Southern Coastal Plains
Small Grains Extension Program
2011 Test Report

North Carolina Cooperative Extension Service
NC State University
North Carolina Small Grain Growers Association

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We want to take the opportunity to thank the many sponsors, producers, and others who assisted with this program. They are as follows:

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Dr. Paul Murphy, Crop Science Professor, NCSU

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Introduction

The Southern Coastal Plains Small Grains Program was developed through cooperation between NC State University and the NC Small Grain Growers Association to address the needs of growers in Southeastern North Carolina who produce small grains. Growers in the area were surveyed in 2009 and again in 2010 through formal surveys and informal conversation to determine their small grain needs. The issues that are listed below were determined to be the most immediate needs for this area. In 2011, tests to address these needs were planted on three farms in Robeson County.

Wilton Shooter & Sons, Inc. of Rowland: Soil types at this location were predominantly Aycock and Exum. The Shooter location followed corn and was disked once, field cultivated, and planted on October 27th, 2010. All tests were replicated at least four times. Planting was done with a research grain drill with the exception of the Palisade and Visor demonstrations, which were planted with the farmer's drill. Plots were 5 feet wide by 30 feet long. Nine tests were conducted on this farm: Soft Wheat Variety Test, Hard Wheat Variety Test, East Coast Foliar Pesticide Program, Fungicide Timing, Head Scab Management, Intensive Seeding Rates with Seed Treatments, Fungicidal and Insecticidal Seed Treatments, Intensive Management for Potash and Nitrogen, and Palisade Plant Growth Regulator and Nitrogen.

Moore Brothers Ag of Maxton: Observations from last season showed taller wheat with larger heads where a subsoiler had been run for a previous corn crop. The Moore Brothers location was selected due to the presence of a hard pan below the soil surface and heavy ryegrass pressure. This farm is a Norfolk Loamy Sand, extremely susceptible to developing a significant hard pan. The field was disked twice and planted conventionally on November 2, 2010 with the variety Dyna-Gro Dominion. Planting was done by separating the grower's drill into 10-foot sections. Consequently, plots were 10 feet wide by 20 feet long. Two tests were conducted on this farm: Deep Tillage on Course Textured Soils, and Italian Ryegrass and Broadleaf Weed Management.

Jimmy D. Powers of Lumberton: Upon talking with growers in the previous season, seeding rates varied widely from one grower to another. In order to look at different seeding rates in a no-till situation, Pioneer 26R12 was planted at 4 different seeding rates (1.1, 1.3, 1.5, and 1.7 million seed per acre). The drill was calibrated prior to planting and drill settings were determined to be planting 92, 111, 129, 148 lbs/a. The plots were planted with the farmer's drill which resulted in plots 10 feet wide by 20 feet long.

Soft Wheat Variety Performance

Cooperators:	Wilton Shooter & Sons, Inc.
Previous Crop:	Conventional corn
Planted:	October 27, 2010
Soil Type:	Aycock and Exum
Tillage:	Conventional
Fertilizers:	Fall: 800 lbs lime
Winter:	February 22nd: 32% N at 28 gal/a
Herbicides:	February 14th: Axial; March 2nd: Harmony Extra
Insecticides:	None
Fungicides:	None
Harvested:	June 2nd and 3rd, 2011

Twenty-eight soft wheat varieties were selected based on their disease and yield characteristics. These varieties (C[1] 9804, Branson, Oakes, Panola, C 9436, DG[1] Baldwin, DG Dominion, DG Shirley, DG V9713, DG V9723, Merl, NC Cape Fear, NC Neuse, NC Yadkin, P[1] 25R32, P 26R12, P 26R15, SS[1] 520, SS 5205, SS 8302, SS 8404, SS 8641, USG 3209, USG 3409, USG 3555, USG 3592, USG 3665, and USG 3725) were evaluated without fungicides.

Foliar Diseases and Insect Pests: Growing conditions through the season were excellent and disease and insect pest levels were low until early May when the weather turned warm and humid and powdery mildew, leaf rust, and Stagonospora Nodorum leaf and glume blotch (SNB) infected some of the varieties in this test. Cereal leaf beetle levels were very low throughout the season.

Yield and Test Weight: Most varieties yielded more than 100 bu/a without insecticides or fungicides (Table 1). Variety selection had a large impact on yield. Just by selecting a high yielding variety, a 20 bu/a yield increase could have been realized. The top two yielding varieties (DG Dominion and DG Shirley) have resistance to powdery mildew and leaf rust. The next three best yielding varieties (SS 8641, SS 5205, and P 25R32) have resistance to one or the other of these two diseases. Table 1 indicates that Oakes and SS 520 were the 7th and 8th highest ranking varieties this year compared to 2010 on the Brixey Farm where they were the lowest yielding. Oakes and SS 520 are susceptible to soilborne wheat mosaic virus, which was a problem at our 2010 location. This past year had a warm dry Fall which was not conducive to soilborne and both varieties performed much better. Coastal plain growers are advised to select at least three varieties that ideally have resistance to powdery mildew, leaf rust, and soilborne. The data in Table 1 shows why resistance to these three pests is important.

[1] Variety abbreviations: Coker = “C”; Dyna-Gro = “DG”; Pioneer = “P”; Southern States = “SS”

Table 1. Yield and test weight results from the soft and hard wheat variety tests on Shooter & Sons, Inc. in 2011, and from Brixey Farm in 2010.

Variety	2011			2010		
	Yield (bu/a)	Yield Rank	Test Weight (lb/bu)	Yield (bu/a)	Yield Rank	Test Weight (lb/bu)
DG Dominion	115.7	1	59.4	59.4	3	54.3
DG Shirley	114.7	2	58.2	62.4	1	53.5
SS 8641	111.0	3	58.7			
SS 5205	110.8	4	59.4			
P 25R32	110.7	5	60.3			
USG 3209	110.4	6	58.9	57.4	5	54.9
Oakes	110.3	7	60.1	42.5	11	56.1
SS 520	109.6	8	58.8	40.9	12	52.4
NC Yadkin	109.6	9	59.3			
SS 8302	109.5	10	60.5			
DG V9713	109.2	11	59.9			
DG V9723	108.8	12	58.0			
Merl	108.7	13	59.7			
SS 8404	108.7	14	60.8			
NC Cape Fear	108.2	15	60.0			
DG Baldwin	107.8	16	61.4			
USG 3409	107.2	17	57.8			
USG 3592	107.0	18	59.3			
USG 3725	107.0	19	55.9			
P 26R12	106.8	20	59.6	57.4	4	55.6
USG 3665	105.5	21	56.4			
C 9804	104.9	22	58.2			
P 26R15	104.8	23	58.3	51.1	9	53.0
NC Neuse	104.4	24	61.2			
USG 3555	102.3	25	58.1	60.6	2	52.5
Branson	101.9	26	57.6			
C 9436	101.7	27	57.5	52.4	8	52.0
Nu East (Hard Wheat)	94.4	28	61.5			
Panola	94.1	29	57.1			
Appalachian White (Hard Wheat)	84.9	30	60.4			
TAM 303 (Hard Wheat)	83.2	31	58			
SS 8308				55.8	6	53.6
P 26R22				54.9	7	51.5
Roane				45.0	10	55.1
Average	105.6		59.0	53.3		53.7

Hard Wheat Variety Performance

Cooperators:	Wilton Shooter & Sons, Inc.
Previous Crop:	Conventional corn
Planted:	October 27, 2010
Soil Type:	Aycock and Exum
Tillage:	Conventional
Fertilizers:	Fall: 800 lbs lime
Winter:	February 22nd: 32% N at 28 gal/a
Herbicides:	February 14th: Axial; March 2nd: Harmony Extra
Insecticides:	None
Fungicides:	None
Harvested:	June 2nd and 3rd, 2011

Three hard wheat varieties that are best adapted to North Carolina; TAM 303, Nu East, and Appalachian White were tested for disease resistance, test weight, and yield.

Foliar Diseases and Insect Pests: Hard wheat varieties are new to North Carolina and do not yet have the high levels of disease resistance we expect from soft wheat varieties. TAM 303 was developed for the dry conditions of Texas and is the most disease susceptible of these three varieties. Nu East and Appalachian White are new varieties developed for North Carolina and have higher levels of resistance. This was very noticeable in May when powdery mildew, leaf rust, and Stagonospora Nodorum leaf and glume blotch (SNB) came in. Cereal leaf beetle levels were very low throughout the season.

Yield and Test Weight: Yield and test weight results for the hard wheat varieties are shown in Table 1. Nu East was the highest yielding hard wheat variety. This is consistent with it having the best resistance (among the hard wheats) against the foliar diseases present at this location. Even so, it did not do as well as most of the more adapted soft wheat varieties.

Statewide 2011 Variety Performance & Recommendations

Randy Weisz • NC State University
Christina Cowger • USDA-ARS

Our recommendations are based on variety tests conducted in North Carolina in 2010 and 2011. These included tests by the NC Small Grains Official Variety Testing Program (OVT), Gaylon Ambrose (Beaufort County Cooperative Extension), Georgia Love (Small Grains Extension Associate, Robeson County), Andrew Gardner (Union County Cooperative Extension), and at the Northeast Ag Expo. Yield performance is reported in Table 3.

Plant At Least Three Varieties: The "Above-Average Yielding" varieties are good first choices for 2011 (Table 3). Additionally, the "Average Yielding Varieties" are likely to produce acceptable yields but may not win a yield contest. Make a note of which varieties you plant where to help with a disease management plan in the Spring (see below).

Avoid Spring Freeze Damage: Early-heading varieties are the most likely to be damaged by late spring freezes. Conversely, late-heading varieties are likely to avoid freeze damage. To reduce the risk of yield loss due to freeze damage, no more than one early or medium-early heading variety should be planted, and at least one late-heading variety should be planted. Late-heading varieties yield best when planted early and should be the first ones to go in the ground. Early-heading varieties should be planted on the late side and so should be the last ones drilled in.

Get Ahead of Head Scab: Epidemics of Fusarium head blight ("scab") have become more common in our region. Wet and warm weather before, during, and after small-grain flowering is the main factor determining whether there is a severe scab epidemic. Consequently, scab can be a problem any year that we have rain and mild temperatures before or during flowering, which usually occurs in late April or early May. Here are some important recommendations to help prevent a scab problem:

- Variety resistance is the best defense against scab. Many varieties have moderate to good resistance to scab. Plant varieties rated "MR" for scab (see Table 3).
- Avoid varieties rated "S" for scab. If a susceptible variety is grown, make sure a good scab management plan is in place (see below).
- Plant at least three varieties with different heading dates, to avoid all your wheat flowering at the same time.
- Avoid planting very late. Late planting means later flowering in the spring, when warmer temperatures are more favorable for scab.

Fine-Tune Variety Choices: Variety selection can be optimized by matching variety characteristics to your region. Here are some examples:

- *Central Piedmont*. The most common yield robbers in this area include Spring freeze damage, barley yellow dwarf virus (BYDV), and scab. Table 3 can be used to select varieties that are rated "MR" or "R" for BYDV and scab, and rated as late-heading to avoid Spring freeze damage.
- *Coastal Plains*. Powdery mildew, leaf rust, and soilborne mosaic virus are common pests in this region. Ideal wheat varieties should be high yielding and have resistance to all three of these diseases.
- *Tidewater*. Hessian fly, soilborne mosaic virus, and scab have been frequent yield robbers in the Tidewater. High-yielding varieties with resistance to these pests can be found in Table 3.

Make A Disease Management Plan That Matches Your Varieties. The most common fungal diseases are powdery mildew, leaf rust, Stagonospora nodorum blotch (SNB), and scab. Varieties that are rated "MR" or "R" to these diseases (in Table 3) can go a long way to preventing yield losses. When varieties are grown that are rated "MS" or "S" to any of these diseases, having a disease management plan in place to protect their yield potential is important.

- *Powdery Mildew, Leaf Rust, and SNB*. The goal of managing these diseases is to keep the flag leaf disease-free. Scouting all fields for diseases is a good idea, but is especially important for varieties rated "MS" or "S". Check these varieties in April and May. If powdery mildew covers 5 to 10% of the upper leaf surfaces it is time to spray. If leaf rust is on 1 to 3% of the leaf area, or if SNB is approaching the upper leaves a fungicide should be applied.
- *Head Scab*. If it is rainy during and after heading, check the scab risk forecast at www.wheatscab.psu.edu. If risk for your county is high, and the variety has high yield potential but is rated "MS" or "S" for scab, consider applying a special fungicide at flowering. These include Prosaro, Proline, and Caramba; they must be applied at flowering with nozzles angled at 45 degrees, and may reduce scab by 40-60%. Folicur will also provide some control. Do not apply a strobilurin fungicide for scab.

Table 3. 2010 & 2011 Wheat Variety Performance

Wheat Variety[1]	Heading Date	Pest Resistance To[3]:								
		Powdery Mildew	Leaf Rust	SNB[2]	Hessian Fly Biotype-L	Barley Yellow Dwarf	Soilborne Wheat Mosaic	Wheat Spindle Streak	Head Scab	Stripe Rust
Above Average Yielding (84.3 to 97.5 bushels per acre)										
AGS 2035	med-early	MS	R	MS	good	S	MR	MS	S	MR
DG Dominion	medium	R	MR	MR	fair-poor	S	R	MS	MR	MR
DG Shirley	late	R	R	S	fair	MR	MR	R	MS	S
NC Cape Fear	med-early	R	MR	MR	fair	MR	MR	R	MS	S
Oakes	medium	MS	MR	MR	fair	MS	S	MS	MR	-
P 26R12	late	MS	MR	MS	good	MR	MR	MR	S	MS
P 26R20	late	MR	R	MS	good-fair	S	-	-	S	-
P 26R22	medium	MS	MS	MS	fair-poor	MS	MR	-	MS	R
SS 560	medium	MS	S	MS	poor	S	MS	R	S	MS
SS 8700	late	MR	-	MR	fair-poor	-	-	-	MR	-
SY 9978	medium	MR	-	S	good	-	-	-	MS	-
USG 3120	med-early	MR	R	MR	-	MR		MR	S	-
USG 3201	late	MR	-	MS	-	-	-	-	-	-
USG 3438	medium	MR	-	MR	-	S	-	-	MS	-
Average Yielding (81.5 to 84.2 bushels per acre)										
AGS 2026	early	S	R	S	good	MR	MR	-	S	R
C 9553	med-early	MR	S	MS	fair-poor	MS	MR	MS	MS	MR
DG Baldwin	medium	MS	R	MS	good	MS	MR	R	MR	MR
Jamestown	early	MR	MS	MS	fair	MR	MS	MS	MR	MR
Merl	late	MR	MS	MS	-	S	-	R	S	-
P 26R15	late	MS	MS	MS	good-fair	S	MR	R	MR	MR
P 26R31	med-early	MR	S	MS	fair-poor	S	MS	MS	MS	-
SS 520	early	MR	MS	MS	poor	MS	S	R	S	S
SS 5205	med-early	MS	MR	MS	poor	MR	-	MR	MS	R
SS 8302	late	MS	S	MS	fair	MS	MS	MR	MR	R
SS 8641	med-early	R	R	MR	fair-poor	MS	MR	MS	S	MR
USG 3209	med-early	MS	S	MS	poor	MS	MR	R	MS	MS
USG 3409	medium	MS	S	MS	-	MS	-	-	S	-
USG 3555	medium	MS	S	MS	fair-poor	MR	MR	R	MR	R
USG 3592	medium	MS	R	MS	fair	MS	MR	R	S	MS
Below Average Yielding (67.8 to 80.4 bushels per acre)										
Branson	late	R	MS	S	good-fair	MS	MS	R	MS	MR
C 9436	late	MR	MS	S	good-fair	S	MR	S	MR	MS
C 9804	medium	MS	S	S	poor	MS	-	MS	S	-
NC Neuse	late	R	MR	MR	good	MS	MR	MS	MR	MS
NC Yadkin	medium	R	MR	MS	fair	MR	MR	R	MS	MS
P 25R32	late	MR	S	MR	good-fair	S	-	-	MR	-
Panola	med-early	MR	S	S	poor	S	MR	MS	S	R
Roane	late	S	MS	MS	fair	MR	MR	R	MR	MS
SS 8404	medium	MS	MS	MS	fair-poor	MS	MR	S	S	S
SS 8600	medium	MR		MR	-	-	-	-	MS	-
USG 3665	late	MS	MS	S	good-fair	S	S	R	MS	MS

1. Listed alphabetically within each yield group: AGS = AgSouth Genetics; C = Coker; DG = Dyna-Gro; P = Pioneer; SS = Southern States; USG = UniSouth Genetics.
2. SNB stands for Stagonospora nodorum blotch.
3. S, MS, MR, & R stand for Susceptible, Moderately Susceptible, Moderately Resistant, & Resistant respectively.

East Coast Foliar Fungicide & Insecticide Program

Cooperators:	Wilton Shooter & Sons, Inc.
Previous Crop:	Conventional corn
Planted:	October 27, 2010
Soil Type:	Aycock and Exum
Tillage:	Conventional
Fertilizers:	Fall: 800 lbs lime
Winter:	February 22nd: 32% N at 28 gal/a
Herbicides:	February 14th: Axial; March 2nd: Harmony Extra
Insecticides:	March 17 and April 13: Quilt + Karate + Induce
Fungicides:	March 17 and April 13: Quilt + Karate + Induce
Harvested:	June 2nd and 3rd, 2011

Many producers questioned whether to apply fungicides and insecticides at topdress and/or at heading, or to apply them based on a threshold. We wanted to know what the maximum yield increase would be if insecticides and fungicides were liberally applied to our variety tests described on pages 2 and 4. To answer this, half of the variety plots were treated with Syngenta's East Coast Foliar (ECF) program and the other half were treated with only an insecticide if cereal leaf beetle went over threshold. The East Coast Foliar program is a fungicide and insecticide application at top-dress (Quilt at 7 oz/a, Karate at 1.92 oz/a), followed with a second fungicide application prior to heading (Quilt at 14 oz/a). A second insecticide application (Karate at 1.92 oz/a) is also made if any cereal leaf beetle are visibly present in the field, not based on a threshold level. Visual ratings for diseases and insects were made before the fungicide or insecticide was applied at topdress and again at heading. Scouting at those times revealed that neither diseases nor insects had reached a threshold level. A few cereal leaf beetle larvae were present at heading, so the second insecticide application in the ECF program was applied then. Powdery mildew, leaf rust, and SNB came into the field shortly after heading.

Soft Winter Wheat Varieties With The East Coast Foliar Program

2011 Results: The BLUE bars in Figure 1 are the yield of the unsprayed varieties reported previously in Table 1. The varieties are shown from left to right in the order they are ranked in Table 1. The RED bars indicate the additional yield gained by using the ECF program. On average the ECF treatment resulted in a 7.6 bu/a yield increase compared to the unsprayed treatment.

Varieties marked with an "R" in Figure 1 (DG Dominion, DG Shirley, SS 8641, NC Yadkin, NC Cape Fear, and NC Neuse) have some resistance to both powdery mildew and leaf rust. Several of them have some resistance against SNB as well. As a result of this resistance they had little to no

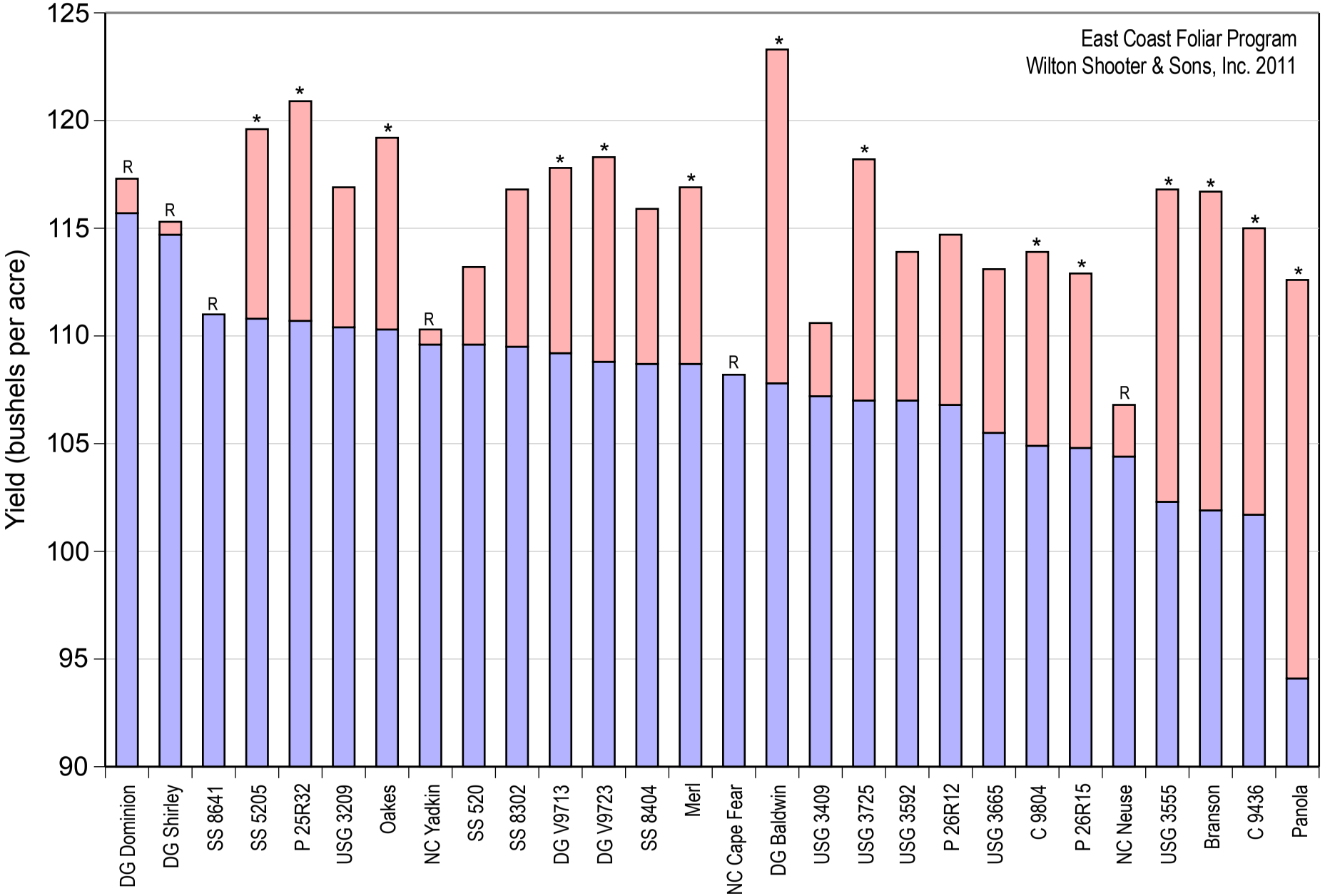


Figure 1. BLUE bars: Yield of the untreated varieties in the soft wheat variety test shown in Table 1. RED bars: additional yield gained by using the ECF program. "*" indicates ECF yield is statistically different from the untreated yield.

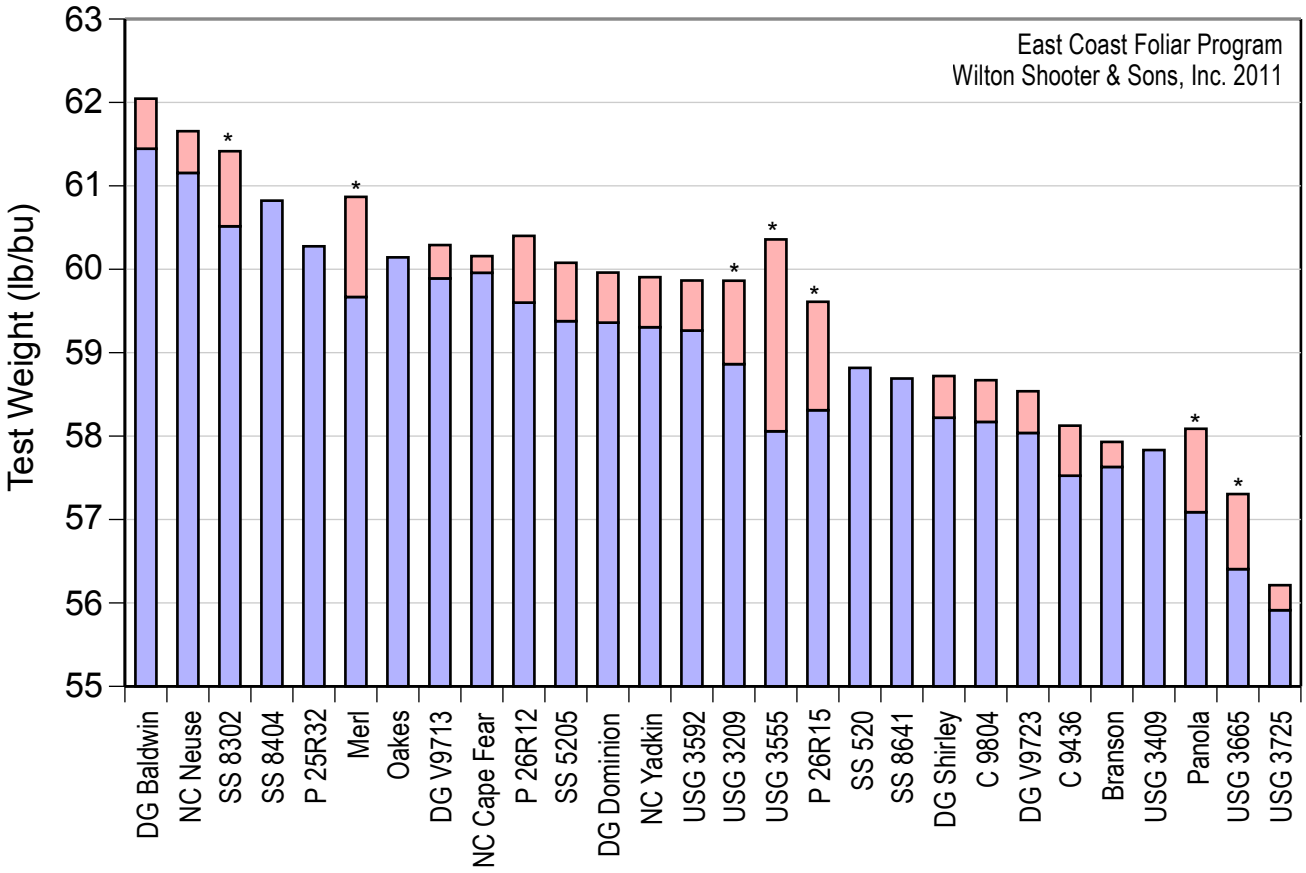


Figure 2. BLUE bars: Test weight of the untreated varieties in the soft wheat variety test shown in Table 1. RED bars: additional test weight gained by using the ECF program. "*" indicates ECF test weight is statistically different from the untreated.

response to the ECF program. On the other hand, Panola, DG Baldwin, and Branson had the largest response to the ECF program. The average response for these three varieties was 16.3 bu/a. Each of these varieties lacks resistance to two of the three diseases in this field.

The average increase in test weight due to the ECF was 0.6 lb/bu (Figure 2).

2010 Results: We had an ECF test on the James & Carey Brixey Farm near Lumberton in 2010. In 2010, there were no foliar diseases or cereal leaf beetle present and the average difference between the unsprayed varieties and the ECF treatment was 0.0 bu/a (Figure 3).

Conclusions: The results from 2010 and 2011 are a good example of how the yield response to fungicide applications depends on both the diseases that develop and to the disease resistance "package" a variety has. In a year without foliar diseases or cereal leaf beetle (like 2010) the ECF program showed no benefit. In a year with high disease pressure (like this year), it was beneficial on varieties that did not have robust disease "packages".

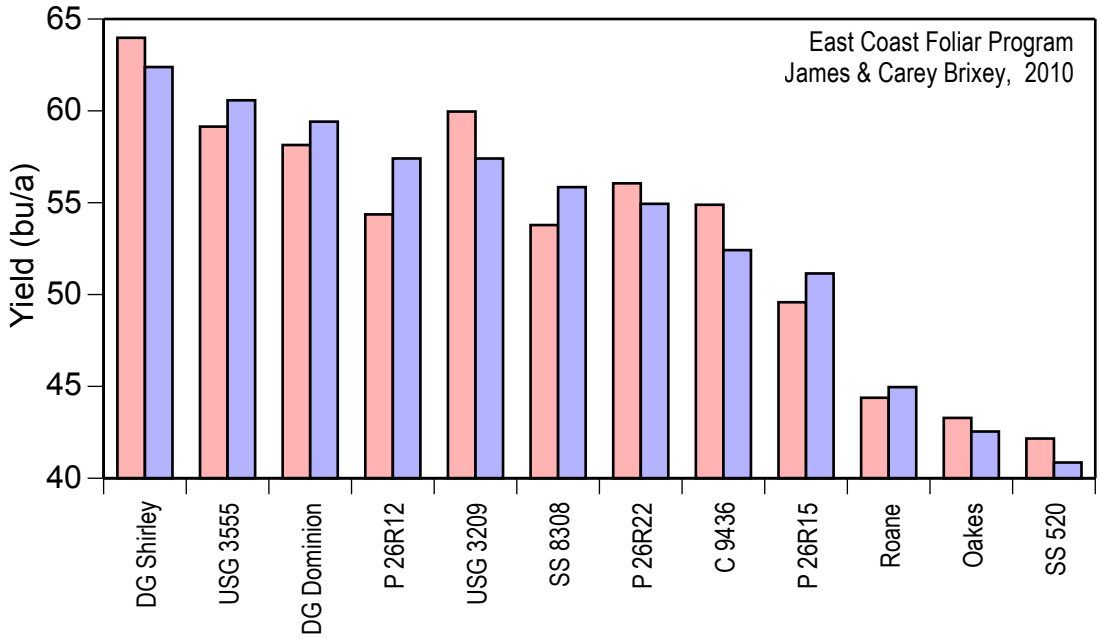
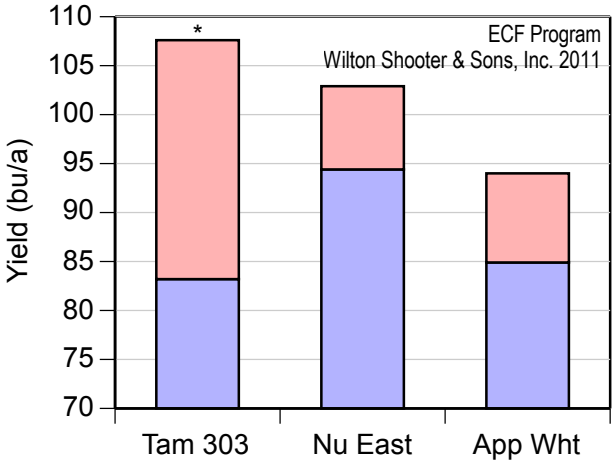
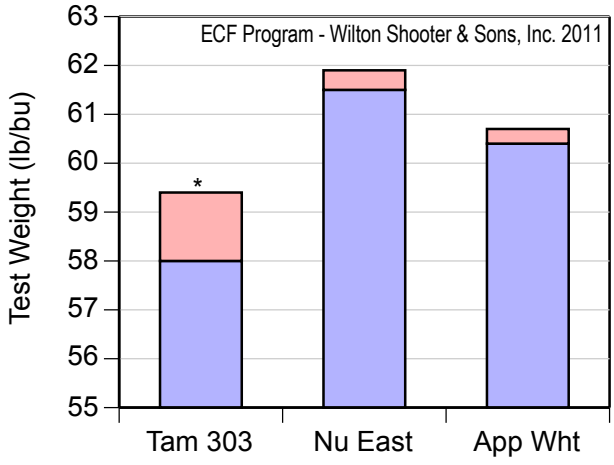


Figure 3. BLUE bars: Yield of the untreated varieties in the soft red winter wheat variety test on the James and Carey Brixey Farm in 2010. RED bars: yield using the ECF program. Yields do not differ statistically between the treatments.

Hard Winter Wheat Varieties with the East Coast Foliar Program

TAM 303 responded the most to the ECF treatments with a 25 bu/a yield increase (Figure 4). Nu East and Appalachian White were not statistically better when treated, but the trend was still there for the ECF to yield better than untreated. The same thing was true for test weight (Figure 5); TAM 303 had the largest increase in test weight compared to Nu East and Appalachian White that had little to no increase in test weight. These results for yield and test weight are consistent with Nu East and Appalachian White having better resistance to foliar diseases than TAM 303.





Figures 4 (Yield) & 5 (Test Weight). BLUE bars: Untreated hard wheat varieties in Table 1. RED bars: additional yield or test weight gained by using the ECF program. "*" indicates ECF is statistically different from the untreated.

Fungicide Timing For Optimal Yield

Cooperators:	Wilton Shooter & Sons, Inc.
Previous Crop:	Conventional corn
Planted:	October 27, 2010
Soil Type:	Aycock and Exum
Tillage:	Conventional
Fertilizers:	Fall: 800 lbs lime
Winter:	February 22nd: 32% N at 28 gal/a
Herbicides:	February 14th: Axial; March 2nd: Harmony Extra
Insecticides:	None
Fungicides:	As indicated
Harvested:	June 2nd and 3rd, 2011

Many growers asked if a fungicide should be applied at topdress time. This test was designed to find out when the best time is to apply fungicides. One variety with a high level of foliar disease resistance (DG Dominion) and one susceptible variety (USG 3209) were evaluated for disease control with Twinline or Quilt applied at different times. Treatments included:

1. Application at topdress time only (Twinline at 8 oz/a, or Quilt at 14 oz/a),
2. Split applications at both topdress time (Twinline at 8 oz/a, or Quilt at 7 oz/a) and at flag leaf (Twinline at 8 oz/a, or Quilt at 14 oz/a),
3. Application at flag leaf only (Twinline at 8 oz/a, or Quilt at 14 oz/a).

Growing conditions through the 2011 season were excellent and disease levels were low until close to heading. In early May, weather conditions were warm and humid and powdery mildew, leaf rust, and SNB began to move into the field.

DG Dominion is rated “R” for resistant to leaf rust (Table 3). The unsprayed check yielded 107.5 bu/a (Figure 6). Twinline applied at topdress time and again at flag leaf was the only treatment that yielded statistically higher than the check (114.8 bu/a). None of the Quilt treatments were statistically better than the check.

USG 3209 is rated “S” for susceptible to leaf rust (Table 3). The unsprayed check was the lowest yielding treatment in this test. Twinline at topdress was statistically no different from the check. All other fungicide treatments were superior to the check.

In general, variety resistance resulted in about 7 bu/a in the absence of a fungicide. If fungicides were sprayed at flag leaf, the yield increase was 5.3 bu/a for the resistant variety and 12.5 bu/a for

the susceptible variety. If fungicides were split applied, the yield increase was 1 bu/a for the resistant variety and 13.6 bu/a for the susceptible variety. If fungicides were applied at topdress, the average yield increase was 1.2 bu/a for the resistant variety and 5.9 bu/a for the susceptible variety. The best time to have applied fungicides this year would have been at flag leaf, or split applied at topdress time and flag leaf.

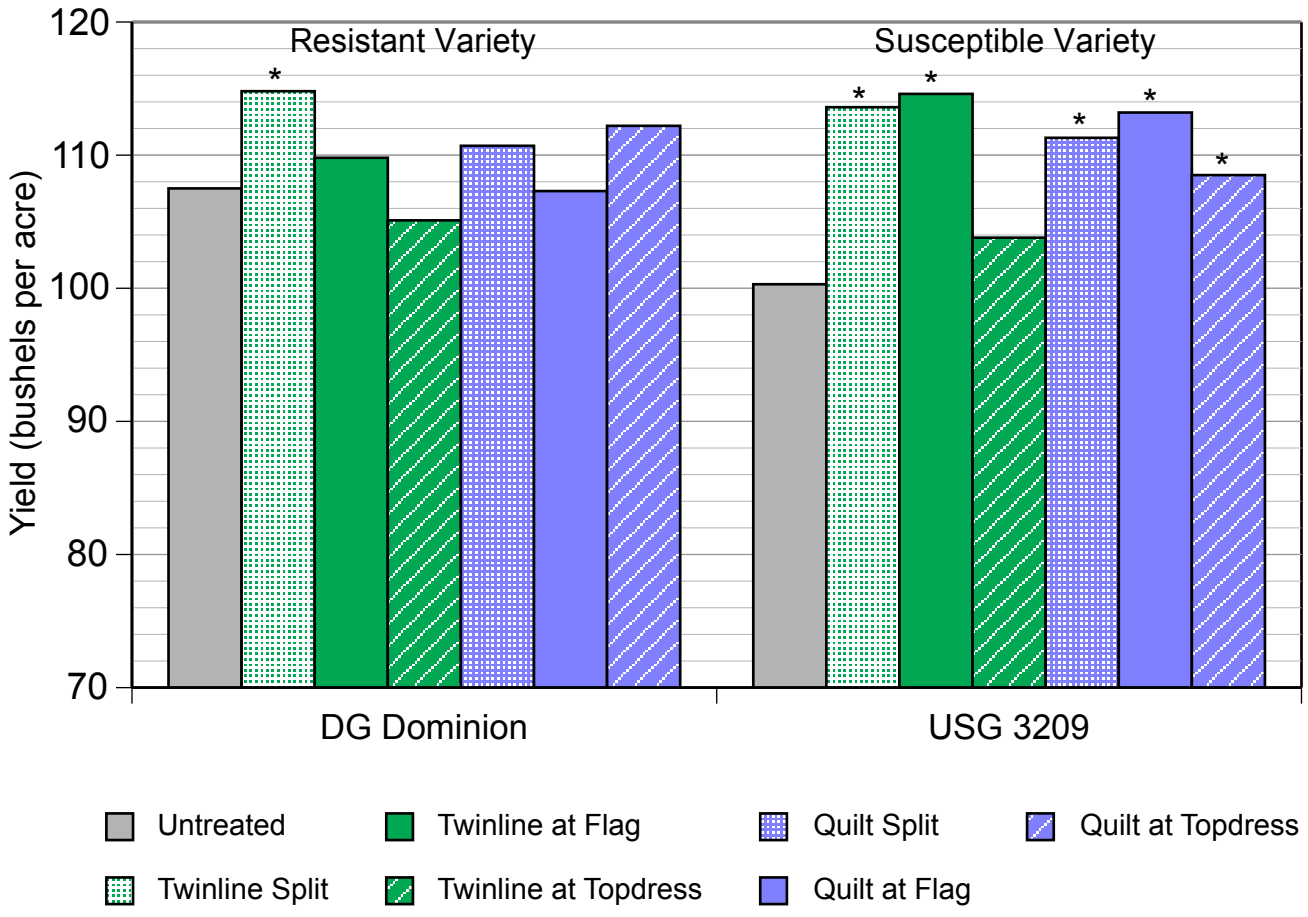


Figure 6. Yield for DG Dominion (resistant to leaf rust), and USG 3209 (susceptible to leaf rust) for treatments including unsprayed; one fungicide application at topdress time or at flag leaf; or two fungicide applications one at topdress time and the second at flag leaf. "*" indicates treatment is statistically different from the unsprayed. Test conducted at Wilton Shooter and Sons, Inc. 2011.

Head Scab Management

Cooperators:	Wilton Shooter & Sons, Inc.
Previous Crop:	Conventional corn
Planted:	October 27, 2010
Soil Type:	Aycock and Exum
Tillage:	Conventional
Fertilizers:	Fall: 800 lbs lime
	Winter: February 22nd: 32% N at 28 gal/a
Herbicides:	February 14th: Axial; March 2nd: Harmony Extra
Insecticides:	None
Fungicides:	Caramba (13 oz/a) or Prosaro (6.5 oz/a) as indicated below
Harvested:	June 2nd and 3rd, 2011

Scab has caused severe economic losses in the past for North Carolina producers, in part because of the toxin DON (vomitoxin). This test was conducted by Dr. Christina Cowger. Seven varieties (DG Dominion, NC-Neuse, C 9436, SS 5205, P 26R12, SS 520, and USG 3592) were selected for their varying levels of scab resistance (Table 4). Plots were heavily inoculated at flag leaf with corn kernels infected with the scab fungus, similar in effect to the large amount of corn debris on the surface in a no-till field. Each wheat variety was treated at flowering with Caramba or Prosaro (the two most effective fungicides for scab reduction), or left untreated. The warm and humid weather during the last week of April was conducive to scab development in most of the varieties, and a moderately heavy epidemic developed.

Scab infection occurs at wheat flowering and up until about 10 days after mid-flowering (50% of heads in flower) if weather conditions are favorable. Rain and warm temperatures (59 to 86°F) favor scab by triggering the release of fungal spores from debris of corn or small grains. The spores are carried to small-grain heads by air currents or sometimes by rain-splash. Consequently, wet weather before, during, and after wheat flowering is the main factor determining if there is a head scab epidemic.

Yield results are shown in Figure 7. GREY bars are unsprayed, RED and BLUE bars are sprayed treatments for Prosaro and Caramba. A "*" above a sprayed bar indicates that it yielded statistically more than the untreated check of that variety. Table 4 gives the heading date, scab resistance level, and average response to the two fungicides for each variety. SS 520 (an early-heading variety) and NC-Neuse (a very late-heading variety) had the lowest response to scab fungicides (4.0 to 4.9 bu/a). The other varieties that headed later than SS 520, but before NC Neuse, had much higher yield increases associated with a scab fungicide (8.1 to 12.7 bu/a). A warm and wet period toward

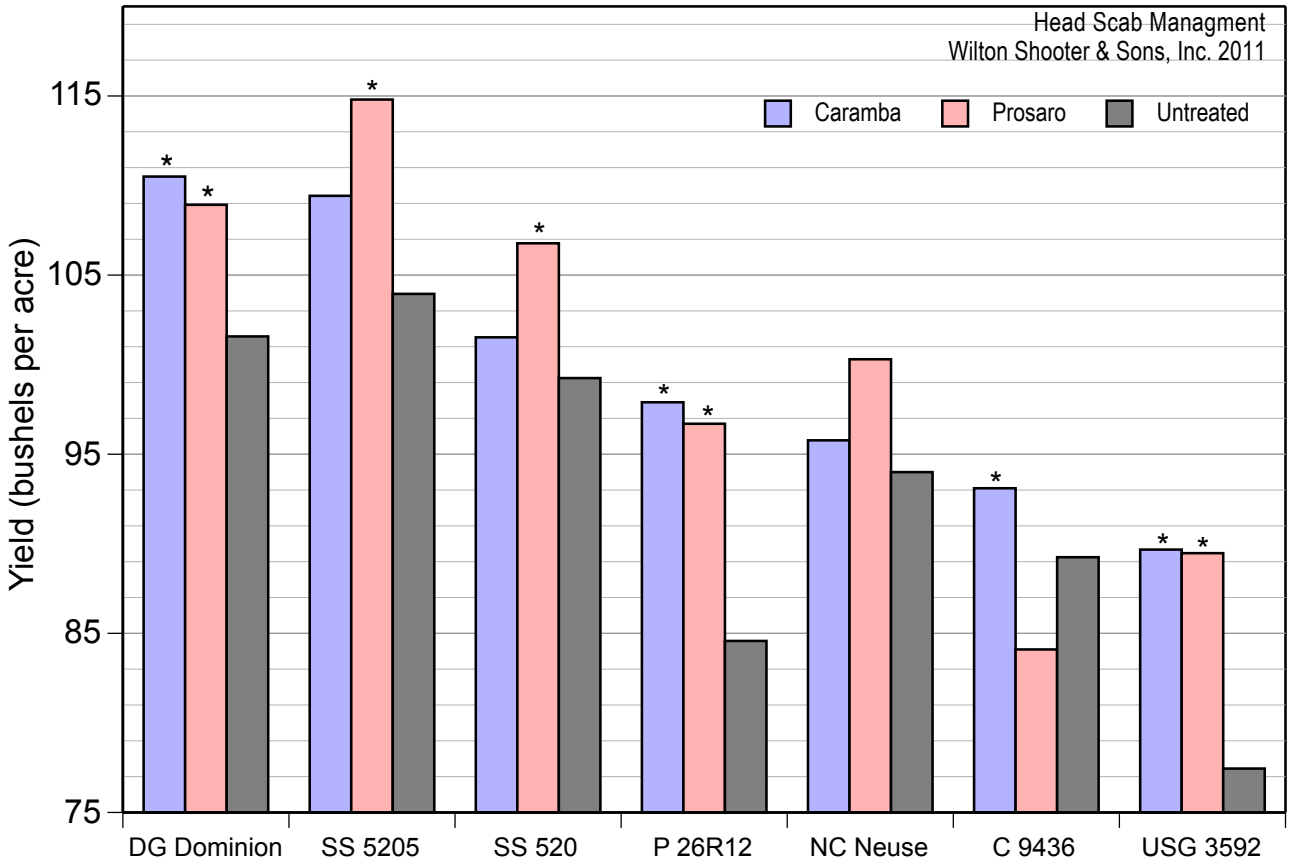


Figure 7. Yield response of seven wheat varieties to Caramba or Prosaro in a head scab management test at Wilson Shooter and Sons, Inc. 2011. "*" indicates the fungicidal treatment is statistically different from the check. Yields of C 9436 and USG 3592 were lower than normal because seed lots of those varieties had only 30-40% germination.

Table 4. Heading date, scab resistance level, and the average fungicide yield response for each variety in the scab management test.

Variety	SS 520	SS 5205	USG 3592	DG Dominion	P 26R12	NC Neuse
Heading Date	Early	Med-Early	Medium	Medium	Late	Very Late
Scab Rating	Susceptible	Moderately Resistant	Susceptible	Moderately Resistant	Susceptible	Moderately Resistant
Fungicide Yield Response (bu/a)	4.9	8.2	12.1	8.1	12.7	4

the end of April was conducive to head scab for varieties flowering within a certain time period. If a variety flowered very early (like SS 520), or very late (like NC Neuse), it was under lower disease pressure and did not respond as strongly to the fungicide.

Growers can use a scab forecasting website (www.wheatscab.psu.edu/riskTool_2011.html) to determine if their wheat is at risk of a severe scab epidemic and would benefit from a fungicide at

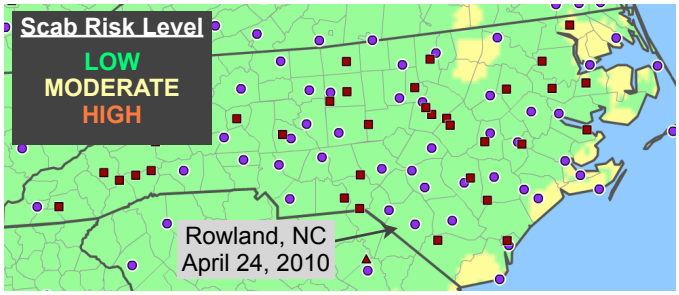


Figure 8. On-line scab risk map for April 15, 2011.

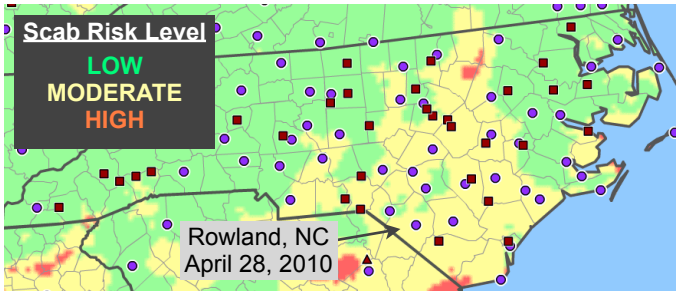


Figure 9. On-line scab risk map for April 28, 2011.

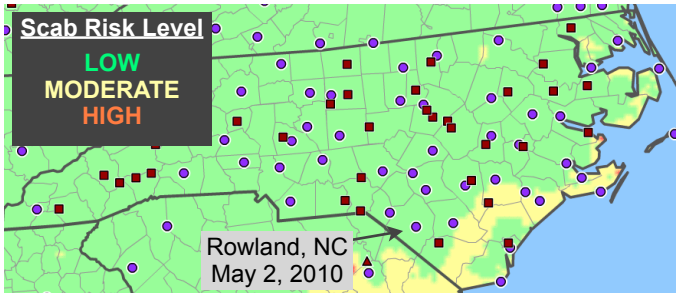


Figure 10. On-line scab risk map for May 2, 2011.

flowering. If a grower in Rowland, NC had used the website on April 15, and chosen that as the flowering date (as was true for SS 520 in this test), the scab risk map in Figure 8 would have been displayed. GREEN indicates low risk to scab, so a fungicide for scab reduction would not likely have been profitable. But by April 28, the weather had turned wet and warm, and the map (Figure 9) indicated a moderate risk of scab. Most of the varieties had flowered in the previous 10 days, and thus were still susceptible to *Fusarium* infection, and they did respond to fungicide (Figure 7). By May 2, however, the weather became dry again and the very latest variety, NC Neuse, was at lower risk of scab infection (Figure 10). Neuse is also moderately resistant to scab, so the combination resulted in no significant yield benefit from fungicide.. **This test illustrates why one of the best ways to avoid large losses to head scab is to grow at least three varieties that differ in heading date.**

For the varieties that flowered at the right time to be at risk during the wet and warm period around April 28 (SS 5205, USG 3592, DG Dominion, and P 26R12), those that are rated "Susceptible" to scab had the largest response to the fungicides (Table 4). This is why a second recommendation to avoid large yield losses to scab is to select varieties that have "Moderate Resistance" to this disease. The third recommendation for avoiding head scab is to use the on-line risk tool when your wheat is flowering (and at least several days after flowering) to find out if a fungicide application is required.

Why use a special fungicide for head scab? Strobilurin fungicides applied at heading can actually increase vomitoxin levels. So if the crop is at risk to scab, strobilurins should be avoided. Prosaro, Proline, and Caramba are the most effective fungicides for scab management. Folicur will also provide some control.

Palisade Plant Growth Regulator and Nitrogen

Cooperators:	Wilton Shooter & Sons, Inc.
Previous Crop:	Conventional corn
Planted:	October 27, 2010
Soil Type:	Aycock and Exum
Tillage:	Conventional
Fertilizers:	Fall: 800 lbs lime
	Winter: February 22nd: 32% N at 28 gal/a
Herbicides:	February 14th: Axial; March 2nd: Harmony Extra
Insecticides:	None
Fungicides:	None
Harvested:	June 2nd and 3rd, 2011

Palisade is a new plant growth regulator that Syngenta may label for wheat in the near future. It was tested for use in an intensive management program using variety NC-Neuse. Treatments included topdress N rates of 100, 130, and 160 lb N per acre, and Palisade rates of 5 or 7 oz/a applied at topdress time, 2.5 oz/a applied at both topdress and again at flag leaf.

NC-Neuse is a short wheat variety and at this location did not lodge even with 160 lb of N applied at topdress. Without Palisade applied, the highest economic return would have been achieved with 130 lb N per acre at topdress time (Figure 11). Increasing the N rate to 160 lb per acre did result in a slight yield increase, but it would not have been enough to pay for the additional N. None of the Palisade treatments resulted in yields that were different from the untreated plots.

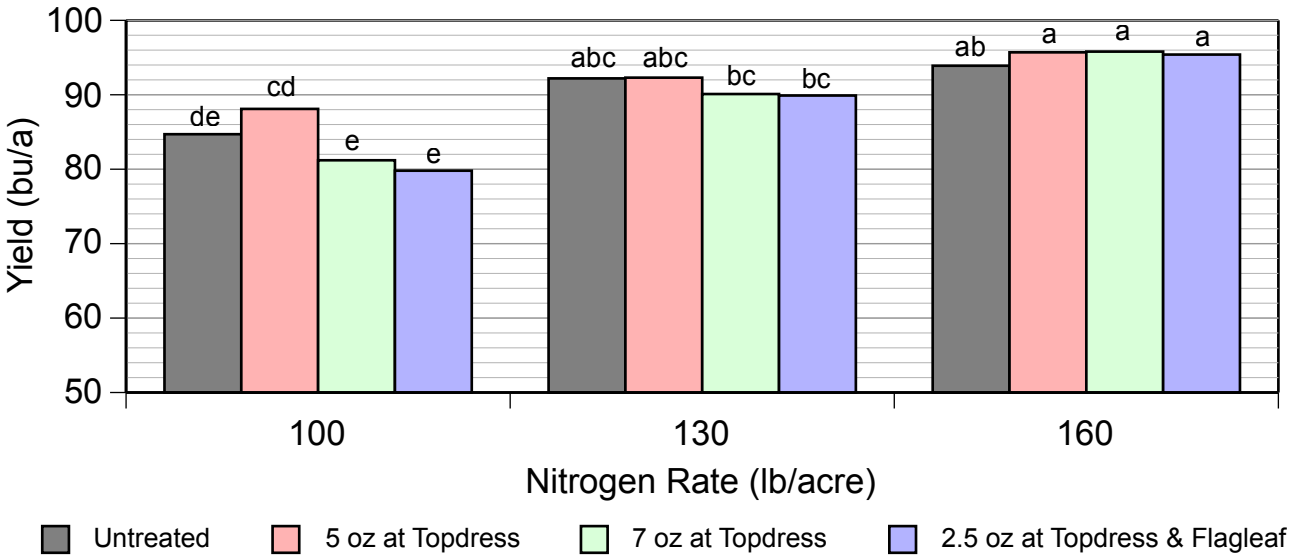


Figure 11. Topdress N rates of 100, 130, and 160 lb/a applied to NC-Neuse each with three Palisade treatments. Tests conducted on Wilton Shooter and Sons, Inc., 2011. Yields with the same letter are not statistically different.

Deep Tillage on Course Textured Soils

Cooperators:	Moore Brothers Ag
Previous Crop:	Conventional triticale
Planted:	November 2, 2010
Soil Type:	Norfolk loamy sand
Tillage:	conventional
Fertilizers:	Preplant: 200 lbs 0-0-60 + 1 ton lime + 225 lbs 9-9-0-7% S
	February 9th: 140 lbs 37-0-0-7%S treated with nutrisphere
	Mid-March: 32% N at 15 gal/A
Herbicides:	February 9th: Axial
Insecticides:	Mid-March: Baythroid
Fungicides:	None
Harvested:	June 3, 2011

Observations throughout this region in 2010 showed taller wheat with larger heads where a subsoiler had been run for an earlier corn crop. To test the effectiveness of deep tillage in wheat, a field at the Moore Brothers Ag Farm was selected due to the presence of a hard pan below the soil surface. This farm is a Norfolk Loamy Sand, extremely susceptible to developing a significant hard pan. The field was disked twice and planted conventionally on November 2, 2010 with the variety DG Dominion. Planting was done by separating the grower's drill into 10-foot sections. Consequently, plots were 10 feet wide by 25 feet long.

Penitrometer readings taken by Rick Morris, NCDA Regional Agronomist, revealed a hard pan beginning at about seven inches below the soil surface and continuing for about four to five inches to about twelve inches below the surface. Prior to planting, in August, treatments were applied to the field in 40-foot strips consisting of the deep tillage implement DMI on 40" centers, the same DMI run twice in the same direction to simulate 20" centers, and a chisel plow, compared to untreated strips where there was no deep tillage. The DMI was run at a depth of 12" to 14".

Each deep tillage treatment yielded higher than the check (Figure 12). The DMI on 20" centers had the highest yield, 11 bu/a more than the untreated control. Economics based on this one year of data are shown in Figure 13. We assumed that a DMI on 40" centers cost $4 for the points, $3 for fuel, and $2 per acre in labor. For two passes with a DMI to result in 20" centers we assumed these costs would double. For the chisel plow we estimated $2 for the points, $3 for fuel, and $2 per acre in labor. At all wheat prices, chisel plowing is the least profitable of the tillage methods tested (Figure 13). At the lowest wheat price ($3/bu) the chisel plow is just about breaking even while either the single or double pass with the DMI makes about $15/a more than no deep tillage. At $6

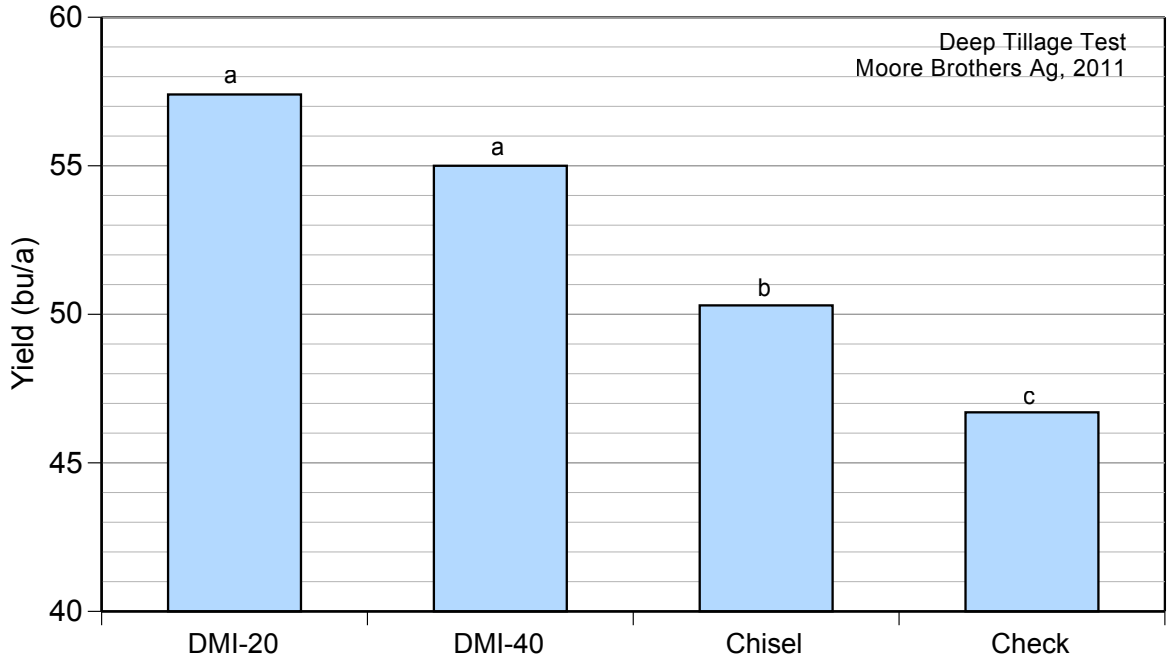


Figure 12. Deep tillage results. Yields with the same letter are not statistically different.

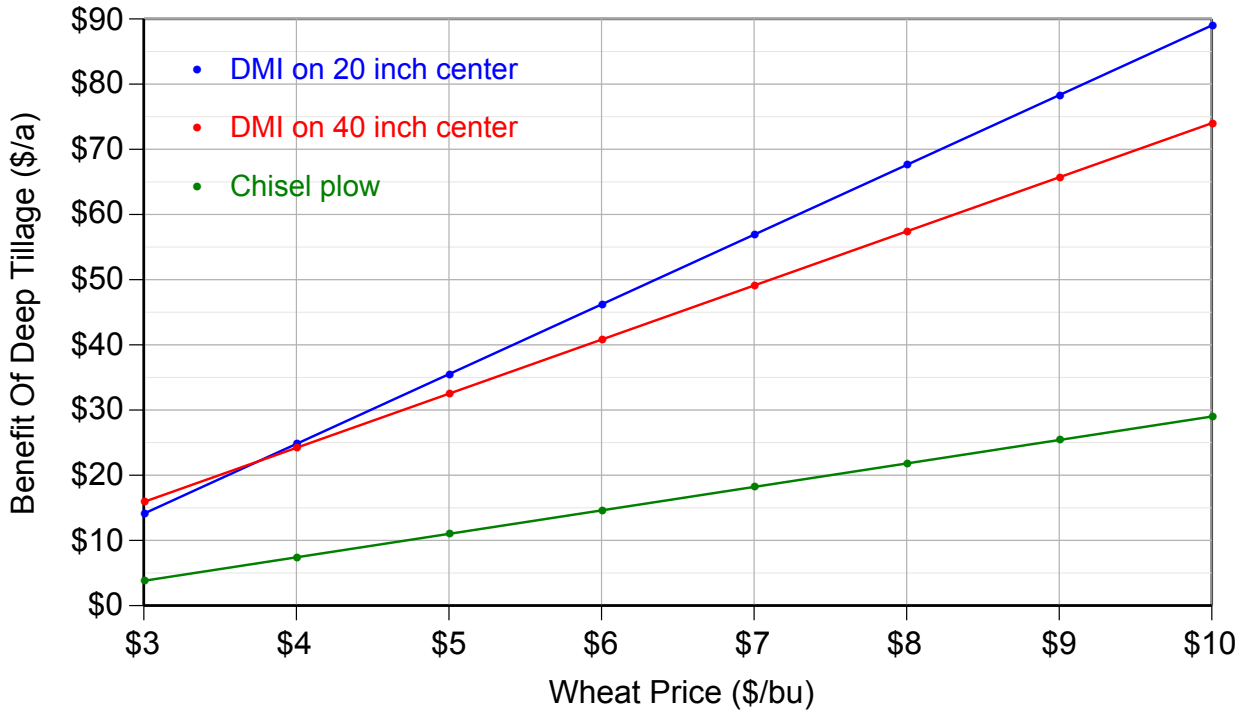


Figure 13. Estimation of the economics associated with deep tillage based on the results from Moore Brothers Ag, 2011.

wheat, chisel plowing is making about $15/a compared to $40 to $45/a for the two DMI treatments. When wheat reaches a price of about $8/bu the additional benefit of the DMI on 20" centers begins to make a difference compared to only making a single pass on 40" centers.

Intensive Seeding Rates with Seed Treatments

Cooperators:	Wilton Shooter & Sons, Inc.
Previous Crop:	Conventional corn
Planted:	October 27, 2010
Soil Type:	Aycock and Exum
Tillage:	Conventional
Fertilizers:	Fall: 800 lbs lime
	Winter: February 22nd: 32% N at 28 gal/a
Herbicides:	February 14th: Axial; March 2nd: Harmony Extra
Insecticides:	None
Fungicides:	None
Harvested:	June 2nd and 3rd, 2011

There was a need for more information on the best seeding rate for the various soil conditions and tillage practices as well as a need to address the impact of seed treatments. Three varieties, C 9184, Panola, and P 26R15, each from two different seed sources were planted, both treated with Proceed (a fungicidal seed treatment from Bayer CropScience) and untreated at four different seeding rates (1.1, 1.3, 1.5, and 1.7 million seeds per acre).

There was no consistent pattern in yield response to the seed treatment (Figure 14). In one case (C 9184 from one seed source) the seed treatment yielded statistically less than the untreated check. In one case (Panola from one seed source) the seed treatment yielded statistically better than the check. In all other cases there was little to no yield difference between the treatments. The average yield increase due to the seed treatment across all varieties and seed sources was 0.1 bu/a.

Seeding rates made very little difference this year (Figure 15). There was no statistical difference in yield between any of the rates we tested, but there was a slight trend for the lowest seeding rate (1.1 million seeds/a) to have the lowest yield. These results are due to the very warm Fall 2010 weather that was ideal for tillering, and to the timely planting of this test in late October. Under these conditions plants at the lowest seeding rate produced all the tillers needed to maximize yield.

In general, when planting on time with high quality seed in a conventional-till seed bed, we recommend seeding rates between 1.3 and 1.5 million seeds/a (see the new Small Grain Production Guide 2011-12 at http://www.smallgrains.ncsu.edu). How many pounds of seed/a is that? It depends on seed size. Table 5 gives recommended seeding rates in pounds/a for varieties with a range of seed sizes planted at either 1.3 or 1.5 million seed/a.

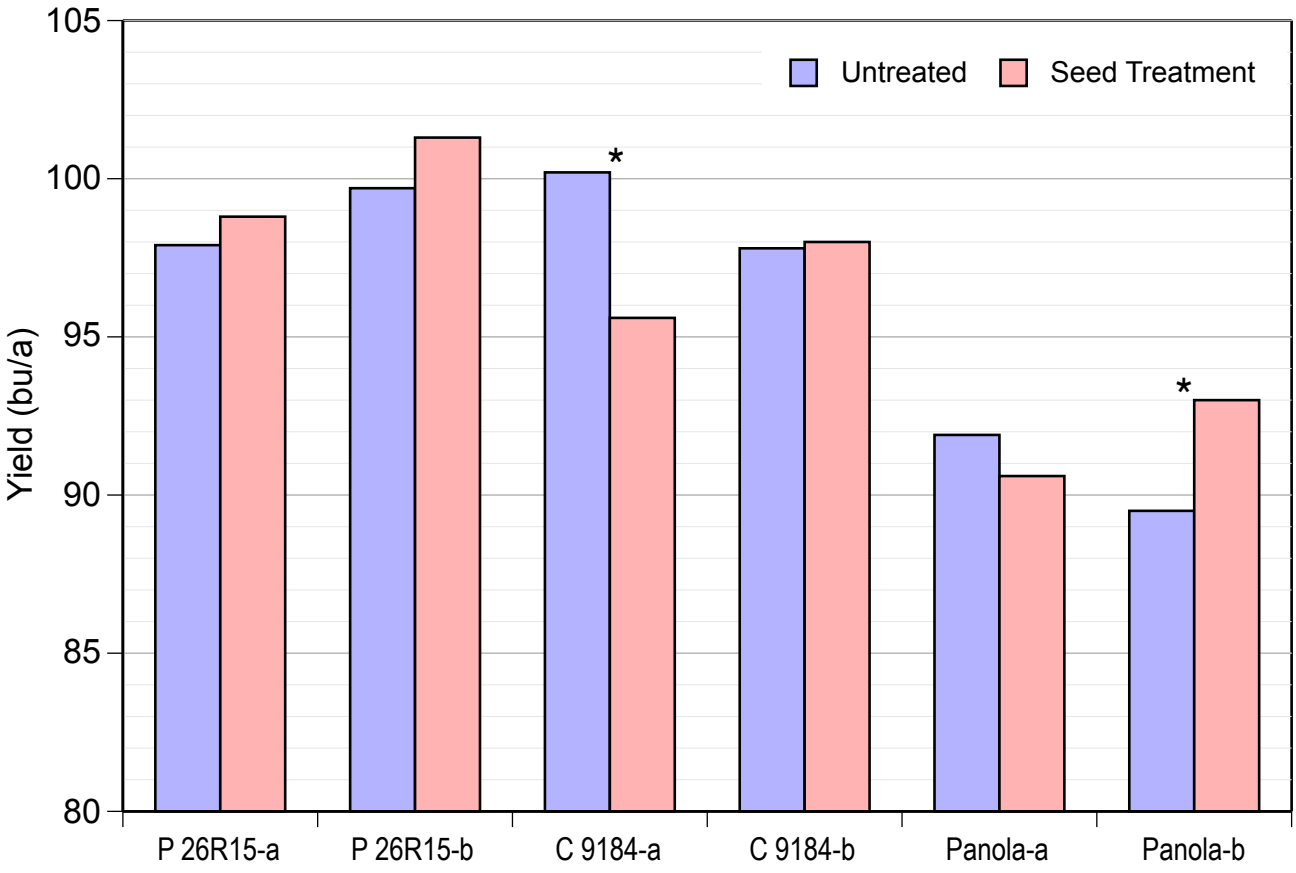


Figure 14. Yield of three varieties each from two different seed sources (indicated as "a" or "b"), treated with Proceed or without a seed treatment. "*" indicates the difference between the seed treatment and the untreated check is statistically significant.

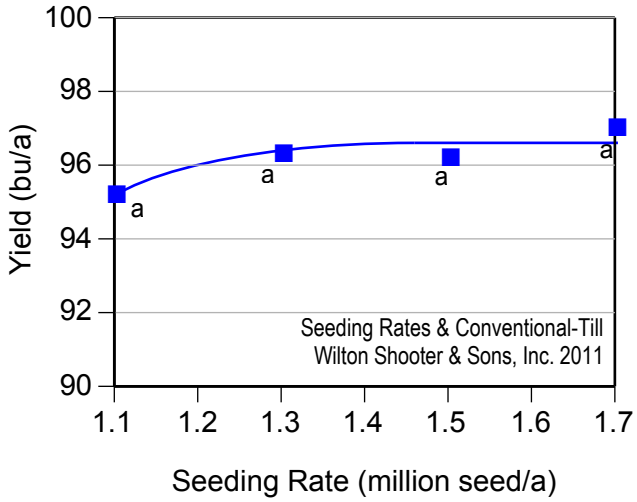


Figure 15. Average yield of three varieties each from two different seed sources planted at 1.1 to 1.7 million seeds per acre. Yields with the same letter are not statistically different.

Table 5. Seeding rates for conventionally tilled seed beds planted on time using a target of 1.3 to 1.5 seeds/a with 90% germination. Increase by 20% for no-till.

Million seeds per acre:	1.3	1.5
Seeds per square foot:	30	35
Seed size (seeds per pound)	**Pounds of seed per acre**	
10,000	131	152
11,000	119	138
12,000	109	127
12,500	105	122
13,000	101	117
14,000	94	109
15,000	87	101
Drill row spacing (inches)	**Seed per drill-row foot**	
6	15	17
7	18	20
7.5	19	22
8	20	23

No-Till Seeding Rate Test

Cooperator:	Jimmy D. Powers
Previous Crop:	No-till corn
Planted:	November 3, 2010
Soil Type:	Rains Sandy Loam
Tillage:	No-till
Fertilizers:	Pre-Plant: 300 lbs 13-13-21 with 20 lbs S
	February 8th: 34 gal/a 30%
Herbicides:	February 8th: Harmony Extra
Insecticides:	March 24th: Karate
Fungicides:	March 24th: Quilt
Harvested:	June 2, 2011

To test different seeding rates in a no-till situation, P 26R12 was planted at 4 rates. Prior to planting we calibrated the grower's John Deere drill to be sure we were putting out the correct number of seed/a. Our target seeding rates of 1.1, 1.3, 1.5, and 1.7 million seeds/a turned out to be 92, 111, 129, and 148 lb of this seed lot of P 26R12 per acre. The seeding rate chart on the drill's seed box was different than the actual seeding rate we measured (Figure 16). To apply 140 lb of seed/a actually required a drill setting of 37. But the John Deere chart suggested a setting of 29, which would have only put out 112 lb of seed.

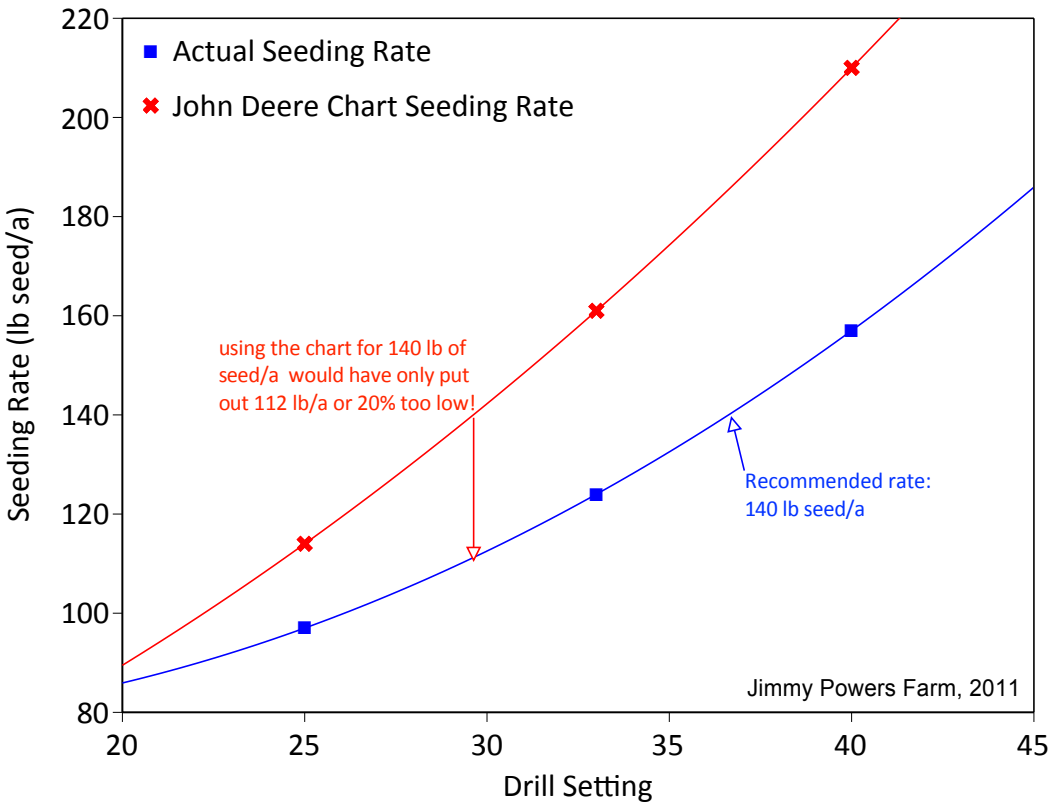


Figure 16. The actual pounds of seed being planted (BLUE), and the John Deere chart value (RED) for pounds of seed per acre for this grower's drill.

The yield results for this no-till test (Figure 17) were similar to what we found for the conventional-till test on Shooter and Son's Farm (Figure 15). Weather conditions last Fall were ideal for tillering, and even the lowest seeding rate had excellent yields.

In general, recommendations for no-till are to increase the conventional-till seeding rates by 20%. If the grower had picked 1.3 million seed/a as the starting rate, adding 20% to that would have brought the target no-till rate to 1.6 million seed/a. Figure 17 shows that 1.6 million seed/a is indeed close to where the highest yield was reached, but this year the yield gain over the lowest seeding rate was very small.

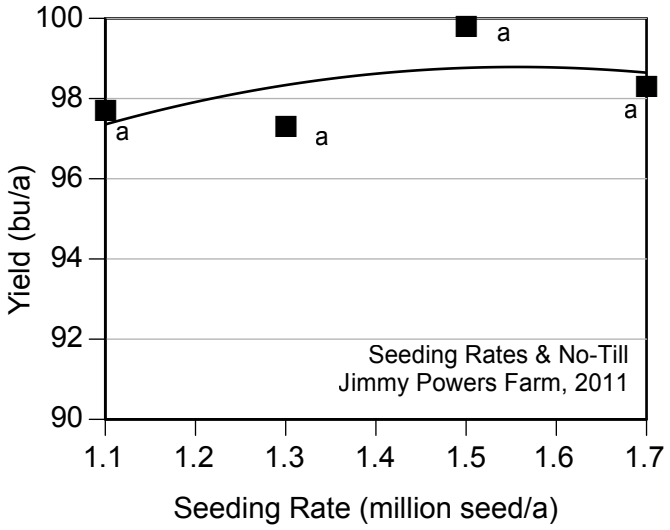


Figure 17. Yield for this no-till test planted at four different seeding rates. Yield values followed by the same letter are not statistically different. See Table 5 to convert these seeding rates to pounds per acre.

Fungicidal and Insecticidal Seed Treatments

Cooperators:	Wilton Shooter & Sons, Inc.
Previous Crop:	Conventional corn
Planted:	October 27, 2010
Soil Type:	Aycock and Exum
Tillage:	Conventional
Fertilizers:	Fall: 800 lbs lime
	Winter: February 22nd: 32% N at 28 gal/a
Herbicides:	February 14th: Axial; March 2nd: Harmony Extra
Insecticides:	None
Fungicides:	None
Harvested:	June 2nd and 3rd, 2011

Many seed treatments were evaluated in a total of five tests including:

1. The variety NC Neuse was treated with Proceed, Dividend Extreme, or Visor (see below), and compared to an untreated check.
2. The variety Massy was treated with Dividend Extreme, Raxil MD, Rancona Pinnacle, Rancona Crest, Rancona 3.8 FS plus Belmont, or Enhance AW and compared to an untreated check.
3. Growers in the area were especially interested in the new Visor seed treatment being marketed last fall by Farm Chemicals, Inc. (FCI). FCI of Raeford provided P 26R24 that had 85% germination, both treated with Visor and untreated, to conduct a Visor seed treatment comparison planted with the grower's drill.
4. The variety DG Dominion was treated with Gaucho, and Cruiser, and compared to an untreated check.
5. Varieties P 26R15, C 9184, and Panola each from two different seed lots were treated with Proceed and compared to an untreated check (reported above in Figure 13).

In Figure 18, the yield of each seed treatment is shown as a percentage of the check yield for that variety. Values above 100% indicate the seed treatment yielded more than the check. Values below 100% indicate the seed treatment yielded less than the check. A "*" indicates the difference between the seed treatment and the check yield was statistically significant. RED bars are for insecticidal seed treatments. ORANGE bars are combination insecticidal and fungicidal seed treatments, and BLUE bars are fungicidal seed treatments.

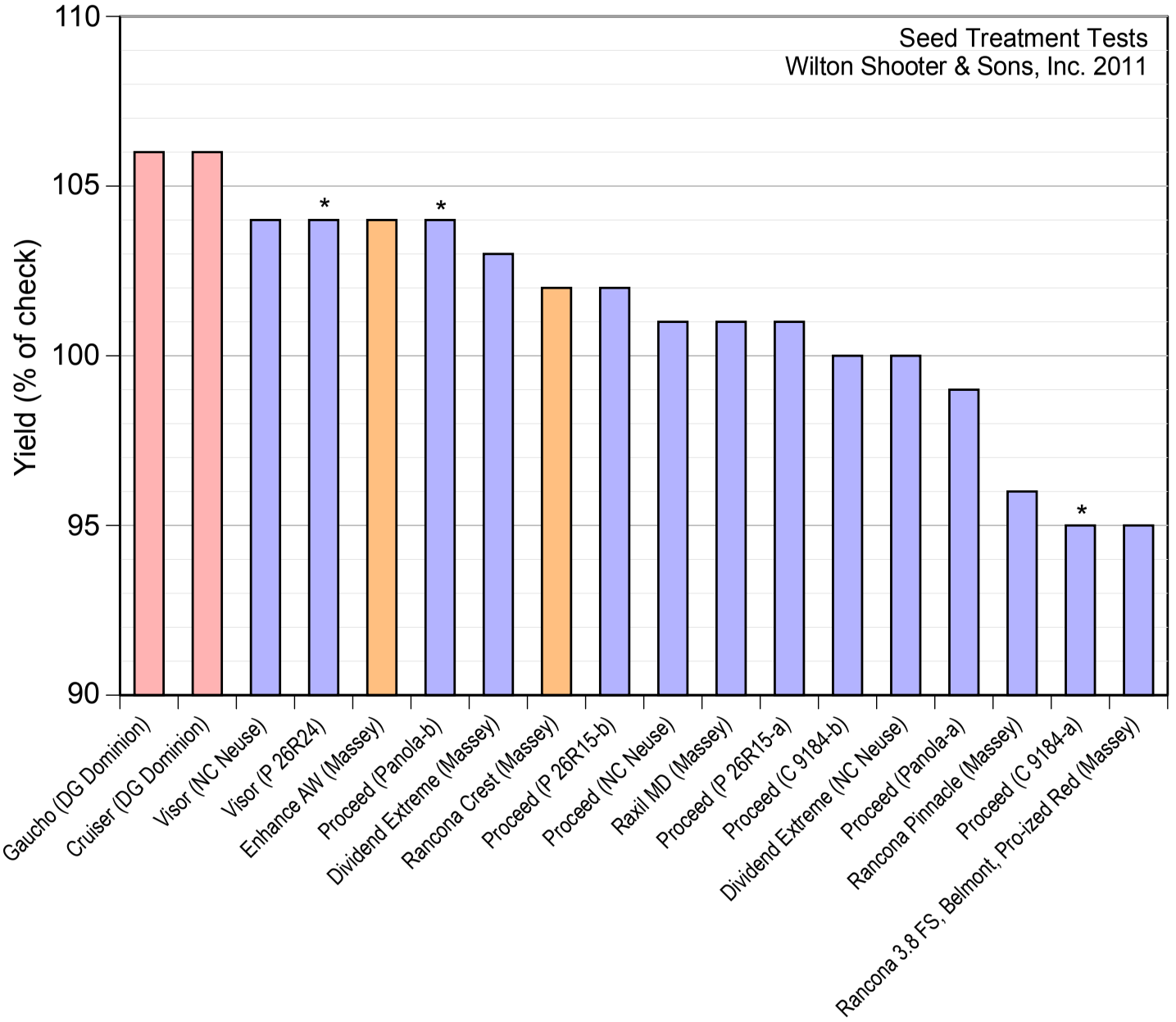


Figure 18. Results from five seed treatment tests. "*" indicates the seed treatment yield was statistically different from the untreated check.

Fungicidal seed treatment yields ranged from 5% below the check to 4% over the check. Visor tended to be one of the higher yielding fungicidal seed treatments. On average fungicidal seed treatment yield was 100.4% of the check, or about a half a bushel yield increase over the untreated controls. This is very consistent with our 2010 results shown in Table 6.

Table 6: Fungicidal Seed Treatment Yields in 2010

Treatment	Brixey Farm (bu/a)	Smith & Barkley Farm (bu/a)	Evans Farm (bu/a)	Average (bu/a)
Untreated	69.2	65.6	50.3	61.7 a
Dividend Extreme	67.2	61.3	51.0	59.8 a
Proceed	63.5	63.1	51.7	59.4 a

Average yields followed by the same letter do not differ statistically.

Seed treatments that contained an insecticide (Gaucho, Cruiser, Enhance AW, and Rancona Crest) were the only ones in 2011, that consistently did better than the check, ranging from a 2 to 6% yield increase. The trend for insecticidal seed treatments to improve yield in the 2011 suggests that aphids, Hessian fly, or wireworm may have been active in the first three week of the 2011 season.

Intensive Management for Potash and Nitrogen

Cooperators:	Wilton Shooter & Sons, Inc.
Previous Crop:	Conventional corn
Planted:	October 27, 2010
Soil Type:	Aycock and Exum
Tillage:	Conventional
Fertilizers:	Fall: 800 lbs lime
	Winter: As Indicated
Herbicides:	February 14th: Axial; March 2nd: Harmony Extra
Insecticides:	None
Fungicides:	None
Harvested:	June 2nd and 3rd, 2011

In 2010, potash deficiency symptoms were observed in fields even though the K-Index was high. Research in VA indicates that potash applied during the season can be beneficial on course-textured soils. To test this, DG Dominion was planted at a low and high seeding rate (0.6 and 1.7 million seed/a) to produce thick and thin wheat stands. The K-Index in this field was 85, so no pre-plant K was applied. At topdress, half of the plots received 45 lb K/a and the other half remained untreated. For the low seeding rate plots with thin stands, four different N treatments were tested: 120 lbs/a in early February, 120 lbs/a in early March, 60 lbs/a in February followed by 60 lbs/a in March, and 150 lbs/a in March only. In the high seeding rate thick plots, three N treatments were tested: 120 lbs/a in early February, 120 lbs/a in early March, and 150 lbs/a in March only.

The K treatment had no effect on any of these plots.

In the thin plots, applying 120 lbs/a N in March resulted in the lowest yield (Figure 19). Applying 150 lbs/a N in March improved yields by 5.2 bu/a . The highest yields were achieved by putting N out in early February. Putting all topdress N (120 lbs/a) out the first week in February yielded 114.2 bu/a. However, this treatment would have been at high risk to freeze injury. Splitting N applications (60 lbs/a applied the first week in February and again in March) would have been less of a risk and yielded 113.8 bu/a. In the high tiller density plots (Figure 20) early N application in February had the lowest yield as adequate tillers were already established and N applied that early was lost to the environment. That treatment also put the wheat at high risk to Spring freeze injury. Waiting to apply N until March tended to have the highest yields.

In general, we recommend that split N applications be applied to thinly-tillered wheat, and that well-tillered wheat receive only one topdress N application in March.

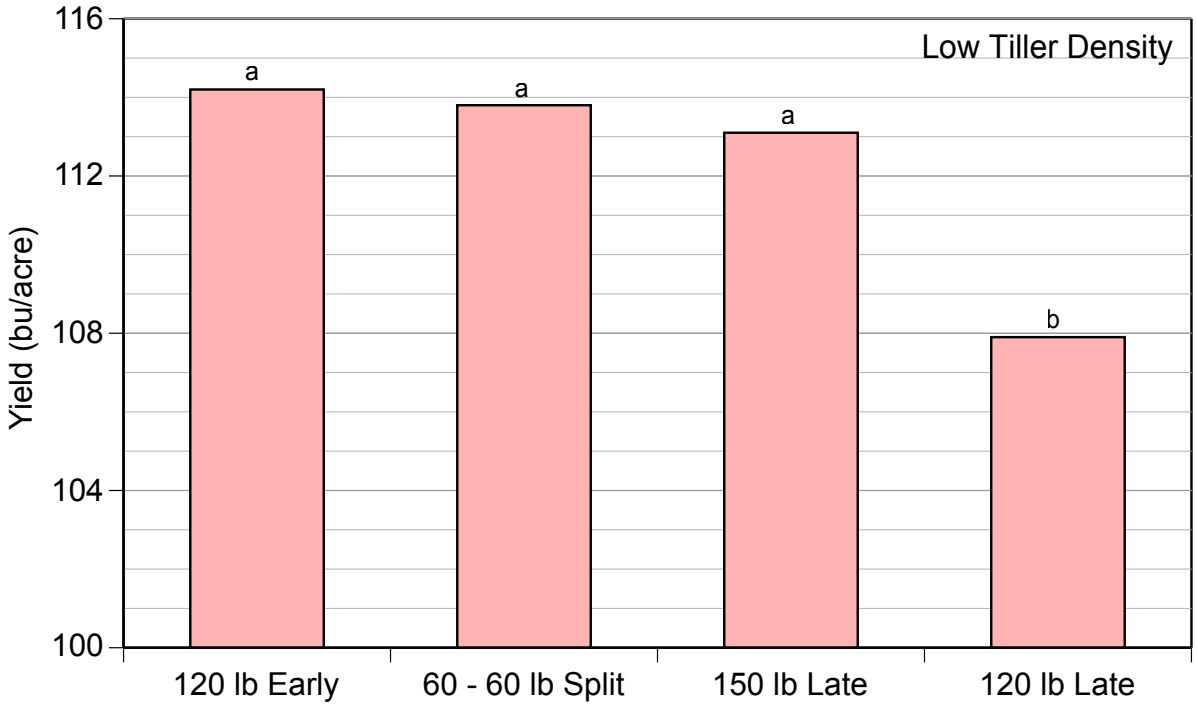


Figure 19. Topdress N treatments on thin wheat stands. Tests conducted on Wilton Shooter and Sons, Inc., 2011. Yields followed by the same letter do not differ statistically.

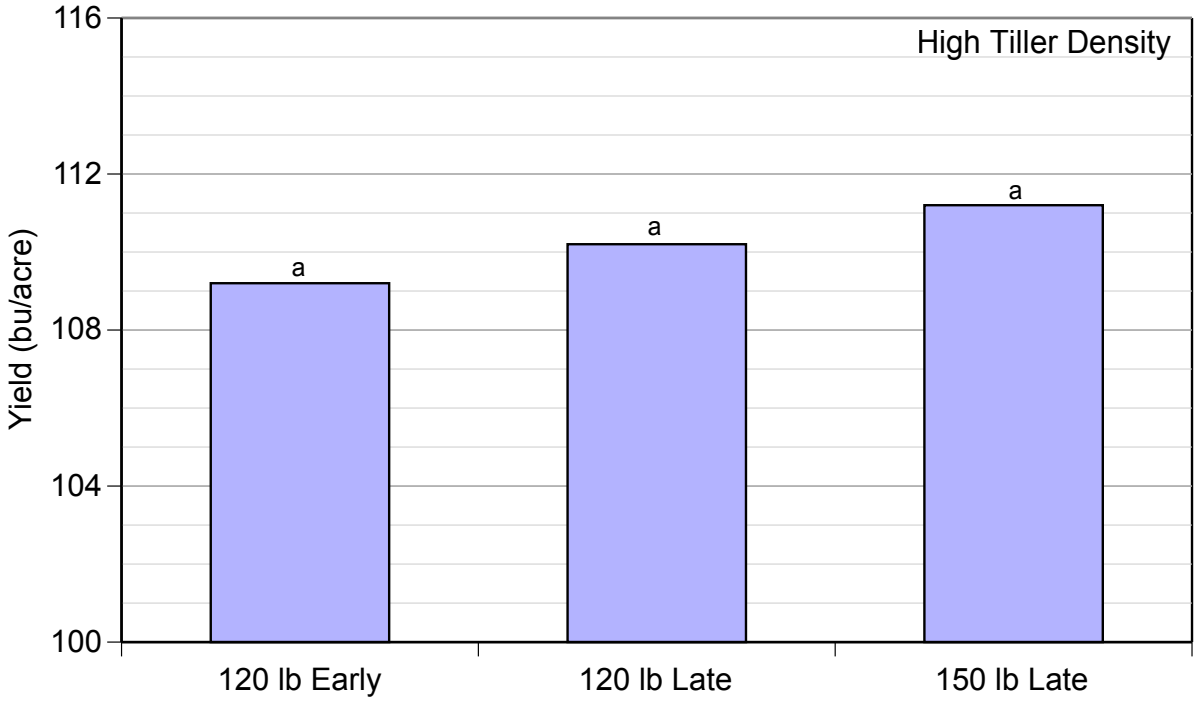


Figure 20. Topdress N treatments on thick wheat stands. Tests conducted on Wilton Shooter and Sons, Inc., 2011. Yields followed by the same letter do not differ statistically.

Weed Management

By Allan York • NC State University

Cooperators:	Moore Brothers Ag
Previous Crop:	Conventional triticale
Planted:	November 2, 2010
Soil Type:	Norfolk loamy sand
Tillage:	conventional
Fertilizers:	Preplant: 200 lbs 0-0-60 + 1 ton lime + 225 lbs 9-9-0-7% S February 9th: 140 lbs 37-0-0-7%S treated with nutrisphere Mid-March: 32% N at 15 gal/a
Herbicides:	As indicated
Insecticides:	Mid-March: Baythroid
Fungicides:	None
Harvested:	June 3, 2011

Four experiments were conducted on the Moore Brothers Ag farm to evaluate Italian ryegrass control in wheat. The soil was a sandy loam, and the location had a light to moderate infestation of Italian ryegrass, henbit, and mouse-ear cress. Wheat variety DG Dominion, was planted on November 2. Spike-stage applications (wheat spiking) were made November 15. The ryegrass was mostly not emerged at this date. Postemergence applications were made on January 3 to 2-tiller ryegrass and February 24 to 5-tiller ryegrass.

Experiment 1. Experiment 1 focused on currently available options for ryegrass control. Treatments, listed in Table 7, included the following: two rates of Axiom applied to spiking-stage wheat on November 15; Osprey, PowerFlex, and Axial applied alone on February 24 or applied following Axiom at the spiking stage; Hoelon applied February 24; Finesse plus Sencor applied to spiking-stage wheat; Prowl applied to spiking wheat followed by Osprey on February 24; Osprey and Osprey plus Prowl applied January 3; and Valor applied January 3 with and without Axiom at spiking. All treatments except Valor applied in-crop are registered.

Adequate and timely rainfall to activate the spiking-stage treatments was received. Wheat injury was generally minor and acceptable with all treatments (Table 7). All treatments except Axiom at 4 oz, Hoelon, and Valor controlled ryegrass at least 97% late in the season. Control by Axiom at 4 oz was 94%. Control by Hoelon was 83%, indicating a likely low frequency of ACCase-resistance in the population. Valor applied alone controlled ryegrass only 58%. Valor has very limited postemergence activity on ryegrass, but does provide relatively good residual control. As expected, no control of henbit was achieved with Axial or Hoelon. All other treatments provided excellent control. Yield of all herbicide treatments was numerically greater than the yield on the non-treated

Table 7. Wheat response and control of ryegrass and henbit with herbicide programs. Experiment 1. Moore Brothers Ag, Maxton, NC. 2010/1011.[1]

Treatment	Application rate	Application time	Wheat injury				Control, April 30		Wheat yield
			Dec. 22	Jan. 20	Mar. 16	April 30	Ryegrass	Henbit	
	product/acre		%						bu/acre
Untreated			0 a	0 a	0 d	0 a	0 e	0 c	54 a
Axiom	4 oz	Nov. 15	1 a	0 a	0 d	2 a	94 b	100 a	66 a
Axiom	6 oz	Nov. 15	1 a	0 a	0 d	2 a	97 ab	100 a	66 a
Osprey	4.75 oz	Feb. 24			7 abc	0 a	99 a	93 b	61 a
Axiom Osprey	4 oz 4.75 oz	Nov. 15 Feb. 24		0 a	4 bcd	0 a	99 a	100 a	64 a
Axiom Osprey	6 oz 4.75 oz	Nov. 15 Feb. 24		0 a	9 ab	3 a	100 a	100 a	60 a
Finesse Sencor	0.4 oz 2.0 oz	Nov. 15	1 a	1 a	0 d	0 a	99 a	100 a	62 a
PowerFlex	3.5 oz	Feb. 24			10 a	3 a	99 a	98 a	60 a
Axiom PowerFlex	6 oz 3.5 oz	Nov. 15 Feb. 24		0 a	10 a	2 a	100 a	100 a	65 a
Axial XL	16.4 fl oz	Feb. 24			1 cd	0 a	99 a	0 c	59 a
Axiom Axial XL	6 oz 16.4 fl oz	Nov. 15 Feb. 24		0 a	5 a-d	5 a	100 a	100 a	59 a
Hoelon	2.5 pt	Feb. 24			0 d	0 a	83 c	0 c	59 a
Prowl H2O Osprey	2 pt 4.75 oz	Nov. 15 Feb. 24	0 a	0 a	2 cd	0 a	99 a	100 a	61 a
Osprey	4.75 oz	Jan. 3		2 a	0 d	2 a	98 a	100 a	61 a
Osprey Prowl H2O	4.75 oz 2 pt	Jan. 3		1 a	0 d	0 a	99 a	100 a	63 a
Valor SX	2.0 oz	Jan. 3		2 a	0 d	0 a	58 d	100 a	60 a
Axiom Valor SX	6 oz 2.0 oz	Nov. 15 Jan. 3		2 a	4 bcd	0 a	100 a	100 a	61 a

[1] Non-ionic surfactant at 0.5% by volume applied with Osprey, PowerFlex, Finesse plus Sencor. Means within a column followed by the same letter are not statistically different at P = 0.05.

check, but no statistically significant differences were noted. This reflects the moderate weed infestation.

Experiment 2. The primary objective of Experiment 2 was to compare GF-2468 to other registered postemergence herbicides for ryegrass control. GF-2468 is a new, more concentrated formulation of pyroxsulam, the active ingredient in PowerFlex, that may ultimately replace PowerFlex. Treatments, listed in Table 8, included GF-2468, PowerFlex, Osprey, Axial, and Hoelon applied at two stages.

Wheat injury was minor with all treatments (Table 8). Excellent ryegrass control was obtained with all treatments applied January 3, and with all treatments except Hoelon applied February 24. No differences in control were noted between PowerFlex and GF-2468. Additionally, no differences in control were noted among PowerFlex, Osprey, and Axial. Henbit control was similar with PowerFlex

Table 8. Wheat response and weed control with PowerFlex, GF-2468, Osprey, Axial, and Hoelon. Experiment 2. Moore Brothers Ag, Maxton, NC. 2010/1011.[1]

Treatment	Application rate	Application time	Wheat injury				Control, April 30			Wheat yield
			Jan. 20	March 3	April 14	April 30	Ryegrass	Henbit	Mouse-ear cress	
	product/acre		%							bu/acre
Untreated			0 c	0 c	0 b	0 a	0 c	0 e	0 b	58 d
PowerFlex	3.5 oz	Jan. 3	6 ab	5 bc	3 ab	3 a	100 a	98 abc	100 a	67 abc
GF-2468	2.0 oz	Jan. 3	4 b	0 c	0 b	0 a	98 a	94 cd	100 a	73 a
Osprey	4.75 oz	Jan. 3	7 a	0 c	0 b	0 a	99 a	100 a	100 a	66 a-d
Axial XL	16.4 fl oz	Jan. 3	5 ab	0 c	0 b	0 a	100 a	0 e	0 b	70 ab
Hoelon	2.5 pt	Jan. 3	4 ab	0 c	3 ab	3 a	93 a	0 e	0 b	61 cd
PowerFlex	3.5 oz	Feb. 24		5 bc	5 a	1 a	97 a	95 bcd	100 a	73 a
GF-2468	2.0 oz	Feb. 24		13 a	4 a	3 a	95 a	93 d	100 a	67 abc
Osprey	4.75 oz	Feb. 24		13 a	3 ab	4 a	100 a	99 ab	100 a	67 abc
Axial XL	16.4 fl oz	Feb. 24		7 b	0 b	0 a	99 a	0 e	0 b	63 bcd
Hoelon	2.5 pt	Feb. 24		7 b	2 ab	0 a	69 b	0 e	0 b	70 ab

[1] Crop oil concentrate at 1.25% by volume applied with PowerFlex and GF-2468; methylated seed oil at 1.0% by volume applied with Osprey, Means within a column followed by the same letter are not statistically different at P = 0.05.

and Osprey, and with PowerFlex and GF-2468. PowerFlex, GF-2468, and Osprey all were totally effective on mouse-ear cress. Axial and Hoelon, as expected, had no activity on the broadleaf weeds.

Experiment 3. Treatments are listed in Table 9. Axial, Osprey, and PowerFlex were applied alone in early January or mixed with Dual Magnum, Prowl H2O, Valor, or Warrant. The objective was to determine wheat response and residual ryegrass control with Dual, Prowl, Valor, and Warrant. Dual, Valor, and Warrant are not registered for this use.

Wheat typically has good tolerance of Valor applied alone postemergence. In this experiment, a high level of initial injury was noted with Valor. This was attributed to the adjuvants in the Axial formulation and to the adjuvants added with Osprey and Powerflex. Injury from Valor was expressed as foliar burn and crop stunting. However, the crop quickly recovered, with very little injury evident two months after application. Compared with Osprey, PowerFlex, or Axial alone, the only yield reduction from Valor occurred when mixed with Axial. Virtually complete ryegrass control was obtained with Axial, Osprey, and PowerFlex alone, hence no benefit from the residual herbicides was noted. Axial, Osprey, and PowerFlex increased wheat yield 9 to 10 bu/acre.

Experiment 4. This experiment focused on crop response and ryegrass control with BAS 9446. BAS 9446 is the development number for the active ingredient pyroxasulfone. Pyroxasulfone is expected to be registered in the near future for corn and soybean. After the initial registration, additional crops such as wheat may be added to the label.

Table 9. Wheat injury and ryegrass control with Axial, Osprey, and PowerFlex alone and mixed with residual herbicides. Experiment 3. Moore Brothers Ag, Maxton, NC. 2010/1011.[1]

		Wheat					Ryegrass	
	Application	Foliar burn	Stunting	Wheat injury			control	Wheat
	rate	Jan. 20	Jan. 20	March 3	April 8	April 30	April 30	yield
	product/acre	%						bu/acre
Untreated		0 h	0 c	0 d	0 c	0 c	0 c	51 d
Axial XL	16.4 fl oz	12 de	2 c	2 cd	3 b	0 c	100 a	61 ab
Axial XL Dual Magnum	16.4 fl oz 1.3 pt	14 d	3 c	0 d	1 bc	3 b	100 a	57 bc
Axial XL Prowl H2O	16.4 fl oz 2 pt	9 ef	2 c	6 a	9 a	0 c	100 a	61 ab
Axial XL Valor	16.4 fl oz 2 oz	65 a	50 a	1 cd	3 b	9 a	100 a	55 cd
Axial XL Warrant	16.4 fl oz 3 pt	13 de	5 c	0 d	0 c	2 bc	100 a	58 bc
Osprey	4.75 oz	5 fg	3 c	0 d	0 c	2 bc	99 b	60 abc
Osprey Dual Magnum	4.75 oz 1.3 pt	5 fg	2 c	0 d	0 c	0 c	100 a	65 a
Osprey Prowl H2O	4.75 oz 2 pt	2 gh	0 c	4 ab	2 bc	0 c	99 b	59 bc
Osprey Valor	4.75 oz 2 oz	45 b	30 b	0 d	2 bc	2 bc	100 a	57 bc
Osprey Warrant	4.75 oz 3 pt	3 gh	2 c	0 d	0 c	1 bc	100 a	59 bc
PowerFlex	3.5 oz	5 fg	2 c	0 d	0 c	0 c	100 a	60 abc
PowerFlex Dual Magnum	3.5 oz 1.3 pt	2 gh	3 c	2 cd	0 c	0 c	100 a	60 abc
PowerFlex Prowl H2O	3.5 oz 2 pt	4 fgh	5 c	3 bc	0 c	1 bc	100 a	59 bc
PowerFlex Valor	3.5 oz 2 oz	40 c	25 b	0 d	1 bc	0 c	100 a	60 abc
PowerFlex Warrant	3.5 oz 3 pt	8 ef	2 c			0 c	99 b	58 bc

[1] Treatments applied January 3, 2011. Means within a column followed by the same letter are not statistically different at P = 0.05.
[2] Non-ionic surfactant at 0.5% by volume and 30% UAN at 2 qt/acre applied with all treatments that included Osprey and PowerFlex.

Treatments are listed in Table 10. BAS 9446 was applied preemergence at several rates alone or followed by Axial applied postemergence in late February. Comparison treatments included Axial alone, Axiom at spike-stage wheat, and Axiom followed by Axial. Approximately 1 inch of rainfall was received during the 2 days following planting and BAS 9446 application.

BAS 9446 at all rates tested provided excellent control of ryegrass, henbit, and mouse-ear cress (Table 10). Axial provided excellent control of ryegrass, and Axiom performed very well on ryegrass, henbit, and mouse-ear cress.

The rainfall following application was ideal for herbicide injury from preemergence application of BAS 9446. Wheat was injured less than 10% by BAS 9446 at rates of 1.0, 1.25, and 1.34 oz (Table

10). These are likely to be within the use rates if and when the product is registered for wheat. BAS 9446 had no effect on wheat stand or wheat yield.

Table 10. Weed control with BAS 9446. Experiment 4. Moore Brothers Ag, Maxton, NC. 2010/1011.[1]

Treatment	Application rate	Application Time[2]	Control, late April		
			Ryegrass	Henbit	Mouse-ear cress
	product/acre		%		
Untreated check			0 d	0 b	0 c
BAS 9446	1 oz	PRE	98 c	100 a	98 b
BAS 9446	1.25 oz	PRE	100 a	99 a	98 b
BAS 9446	1.34 oz	PRE	99 b	100 a	100 a
BAS 9446	1.7 oz	PRE	99 b	100 a	100 a
BAS 9446	2.0 oz	PRE	100 a	99 a	99 ab
Axial XL	16.4 fl oz	POST	99 b	0 b	0 c
BAS 9446 Axial XL	1 oz 16.4 fl oz	PRE POST	100 a	97 a	100 a
BAS 9446 Axial XL	1.25 oz 16.4 fl oz	PRE POST	100 a	100 a	100 a
BAS 9446 Axial XL	2.0 oz 16.4 fl oz	PRE POST	100 a	100 a	100 a
Axiom DF	6 oz	SPIKE	98 c	100 a	100 a
Axiom DF Axial XL	6.0 oz 16.4 fl oz	SPIKE POST	100 a	99 a	100 a

[1] Means within a column followed by the same letter are not statistically different at P = 0.05.
[2] PRE applied November 2; SPIKE applied to spike-stage wheat on November 15; POST applied postemergence on February 24.

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