

2010 SMALL GRAIN PERFORMANCE TRIALS

LAES Research Summary No. 185

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Performance of Small Grain Varieties in Louisiana, 2008-09

Stephen A. Harrison¹, Kelly Arceneaux¹, R.L. "Bubba" Bell², Dustin Harrell³, Patrick D. Colyer⁴, Mildred Deloach⁵, Robert Ferguson⁵, James Leonards³, H.J. "Rick" Mascagni², Katie McCarthy¹, G. Boyd Padgett⁶, Myra Purvis⁶, Ronald Regan³, Glenn Schexnayder¹, H.P. "Sonny" Viator⁷, and Greg Williams⁷

INTRODUCTION

Small grain variety trials are conducted annually by scientists of the Louisiana Agricultural Experiment Station (LAES) to evaluate grain yield, agronomic performance, and disease reaction of varieties and advanced lines. The trials are conducted at seven LAES research stations representative of the major soil and climate regions of the state (map). Entries are included in the trials based upon previous performance or at the request of the originating agency. Inclusion of an entry in the trials does not constitute an endorsement by the LAES. The 2009 statewide wheat performance trials included 70 varieties (bold font) and experimental lines (normal font).

New entries in the statewide trials are tested at all locations, but may be dropped from a region if they show little potential in that area. South Louisiana consists of the Baton Rouge, Crowley, and Jeanerette locations; whereas North Louisiana consists of locations at Alexandria, Bossier City, St. Joseph, and Winnsboro. When choosing varieties, growers should consult their local LCES agents and the variety should be chosen from the list of recommended varieties for a given region (north or south Louisiana). Growers should also consider specific data from the LAES variety trial location that most closely match the weather and soil conditions of their farm and should avoid growing a single variety on a large acreage. Growing several varieties will help ensure that the entire crop is not severely damaged by chance occurrences in weather or by shifts in pathogen races or virulence patterns. Yield, test weight, maturity, and disease resistance are important traits to consider when selecting varieties. If a grower plans to plant wheat early, he should avoid varieties that have a very early heading date to reduce the danger of freeze damage.

Specific management and cultural practices for a location are presented at the bottom of the tables, along with unusual or key observations about that test. Rainfall and temperature information for each location is presented in Figure 1. All plots were seeded at the recommended rate with seed provided by the originating agency or company (Appendix A).

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- 1 Professor and variety trial coordinator, Research Associate, Research Farm Assistant 2, and Research Farm Specialist 2, respectively. SPESS Department, Baton Rouge.
 - 2 Research Associate, and Professor, respectively, Northeast Research Station, St. Joseph.
 - 3 Assistant Professor, and Research Associates. Rice Research Station, Crowley.
 - 4 Professor, and Research Associate, respectively. Red River Research Station, Bossier City.
 - 5 Research Associate, and Extension Associate, respectively, Dean Lee Research Station, Alexandria.
 - 6 Associate Professor and Research Associate. Macon Ridge Research Station, Winnsboro.
 - 7 Professor and Research Associate. Iberia Research Station, Jeanerette.

Characters Evaluated and Statistics Reported:

Data are collected on grain yield, test weight, heading and maturity dates, plant height, lodging, and disease reaction, as appropriate at each location. Grain yield was adjusted to 13% moisture. **Least significant differences (LSD's)** are reported at the 10% probability level. An LSD of 10% probability ($\alpha=0.10$) is the level of difference in a trait that occurs between two varieties once in every 10 comparisons as a result of random chance due to greater soil fertility, better drainage, slightly greater harvest length, or any other "uncontrollable or unmeasurable factors," even if the varieties had the same genetic yield potential. If the LSD (0.10) for yield in a trial is 7.0 bu/a, there is a 10% chance that two varieties with a reported yield difference of 7.0 bu/acre are genetically equal and a 90% probability they have differences in genetic potential in that particular environment. LSD values are influenced by the degree of precision that soil fertility, stand establishment, plot length, harvest efficiency, and other variables of the trials are controlled, and by the number of replications of each variety or treatment. The letters '**ns**' are used in the text and tables to indicate lack of significance (**not significantly different**) at the 10% probability level. Correlations are sometimes given to indicate the degree to which two traits, such as rust rating and yield, are related. A correlation between rust rating and yield of $r = -1.0$ would indicate that for every unit increase in rust there was a proportional decrease in yield.

Wheat leaf rust (*Puccinia triticina*), stripe rust (*Puccinia striiformis*), and oat crown rust (*Puccinia coronata*) are reported as percentage of the upper two leaves affected by the disease. Two replications are evaluated for leaf rust, between flowering and the early dough stage of kernel development. Wheat and oat stem rust (*Puccinia graminis*) are reported on a scale of 0-9, where a 0 indicates no disease and a 9 indicates that the plant was killed by the disease. Stem rust is normally rated somewhat later than leaf rust.

Bacterial streak (*Xanthomonas campestris* pv. *translucens*), Septoria leaf (*Mycosphaerella graminicola*) and glume blotch (*Leptosphaeria nodorum*) are rated on a scale of 0 to 9 during the dough stage of development. A rating of 0 indicates that no disease was present, while a 9 indicates very severe disease. The upper few leaves, heads, and stems below the head are the portions rated for these two diseases. Since bacterial streak (black chaff) is not controlled by fungicides, it is important that this disease be distinguished from septoria blotch. Heading day is given as calendar day (day of year). Lodging is rated on a 0-9 scale, where a 0 indicates that all plants were completely upright.

Trait	Abbreviation	Description
Yield	Yield	Grain yield in bushels per acre adjusted to 13% moisture.
Test weight	Test wt	Volume weight of grain in pounds per bushel
Heading day	Head day	Day of calendar year (days after December 31) until 50% heading.
Plant height	Ht	Plant height in inches.
Lodging rating	Lod	Lodging rated on a scale of 0 - 9, where a 0 indicates no lodging and a 9 indicates complete lodging (all plants flat).
Leaf rust	Leaf rust	Percent of upper two leaves affected by leaf rust, rated during grain fill. This rating is generally taken during soft to mid-dough, but varies somewhat by location and variety.
Stripe rust	Stripe rust	Percent of upper two leaves affected by leaf rust, rated between flag leaf and mid grain fill.
Septoria	Sept	Septoria leaf & glume blotch rated on a scale of 0 - 9, where 0 indicates no disease and 9 indicates severe disease on the flag leaf and head.
Bacterial Streak	Bact	Bacterial streak (black chaff) rated on a scale of 0 - 9, where 0 indicates no disease and 9 indicates severe disease on the flag leaf and head.
Powdery mildew	Powd mild	Powdery mildew rating on a scale of 0 - 9, where 0 indicates no disease and 9 indicates severe disease present on the foliage. Rated in early to mid spring.
Phenotype	Phe	Phenotypic rating, an overall visual rating prior to harvest. 0=excellent, 9=poor. This rating is a visual rating of 'eye-appeal'.

Results and Discussion

Performance of Wheat Varieties Across South Louisiana

South Region Means

The growing season was characterized by a very wet period following planting from mid December through the end of January. This was followed by unusually dry weather in February and early March. This combination resulted in reduced tillering and somewhat smaller head size.

Performance of wheat varieties tested across south Louisiana in 2009 is shown in Table 1. Bold print in all tables indicates that the entry is a released variety and normal print indicates that the entry is a breeding line that is not commercially available. Dyna-Gro Baldwin (86.1 bu/acre), AgriPro Coker Magnolia (81.1 bu/acre), AGS 2035 (80.4 bu/acre) and Pioneer 26R61 (79.1 bu/acre) were the highest yielding released varieties. Two breeding lines X3546 (82.3 bu/acre), and LA01110D-150 (81.7 bu/acre) rounded out the top five entries for South Louisiana. The mean yield of 60 entries was 63.9 bu/acre and the mean test weight was 56.5 lbs/bu.

Leaf rust pressure was relatively light due to a dry early spring, with most entries having ratings under 10%. The test mean for leaf rust was 5%.

Dyna-Gro Baldwin (77.9 bu/acre) and AGS 2035 (75.1 bu/acre) were the highest-yielding released varieties across south Louisiana for two years (Table 2), with AgriPro Magnolia (72.5 bu/acre), Terral LA821 (72.0 bu/acre) and AGS 2060 (71.5 bu/acre) rounding out the top five in yield. The 28 entries tested at Baton Rouge, Crowley, and Jeanerette for two years had means of 61.2 bu/acre for yield and 56.0 lbs/bu for test weight. The seven lowest yielding varieties all had heading dates later than the average of 87 days (day of year). Significant differences among varieties existed for leaf rust incidence.

Twenty one entries were tested over three years in south Louisiana with AGS 2060 (75.8 bu/acre), Terral LA821 (75.3 bu/acre), and AgriPro Coker Magnolia (75.2 bu/acre) having the top three yields (Table 3). The top five was rounded out by AGS 2020 (72.8 bu/acre) and Terral LA482 (71.6 bu/acre). The average yield was 66.1 bu/acre and the average test weight was 56.3 lbs/bu. The top five entries all received low ratings for leaf rust, stem rust, and septoria.

Baton Rouge

At Baton Rouge, two released varieties, AgriPro Magnolia (80.8 bu/acre) and Dyna-Gro Baldwin (79.1 bu/acre) had the highest yields (Table 4). Three breeding lines, LA01110D-150 (77.6 bu/acre), LA01110D-181-6 (77.1 bu/acre) and LA01139D-56-1 (76.4 bu/acre) also ranked in the top five. The mean yield was 61.5 bu/acre and the mean test weight was 57.5 lbs/bu. Average heading occurred at day 87. Delta King DKX732 was very late/poorly headed and not harvestable. Severe lodging occurred in some early varieties due to very high winds and heavy rains that occurred around April 1 (early grain fill). Leaf rust pressure was light, with ratings ranging from 0 to 18% and a mean of 2%. Seed black point ratings ranged from 0 to 6.8 (0-9, where 9 indicates severe discoloration of the seed germ).

Crowley

At this location, a breeding line, X3546 (94.5 bu/acre), and the variety Dyna-Gro Baldwin (80.8 bu/acre) led in yield with two additional breeding lines, GA991336-6E9 (79.4 bu/acre) and GA991371-6E12 (77.7 bu/acre) and variety Magnolia (76.1 bu/acre) rounding out the top five (Table 5). The average yield was 60.9 bu/acre for yield and the average test weight was 56.8 lbs/bu. Leaf rust pressure was high with ratings ranging between 0 and 60% and a mean of 10%. Fusarium headblight disease frequently occurs in the rice growing region of Louisiana. Fusarium head blight ratings ranged from 0 to 6 (0-9 scale, 9 indicates severe disease) with a mean of 2.4. Average heading was 82 days at this location.

Jeanerette

Baldwin (98.4 bu/acre), AGS 2035 (92.6 bu/acre), AGS 2026 (88.9 bu/acre), and Pioneer 26R61 (88.8 bu/acre) were the highest-yielding released varieties at Jeanerette (Table 6). The breeding line, LA0110D-150 has a yield of 95.2 bu/acre. Test means were 66.8 bu/acre for yield and 54.8 lbs/bu for test weight. Average heading occurred at day 87 at this location. Leaf rust pressure was low at this location with ratings ranging from 0 to 23% and a mean of 3%.

Performance of Wheat Varieties Across North Louisiana

North Region Means:

Yields were excellent across North Louisiana (Alexandria, St. Joseph, and Winnsboro) in 2009 (Table 7). Dixie 427 (84.0 bu/acre) had the highest yield of 69 entries with the breeding line GA991209-6E33 (81.0 bu/acre) and the released varieties Magnolia, Pioneer 26R87, and USG 3295 rounding out the top five, all with yields above 80.0 bu/acre. Averages were 73.0 bu/acre for yield and 56.3 lbs/bu for test weight. Leaf rust pressure was moderate with ratings ranging between 0 and 40%, with a mean of 7%.

For two years across North Louisiana (Table 8), the released varieties Dixie 427 (80.0 bu/acre), Pioneer 26R87 (78.4 bu/acre), USG 3295 (78.1 bu/acre), Baldwin (77.9 bu/acre) and USG 3555 (77.1 bu/acre) had the highest yields of 32 entries. Averages were 70.8 bu/acre for yield and 57.4 lbs/bu for test weight. Leaf rust ratings were moderate, ranging from 0 to 43% with an average of 12%. Average heading day was 92 (day of year).

USG 3295 (77.7 bu/acre) led in yield across north Louisiana for three years (Table 9). Four other released varieties, Pioneer 26R87, AGS 2060, USG 3295, and Magnolia rounded out the top five, all with yields above 76.9 bu/acre. The average yield was 71.8 bu/acre for yield and the average test weight was 57.7 lbs/bu.

Alexandria

Ragan & Massey LA95135 (77.5 bu/acre) had the highest yield at Alexandria (Table 10). Three other released varieties, USG 3592, Dixie 427, DK9577, and one breeding line, EXP

SR39L47 also ranked in the top five, all with yields above 75 bu/acre. The average yield was 67.8 bu/acre for yield and the average test weight was 54.4 lbs/bu for test weight. Leaf rust levels were moderate with a range of 0 to 50% and a mean of 8%.

Bossier City

Feral hogs got into the plots at this location and selectively ate portions of several non-awned (beardless) varieties as is indicated by the 'Hog Note'. Six entries had severe damage in three or four of the four replications and yield is not reported for these entries. This location was not used in north Louisiana regional means for that reason. USG 3295 (78.8 bu/acre) had the highest yield (Table 11). Three released varieties, AGS 2060, USG 3555, Jamestown and one breeding line, GA991336-6E9 also ranked in the top five with yields above 72.0 bu/acre. The test means were 58.3 bu/acre for yield and 54.0 lbs/bu for test weight, and 81 for heading day. Leaf rust levels were moderate, ranging from 0 to 78% with a mean of 8%.

St. Joseph

This location had excellent yields with Pioneer 26R87 (89.7 bu/acre) ranking first (Table 12). Two breeding lines, Pioneer XW07B (88.9 bu/acre) and LA01139D-56-1 (85.9 bu/acre) and two additional varieties, Dixie 427 (87.2 bu/acre) and Jamestown (85.4 bu/acre) also ranked in the top five. Test averages were 69.4 bu/acre for yield, and 56.7 lbs/bu for test weight. Average heading day was 80.

Winnsboro

Baldwin had the highest yield of 69 entries planted at this location, with a yield of 101.4 bu/acre (Table 13). AGS 2026, AGS 2020, Oglethorpe, and GA991336-6E9 ranked second through fifth, respectively. The top five entries have yields above 93.0 bu/acre. Test averages were 81.9 bu/acre for yield and 56.7 lbs/bu for test weight. Leaf rust pressure was minimal with a rating range of 0-6% and a mean of 1%.

Over two years, Baldwin ranked first at Winnsboro with a yield of 100.4 bu/acre. Four other varieties, AGS 2026, AGS 2026, AGS 2035, and Terral LA821 also had yields above 91.0 bu/acre.

Statewide Performance of Wheat Varieties

Table 14 contains the average performance of 63 entries across six locations in 2009. Yield data are separated into locations and ranked according to statewide mean yield in Table 14B. The variety Baldwin led with the highest statewide mean yield of 83.2 bu/acre. The varieties Magnolia, AGS 2035, and Terral LA821 and the breeding line X3546 also ranked in the top five, all with yields above 77.0 bu/acre compared to the test average of 68.2 bu/acre. Leaf rust pressure was moderate with an average of 6%. Four of the top five entries had leaf rust ratings of 0 or 1%.

Twenty eight entries were tested across Louisiana in 2008 and 2009 (Table 15). The

released variety Baldwin had the highest yield of 77.9 bu/acre compared to the average of 67.0 bu/acre. Four other varieties took the other top five rankings, all with yields above 72.0 bu/acre. The top three entries scored below the leaf rust average of 8%.

Over the three years 2007, 2008, and 2009, twenty one entries were tested across Louisiana (Table 16) with five locations reported in 2007, six in 2008, and five in 2009. The released variety AGS 2060 had the highest yield of 76.4 bu/acre compared to the average of 69.6 bu/acre. The four other varieties ranking in the top five all had yields above 73.3 bu/acre.

OTHER WHEAT TRIALS

GA01170, LA01139, and LA01034 yielded more than 95 bu/acre in the USDA USSRWVN at Baton Rouge (Table 17). The average yield of 40 entries was 71.2 bu/acre and the highest-yielding check variety was Coker 9553 (83.7 bu/acre). LA01139 was the highest-yielding entry at Winnsboro (Table 18). Five entries yielded more than 75 bu/acre. Test weights were generally high, with the exception of entries that headed late and matured under heat stress.

Wheat Preliminary Yield Trial A (WPA) was planted at Baton Rouge, Winnsboro, and Stoneville, Mississippi in 2009 (Tables 19, 20, and 21) and contained 40 entries (36 experimental lines and 4 checks). At Baton Rouge, the breeding line LA01139D-56-7-3 had the top yield of 78.7 bu/acre compared to the average of 67.2 bu/acre. Severe lodging occurred in some early varieties at this site due to high winds and heavy rainfall that occurred around March 30th. A second breeding line, LA01158D-36-6-C had the top yield of 95.2 bu/acre at Winnsboro compared to the average of 82.6 bu/acre. At Stoneville, the variety USG 3295 (89.0 bu/acre) had the highest yield compared to the mean of 71.2 bu/acre. Across Baton Rouge, Winnsboro, and Stoneville (Table 22), the leading entry, LA01110D-11-2-C had a yield of 82.7 bu/acre compared to the mean of 73.6 bu/acre.

Wheat Preliminary Yield Trial B (WPB) was planted at Baton Rouge, Winnsboro and Stoneville and contained 20 entries (Tables 23 and 24). At Baton Rouge, the check AGS 2060 had the highest yield of 66.4 bu/acre compared to the average of 49.4 bu/acre. Delayed harvest at this location led to lowered yields and test weights. The breeding line LA01158D-36-6-C had the top yield of 90.9 bu/acre compared to the average of 75.9 bu/acre at Winnsboro.

Due to the increasing incidence of Hessian fly in the state, Hessian fly variety trials were planted at Maringouin and Winnsboro in fields that had high Hessian fly incidence the previous year and were managed to encourage Hessian fly development. Results are presented in Tables 27 and 28. Significant differences occurred among varieties for reaction to Hessian fly, with a range of 0.0 to 7.6 Hessian fly per tiller at Winnsboro. The use of systemic seed treatment plus foliar application of insecticides increased average yield by 4.2 bu/acre. This difference was not enough to justify the cost associated with application and was much less than the difference among varieties due to genetic resistance. Grain yield ranged from 5.9 to 67.3 bu/acre, with the higher yields generally associated with lower Hessian fly counts. Hessian fly pressure developed later to a lesser extent at Winnsboro, but results were very similar.

Performance of Oat Varieties

Performance of Oat Varieties Across Louisiana:

The oat variety performance trials were conducted at Baton Rouge, Bossier City, and Winnsboro in 2009 (Table 29). This trial was composed of 22 entries and included 8 commercial varieties and 14 breeding lines. The five top-yielding entries included only one released variety, Horizon 270, which ranked first with a yield of 120.5 bu/acre. Four breeding lines, one from Texas, one from Louisiana and two from Florida, rounded out the top five, all with yields above 111.0 bu/acre. The test means were 98.9 bu/acre for yield and 31.8 lbs./bu for test weight. Crown and stem rust ratings (Baton Rouge only) were relatively low with test means of 5% and 1.3 (0-9), respectively. The crown rust susceptible check variety, Brooks, had 80% crown rust incidence, which indicates that inoculum was present but most entries had some resistance. The top five entries all had crown rust ratings of 0 and stem rust ratings between 0.5 and 2.5.

Table 30 contains oat variety trial data for two years. The top five entries include one released variety, Horizon 270 (127.2 bu/acre) followed by four breeding lines, one from Florida, one from Texas and two from Louisiana. The top five entries all had yields greater than 118.0 bu/acre, well above the test mean of 109.3 bu/acre. Other test means include 32.7 lbs/bu for test weight, 5% for crown rust and 1.8(0-9) for stem rust.

Horizon 270 had the highest yield (126.6 bu/acre) across Louisiana for three years (Table 31), well above the test mean of 110.3 bu/acre. It had a test weight of 33.3 lbs/bu compared to a mean of 32.9 lbs/bu.

Baton Rouge:

The breeding line TX02U7682 ranked first at this location with a yield of 111.6 bu/acre (Table 32). The top five also included two other breeding lines, one from Louisiana, and one from Florida and two varieties, Horizon 270 and LA99017, all with yields above 98.0 bu/acre. Test means were 81.7 bu/acre for yield and 32.8 lbs/bu for test weight. Crown and stem rust pressure were relatively light with test means of 5% and 1.3(0-9), respectively.

Bossier City:

The Texas breeding line TX05CS347-1 led 22 entries at this location with a yield of 138.7 bu/acre (Table 33). Two varieties, LA99017 and Horizon 270, and two breeding lines from Louisiana and Florida ranked in the top five all with yields above 125 bu/acre.

Winnsboro:

At this location, the variety Horizon 270 ranked first with a yield of 125.6 bu/acre (Table 34). Two other varieties, LA99016 and Horizon LA976 and two breeding lines, one from Florida and the other from Louisiana rounded out the top five, all with yields of 119.2 and above. Test means included 110.6 for yield and 32.4 lbs/bu for test weight.

Uniform Oat Nursery at Baton Rouge:

The USDA regional Uniform Winter Oat Yield Nursery was grown at Baton Rouge (and other locations across the southern US). The test included 24 entries, four of which are released varieties. A Texas breeding line TX02U7682 ranked first with a yield of 137.0 bu/acre (Table 35). Four other breeding lines, from Louisiana, Texas and Florida ranked in the top five, all with yields above 114.0 bu/acre. Test means were 93.0 bu/acre for yield and 31.9 lbs/bu for test weight, 2.5% for crown rust and 0.7 (0-9) for stem rust.

SUNOAT Nursery at Baton Rouge:

The SUNOAT (Southeastern University Oat) nursery was grown at Baton Rouge and other location throughout the region. The test contained 45 entries from the LSU AgCenter, Texas A&M and University of Florida. Entries included three released varieties as checks. The Florida breeding line FL04155-S06-31-B-S1 had the highest yield (139.4 bu/acre, Table 36). Three other Florida breeding lines as well as the variety Horizon 270 also ranked in the top five, all with yields above 122.0 bu/acre. Test means were 103.6 bu/acre for yield, 33.0 lbs/bu for test weight, 0% for crown rust and 0.8% for stem rust.

Preliminary Oat Yield Trial ‘A’ (SUNOAT) at Winnsboro:

At Winnsboro (Table 37), the breeding line FL0115-J2-B-S1 led this test with a yield of 139.5 bu/acre. Three other Florida breeding lines and one released variety, Horizon 270 rounded out the top five, all with yields above 129.0 bu/acre. Test means were 121.8 bu/acre for yield and 32.9 lbs/bu for test weight.

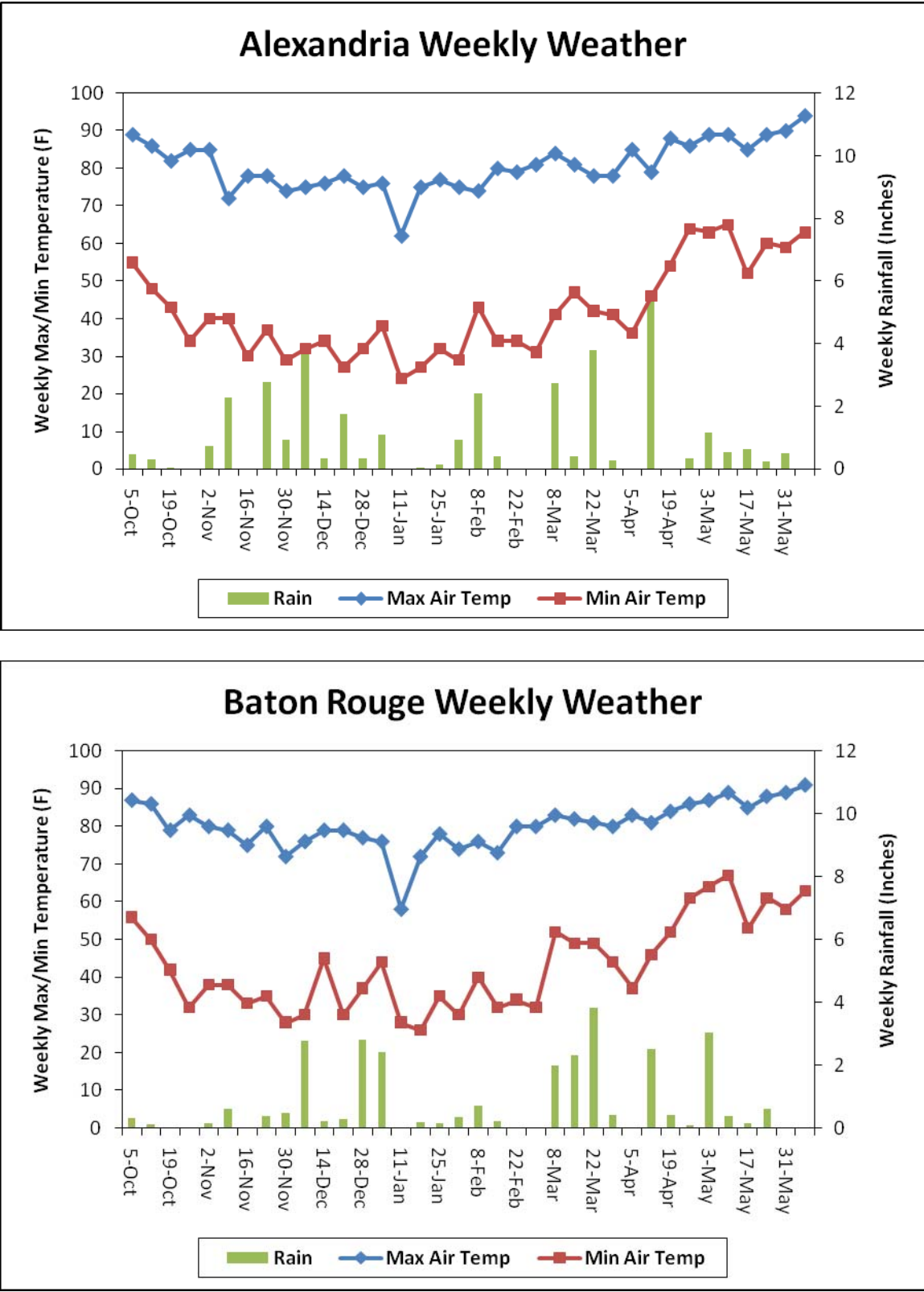
Preliminary Oat Yield Trial ‘B’:

Horizon 270 had the highest yield in Oat Prelim-B data at Baton Rouge (Table 39). LA99016, two LA breeding lines and one Florida breeding line also ranked in the top five, all with yields above 118 bu/acre. Test means were 97.2 for yield, 32.8 lbs/bu for test weight, 0% for crown rust and 0.8 (0-9) for stem rust.

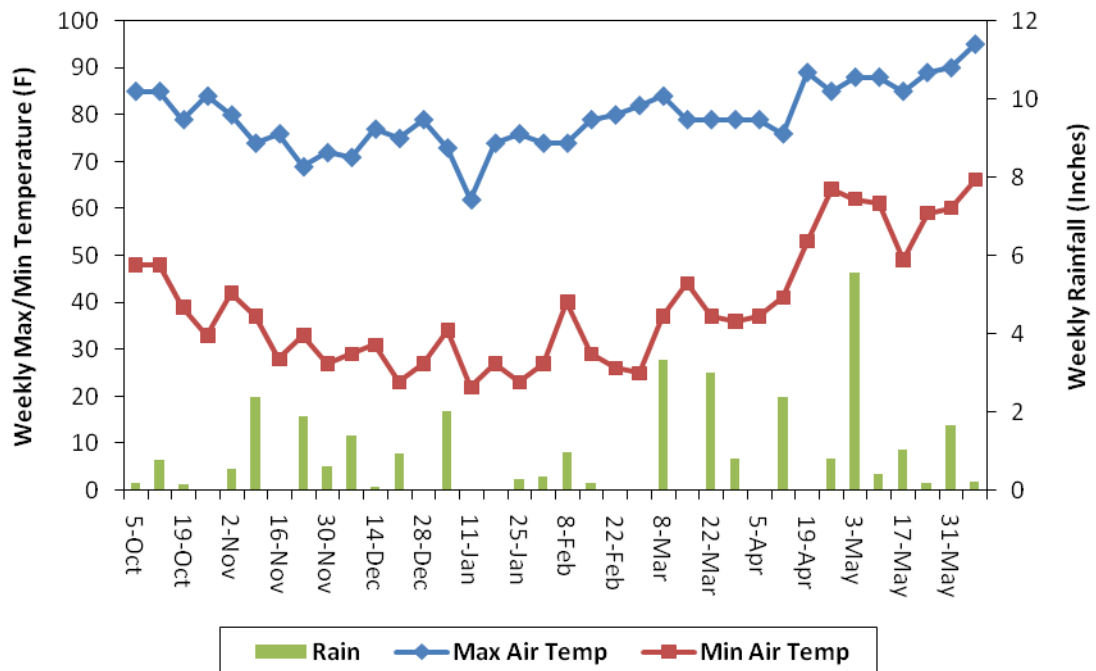
Other Oat Trials:

Elite Nuda Oat Trial consisted of 24 entries (20 experimental lines and 4 checks) and was planted at Baton Rouge and Winnsboro in 2009 (Tables 40 and 41). At Winnsboro, Two conventional hulled checks, Horizon 201 (136.7 bu/acre) and Horizon 270 (130.6 bu/acre) ranked first and second for yield respectively. Three hull-less lines, one Florida experimental line, one Louisiana breeding line and the variety Caballo yielded greater than 106.0 bu/acre and were over 96% hull-less. Test means were 98.3 bu/acre for yield and 34.5 lbs/bu for test weight.

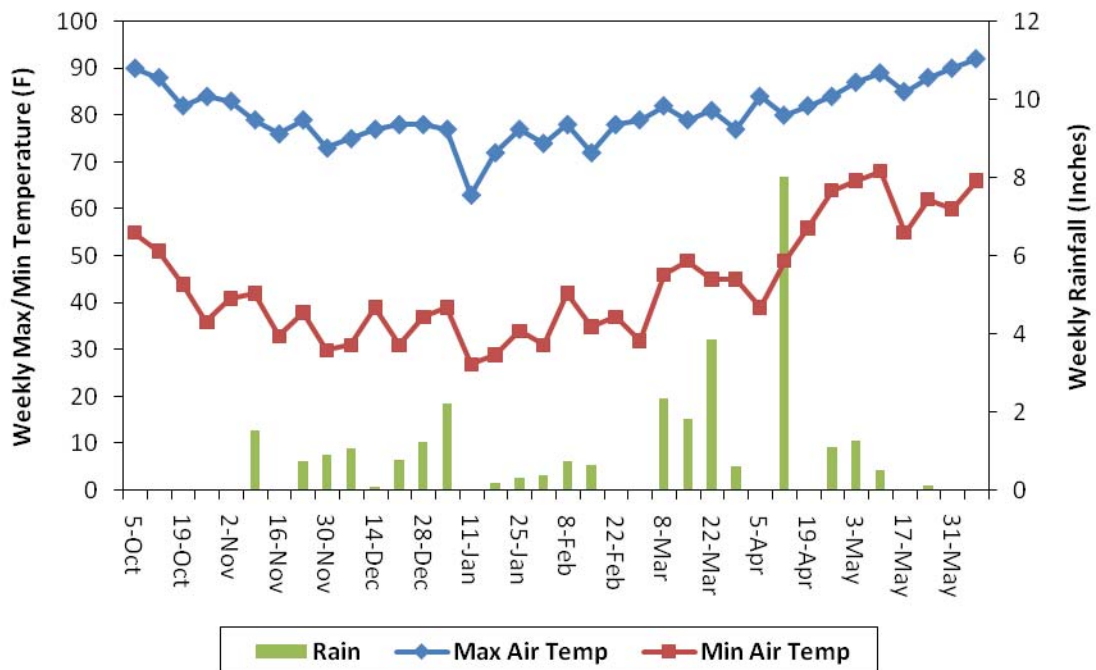
Figure 1.



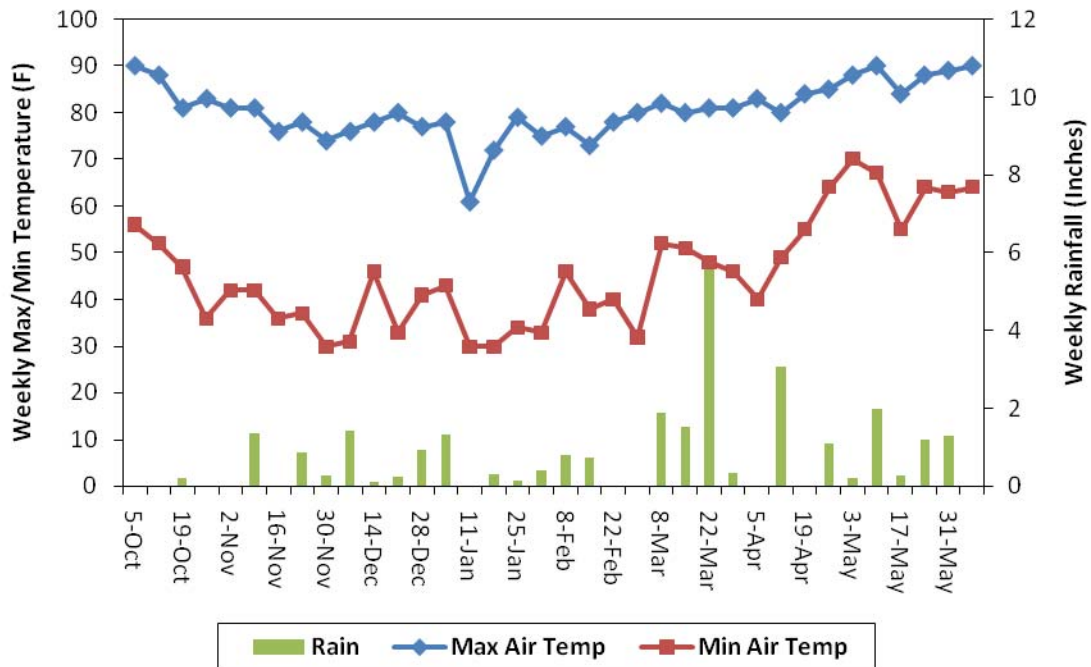
Bossier City Weekly Weather



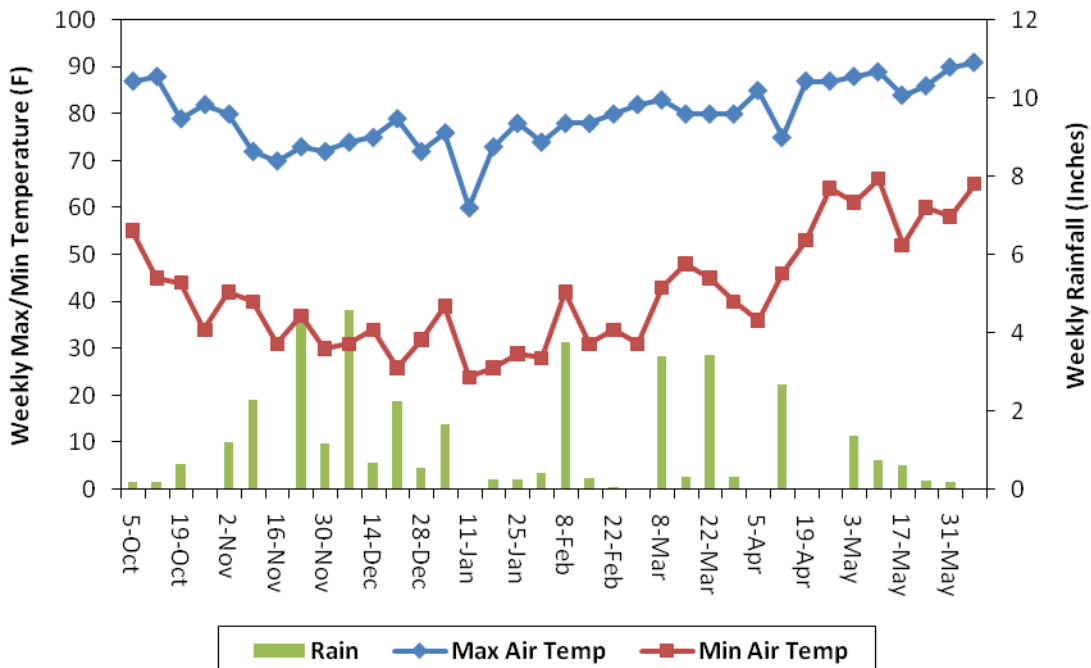
Crowley Weekly Weather



Jeanerette Weekly Weather



St. Joseph Weekly Weather



Winnsboro Weekly Weather

