5. The Siskiyou site was abandoned due to a severe weed infestation (feral rye). Many plots at the October-sown Tulelake site had poor stands, especially 95Ab2299 (5-20% normal stand), Steptoe (60-75% normal stand), Maja (60-80% normal stand), and 93Ab669 (60-80% normal stand) due to winter-kill and wind erosion. Bird damage (shatter) was severe for Ceb 20254 and Devora. Stripe rust was severe on 93Ab669 and 93Ab631. Stands were excellent at the March-sown Tulelake site. Yields were very high at both sowing dates, ranging from 3580 to 8720 lb/acre (Boyer) for the October-sowing and from 6270 to 8410 lb/acre (Maja) for the March-sowing. Boyer, Strider and Westbred Sprinter were the highest yielding in 2006, while Boyer, Eight-Twelve, Maja, Westbred Sprinter and Strider were the highest yielding in the three year period 2004-2006.

Fall-sown spring barley. The fall-sown spring barley test contained 23 entries (9 cultivars and 14 advanced lines). Entries in the test, type of barley, their backgrounds, and seed sources are shown in Table 6. Yield and agronomic performance data are given in Tables 7-14. The Butte site was abandoned due to poor stand establishment and a severe bindweed infestation. A severe weed infestation (fiddleneck) occurred at the rainfed San Luis Obispo site. Stripe rust was severe only on Max and WWW BA1129A at the UC Davis, Merced, and Kings sites. Leaf rust was severe on several entries (Patti, UC 933, UC 937, UCD C135, UCD C147) at the Merced and/or UC Davis sites. Lodging was moderately severe to severe for many entries at the Kings and/or Merced sites; UCD 11HB13, Ceb 20254, UCD YP03-9/3, UC 969, and Devora showed the best lodging resistance. Average yields ranged 3990 lb/acre at the rainfed San Luis Obispo site to 5800 lb/acre at the UC Davis site. Ishi was the highest yielding in the Sacramento Valley; UCD C109, 23 IBYT 7, and UCD C135, in the San Joaquin Valley; and UCD C147, Ishi, 23 IBYT 7, and UCD C140 at rainfed sites. In the three year period 2004-2006, 23 IBYT 7 was highest yielding in the Sacramento Valley; UCD C109, UCD C135, and UCD YP03-9/16, in the San Joaquin Valley; and UCD C140, UCD C147, and Ishi, at rainfed sites.

Spring-sown spring barley. The intermountain spring barley test contained 34 entries (20 cultivars and 14 advanced lines). Entries in the test, type of barley, their backgrounds, and seed sources are shown in Table 15. Yield and agronomic performance data are given in Tables 16-17. Stripe rust was moderate to severe at the Tulelake site, especially on Steptoe, UT01B1788-435, Tradition and Creel. Lodging was severe for most entries; Millenium and UCD-TL20 showed the best lodging resistance. Yields ranged from 4320 to 7630 lb/acre. UCD-TL20, Creel, and UCD-TLB52 were highest yielding. In the three year period 2004-2006, UCD-TL20, Creel, and UCD-TLB52 were highest yielding region-wide and at Tulelake.

WHEAT

Fall-sown winter wheat and triticale. The fall-sown winter wheat and triticale test contained 15 entries (13 wheat and 2 triticale). Entries in the test, their backgrounds, and seed sources are shown in Table 18. Yield and agronomic performance data are given in Tables 19-21. The Siskiyou site was abandoned due to a severe weed infestation (feral rye). The October-sown Tulelake site had very good stands, no disease, no lodging and very high yields (ranging from 7480 to 9140 lb/acre). Some entries (Lambert, Golden Spike, Brundage 96, Simon, Chukar, and ORCF-102) did not fully vernalize at the March-sown Tulelake site due to the late planting date. Those entries produced few spikes and matured very late, so were not harvested. Yields ranged from 6660 to 8370 lb/acre for the entries that were harvested. Lambert and Finch were highest yielding at the October-sown Tulelake site, while Stephens was highest yielding at the March-sown Tulelake site. The triticale Décor was highest yielding in the three year period 2004-2006; Rod, Golden Spike, and Stephens were the highest yielding wheat entries in that period.

Fall-sown spring wheat and triticale. The fall-sown spring wheat and triticale test contained 42 entries (17 wheat cultivars, 20 advanced wheat lines, and 5 triticale cultivars). Entries in the test, type, background, and seed sources are shown in Table 22. Yield, agronomic performance, and quality data are given in Tables 23-35. The Butte and Colusa sites were not harvested due to severe weed (bindweed and wild oat, respectively) infestations.

There was a severe ryegrass infestation at the rainfed Glenn site. Stripe rust was severe on susceptible entries at 7 sites (Table 32). Entries highly susceptible at one or more sites included Anza, Yecora Rojo, Pavon, Express, Summit, Blanca Grande, Plata, Solano, Tempo, Pavon 1RS.1AL, Pavon 1RS.1BL, Pavon 1RS.1DL, and APB 20-1. Cultivars and lines with the lowest disease reactions (most resistant) to stripe rust included Mica, Patwin, Cal Rojo, Espresso, Blanca Fuerte, YU999-158, WWW BR6000W, UC 1494, UC 1495, WB DA984-034SSRR, WB HZ-210, UC 1514, APB W02AZ-361, APB W03AZ-146, RSI 01W20728, RSI 02W50076 and triticale entries Trical Brand 105 and Trical Brand 118. Septoria tritici blotch was severe on susceptible entries at 3 sites (Table 32). Entries highly susceptible at one or more sites included APB W02AZ-361, Joaquin, WWW BR0318W, WWW CHBR1985A, Clear White, and WWW BR5874E. Stress from disease at the Sacramento Valley sites and from disease and early irrigation cut-off at the Kings and Kern sites caused low yields and low bushel weights and resulted in high grain protein content for many entries. Grain protein content of samples from two sites in the Sacramento Valley and three sites in the San Joaquin Valley was measured (Table 33). Average grain protein content ranged from 11.5% to 15.3% for samples from the Sacramento Valley and from 13.4% to 16.5% for samples from the San Joaquin Valley. Quality evaluations (conducted by the California Wheat Commission laboratory) of samples from the Kings site (Table 34) showed that Express produced the highest loaf volume and overall bread score. Overall, sixteen entries produced the maximum bread score. Average grain yields ranged from 3350 lb/acre at the rainfed Glenn site to 5980 lb/acre at the Imperial site. Trical Brand 118 triticale was highest yielding in the Sacramento Valley; Joaquin, in the San Joaquin Valley; Blanca Grande and Trical Brand 96 triticale, in the Imperial Valley; and WWW BR6000W, Cal Rojo, and Trical Brand 118 triticale, at rainfed sites. In the three-year period 2004-2006, Trical Brand 118 triticale was highest yielding in the Sacramento Valley and the San Joaquin Valley; Blanca Grande, in the Imperial Valley; and Trical Brand 118 triticale, at rainfed sites.

Spring-sown spring wheat. The intermountain spring wheat test contained 25 entries (20 cultivars and 5 advanced lines). Entries in the test, type of wheat, their backgrounds, and seed sources are shown in Table 36. Yield and agronomic performance data are given in Tables 37-38. Stripe rust pressure was low to moderate at the Tulelake site; only Dirkin and UI Pettit developed significant disease. Lodging was severe for many entries; Espresso, UI Pettit, Otis, and OR4201019 showed the best lodging resistance. Yields ranged from 6240 to 9060 lb/acre. UI Pettit and Otis were highest yielding. In the three year period 2004-2006, Nick and Alturas were highest yielding region-wide and at Tulelake.

Durum wheat. The durum wheat test contained 29 entries, including 13 cultivars and 16 advanced lines. Entries in the test, their backgrounds, and seed sources are shown in Table 39. Yield, agronomic performance, and quality data are given in Tables 40-49. Stress from early irrigation cut-off at the Kings and Kern sites caused low yields and low bushel weights and resulted in high grain protein content for many entries. Severe stripe rust developed on several entries (including Mohawk, Kronos, and APB D02AZ-111MT) at the UC Davis, Madera and/or Kern sites. Low to moderate levels of black point occurred on several entries at the UC Davis and Kern sites. Grain protein content of samples from three sites in the San Joaquin Valley and one site in the Imperial Valley was measured (Table 46). Average grain protein content ranged from 13.1% to 15.4% for samples from the Central Valley, and from 14.1% to 16.6% for samples from the Imperial Valley. Quality evaluations (conducted by the California Wheat Commission laboratory) of samples from the Kings (Table 47) and Imperial (Table 48) sites showed that samples of 11 entries from the Kings site and 7 entries from the Imperial site had the highest possible pasta color scores. Mohawk, RSI 64, RSI 59, RSI EXP 14, and WB YU803-1 had the maximum pasta color score at both sites. Average grain yields ranged from 4480 lb/acre at the Kings site to 7450 lb/acre at the Imperial site. Topper was highest yielding in the San Joaquin Valley while APB D257-11 was highest yielding in the Imperial Valley. In the three-year period 2004-2006, Desert King and Platinum were highest yielding in the San Joaquin Valley; and Duraking, in the Imperial Valley.