

# Wheat variety selection

for yield and  
disease  
resistance

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*Wheat plots at Ben Hur station, Baton Rouge, 2025*

# WHEAT IN LOUISIANA

- Wheat acres have declined in Louisiana since early 2010s, in part due to issues with stripe rust and Fusarium head blight epidemics.
- Breeding progress over past 10-15 years by both public and private programs has dramatically improved resistance in high-yielding and adapted backgrounds.
- With variable soybean prices, soybean growers may consider re-integrating double-cropped wheat with later-planted soybeans on a portion of their acres to spread out risk.
- Suggest focus on *low-variability* (stable) wheat varieties for double-crop system:
  - Pest and disease resistance, especially to FHB
  - Multi-year record of performance in state variety trial

*Around half of wheat in LA in 2025 was planted with LSU AgCenter-developed varieties*

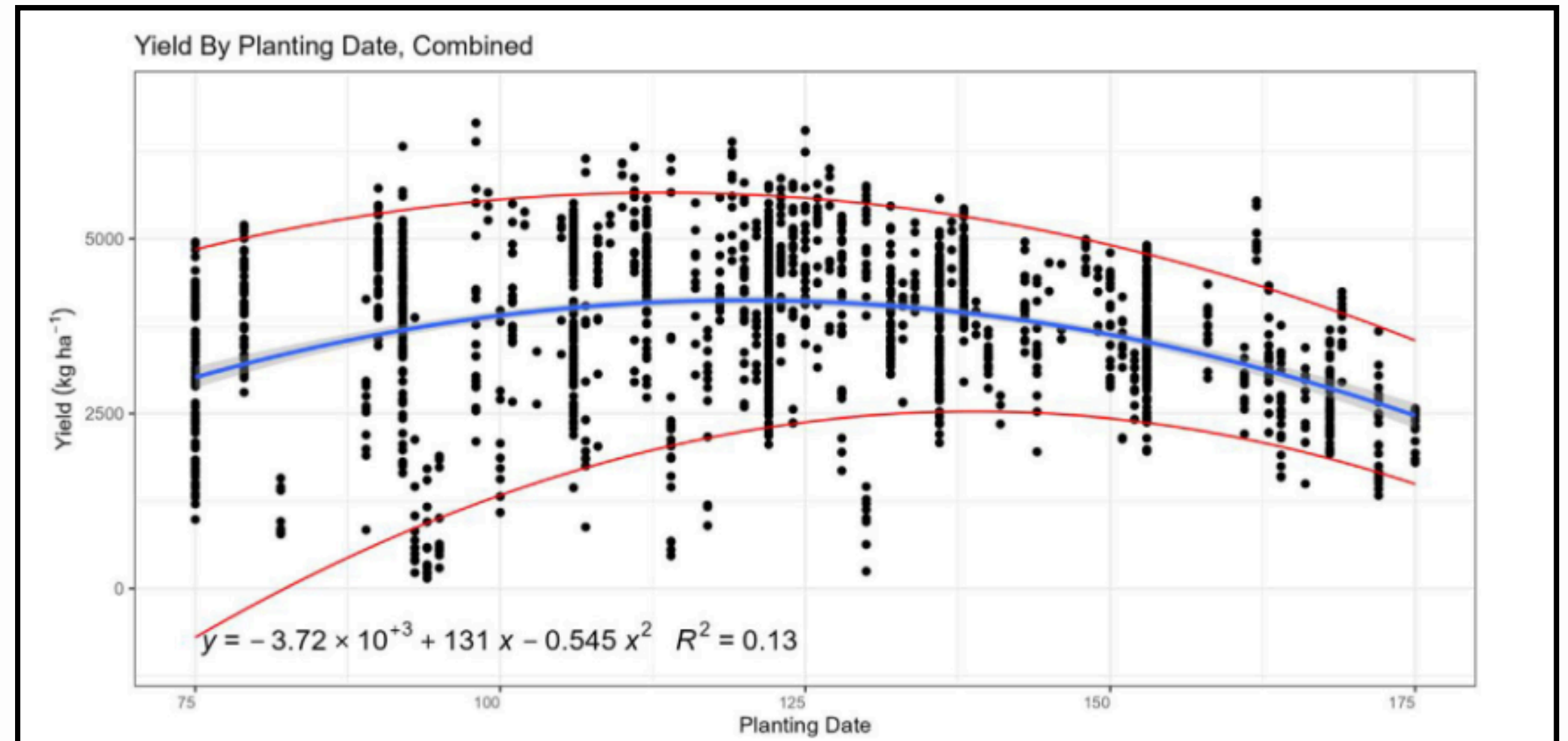
# WHEAT/SOYBEAN DOUBLE-CROPPING IN LOUISIANA

- Soybean/corn growers in other southern states often double-crop with wheat for a number of benefits
  - Additional profit
  - Risk management
  - Cover crop benefits
- A majority (51%) of the winter wheat grown in Louisiana is double-cropped with soybeans (2023 data)
- A comparatively small portion of acreage planted in wheat for risk management can have significant benefits for soybean growers
  - Proportion of soybean acreage double-cropped with wheat is low in Louisiana -- 0.05% -- lower than other southern states
  - This number was as high as 20% a decade+ ago

State	Soybeans	Dbl Crop WinWht/ Soybeans	Dbl Crop Soybeans /Oats
ALABAMA	0.71	0.28	0
FLORIDA	0.8	0.33	NA
GEORGIA	0.65	0.33	0.01
ILLINOIS	0.96	0.04	0
KENTUCKY	0.76	0.24	0
LOUISIANA	0.95	0.05	0
NORTH CAROLINA	0.73	0.26	0
SOUTH CAROLINA	0.76	0.23	0.01
TENNESSEE	0.81	0.19	0
VIRGINIA	0.73	0.25	0
ARKANSAS	0.93	0.06	0
MISSISSIPPI	0.95	0.05	0

# MINOR YIELD IMPROVEMENTS WITH ESPS

- Results from David Moseley and others suggest some advantage to planting early, but common wheat harvest dates are nearly optimal for soybean planting
- With modern varieties, no strong yield advantage to planting early and sacrificing double-crop with wheat
- Other reason to prefer early planting/harvest of soybeans, but planting across a wider range of dates spreads risk
- Some proportion of acres in wheat/normal planted soybean may help growers manage risk and gain access to higher profit potential and early-season cash flow.



# “DEFENSIVE” WHEAT FOR DOUBLE-CROPPING

- Recommend lower-risk, “defensive” wheat varieties for growers wishing to plant a portion of wheat acres in a double-crop system
- Two principal drivers of wheat risk in Louisiana:
  - Biotic stresses -- fungal pathogens and insect pests that damage yields and can lower grain quality
  - Abiotic stresses -- issues with vernalization requirements, early freezes, wet harvests
- State variety trial data can be used to evaluate suitability for target environment ([www.lsuagcenter.com/topics/crops/varietytrial](http://www.lsuagcenter.com/topics/crops/varietytrial))
  - Multi-year averages for wheat performance, not just one
  - Presence in “Southern Louisiana” trial indicates that vernalization requirement low
  - High-quality data from inoculated, replicated disease nurseries for varietal resistance

# COMMON PESTS AND PATHOGENS OF LOUISIANA

## Stripe rust

- Strong varietal resistance
- Easily controlled by fungicides
- Common early-season, prefers moisture and cooler temperatures



## Leaf rust

- Strong varietal resistance
- Easily controlled by fungicides
- Common later in the season



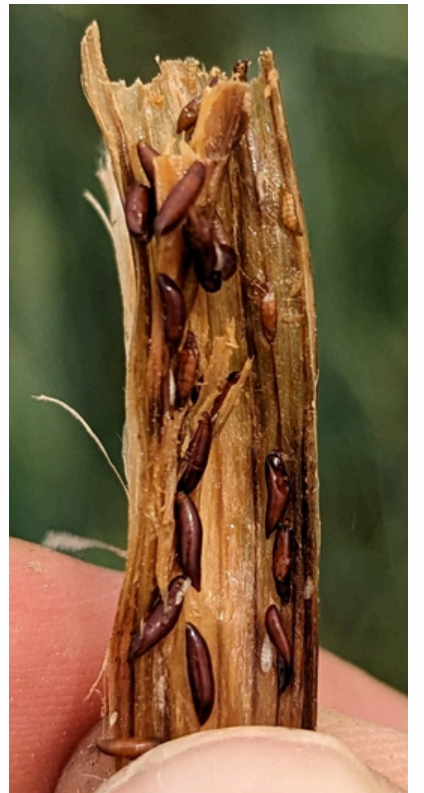
## Fusarium head blight

- Variable varietal resistance
- Moderately controlled with fungicides
- Common, associated with corn rotation and rain during heading



## Hessian fly

- Variable varietal resistance
- Poorly controlled by pesticides
- Only in some years - prefers warm winters - but large yield drag



# VARIETAL RESISTANCE

- Varietal resistance to rusts (primarily leaf and stripe rust) common, but control with fungicides still cheap and effective
- FHB and Hessian fly are most challenging to manage without strong genetics
  - FHB -- critical timing of fungicide applications near heading, fungicide treatments alone may not provide strong protection in susceptible varieties
  - Hessian fly -- seed treatments help manage winter infestations, but not spring infestations common in Texas and Louisiana
- Breeding emphasis creates trade-offs between yield and resistance
  - Easier to focus on yield if breeding program does not also select for resistance
  - High yield-potential varieties may be optimal for high-input systems where wheat is the focus, but lack the disease resistance that reduces risk in double-cropping systems

# SCREENING NURSERIES

- Quantitative resistance and variable presence requires managed nurseries for FHB and HF

## FHB

- Misted and corn spawn-inoculated at three locations, with Trey Price at Winnsboro and Boyd Padgett at Alexandria
- Harvest infected grain and process/screen



## HF

- Managed nursery (no-till soybean summer crop, strip tilling of tests) at Baton Rouge
- Rate visually and harvest immature plants to count number of pupae infesting tillers



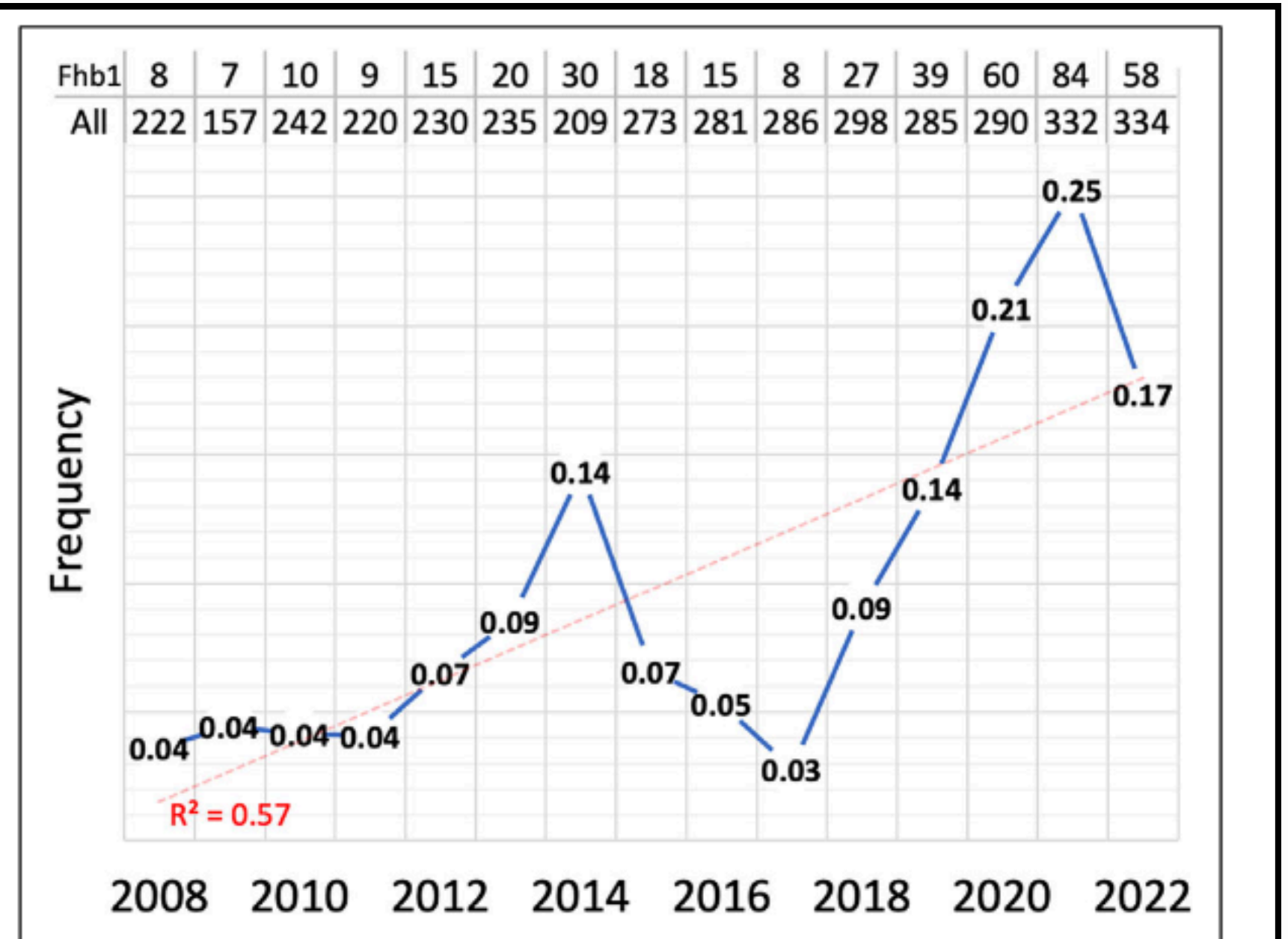
# FUSARIUM HEAD BLIGHT

- Fusarium graminearum produces Fusarium head blight
- #1 disease trait we focus on, #2 total trait after yield
- Host on corn stubble. Emergence as issue in 90s and 2000s associated with increasing corn acreage and no-till practices
  - At the time, overall resistance of US germplasm was very poor
- Fusarium infection produces Deoxynivalenol (DON), a vomitoxin with major detrimental health effects for humans and cattle
- Some important QTL (*Fhb1*), but resistance quantitative
  - Resistance by many small-effect genes common



# FHB1 AND QUANTITATIVE RESISTANCE

- Varietal resistance for FHB has improved dramatically over past 20 years due to breeding efforts
- Part of improved resistance is due to *Fhb1*, a major resistance gene
- Additional genes of moderate effect and improvement for “background” resistance
- An *Fhb1* variety is generally resistant, but many lines have strong resistance without *Fhb1*



**FIGURE 3** Frequency of *Fhb1* in southern SRWW cooperative nurseries. [Color figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

# FHB TRAITS - STATE TRIAL

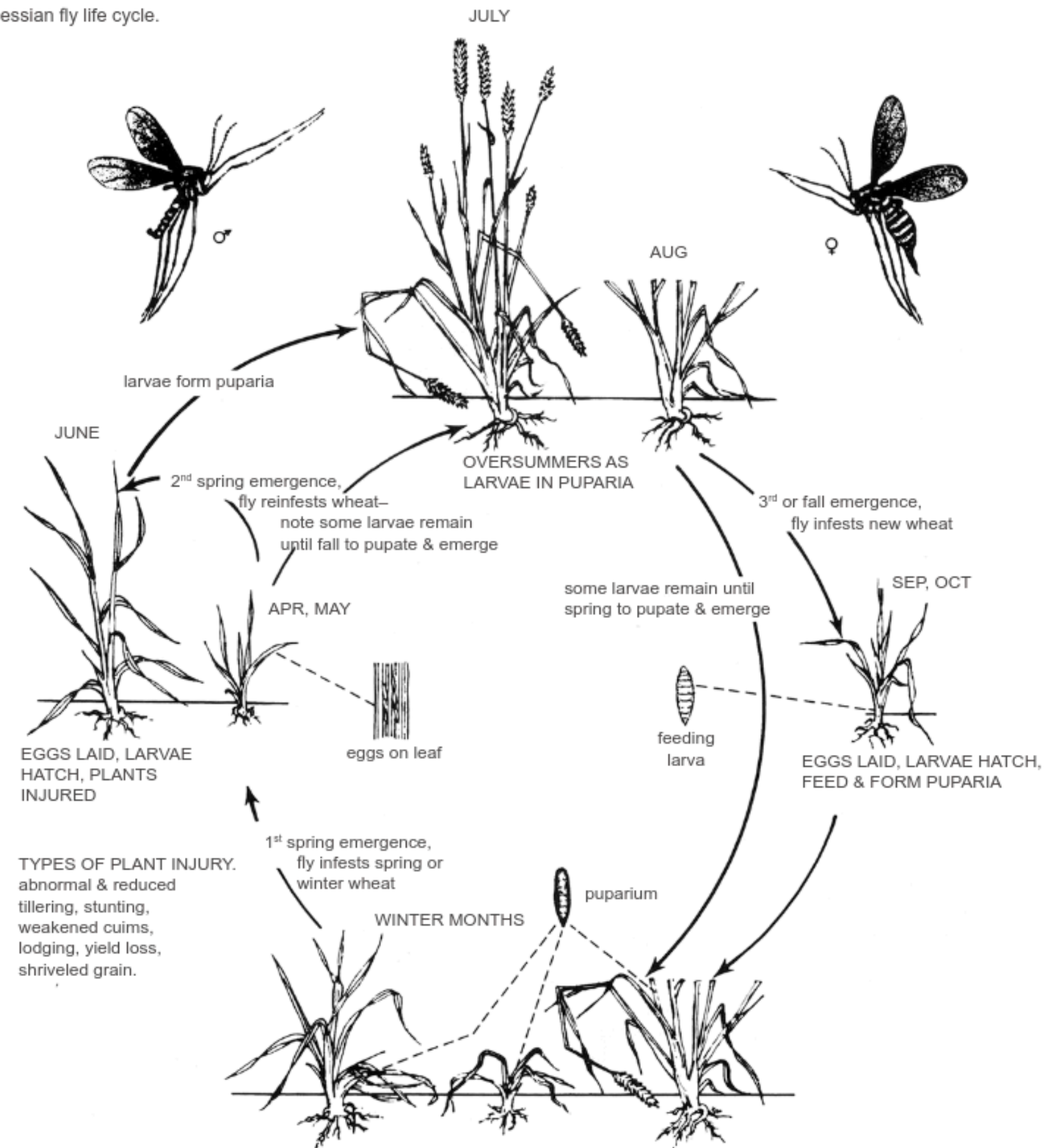
- Three traits of interest from misted nursery:
  - **Visual rating** -- how visible is FHB infection on live plants?
  - **FDK** -- Fudarium Damaged Kernel (%) - what proportion of kernels are damaged in harvested grain?
  - **DON** -- Deoxynivalenol (ppm) - what is concentration of toxin in flour made from harvested grain?
  - **Index** -- weighted sum of ratings with more emphasis on DON than FDK, and on FDK more than visual
- Reported data from misted nurseries is generally good and sufficient to discriminate resistant from susceptible varieties
  - Multi-year averages in variety trial report preferred
  - Three traits generally correlated

Brand / Variety	Misted Nursery FHB (0-9)	Misted Nursery FDK (0-9)	Misted Nursery DON (ppm)
<b>AGRIMAXX 492</b>	<b>1.8</b>	<b>15</b>	<b>4.5</b>
GA15490ID-19-5-21LE2	2.8	35	10.2
<b>DELTA GROW 1200</b>	<b>1.0</b>	<b>43</b>	<b>5.0</b>
<b>DELTA GROW 3500</b>	<b>2.8</b>	<b>38</b>	<b>9.2</b>
<b>PROGENY #CHAD</b>	<b>3.3</b>	<b>33</b>	<b>6.2</b>
<b>AGRIMAXX 535</b>	<b>1.0</b>	<b>25</b>	<b>5.8</b>
LA17006LDH042	2.3	40	7.2
<b>AGRIMAXX 514</b>	<b>0.8</b>	<b>28</b>	<b>7.1</b>
<b>PROGENY #BUSTER</b>	<b>1.3</b>	<b>28</b>	<b>5.7</b>
<b>DELTA GROW 1900</b>	<b>1.0</b>	<b>13</b>	<b>4.1</b>
LA13176CB-15-1-3	3.3	60	8.1
LA18003-NDH119	0.8	13	2.9
PROGENY PGX 22-21	1.0	20	3.8
<b>DYNA-GRO 9393</b>	<b>1.3</b>	<b>25</b>	<b>6.3</b>
<b>PROGENY #BINGO</b>	<b>0.3</b>	<b>30</b>	<b>5.6</b>
PROGENY PGX 22-3	1.3	13	5.3
SCLANC11558-33	2.5	15	4.2
<b>DYNA-GRO 9332</b>	<b>2.5</b>	<b>50</b>	<b>15.5</b>
LA19333NDH-34	2.0	15	4.7
<b>DYNA-GRO RIVERLAND</b>	<b>3.8</b>	<b>53</b>	<b>16.8</b>

# HESSIAN FLY

- Symptoms created by lava feeding on tillers:
  - “Lack of vernalization” appearance - small number of heads, reduced tillering
  - Lodging in multiple directions
  - Stunted plants with large, green flag leaves
- We saw a lot of issues with Hessian fly in central and southern part of state in 2023, including some fields with total loss
- Hessian fly undergoes many cycles to build up harmful population sizes
  - Seed treatment can help mitigate fall infestation, but doesn't do much for spring infestation
  - Warm winters and early springs create conditions for severe epidemics

1. Hessian fly life cycle.

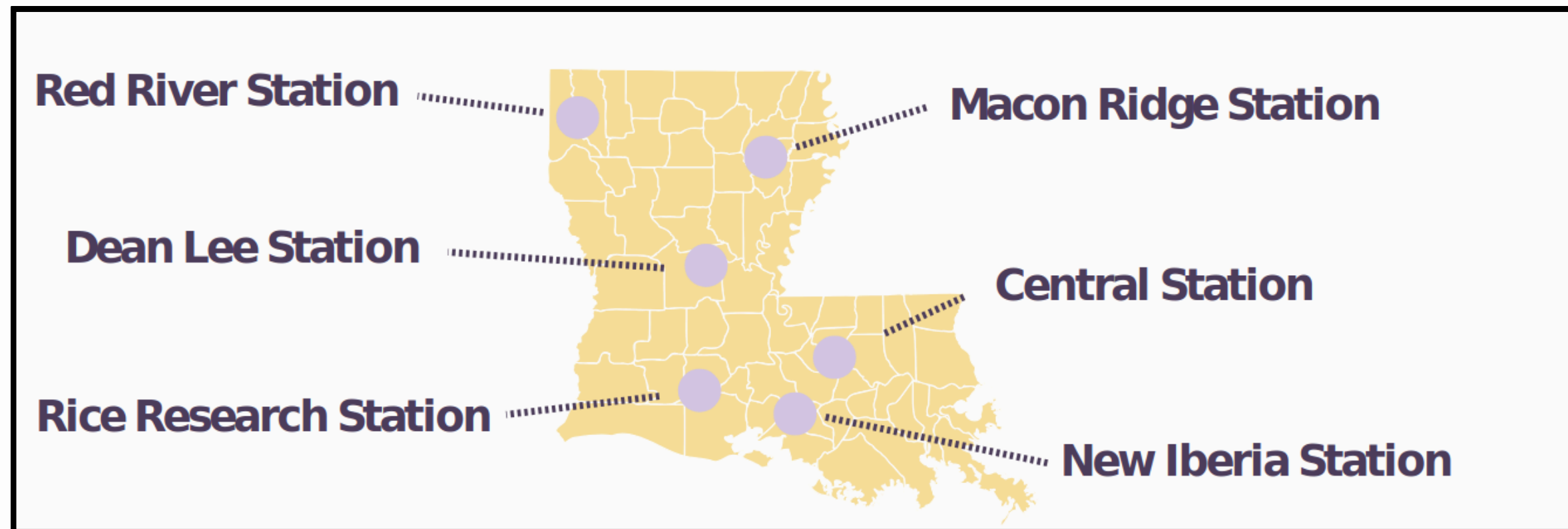


# HESSIAN FLY RESISTANCE

- Emphasis for breeding programs -- major resistance genes
  - *H13* and *Q7D* resistance genes conferred resistance in 2024 field nursery screenings (right)
  - Selection for these genes has been prioritized
- Information on major Hessian fly genes available at request for some (but not all) commercial varieties
- Genetic resistance through *H13* kills larvae during all phases of the growing season, providing strong protection
  - Non-*H13* resistance is generally “field resistance”
  - Plants are healthy with reduced but non-zero larvae levels through tolerance, pest avoidance, or horizontal resistance

Line Name	BIO L	PIT	H13	Q7D
	<i>USDA, IN</i>	<i>BR, LA</i>	<i>ERSGGL</i>	<i>ERSGGL</i>
GA16349 ID-8-1-5-22LE31	R	0.00	H13	het
SCLA18WF0108-12-1	R	0.00	H13	het
18VTK12-111	R	0.08	H13	
MD-98-23	R	0.00	H13	
SCNC16VT30-7-47	R	0.00	H13	
NC18-16900	R	0.14	H13	
PIO 26R41	R	0.00	H13	
TN 2401	R	0.00	H13	
VA21W-112	R	0.06	H13	
TX20D5116	R	0.10	het	Q7D
FL15020-50	R	0.00	het	het
GA141028-13-3-4-22LE25	R	0.00	het	het
NC20-21971	R	0.00	het	
SCLA18WF0705-4	S	0.14	het	
TX20D5143	R	0.00	het	
TX20D5145	R	0.14	het	
FLGA111151-41	S	0.14		Q7D
FLGA111151-55	S	0.04		Q7D
GA15577-3-10-2-22LE38	S	0.20		Q7D
LA15203-LDH197	S	0.13		Q7D
LA18003-NDH119	S	0.06		Q7D
TWR39903	S	0.13		Q7D
TX20D5056	S	0.11		Q7D
AGS 2000	S	0.29		het
17VDH-SRW02-125	S	0.18		
18VTK5-95	S	0.38		
GA151450-13-6-9-22LE29	S	0.26		
Hilliard	S	0.45		
Jamestown	S	0.30		
KWS534	S	0.84		
KWS542	S	0.00		
KWS543	S	0.38		
LA17006-LDH042	R	0.25		
MD-573-9	S	0.15		
SCNC13217-2111	R	0.41		
SCGA151058-2	S	0.65		
TN 2303	S	0.26		
TWR39909	S	0.69		
TWR39919	S	0.48		
TWR39925	S	0.09		

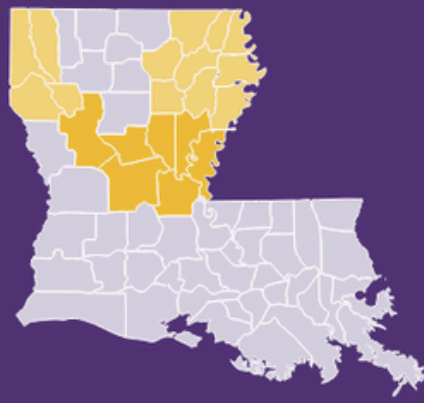
# WHEAT VARIETY TRIAL



- Yield trial locations across state, FHB nurseries at Dean Lee, Macon Ridge, and Central Station
- New on-farm location at Somerset Plantation in Tensas parish with help from Hardwick family
- Preliminary data report available prior to fall planting decisions with that year's data

# North Louisiana

## Top Varieties



### AgriMAXX 492

Yield **A+**  
 Test Weight **A**  
 Maturity **Medium**

#### Disease Resistance



AgriMAXX 492 is a high-yield potential variety for Northern Louisiana, with a medium maturity in Louisiana. AgriMAXX 492 has good resistance to both stripe and leaf rust and moderate resistance to Fusarium head blight. Its Hessian fly resistance is unknown.

### Progeny #BUSTER

Yield **A+**  
 Test Weight **A+**  
 Maturity **Medium-Late**

#### Disease Resistance

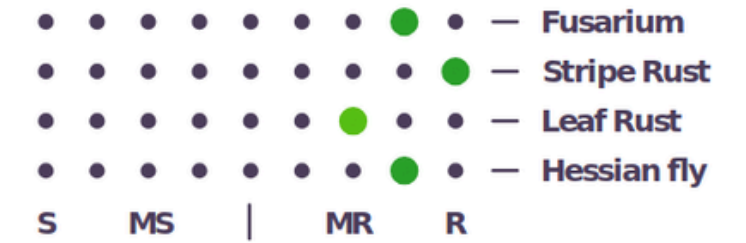


Progeny #BUSTER is a high-yielding variety well-suited for production in North Louisiana. #BUSTER is a medium-late line that might be a good balance planted alongside one or more earlier varieties. #BUSTER has strong stripe rust resistance and moderate leaf rust resistance, but is moderately susceptible to Fusarium head blight. Properly-timed management with fungicides will help reduce negative effects of Fusarium infections. Of the North Louisiana variety picks, #BUSTER has the highest vernalization requirement, and should not be planted in Central Louisiana parishes where winters are warmer.

### AgSouth 3022

Yield **B**  
 Test Weight **A**  
 Maturity **Early**

#### Disease Resistance

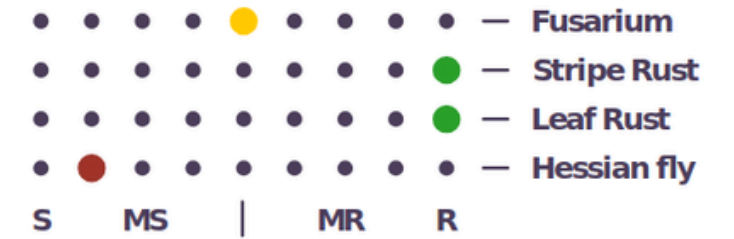


AGS 3022 is an LSU AgCenter-developed variety released through the SunGrains breeding cooperative. It has consistent, good yield potential in the North part of the state, excellent test weight, and resistance to Fusarium head blight, leaf and stripe rust, and Hessian fly. AGS 3022 is an early variety in this part of the state, ideal for double cropping with soybeans, but should be planted after November 1 to avoid late spring freezes.

### Progeny #TURBO

Yield **A**  
 Test Weight **B**  
 Maturity **Medium**

#### Disease Resistance

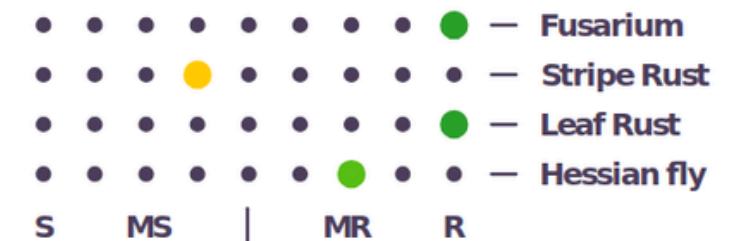


Progeny #TURBO is a high-yielding, medium-maturity variety for Northern Louisiana. #TURBO has average test weight and excellent resistance to both leaf and stripe rust. It is moderately resistant to moderately susceptible to Fusarium head blight, so fungicide applications may be needed. Field screenings conducted by the University of Georgia variety testing program indicate #TURBO is highly susceptible to Hessian fly.

### AgSouth 4043

Yield **C+**  
 Test Weight **A**  
 Maturity **Medium-early**

#### Disease Resistance



AGS 4043 is a scab-resistant SunGrains variety developed by the University of Georgia breeding program. A line with the *Fhb1* gene for elite Fusarium resistance, AGS 4043 also has leaf rust and Hessian fly resistance, and had moderate yield performance in Northern Louisiana. AGS 4043 has moderate susceptibility to stripe rust, and may benefit from an early-season fungicide application.



# LA19-31

- Resistant to leaf and stripe rust
- Moderately resistance to FHB and Hessian fly
- Very strong yield potential in commercial variety tests
  - #2 two-year yield performance in Southern LA
  - #2 performance in Georgia, #5 in MS, #3 in AL, #2 two-year in SC
- Licensed in 2025, may be commercially available as USG variety in 26 or 27

	Classification	Severity (0-9)			FDK (%)			DON
		25	24	Avg	25	24	Avg	24
AGS 4043	Resistant	3.0	0.5	<b>1.8</b>	8	13	<b>10</b>	2.6
LA18-119	Resistant	2.5	0.8	<b>1.6</b>	9	13	<b>11</b>	2.9
AGS 3022	Mod-R	3.5	2.5	<b>3.0</b>	15	13	<b>14</b>	3.1
#CHAD	Mod-R	6.3	1.8	<b>4.0</b>	28	13	<b>20</b>	4.6
LA19-31	Mod-R	4.3	3.0	<b>3.6</b>	19	10	<b>14</b>	5.2
#TURBO	Mod-R	2.8	0.3	<b>1.5</b>	30	30	<b>30</b>	5.6
GoWheat 6000	Mod-S	2.3	1.5	<b>1.9</b>	18	30	<b>24</b>	8.6
AGS 2055	Susceptible		4.5			75		23.1

	Griffin		Plains		Average	
	PIT (%)	PPT	PIT (%)	PPT	PIT (%)	PPT
Min	0	0.0	0	0.0	<b>0</b>	<b>0.0</b>
AGS 3022	5	0.2	10	0.1	<b>8</b>	<b>0.1</b>
AGS 4043	10	0.2	0	0.0	<b>5</b>	<b>0.1</b>
LA19-31	20	0.3	0	0.0	<b>10</b>	<b>0.2</b>
Mean	21	0.6	5	0.1	<b>13</b>	<b>0.3</b>
#BINGO	60	5.1	0	0.0	<b>30</b>	<b>2.6</b>
Go Wheat 6000	60	2.0	30	0.5	<b>45</b>	<b>1.2</b>
Max	70	5.1	30	0.7	<b>45</b>	<b>2.6</b>



U.S. Wheat & Barley  
Scab Initiative

**THANK YOU!**



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