2012-2013 Wheat Research Summary

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2012-2013 in Review

The 2012-2013 growing season was atypical for the production of soft red winter wheat in the Northern Texas Blacklands. Dry fall conditions allowed growers to plant all of their intended wheat acres, but the fall rainfall ceased on October 13 and we did not receive another significant rain until Christmas day. The Christmas rain was uniform across the region, and the vernalization process on the late planted and unemerged wheat started at that time. Fortunately, we experienced cooler than normal conditions throughout the winter and spring months, and all of the wheat vernalized and produced grain. Three freezes in March set back the early planted wheat and killed the main stem in the early maturing varieties. Fortunately, the wheat that had been set back from the freeze compensated by producing an excellent tiller crop, and in most cases, the tiller crop compensated for the loss of the main stem. The wheat that emerged following the Christmas rain surprised everyone and produced excellent yields, some rivaling last year's record yields. This was likely caused by a cool spring and longer grain filling period, which allowed the late emerged wheat to mature ahead of the usual hot, dry spring and early summer temperatures.

Growers in Northeast Texas were successful with both early and late maturity groups this year. The freezes were not as damaging to the early varieties as we originally anticipated, and weather conditions allowed a long enough grain filling period to maximize the yields of the later maturing varieties. Most growers averaged around 70 bushels per acre, and some produced yields over 80 bushels, averaged over their entire acreage. Several growers reported yields in excess of last year's record yields.

The dominant fungal disease in 2013 was leaf rust (*Puccinia recondita)*. Leaf rust is common in the mid-South, and occurs at damaging levels in this region on a regular basis. Leaf rust had a damaging effect on almost all commercial varieties planted across the region, and a foliar fungicide was very profitable in all of our foliar fungicide trials this year.

None of the experiments in this summary were sprayed with a foliar fungicide. This phase of our program is intended to measure genetic resistance to foliar plant diseases. We will address foliar fungicides and their profitability in an additional publication to be released later this year.

This paper is divided into two sections. The first will address the performance and characteristics of soft red winter wheat varieties (SRWWs) in this region. The second section is a summary of the performance of soft red winter wheat varieties in comparison with selected hard red winter wheat varieties (HRWWs). A significant focus of this research program is to search for HRWWs that are competitive in yield with SRWWs. Competitive HRWWs would be attractive to growers because they usually have a price advantage over SRWWs.

In 2012-2013, we planted studies in three locations: Royse City, Bailey, and Howe. Unfortunately, we experienced an excessive amount of freeze damage at our Royse City location, which compromised our yield data. Therefore, only information from the Bailey and Howe locations are discussed in this paper. We harvested the variety trials from the Royse City location, but are not reporting them as the freeze put the early maturing varieties at a significant disadvantage. All of the wheat in the Royse City location emerged in November, and the tiller crop did not compensate for the main stem loss in this location.

Table 1: Summary – Performance of Selected Soft Red Winter Wheat Varieties in Bailey, Texas. 2013

Variety	Yield Bu/A	Test Weight Lb/Bu	Percent Leaf Rust on Flag Leaf May 17	Percent Stripe Rust on Flag Leaf May 17	Plant Height (Inches)	Lodging[1] Rating (Angle to Ground)
USG 3120	91.5a	58.0b	0.2a	4.3ab	36.5abc	73.3a
Syngenta Coker 9553	89.4ab	59.4a	15.0abc	0.0a	35.0bcd	68.3a
AGS 2035	88.0ab	57.4b	0.0a	5.8b	36.8ab	78.3a
USG 3555	83.3abc	55.0cde	11.7ab	0.0a	31.0f	78.3a
USG 3409	81.0bcd	55.4cd	6.0a	1.0a	35.5bc	76.7a
USG 3209	75.0cde	53.4fg	26.7bcd	1.8a	32.2ef	48.3b
USG 3201	72.4def	57.0b	16.7abc	0.0a	34.8bcd	80.0a
USG 3993	69.2efg	54.1def	0.0a	44.2c	38.0a	80.0a
Terral TV8525	67.4efg	54.5cdef	31.7cd	0.0a	34.0cde	73.3a
Pioneer 25R40	65.8efgh	53.8ef	15.8abc	0.0a	33.0de	80.0a
Terral TV8848	65.5efghi	52.5gh	39.2d	0.0a	35.3bcd	78.3a
Syngenta Harrison	63.7efghi	50.5i	39.2d	0.0a	34.0cde	80.0a
Pioneer 25R30	62.4fghi	55.1cde	15.8abc	0.0a	35.0bcd	70.0a
Syngenta Oakes	61.4fghi	55.8c	19.2abc	1.3a	36.2abc	75.0a
Terral TV 8861	60.9fghi	54.9cde	38.3d	0.0a	34.7bcd	80.0a
USG 3251	60.6fghi	53.4fg	15.8abc	0.0a	36.8ab	80.0a
USG 3883	58.8ghi	54.4cdef	0.8a	1.7a	35.7abc	80.0a
Terral TV8535	58.6ghi	51.7h	13.3abc	0.0a	32.3ef	76.7a
SY 474	54.5hi	53.9def	37.5d	3.3ab	35.8abc	78.3a
Pioneer 25R39	53.3i	54.6cdef	14.2abc	0.0a	36.8ab	76.7a
Syngenta Magnolia	53.1i	54.2def	63.3e	0.0a	37.0ab	80.0a
Grand Mean	**68.4**	**54.7**	**20.0**	**3.0**	**35.1**	**75.8**

[1] Lodging was assessed by measuring the angle to the ground. 90° = wheat standing straight up, 0° = wheat flat on the ground.

2013 SRWW Highlight Summary

- The Bailey location was planted on October 30 and harvested on June 13. Ninety five percent of the wheat did not emerge until mid -January following a general rain on December 25.
- USG 3120 and AGS 2035 are very early maturing varieties, and showed some freeze damage following the March freezes. Because they emerged so late in this location, they were at an early stage of development when they were exposed to the cold weather in March, and thus escaped significant freeze damage. We suggest these varieties not be planted before mid –to late November this fall.
- Leaf rust infection levels were heavy across the region, and most of the varieties sustained damage from this pathogen. Stripe rust (*Puccinia striiformis)* infection pressure was very low, except in USG 3993.
- Bushel weights were low in this study, likely due to a late season leaf rust infection.
- Lodging was not a serious problem with the SRWWs at the Bailey location, except in the case of USG 3209

Yield stability is the most important consideration when selecting wheat varieties to plant in northeast Texas. It is risky to make varietal choices based on one year's results because weather conditions and disease pressures vary greatly from year to year. Therefore, performance over a number of years and locations is the best indicator of varietal stability.

The tables below represent a summary of the top ten performing varieties over a two and three year period from 2011-2013.

Table 1A: Two Year Summary – Yield (Bushels/Acre) of the Top Ten Soft Red Winter Wheat Varieties in Northeast Texas. 2012 (Leonard) and 2013 (Bailey)

Varieties	Mean
USG 3120	**96.5**
AGS 2035	**94.1**
USG 3409	**88.2**
Syngenta Coker 9553	**88.0**
USG 3555	**85.5**
USG 3201	**82.9**
Syngenta Oakes	**80.8**
Pioneer 25R40	**80.1**
Terral 8525	**79.4**
Syngenta Harrison	**79.1**

Table 1B: Three Year Summary – Yield (Bushels/Acre) of the Top Ten Soft Red Winter Wheat Varieties in Northeast Texas. 2011 (Royse City), 2012 (Leonard) and 2013 (Bailey)

Varieties	Mean
USG 3120	**92.3**
USG 3409	**84.7**
AGS 2035	**84.4**
Terral 8525	**82.0**
Syngenta Coker 9553	**81.9**
USG 3201	**81.5**
Pioneer 25R40	**80.9**
USG 3555	**80.4**
Syngenta Oakes	**79.6**
USG 3251	**79.4**

Note:

USG 3120 and AGS 2035 performed very well over the past three years in our harvested studies, but they are the earliest maturing varieties we have seen in a number of years. Both are earlier maturing than Terral LA 841, a variety that has suffered more than its share of freeze injury over the years. If planted at our normal time (late October-early November), they are more likely to experience freeze damage than any of the other varieties being grown here. Both varieties sustained severe freeze damage at our Royse City location this year, and produced low yields.

Maturity Groups

We have more good SRWW wheat varieties to choose from than ever. Below is a table listing the relative maturities of selected varieties.

Variety	Maturity Group
USG 3120 AGS 2035	Early
Terral LA 841	Medium Early
USG 3555 USG 3201 USG 3295 Syngenta Coker 9553 USG 3409 Syngenta Magnolia	Medium
Syngenta Oakes Terral TV 8525	Medium Late
Pioneer 25R30 Pioneer 25R40 Terral TV 8861 USG 3251 Syngenta Harrison	Late

To hedge against weather risks, it would be advisable to plant multiple varieties from more than one maturity group. Start by planting the later maturing varieties, and finish with the earlier ones. The later maturing varieties are less likely to experience freeze damage in March, but are more subject to hot, dry conditions during the grain filling period. The medium early varieties are at more risk from a late freeze, but will likely experience more favorable weather conditions during the grain filling period.

Our research over the past 29 years has shown the optimum planting date in Northeast Texas to be the last few days in October through the first week in November. Planting prior to October 25 is not advisable, as it exposes the crop to more potential damage to the Hessian fly, foliar plant diseases, and freeze injury in the spring.

Early maturing varieties are a fit for late planting (after November 15), but are more likely to suffer freeze injury when planted at the normal time. Earlier maturing varieties are better forage producers than later maturing ones, and can be planted earlier if they are grazed. An effective grazing program will delay their maturity.

A Comparison of Selected SRWW and HRWWs in the Northern Texas Blacklands

Table 2A: Summary – Average Yield of Selected Hard and Soft Red Winter Wheat Varieties in Bailey and Howe, Texas 2013

Variety	Bailey Yield Bu/A	Howe Yield Bu/A	Average Yield Both Locations
Armour *(HRWW)*	84.8ab	82.9ab	**83.9**
USG 3555 *(SRWW)*	86.9a	79.7abc	**83.3**
USG 3120 *(SRWW)*	82.7abc	83.8a	**83.3**
AGS 2035 *(SRWW)*	88.5a	73.2abc	**80.9**
Syngenta Coker 9553 *(SRWW)*	85.3ab	74.7abc	**80.0**
Cedar *(HRWW)*	84.9ab	72.4abcd	**78.7**
Gallagher *(HRWW)*	75.3bcd	75.3abc	**75.3**
TAM 305 *(HRWW)*	66.8def	75.7abc	**71.3**
Shocker *(HRWW)*	70.4de	70.8bcd	**70.6**
Terral TV8525 *(SRWW)*	67.7def	71.2bcd	**69.5**
Syngenta Harrison *(SRWW)*	65.5def	70.7bcd	**68.1**
Billings *(HRWW)*	73.5cd	61.5de	**67.5**
Pioneer 25R40 *(SRWW)*	66.5def	67.7cde	**67.1**
Pioneer 25R30 *(SRWW)*	60.1ef	72.5abcd	**66.3**
Terral TV8861 *(SRWW)*	58.4f	59.7e	**59.1**
USG 3251 *(SRWW)*	56.5f	60.2e	**58.4**
P value	.001	.001	

Table 2B: Summary – Bushel Weights of Selected Hard and Soft Red Winter Wheat Varieties in Bailey and Howe, Texas. 2013

Variety	Leonard Bushel Weight Lb/Bu	Howe Bushel Weight Lb/Bu	Average Bushel Weight
Billings *(HRWW)*	59.5a	58.8a	**59.2**
TAM 305 *(HRWW)*	59.1a	59.0a	**59.1**
Shocker *(HRWW)*	59.8a	58.3ab	**59.1**
Gallagher *(HRWW)*	59.5a	58.1ab	**58.8**
Syngenta Coker 9553 *(SRWW)*	58.9ab	58.3ab	**58.6**
Armour *(HRWW)*	57.9bc	58.2ab	**58.1**
USG 3120	57.2c	58.9a	**58.1**
Cedar *(HRWW)*	57.9bc	57.0b	**57.5**
AGS 2035 *(SRWW)*	57.6c	57.1b	**57.4**
Terral TV8525 *(SRWW)*	55.0d	55.1c	**55.1**
Pioneer 25R30 *(SRWW)*	54.9d	54.9c	**54.9**
USG 3555 *(SRWW)*	55.1d	53.3d	**54.2**
Terral TV8861 *(SRWW)*	54.4de	52.8d	**53.6**
Pioneer 25R40 *(SRWW)*	53.5e	53.3d	**53.4**
USG 3251 *(SRWW)*	53.4e	52.8d	**53.1**
Syngenta Harrison *(SRWW)*	50.9f	51.5e	**51.2**
P value	.0001	.0001	

Table 2C: Summary – Standability Comparisons (Lodging)[2] of Selected Hard and Soft Red Winter Wheat Varieties in Bailey and Howe, Texas. 2013.

Variety	Bailey	Howe	Average Both Locations
Syngenta Harrison *(SRWW)*	80.0a	80.0a	**80.0**
Terral TV8861 *(SRWW)*	80.0a	75.0ab	**77.5**
USG 3120 *(SRWW)*	75.0ab	71.7ab	**73.4**
USG 3555 *(SRWW)*	75.0ab	68.3ab	**71.7**
Pioneer 25R40 *(SRWW)*	76.7a	63.3abc	**70.0**
USG 3251 *(SRWW)*	75.0ab	63.3abc	**69.2**
AGS 2035 *(SRWW)*	73.3ab	63.3abc	**68.3**
Terral TV8525 *(SRWW)*	73.3ab	61.7abc	**67.5**
Pioneer 25R30 *(SRWW)*	65.0bc	68.3ab	**66.7**
Syngenta Coker 9553 *(SRWW)*	63.3bc	56.7bcd	**60.0**
Shocker *(HRWW)*	60.0c	48.3cde	**54.2**
TAM 305 *(HRWW)*	60.0c	41.7def	**50.9**
Armour *(HRWW)*	55.0cd	41.7def	**48.4**
Gallagher *(HRWW)*	55.0cd	35.0ef	**45.0**
Billings *(HRWW)*	45.0d	30.0f	**37.5**
Cedar *(HRWW)*	28.3e	48.3cde	**38.3**
P value	.0001	.0001	

[2] Standability rating (lodging) is based on angle to the ground. Rating Scale: 90° = wheat standing straight up, 45° = wheat leaning at a 45 degree angle, 0° = wheat flat on the ground

Table 2D: Summary – Other Agronomic Characteristics of Selected Hard and Soft Red Winter Wheat Varieties in Bailey, Texas. 2013.

Variety	Head Type	Percent Leaf Rust Infection on Flag Leaf May 17	Plant Height (inches)
AGS 2035 *(SRWW)*	Awned	0.0a	36.7a
Shocker *(HRWW)*	Awned	0.0a	34.8ab
Armour *(HRWW)*	Awned	0.0a	32.3cde
Gallagher *(HRWW)*	Awned	0.0a	35.3ab
Billings *(HRWW)*	Awned	0.0a	35.2ab
TAM 305 *(HRWW)*	Awned	0.0a	31.3de
USG 3120 *(SRWW)*	Awned	0.2a	34.2bc
Cedar *(HRWW)*	Awned	9.2a	31.3de
USG 3555 *(SRWW)*	Semi-awned	11.7a	30.7e
Syngenta Coker 9553 *(SRWW)*	Awned	15.0a	35.7ab
USG 3251 *(SRWW)*	Awned	15.8a	35.5ab
Pioneer 25R30 *(SRWW)*	Awned	15.8a	34.3bc
Pioneer 25R40 *(SRWW)*	Awned	15.8a	31.3de
Terral TV8525 *(SRWW)*	Awned	31.7b	33.8bc
Terral TV8861 *(SRWW)*	Awned	38.3b	32.3cde
Syngenta Harrison *(SRWW)*	Awned	39.2b	33.3bcd
P value	-	.0001	.0001

HRWW vs. SRWW Highlight Summary

- The Bailey location was planted on October 30 and harvested on June 13. Ninety five percent of the wheat did not emerge until mid -January following a general rain on December 25. The Howe location was planted on October 23 and harvested on June 14; and over 75% of the wheat did not emerge until mid-January, following the December 25 rain. The Royse City location was severely damaged by a freeze in March and the data is not reported in this paper.
- USG 3120 and AGS 2035 are very early maturing varieties, and showed some freeze damage following the March freezes. We suggest these varieties not be planted before mid to late November.
- Leaf rust infection levels were heavy across the region, and many of the varieties sustained damage from this pathogen. Stripe rust (*Puccinia striiformis)* infection pressure was very low in 2013.
- Bushel weights were low in this study, likely due to a late season leaf rust infection.
- The HRWWs produced an average of 3 more bushels per acre than the SRWWs. We suspect this is because, overall, the HRWWs tested displayed better leaf rust resistance than the SRWWs. Parallel studies showed yield increases ranging from 16 to 66% where SRWWs were sprayed with a fungicide (tebuconazole).
- HRWW bushel weights averaged 3.6 pounds heavier than SRWWs
- Straw strength in SRWWs was significantly better than HRWWs in both locations. Lodging issues continue to be the major limitation to the adoption of HRWWs in this region.