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2007 REGIONAL BARLEY, COMMON WHEAT AND TRITICALE, AND DURUM WHEAT PERFORMANCE TESTS IN CALIFORNIA[1]

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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 2007. 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 spring barley (26 entries) was evaluated at 7 sites and spring-sown spring barley (26 entries) was evaluated at one site. Fall-sown winter wheat (40 entries) was evaluated at two sites; fall-sown spring wheat and triticale (44 entries total), at ten sites (not all entries were evaluated at all sites); and spring-sown spring wheat (30 entries), at one site. Durum wheat (49 entries at Imperial and 26 entries at the other sites) 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 75 to 153 lbs/acre for common wheat, and from 97 to 163 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 79 to 115 lbs/acre) and triticale (equivalent to 78 to 115 lbs/acre) tests. Randomized complete block designs with four replications were used for all tests except the fall-sown winter wheat and spring-sown spring wheat tests for which three 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 2007 consisted of 640,000 acres of wheat (including 90,000 acres of durum), 75,000 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 now is probably over 75,000 acres. Wheat for green-chop forage for dairies accounts for about 200,000 acres in the Central Valley (mostly in the San Joaquin Valley). California's wheat cultivar survey showed that the stripe rust susceptible cultivar Blanca Grande had the highest acreage statewide, followed by the stripe rust resistant forage wheat cultivar PR 1404, and the stripe rust susceptible cultivar Summit. The new stripe rust resistant cultivar Cal Rojo was next in total acreage. For durum wheat, the leading cultivars were Kronos, Platinum, and Orita.

The 2007 growing season in California was very dry. The positive aspects of the dry season were that it allowed very timely field preparation and planting, resulted in generally very low weed pressure, especially

[1]These 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.

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compared to the 2006 season, and had much less and much later occurring disease pressure than in 2006. The downside of the dry conditions was drought stress, particularly in the southern half of the state, which resulted in extremely low yields in the absence of irrigation. Grain yields under rainfed conditions were about 1/3 of what they were in 2006 when rainfall was adequate. Grain yields under irrigated conditions, however, were very high. With regard to disease pressure, wheat stripe rust infections in the Sacramento Valley did not occur until the end of the 1st week of April, near heading, which was about one month later than in 2006. Because of this, the impact of the disease, even on susceptible varieties, was much less than in 2006. Conducive conditions (rain showers, cool temperatures) did occur in mid-late April in the Sacramento Valley, particularly in Colusa County, and this allowed stripe rust to reach high severity in that area on susceptible varieties that were not treated with fungicide. In contrast, only trace to low levels of stripe rust developed in the drier San Joaquin Valley through early May. Disease did increase to severe levels in small areas of fields of susceptible cultivars in that region by mid-May, but yield losses were minimal because of the late development and limited spread of stripe rust. Regarding other diseases, the aphid-transmitted BYD virus was widespread throughout the state and reached moderate severity on susceptible cultivars. Other diseases regularly assessed in California, leaf rust and Septoria tritici blotch of wheat and scald, net blotch, leaf rust and powdery mildew of barley, were rare. Septoria tritici blotch, which can be a major problem in wetter than normal seasons in the Sacramento Valley, was detected in high severity on one new cultivar in nurseries in the Sacramento Valley, despite the dry season. The variety, Joaquin, is a high yielding, stripe rust resistant cultivar adapted to the San Joaquin Valley. It should not be grown in the Sacramento Valley because of its vulnerability to Septoria tritici blotch.

BARLEY

Fall-sown spring barley. The fall-sown spring barley test contained 26 entries (7 cultivars and 19 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 3-11. Plots of Solar and WWW BA 2391 were severely damaged by wild boars and shattered at the rainfed Glenn site. Foliar diseases were not a factor at any site due to the dry season. Leaf necrosis (due to salt toxicity) was severe at the Kings site on most entries; least affected were UC 933, Ishi, UCD C147, and T/S//E 11-18. Severe drought stress at rainfed sites in the San Joaquin Valley and surrounding areas resulted in stunted plants and very low yields. Average yields ranged from 410 lb/acre at the rainfed Fresno site to 6210 lb/acre at the Kings site. UCD C147 and UCD C135 were the highest yielding in the Sacramento Valley; UCD C147 and UCD C109, in the San Joaquin Valley; and UCD C147 and UCD C135, at rainfed sites. In the three year period 2005-2007, 23 IBYT 7 and UCD C147 were highest yielding in the Sacramento Valley; UCD C109 and UCD C135, in the San Joaquin Valley; and UCD C147, Ishi, and UCD C140, at rainfed sites.

Spring-sown spring barley. The intermountain spring barley test contained 26 entries (16 cultivars and 10 advanced lines). Entries in the test, type of barley, their backgrounds, and seed sources are shown in Table 12. Yield and agronomic performance data are given in Tables 13-14. Stripe rust foci were observed in plots of Steptoe at the Tulelake site, but disease did not develop further. Lodging was moderately severe on several entries. Yields ranged from 6760 to 8840 lb/acre. Creel, TLB 148 and TL B150 were highest yielding. In the three year period 2005-2007, Creel, UCD-TLB52, and UCD-TL20, were highest yielding.

Spring-sown spring hay barley. A hay barley observation test containing 10 entries (including one 6-row spring feed check, T/S//E 11-18) was planted adjacent to the spring barley test. The entries (Table 15) included 6-row and 2-row hooded entries as well as one 2-row awnless entry (Ridawn). Plant height ranged from 35 inches (T/S//E 11-18) to 52 inches (Westford and Sara). Lodging was severe on most entries. The 6-row spring feed check T/S//E 11-18 did not lodge. Among the hay barley entries, Hays and Sara had the least amount of lodging. Sara was earliest to head. It headed 9 days earlier than the latest heading entries, Westford and Washford.

WHEAT

Fall-sown winter wheat. The fall-sown winter wheat test that was evaluated, the Oregon Winter Wheat Elite Yield Test, was provided by Mike Flowers, Extension Specialist, Oregon State University. The test contained 40 entries (15 cultivars and 25 advanced lines), and was evaluated at two sites, Montague (Siskiyou county) and Tulelake (Modoc county) (Tables 16-18). There was a trace to low level of BYD and one focus of infestation of Russian wheat aphid (one plot of Entry 30 – Cara) at the Tulelake site. There was a moderate level of physiological leaf spot on Entry 15 (Masami) at both sites. Leaves of all entries at the Tulelake site became covered with sooty

mold (which grew on exudates from a high population of cereal aphids) by the soft dough stage, obscuring any later occurring foliar diseases. Lodging was moderately severe to severe on Entry 23 (ORI2042037) at both sites. Early irrigation cut-off led to low bushel weights at the Siskiyou site. Yields ranged from 4440 to 7930 lb/acre at the Siskiyou site and from 4970 to 8150 lb/acre at the Tulelake site. ORH010837 was highest yielding at the Siskiyou site, while Tubbs 06 was highest yielding at the Tulelake site. WA007973 was highest yielding overall.

Fall-sown spring wheat and triticale. The fall-sown spring wheat and triticale test contained 44 entries (19 wheat cultivars, 21 advanced wheat lines, and 4 triticale cultivars). Entries in the test, type, background, and seed sources are shown in Table 19. Yield, agronomic performance, and quality data are given in Tables 20-33. Non-uniform irrigation at the Madera site resulted in stunting and low-yielding, water-stressed plots scattered throughout the field, and high yield variability. Plants at the rainfed Tulare site were stunted due to extreme drought stress (the site received only 2.5" rain), and had very low grain yield. Several entries (WWW BR0202W, UCD06010/5, UCD06010/6, UCD06010/7, UCD06010/26, and APB W02AZ-353) had moderately severe shatter at one or more of the following sites: Glenn rainfed, Colusa, and Imperial. Several entries (Yecora Rojo, Blanca Grande, WWW BR0202W, APB W02AZ-361, Wincal 14-4 and WWW IDBR08811) had severe lodging at harvest at the Colusa site. Stripe rust was severe on susceptible entries at 4 sites (Table 30). Entries highly susceptible at one or more sites included Anza, Yecora Rojo, Express, Summit, Blanca Grande, Clear White, and Solano. Despite the dry conditions, Septoria tritici blotch occurred at the Colusa site and was very severe on Joaquin. Grain protein content of samples from three sites in the Sacramento Valley and three sites in the San Joaquin Valley was measured (Table 31). Average grain protein content ranged from 11.3% to 14.8% for samples from the Sacramento Valley and from 12.4% to 15.1 % for samples from the San Joaquin Valley. Entries APB W02AZ-353, UCD 06010/5, Expresso, and UCD 06010/26 had the highest grain protein contents overall. Quality evaluations (conducted by the California Wheat Commission laboratory) of samples from the Kings site (Table 32) showed that Solano, Joaquin, and Expresso produced the highest loaf volumes and overall bread score. Overall, nine entries produced the maximum bread score. Average grain yields ranged from 560 lb/acre at the rainfed Tulare site to 7370 lb/acre at the Sacramento/San Joaquin Delta site. Trical Brand 118 triticale was the highest yielding in the Sacramento Valley (Blanca Fuerte was the highest yielding wheat); Joaquin, in the San Joaquin Valley; Anza and Solano, in the Imperial Valley; and WB DA 904-32W, at rainfed sites. In the three-year period 2005-2007, Trical Brand 118 triticale was the highest yielding in the Sacramento Valley (Cal Rojo was the highest yielding wheat); Trical Brand 118 triticale, in the San Joaquin Valley (Joaquin was the highest yielding wheat); Trical Brand 105 triticale, in the Imperial Valley (Blanca Grande was the highest yielding wheat); and Trical Brand 118 triticale, at rainfed sites (Dash 12 and WWW BR6000W were the highest yielding wheat entries).

Spring-sown spring wheat. The spring-sown spring wheat test that was evaluated, the Oregon Spring Wheat Elite Yield Test, was provided by Mike Flowers, Extension Specialist, Oregon State University. The test contained 30 entries (16 cultivars and 14 advanced lines), and was evaluated at one site, Tulelake (Modoc county) (Table 34). Most entries had fair to good stands and plants tillered well. No foliar diseases occurred. Several entries (Winchester, Tara 2002, ID0377s, BZ903-445-WP, and Louise) had severe lodging. Grain yields ranged from 3670 to 7940 lb/acre. Alpowa, Merill, Nick, Cataldo, and Alturas were highest yielding.

Durum wheat. The durum wheat test contained 49 entries (17 cultivars and 32 advanced lines). All entries were evaluated at the Imperial site, but only 26 entries were evaluated at the other sites. Entries in the test, their backgrounds, and seed sources are shown in Table 35. Yield, agronomic performance, and quality data are given in Tables 36-45. Non-uniform irrigation at the Madera site resulted in stunting and low-yielding, water-stressed plots scattered throughout the field, and high yield variability. Stripe rust was moderately severe on Kronos, UCD 06222/30, and WWW D1636 at the UC Davis site. BYD was severe on UCD 06222/30 and UCD 06222/33 at the Madera, Kings, and Kern sites (Table 41). Low levels of black point occurred on many entries at the Kern site. Grain protein content of samples from four sites in the Central Valley and one site in the Imperial Valley was measured (Table 42). Average grain protein content ranged from 12.5% to 14.4% for samples from the Central Valley, and from 12.7% to 15.5% for samples from the Imperial Valley. Quality evaluations (conducted by the California Wheat Commission laboratory) of samples from the Kings (Table 43) and Imperial (Table 44) sites showed that samples of 14 entries from the Kings site and 19 entries from the Imperial site had the highest possible pasta color scores. Eight entries (Mohawk, RSI 64, WB YU803-1, WB DA804-7, UCD 06222/30, APB D01AZ-486, APB D02AZ-152, and APB D02GE-72) had the maximum pasta color score at both sites. Average grain yields ranged from 3830 lb/acre at the Madera site to 7250 lb/acre at the Kern site. Sevevo was the highest yielding in the San Joaquin Valley while UCD 06201/1 was highest yielding in the Imperial Valley. In the three-year period 2005-2007, Platinum, Topper, and Duraking were the highest yielding in the San Joaquin Valley; and RSI 59 and Duraking, in the Imperial Valley.