Fusarium Head Blight of Wheat (Scab) in Louisiana

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Introduction

Fusarium head blight (FHB, commonly referred to as scab) is primarily caused by *Fusarium graminearum*. The fungus causes shriveled and poorly filled seed that result in reduced yield and test weight. The pathogen also produces the mycotoxin, deoxynivalenol (DON), which is toxic to animals and humans and can cause grain rejection at the elevator. Scab has been a major problem in Louisiana wheat over the past several years and is a major factor in the decline of Louisiana wheat acreage. Management of FHB is difficult because there are no highly effective single management practices (varieties or fungicides) and an integrated approach is required.

Epidemiology and Symptoms

Scab management begins with an understanding of the conditions favoring infection and disease development. The fungus infects corn and wheat and fields planted to corn the previous year, are at higher risk of developing scab than those planted after soybeans. Infested corn debris (also wheat straw and other hosts) can harbor the pathogen and serve as initial inoculum sources. Fungal spores produced on this debris are dispersed by rain splash or wind to nearby wheat plants. Other inoculum can be introduced into the field via windblown spores. Other hosts include 14 genera of Poaceae, two genera of Fabaceae, and one genus of Curcurbitaceae. Once an epidemic begins, plant to plant spread is likely to occur. Infection normally occurs during flowering but can occur from head emergence though early grain fill. Prolonged periods of rainfall during flowering and temperatures from 75-85ºF are conducive to scab development. Symptoms usually appear 10 to 14 days after flowering as bleached sections of heads, which will be evident from the turn row (Figure 1). This symptom is often mistaken with the appearance of maturing wheat. Upon closer inspection, affected fields will usually have infected heads showing the characteristic bleached appearance of sections (florets) with pinkish/salmon/light orange coloration along the glumes (Figure 2). This coloration is caused by millions of microscopic spores (reproductive structures) of the pathogen. There are usually healthy kernels along with the diseased kernels on the same head (Figure 2). In extreme cases, however, the entire head may be infected. At harvest, infected seed will be shriveled, off-color, much lighter than healthy kernels, and are referred to as “tombstones” (Figure 3) or Fusarium Damaged Kernels (FDK).


Figure 1. FHB infected field showing bleaching of heads.

DON

The advisory levels for DON are as follows:

Figure 2. Wheat head showing infected and healthy sections and salmon-coloration along glumes.

Figure 3. Scabby kernels showing shriveling and discoloration versus healthy kernels.

DON

The advisory levels for DON are as follows:

1. One ppm DON on finished wheat products such as flour, bran, and germ, for human consumption.
2. 10 ppm DON on grains and grain by-products and 30 ppm in distillers grains, brewers grains, and gluten feeds with limits on daily intake.
3. 5 ppm DON on grains and grain by-products destined for swine with the added recommendation that these ingredients not exceed 20% of their diet.
4. 5 ppm DON on grains and grain by-products destined for all other animals with the added recommendation that these ingredients not exceed 40% of their diet.

This guidance has been prepared by the Division of Plant and Dairy Food Safety in the Center for Food Safety and Applied Nutrition and the Office of Surveillance and Compliance in the Center for Veterinary Medicine at the Food and Drug Administration (FDA).

Additional information on DON can be found at: https://www.fda.gov/regulatory-information/search-fda-guidance-documents/guidance-industry-and-fda-advisory-levels-deoxynivalenol-don-finished-wheat-products-human

Management

While there is no single effective management practice, combining a moderately resistant variety with a timely fungicide application for suppression of FHB can significantly reduce damage from this disease. It is important to have a management plan in place before planting. Each year LSU AgCenter scientists evaluate scab severity in variety trials, and in inoculated, misted nurseries at several locations. This information can be used to help a grower choose varieties with moderate levels of FHB resistance along with good yield and agronomic characteristics.

Other management practices that may aid in management include: crop rotation with non-host crops, tillage, mowing/shredding, or staggered planting/varietal maturity. At harvest, combine fan speed may be increased to blow out infected seed, which is lighter than healthy seed. This practice can lower FDK and DON, an increase test weight of harvested grain. Additionally, seed cleaning equipment may help remove affected seed but may not be cost effective. These cultural practices alone will not completely manage FHB. An integrated approach is required to lessen the impact of FHB.

1. If possible plant moderately resistant, locally adapted varieties.
2. Avoid following corn and start with a clean seedbed if possible.
3. Apply a suppressive fungicide in a timely manner. Triazole fungicides are suppressive on FHB, and some are more effective than others (Table 1). Generally, applications of Prosaro, Proline, or Caramba at flowering will reduce scab severity and DON while preserving yield.
4. More recently, an SDHI/triazole premix marketed as Miravis Ace, has been shown to be competitive with the best triazoles (Table 1).
5. **DO NOT APPLY** a QoI (strobilurin) fungicide after flag leaf emergence. These fungicides can increase DON.

Timing is critical. There is a very short window during flowering to make an effective fungicide application for FHB control. The biggest problem is that ideal conditions (wet weather) for FHB infection are not conducive to making fungicide applications by ground. Head coverage also is critical. Sprayers should be calibrated to deliver maximum water volume (minimum 15 GPA by ground, 5 GPA by air) and optimal droplet size (300 to 350 microns). For ground sprayers, nozzles angled at 30° to the horizontal will maximize head coverage. Some research has shown that dual nozzles angled in opposite directions will also increase head coverage.

It is common to see several years of scab epidemics followed by a year with little to no disease. In Louisiana, scab epidemics have occurred in 5 of the last 6 seasons. There are disease forecasting tools that predict the likelihood of a scab epidemic based on weather pattern, variety susceptibility, and crop growth stage. The **ScabSmart** (**www.wheatscab.psu.edu**) risk assessment tool that is based on temperature and relative humidity is available online, and has regional commentary that will help you to determine scab risk at your given location. This is the only practical way to determine the need to spray since scab symptoms may not show up for a week or more after infection occurs. For more information, please see the following resources:
www.scabsmart.org
www.scabusa.org

Table 1. Fungicide efficacy for control of wheat Fusarium head blight (scab).

Class	Active ingredient	Product	Rate/A (fl. oz)	Head Scab Management[1]	Harvest Restriction
Strobilurin	Picoxystrobin 22.5%	Aproach SC	6.0 – 12.0	NL	Feekes 10.5
Strobilurin	Pyraclostrobin 23.6%	Headline SC	6.0 - 9.0	NL	Feekes 10.5
Triazole	Metconazole 8.6%	Caramba 0.75 SL	10.0 - 17.0	G	30 days
Triazole	Tebuconazole 38.7%	Folicur 3.6 F[5]	4.0	F	30 days
Triazole	Prothioconazole 41%	Proline 480 SC	5.0 - 5.7	G	30 days
Triazole	Prothioconazole19% Tebuconazole 19%	Prosaro 421 SC	6.5 - 8.2	G	30 days
Triazole	Propiconazole 41.8%	Tilt 3.6 EC[2]	4.0	P	Feekes 10.5.4
Mixed modes of action	Tebuconazole 22.6% Trifloxystrobin 22.6%	Absolute Maxx SC	5.0	NL	35 days
Mixed modes of action	Cyproconazole 7.17% Picoxystrobin 17.94%	Aproach Prima SC	3.4 - 6.8	NR	45 days
Mixed modes of action	Prothioconazole 16.0% Trifloxystrobin 13.7%	Delaro 325 SC	8.0	NL	Feekes 10.5 35 days
Mixed modes of action	Pydiflumentofen 13.7% Propiconazole 11.4%	Miravis Ace SE	13.7	G[3]	Feekes 10.5.4
Mixed modes of action	Fluapyroxad 2.8% Pyraclostrobin 18.7% Propiconazole 11.7%	Nexicor EC	7.0 - 13.0	NL	Feekes 10.5
Mixed modes of action	Fluoxastrobin 14.8% Flutriafol 19.3%	Preemptor SC	4.0 - 6.0	NL	Feekes 10.5 and 40 days
Mixed modes of action	Fluxapyroxad 14.3% Pyraclostrobin 28.6%	Priaxor	4.0 - 8.0	NL	Feekes 10.5
Mixed modes of action	Propiconazole 11.7% Azoxystrobin 13.5%	Quilt Xcel 2.2 SE[2]	10.5 - 14.0	NL	Feekes 10.5.4
Mixed modes of action	Prothioconazole 10.8% Trifloxystrobin 32.3%	Stratego YLD	4.0	NL	Feekes 10.5 35 days
Mixed modes of action	Benzovindiflupyr 2.9% Propiconazole 11.9% Azoxystrobin 10.5%	Trivapro SE	9.4 - 13.7	NL	Feekes 10.5.4 14 days

[1]Application of products containing strobilurin fungicides may result in elevated levels of the mycotoxin Deoxynivalenol (DON) in grain damaged by head scab. P = poor, F = fair, G = good, NL = not labeled, NR = not recommended.
[2]Multiple generic products containing the same active ingredients also may be labeled in some states.

[3]*Based on application timing at the beginning of anthesis (Feekes 10.5.1).*

Varietal Resistance to Fusarium Head Blight Disease

Over the past 10 years a very high priority has been placed on development of FHB resistant wheat varieties by the SunGrains breeders (http://www.sungrains.lsu.edu/), particularly the LSU AgCenter wheat breeding program. Our goal is to develop high-yielding FHB-resistant wheat varieties adapted to the unique environment of the Gulf Coast region and to present information to growers to help them deal effectively with FHB. To accomplish this, misted nurseries inoculated with scabby corn are grown at Alexandria, Baton Rouge, and Winnsboro to characterize FHB reaction of LSU breeding lines and entries in the state variety trials and regional nurseries. Molecular markers and genomic selection methods are also used to enable 'stacking' of several FHB resistance genes in the same variety. This is important because there are no single genes that provide a high level of resistance, but genes can be stacked in a variety to provide a higher level of resistance.

When evaluating FHB ratings keep in mind that scab is greatly influenced by rainfall and temperature during heading. When comparing FHB, FDK, and DON of varieties in the yield trials, it is important to compare varieties that head within a few days of each other. Very early or late-heading varieties may escape disease by virtue of flowering at a time when weather was not conducive for infection. The use of misted and inoculated nurseries (Figure 4) ensures heavy disease pressure during flowering and avoids confounding of genetic resistance with maturity differences. Determination of genetic resistance should be based on several locations and years when scab was present. AgCenter researchers collaborate with other scientists across the nation as a part of the U.S. Wheat and Barley Scab Initiative (**https://scabusa.org/**), and this is an excellent source of information on scab. Efforts from this multi-state initiative are directed toward developing and identifying varieties and management practices that minimize the impact of this disease on growers. In addition, new and existing fungicides are evaluated for their ability to reduce infection and spread of scab.

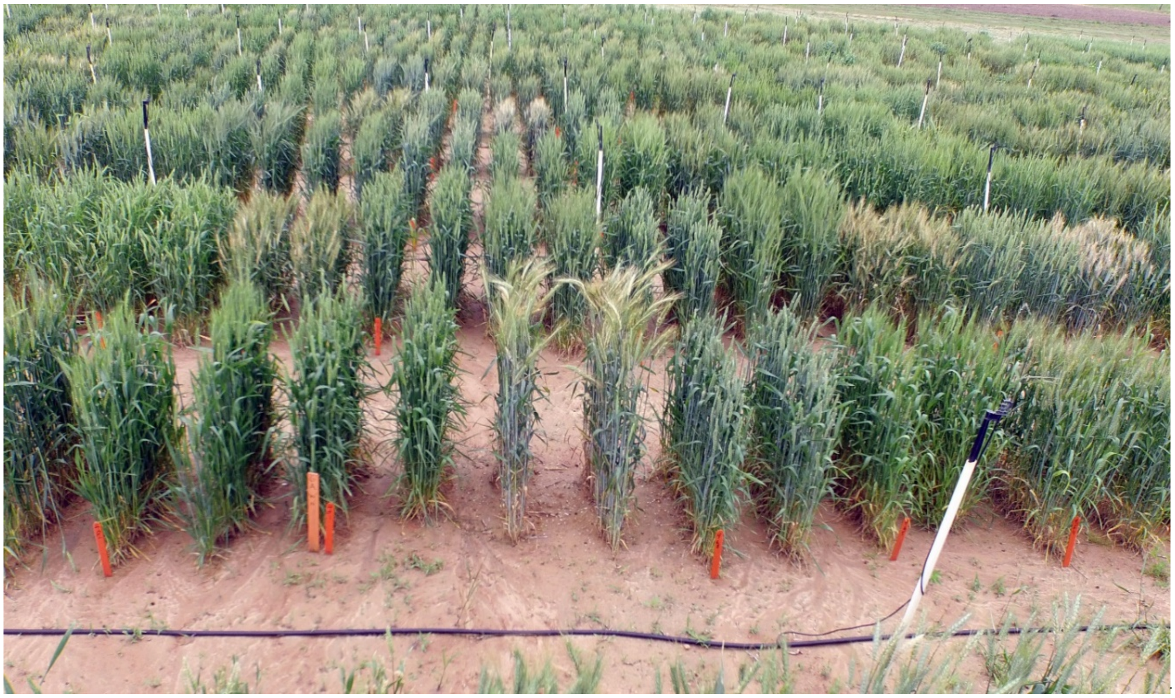

Figure 4. Misted and inoculated nursery used to evaluate FHB reaction of wheat varieties.

The complete wheat performance report and data tables can be found at:
http://www.lsuagcenter.com/topics/crops/wheatoats/variety_trials_recommendations
or http://www.wheat.lsu.edu/data.shtml .

Table 2 gives a Fusarium reaction type and FHB traits data based on at least two years of data in the disease nurseries. **Keep in mind that this data is from a misted and inoculated nursery and that disease pressure is intense in order to separate varieties. Normal yield plots and grower fields are very unlikely to have disease levels this high.** Table 3 contains yield and agronomic performance of varieties tested in the past two years in Winnsboro, LA. Varieties are classified as Resistant (R), Moderately Resistant (MR), Moderately Susceptible (MS), or Susceptible (S) based on FDK and DON data for at least two years. There are big differences in FHB reaction of the varieties. If possible, growers should choose a MR or R variety that has good grain yield and agronomic characteristics.

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Table 2. Fusarium Headblight Reaction and Ratings from Winnsoboro Disease Nursery for Two Years.

Band/Variety	FHB Reaction[a]	FHB[b] 2020	FHB 2019	FHB 2018	FHB 2-yr	FHB 3-yr	FDK[c] 2020	FDK 2019	FDK 2018	FDK 2-yr	FDK 3-yr	DON[d] 2019	DON 2018	DON 2-yr
DELTA GROW 1800	R	4.3	4.0	2.0	5.5	3.6	6	15	5	10	8	3	3	3
LA12080LDH-72	R	5.0	4.5	.	4.3	.	10	8	.	9	.	2	.	.
LIBERTY 5658	R	1.8	4.0	.	3.3	.	4	15	.	11	.	4	.	.
AGS 3040	MR	4.0	7.0	2.5	6.5	4.4	3	45	10	25	15	3	3	3
DELTA GROW 1000	MR	1.0	4.5	1.3	3.3	1.9	1	70	5	36	19	19	4	12
DYNA-GRO 9701	MR	1.0	5.0	0.5	3.3	1.9	1	65	5	33	18	22	4	13
PIONEER 26R45	MR	1.0	5.0	0.5	3.5	1.9	2	60	5	31	17	11	3	7
PROGENY AG #BULLET	MR	1.8	5.0	2.8	3.3	2.8	5	50	8	26	17	17	3	10
SY VIPER	MR	2.0	5.5	2.8	4.3	3.1	2	53	13	27	17	10	4	7
AGRIMAXX 473	MR/MS	1.4	5.5	1.3	3.5	2.3	2	73	5	37	18	24	4	14
AGRIMAXX 481	MR/MS	5.5	8.0	.	7.8	.	14	38	.	26	.	5	.	.
AGRIMAXX 492	MR/MS	4.8	5.5	2.5	6.0	4.4	18	43	15	33	23	5	9	7
GA 19436-16LE12	MR/MS	2.5	7.5	.	5.0	.	7	35	.	18	.	4	.	.
PROGENY AG #TURBO	MR/MS	2.3	6.0	3.8	5.0	3.6	2	40	53	21	24	9	29	19
SY RICHIE	MR/MS	2.8	7.0	.	5.3	.	9	40	.	25	.	6	.	.
USG 3118	MR/MS	3.0	6.5	2.5	6.3	3.8	7	58	20	34	23	6	5	6
USG 3640	MR/MS	4.3	8.0	4.3	6.0	5.2	5	48	33	25	23	4	11	7
DYNA-GRO DG9002	MS	1.5	5.0	.	4.5	.	1	68	.	36	.	12	.	.
DYNA-GRO 9811	MS	2.5	5.5	2.3	4.8	3.2	5	80	15	44	26	12	7	10
DYNA-GRO PLANTATION	MS	7.3	8.0	.	7.8	.	34	50	.	36	.	3	.	.
GO WHEAT LA754	MS	6.5	5.0	3.8	5.3	5.4	18	55	30	31	30	3	10	7
PIONEER 26R59	MS	1.5	6.5	2.0	4.8	2.9	3	78	18	40	25	13	6	9
PROGENY AG PGX 18-2	MS	1.5	4.5	.	3.8	.	6	65	.	35	.	8	.	.
PROGENY AG PGX 18-7	MS	1.0	5.0	.	3.5	.	4	65	.	35	.	22	.	.
SY 547	MS	2.5	4.5	.	3.5	.	3	73	.	37	.	12	.	.
AGS 2038	S	4.0	8.0	4.5	7.3	5.1	28	95	38	70	47	25	17	21
AGS 2055	S	4.8	9.0	3.3	7.8	5.4	24	95	45	66	47	16	20	18
DYNA-GRO BLANTON	S	6.3	9.0	.	6.8	.	53	65	.	48	.	4	.	.
DYNA-GRO RUTLEDGE	S	8.0	8.5	.	8.3	.	44	80	.	64	.	9	.	.
PROGENY AG #FURY	S	5.0	8.5	2.8	8.0	5.3	35	95	28	80	48	14	10	12
PROGENY AG PGX 18-8	S	1.8	5.5	.	4.3	.	5	83	.	43	.	21	.	.
Mean	-	3.6	6.2	2.5	5.2	3.7	11	60	21	35	25	10	9	10
Least Significant Difference (%)	-	3	1	1	2	2	18	28	11	26	16	5	5	5

Contains data for entries tested in past two years in misted nurseries at Winnsboro in 2018, 2019 and 2020.

[a]FHB Reaction is observed reaction based on FDK and DON for two or more years. Reaction Types are: Resistant (R), Moderately Resistant (MR), Moderately Susceptible (MS), and Susceptible (S).

[b]FHB rating is a 0-9 score of head symptoms, where a 0 indicates no symptoms and a 9 indicates complete head coverage

[c]FDK is percent Fusarium Damaged Kernels.

[d]DON is parts per million of Deoxynivalenol toxin. DON data from 2020 is not complete.

Table 3. Performance in normal wheat variety trial across North Louisiana for two years.

Brand/variety[a]	FHB[b]	Grain Yield[c]	Test Weight[d]	Head Day[e]	Stripe Rust[f]	Leaf Rust[g]
PROGENY AG PGX 18-8	S	74.4	57.0	98	0	4
DYNA-GRO 9002	**MS**	**74.1**	**55.9**	**94**	**0**	**2**
AGRIMAXX 492	**MR/MS**	**73.7**	**56.8**	**89**	**0**	**0**
DYNA-GRO 9811	**MS**	**73.4**	**57.0**	**92**	**0**	**0**
PROGENY AG PGX 18-2	MS	71.2	55.6	89	0	0
AGS 2055	**S**	**71.0**	**52.7**	**90**	**3**	**0**
DELTA GROW 1000	**MR**	**71.0**	**56.5**	**99**	**0**	**0**
SY RICHIE	**MR/MS**	**70.6**	**54.0**	**86**	**0**	**0**
PIONEER 26R59	**MS**	**70.3**	**55.3**	**96**	**0**	**8**
DELTA GROW 1800	**R**	**70.1**	**56.4**	**84**	**0**	**0**
USG 3118	**MR/MS**	**70.0**	**55.5**	**88**	**0**	**0**
PROGENY AG #TURBO	**MR/MS**	**69.4**	**56.7**	**91**	**0**	**0**
DYNA-GRO 9701	**MR**	**68.9**	**57.1**	**99**	**0**	**0**
PROGENY AG PGX 18-7	MS	68.9	58.3	93	15	1
SY 547	**MS**	**68.4**	**55.9**	**92**	**5**	**0**
DYNA-GRO PLANTATION	**MS**	**67.7**	**53.7**	**79**	**19**	**0**
LIBERTY 5658	**R**	**67.6**	**56.3**	**86**	**0**	**4**
PROGENY AG #FURY	**S**	**67.2**	**52.0**	**87**	**10**	**0**
PIONEER 26R45	**MR**	**67.1**	**56.1**	**99**	**0**	**4**
AGRIMAXX 481	**MR/MS**	**66.5**	**53.7**	**81**	**18**	**0**
DYNA-GRO RUTLEDGE	**S**	**66.0**	**49.1**	**80**	**1**	**0**
SY VIPER	**MR**	**65.8**	**56.7**	**91**	**0**	**9**
PROGENY AG #BULLET	**MR**	**65.6**	**57.1**	**99**	**1**	**0**
LA12080LDH-72	R	64.3	53.3	83	0	3
USG 3640	**MR/MS**	**63.6**	**52.6**	**83**	**15**	**0**
AGS 3040	**MR**	**63.4**	**54.9**	**83**	**21**	**0**
GO WHEAT LA754	**MS**	**63.2**	**52.1**	**79**	**25**	**2**
DYNA-GRO BLANTON	**S**	**63.2**	**50.1**	**81**	**4**	**0**
AGS 2038	**S**	**62.8**	**52.7**	**90**	**0**	**0**
AGRIMAXX 473	**MR/MS**	**62.0**	**56.1**	**98**	**0**	**0**
GA09436-16LE12	MR/MS	61.7	56.7	86	1	0
Mean	-	**67.9**	**55.0**	**89.0**	**4**	**1**
CV(%)	-	**12**	**2**	**3**	**141**	**196**
LSD(0.10)	-	**NS[h]**	.	**3**	.	.

Data from Alexandria and Winnsboro in 2019 and 2020.

[a]***Bold*** *'Brand/variety' indicates the entry is commercially available, others are non-released breeding lines.*

[b]***FHB*** *is Fusarium Headblight Reaction Type based on at least two years of data from a misted and inoculated nursery. Resistant (R), Moderately Resistant (MR), Moderately Susceptible (MS), and Susceptible (S).*

[c]***Grain Yield*** *is bushels per acre at 13% moisture.*

[d]***Test Weight*** *is pounds per bushel.*

[e]***Head Day*** *is day of year for 50% heading.*

[f]***Stripe rust*** *is relative score with 0 = none and 9 = severe infection and dieback.*

[g]***Leaf Rust*** *is percent tissue of upper three leaves affected by leaf rust.*

[h]***NS*** *indicates that variety mean difference were not statistically significant.*

Winter Cover Crops: Benefits and Planning Strategies for Cover Crop Success

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Corn harvest is winding down across Louisiana, soybean harvest is in full swing and cotton harvest has begun in a few areas. As we move into the fall months, now is the time to begin planning your winter cover crop management strategy.

Cover crops are the most effective and efficient tool in improving soil fertility. Cover crops add organic materials to the soils that improve soil physical, chemical and biological properties. They can improve soil organic matter content, cation exchange capacity (CEC), water and nutrient holding capacities, water infiltration, water use efficiency, soil structure, bulk density (a measure of soil compaction), microbial biomass and nutrient cycling. Cover crops ensure year-round ground cover that reduces soil runoff and erosion potentials, decreases weed pressure and herbicide needs, scavenges nutrients left over from the previous crop and prevents leaching loss of nutrients into groundwater.

Cover crop selection will depend on the goals a producer would like to accomplish. For example, a cover crop that produces a deep tap root, such as the tillage radish, should be selected for compacted or no-till soils.

Having a clear objective will also aid in cover crop management. For example, cereal rye can be a good choice for increasing soil organic matter, minimizing soil erosion and suppressing weeds. The fibrous root system of cereal rye and other cereals helps prevent soil erosion and scavenge nutrients. In contrast, a tap-rooted cover crop — such as forage or tillage radishes, woolypod vetch and red clover — is better suited for deep nutrient scavenging and potentially aids in loosening a soil compaction layer or preventing one. Mixes of cereal and legume covers can reduce early-season N fixation issues in corn. Legume cover crops such as crimson clover and hairy vetch can be a good source of nitrogen fertilizer for the subsequent corn or cotton crop, which could reduce fertilizer need and cost. Preliminary data collected by AgCenter scientists have shown that in soybeans, legume cover crops can supply N for early growth needs until nodules develop.

Other important considerations when selecting a winter cover crop includes the cash crop to be grown and winter cover crop termination. Be sure to plant only quality seed, which will help eliminate weed seed contamination issues. When planting legumes, make sure the rhizobium inoculant strain is correct for the legume species that will be planted, and always inoculate. If planting pre-inoculated legume seed, get pure live seed per pound and adjust seeding rates accordingly; some pre-inoculated seed is larger and therefore has less pure live seed per pound. Seeding rates of cover crops will depend on seeding method, date of sowing and whether the farm is enrolled in a CSP or EQIP program. For cereals, avoid low seeding rates and/or establishment methods that could lead to spotty emergence. Spotty emergence could cause the cereal to “bunch” (a single plant with multiple tillers and a large root system), which could lead to main crop establishment issues, such as skips and variations in seed placement depth and seedling emergence. Also, avoid planting a cover crop drill into the top and middle of the seed bed. This will prevent planting the cash crop into the cover crop drill, which could lead to stand establishment issues.

Cover crops should be planted as soon as possible following the main crop harvest. When planted earlier in the fall, nutrient scavenging will be increased and growth/biomass production will be maximized prior to cold weather, which will slow the growth and development of the cover crop. Planting your cover crop soon after harvest is especially important if corn will be planted. Early cover crop termination, when planting corn, combined with late planting of a cover crop (November) will reduce overall biomass production, therefore minimizing the benefits of the cover crop. Legumes are generally slow growing if planted late (November), and biomass production will be minimal prior to the onset of cold weather. If fields are enrolled in an NRCS conservation program requiring cover crops, be sure to follow the NRCS cover crop guidelines. Below is a link (hyperlink No. 1) that contains NRCS seeding rates and planting dates for common cover crops grown in Louisiana. In cooperation with the NRCS, data provided by LSU AgCenter research resulted in a reduction in cereal rye seeding rate from 90 to 120 lb/a to the current rate of 45 to 120 lb/a.

The planting window for most winter cover crops is Oct. 1 to mid-November. Ranges for average first frost dates for Monroe, Shreveport, Alexandria and Baton Rouge are November 15, 18, 19 and 29, respectively (https://www.farmersalmanac.com/average-frost-dates). Hyperlinks No. 2 and 3 below are some useful tools that may aid in further refinement of accomplishing the intended goals for your farm. NRCS payments for cover crops change from year to year. Updated numbers are included in the decision tool (hyperlink No. 4) in estimating overall costs of cover crops implementation. If you have any questions or concerns, please feel free to contact your local AgCenter agent or one of us.

1. NRCS planting dates and seeding rates for common cover crops grown in Louisiana:
https://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/lapmctn9979.pdf

2. Cover Crop and Tillage Scenarios (Potential Scenarios and their implications on incentives payments.):
https://www.lsuagcenter.com/profiles/aiverson/articles/page1531855108542

3. Q & A of Conservation Policy and Crop Insurance Surrounding Cover Crops:
http://www.lsuagcenter.com/profiles/nadusumilli/articles/page1520011387670

4. Cover Crop Economics Decision Tool:
http://www.lsuagcenter.com/profiles/nadusumilli/articles/page1533331282945

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Reduced Plant Growth Due to Soil Compaction

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A soybean field in West Carroll Parish with a poor growing area was investigated earlier this month. The visual observation showed mainly weeds growing in the suspect space surrounded by healthy soybean plants (Figure 1). There was prior knowledge of heavy equipment and supplies previously sitting in the weak area. A penetrometer (Figure 2) was used to compare the compaction in the two different growing areas. Approximately 175 psi was required to push through 2 inches of soil where healthy plants were growing, but between 250 and 300 psi was required in the poorly covered area.

With a high penetrometer reading and the knowledge of heavy equipment and supplies stored on wet soils, it was determined that soil compaction at 2 inches was causing the poor growth. Soil compaction can occur with heavy pressure on soils, especially in saturated conditions. Silt loam soils are typically prone to compaction; however, clay soils can also have compaction even though they crack open during droughty conditions. Compacted soils will typically have a reduction in pore space and higher bulk density. These conditions can impede plant root growth leading to a restriction of water, oxygen and nutrient availability. A reduction of nitrogen-fixing nodule formation can also occur in compacted soils. Ultimately, compacted soils can lead to a reduction in yield.

If visual observations of reduced crop growth such as nutrient deficiency or wilting occurs, a penetrometer should be used to determine if compaction is an issue. The penetrometer should be inserted into the top of the plant bed or row when the soil moisture is at field capacity (or when there would be efficient moisture for planting). As the penetrometer resistance reading increases, the root’s ability to penetrate the soil will decrease. The USDA has previously reported that roots typically will not penetrate soils with a penetrometer reading of 300 psi.

Field operations during saturated conditions should be limited to prevent soil compaction. If there is a compaction zone, deep vertical tillage is the most direct method to quickly alleviate the compaction layer. Over time, winter cover crops with deep or tap roots can be used to loosen a compacted soil. The cover crops can improve the soil structure and increase organic matter and may help prevent compaction layers from occurring.

Figure 1. A soybean field with an area of weak plants due to soil compaction.

Figure 2. A penetrometer is used to measure the severity of soil compaction.

Glyphosate-resistant Italian ryegrass management: Now is the time!

Daniel Stephenson and Josh Copes

Glyphosate-resistant Italian ryegrass has been an issue in the mid-South for the past 10 to 15 years. In Louisiana, growers have been battling this pest for five to 10 years, and the problem is spreading each year. Louisiana does not have ryegrass issues like Mississippi, but if control strategies are not implemented, Louisiana will.

Mississippi State University developed herbicide programs for glyphosate-resistant management, and the LSU AgCenter has adopted those programs for dissemination to Louisiana producers. The Mississippi program is divided into fall, winter and spring treatments for corn, cotton, soybean and rice.

The fall program — the best strategy for glyphosate-resistant Italian ryegrass management — begins with residual herbicides that are applied mid-October to mid-November. Residual herbicide choices are *S*-metolachlor at 1.27 to 1.6 lb/A of active ingredient, Boundary at 2 pt/A, Zidua WG at 2.5 oz/A, trifluralin at 1.5 lb/A of active ingredient and Command at 2 pint/A. The crop to be planted dictates which residual herbicide should be used. *S*-metolachlor should be used for corn, cotton and soybeans; Boundary for corn and soybeans; Zidua for corn and soybeans; trifluralin for cotton and soybeans; and Command for rice. Regardless of which residual herbicide is applied, tank-mixing with paraquat at 0.5 to 0.75 lb/A of active ingredient is a must to control any emerged ryegrass at application.

If a fall cover crop will be planted, many of the residual herbicides listed above should not be applied before planting. However, research has shown that applying *S*-metolachlor or Zidua one to three weeks after emergence of cereal rye, clover and Austrian winter peas will cause little to no injury of the cover crop and will provide residual control of many winter weeds.

Winter programs, meaning mid-January to mid-February, are limited. Research shows that clethodim at 0.094 to 0.125 lb/A of active ingredient is the only choice; however, ryegrass must be no more than 4 to 6 inches tall at application. Remember that clethodim must be applied at least 30 days before planting corn or rice. Also, whether clethodim is applied alone or tank-mixed with another herbicide, always apply clethodim with a high-quality crop oil concentrate rather than non-ionic surfactant or methylated seed oil. In addition, spray-grade ammonium sulfate should be added.

More than likely, the clethodim application in the winter will be tank-mixed with other herbicides for burndown. If clethodim is tank-mixed with any auxin herbicide like 2,4-D, then 0.125 lb/A of clethodim must be used. Auxin herbicides can antagonize the activity of clethodim on Italian ryegrass, thus reducing control, but applying 0.125 lb/A is enough clethodim to overcome the antagonism. However, one major point is often overlooked. Italian ryegrass must be no more than 4 to 6 inches tall at this application if control is to be achieved. I have observed numerous claims of clethodim “failures” on ryegrass, then determined that the rate was less than 0.125 lb/A when tank-mixed with an auxin herbicide, was applied with an airplane so coverage was inadequate and/or ryegrass was much larger than 6 inches in height. Incorrect herbicide rate, poor coverage and large weed size are consistent reasons for herbicide failures regardless of the weed targeted or time of the year. Yes, clethodim-resistant Italian ryegrass has been documented in Mississippi. Louisiana has some highly suspicious sites that are under evaluation, but I believe resistance begins when clethodim is applied incorrectly. Please take the time to do it right.

Imagine it is March 10, corn will be planted in a few days and 12- to 36-inch, multi-tillered glyphosate-resistant Italian ryegrass is present in the field. Based on data, paraquat is the only option available in the spring program. Unfortunately, paraquat is not a great option. In this situation, applying paraquat at 0.75 to 1 lb/A plus atrazine at 1 qt/A followed by another paraquat application at similar rate 10 to 14 days later is required. An identical plan is required where cotton and soybeans will be planted, except tank-mix diuron at 1.5 pt/A of active ingredient for cotton or metribuzin 75 DF at 4 oz/A for soybeans. Understand that these paraquat applications are not going to “melt” the ryegrass or make it disappear. It will die, hopefully, but its carcass could hamper planting and/or compete with seedling crops.

Earlier this year I wrote an article entitled “Italian ryegrass is everywhere! Do not forget about it this fall” where I asked farmers, consultants and dealers to not forget about the ryegrass issue. Now is the time to take the plan discussed above and implement it. If we do not, then we cannot expect a different situation next spring.

Feel free to contact Daniel Stephenson at 318-308-7225 or Josh Copes at 318-334-0401 with questions. Have a great day.