Wheat varieties tested for susceptibility to pre-harvest sprouting

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Wheat grain quality at harvest can have a huge impact on the price you receive for your grain. Now you can find out how your varieties rate for pre-harvest sprouting.

Preharvest sprouting (PHS) is a serious grain quality concern for millers and farmers alike. Sprouting is when the seed breaks dormancy and creates enzymes to begin breaking down kernel starch. As this process continues, the grain's value to millers greatly diminishes. PHS is more likely to occur where there is frequent rainfall and high humidity once the grain reaches maturity. Additionally, cold shock during grain development can lead to PHS.

Falling number is a test that indicates how well the grain's starch has retained its strength. To conduct the test, you must grind the grain into meal, add water, mix with a stirrer and add heat for 60 seconds. Heat activates the starch to produce a thick, gelatinous consistency. Thin consistency indicates that the starch has already been degraded. The falling number is the number of seconds it takes for the stirrer to fall to the bottom of the test tube. The longer it takes the stirrer to fall, the higher the quality of starch (longer chains). If it falls quickly, that is an indicator that alpha amylase enzyme may be at high enough levels to start the starch degradation process for seed germination. Millers prefer wheat testing above 300 seconds. Discounts begin at levels less than 240 to 260, depending on the year, the elevator and the needs of the end-user. Wheat with low falling numbers may only be able to be sold as livestock feed.

It became apparent early in the 2017 wheat harvest that falling numbers was a problem in some areas of the state. Therefore samples were collected from Tuscola state yield trial location and tested for falling numbers at MSU's Cereal Milling and Product Laboratory by Schae-Lee Olckers. Results are listed in the table below. All varieties were located in the same field, so weather conditions should be fairly consistent and not the cause of variability between varieties. This information is valuable in determining which varieties are better able to resist sprouting. When selecting varieties, use multi-year data from multiple sources.

Table 1. Falling number and category for varieties entered in the MSU Wheat Performance Trials. Samples were collected at the Tuscola County state yield trial location and submitted to the MSU Cereal Milling and Product Laboratory for testing. Categories were assigned (R=resistant, MR=moderately resistant, MS=moderately susceptible, S=susceptible, VS=very susceptible) based on the mean of the trial with separations made at one or two standard deviations above and below the mean. Data in this table are from one location, in one year only. When selecting varieties, use data from multiple years and multiple locations.

Brand	Variety	Falling Number	Grain Color	FN Category
AgriMAXX Wheat Company	AgriMAXX Exp. 1786	446.5	Red	R
DF Seeds, Inc.	DF EX 1713	432.8	Red	R
Michigan State University	MI14R0011	426.3	Red	R
Michigan Crop Improvement Association	StarBurst	421.3	Red	R
Michigan Crop Improvement Association	Sunburst	420.5	Red	R
Virginia Tech / VCIA	VA11W-313	412.8	Red	R
Irrer Seed Farm	L11418	400.3	Red	R

Brand	Variety	Falling Number	Grain Color	FN Category
DF Seeds, Inc.	DF EX 1717	389.5	Red	R
Rupp Seeds, Inc.	9xp710	386.5	Red	MR
Dyna-Gro Seed	Dyna-Gro 9701	385.0	Red	MR
Michigan State University	MI14R0160	384.8	Red	MR
DF Seeds, Inc.	DF EX 1718	383.8	Red	MR
DF Seeds, Inc.	DF EX 1716	383.3	Red	MR
Michigan State University	MI14W0003	382.8	White	MR
AgriMAXX Wheat Company	AgriMAXX 413	381.3	Red	MR
AgriMAXX Wheat Company	AgriMAXX Exp. 1785	378.8	Red	MR
Michigan State University	VA09W-192WS-29	378.5	White	MR
DF Seeds, Inc.	DF EX 1710	375.8	Red	MR
Harrington Seeds, Inc.	HS EX17R	375.3	Red	MR
Michigan Crop Improvement Association	MCIA 110201	374.8	Red	MR
Irrer Seed Farm	L11621	373.3	Red	MR
Michigan Crop Improvement Association	MCIA Venus	373.3	White	MR
Wellman Seeds, Inc.	W 302	373.3	Red	MR
DF Seeds, Inc.	DF 112 R	373.0	Red	MR
Rupp Seeds, Inc.	RS 910	373.0	Red	MR
DF Seeds, Inc.	DF EX 1715	372.8	Red	MR
Michigan State University	MI14R0330	370.0	Red	MR
DF Seeds, Inc.	Aubrey	367.8	White	MR
Michigan Crop Improvement Association	MCIA Red Dragon	367.8	Red	MR
Dyna-Gro Seed	Dyna-Gro 9750	366.8	Red	MR
Virginia Tech / VCIA	VA12W-31	365.5	Red	MR
Dyna-Gro Seed	Dyna-Gro 9362W	361.8	White	MR
Bio Town Seeds	Diener XW1701	361.0	Red	MR
Michigan Crop Improvement Association	MCIA Harpoon	361.0	Red	MR
Steyer Seeds	Steyer STex166	360.8	Red	MR
Harrington Seeds, Inc.	Glacier	359.8	White	MR
Michigan State University	MI14R0009	359.8	Red	MR
Wellman Seeds, Inc.	W 206	359.5	Red	MR
Michigan State University	VA09W-192WS-121	359.3	White	MR
DF Seeds, Inc.	DF EX 1714	358.8	Red	MR
DF Seeds, Inc.	DF 105 R	357.3	Red	MR
Wellman Seeds, Inc.	W 305	355.8	Red	MR
Michigan Crop Improvement Association	AC Mountain	353.8	White	MR
Wellman Seeds, Inc.	W 303	352.5	Red	MR
Wellman Seeds, Inc.	W 151	350.8	White	MR

Brand	Variety	Falling Number	Grain Color	FN Category
Rupp Seeds, Inc.	9xp732	350.3	Red	MR
Michigan State University	MI14R0029	349.8	Red	MR
Harrington Seeds, Inc.	HS 30.06	349.0	Red	MR
Dyna-Gro Seed	Dyna-Gro 9552	348.5	Red	MR
Michigan State University	MI14W0190	348.0	White	MR
Irrer Seed Farm	L11610	347.8	Red	MR
AgriMAXX Wheat Company	AgriMAXX 444	346.5	Red	MR
Michigan State University	MI14R0288	346.3	Red	MR
Dyna-Gro Seed	Dyna-Gro WX17441W	346.0	White	MR
Harrington Seeds, Inc.	HS EX16R	346.0	Red	MR
AgriMAXX Wheat Company	AgriMAXX 438	342.0	Red	MR
DF Seeds, Inc.	DF 111 R	341.8	Red	MR
Wellman Seeds, Inc.	W 204	341.5	Red	MR
Michigan Crop Improvement Association	Jupiter	341.0	White	MR
AgriMAXX Wheat Company	AgriMAXX 454	340.8	Red	MR
DF Seeds, Inc.	DF 109 R	340.3	Red	MR
Rupp Seeds, Inc.	RS 972	340.3	Red	MR
Michigan Crop Improvement Association	E6012	334.8	White	MS
Rupp Seeds, Inc.	RS 902	333.5	Red	MS
Syngenta AgriPro	SY 547	332.5	Red	MS
Michigan State University	MI14W0250	332.3	White	MS
Irrer Seed Farm	L11538	330.0	Red	MS
Dyna-Gro Seed	Dyna-Gro 9692	323.3	Red	MS
Wellman Seeds, Inc.	W 304	319.5	Red	MS
Michigan Crop Improvement Association	MCIA Red Devil	319.0	Red	MS
Syngenta AgriPro	SY 100	318.0	Red	MS
Michigan State University	MI14R0213	314.5	Red	MS
Virginia Tech / VCIA	Hilliard	309.5	Red	MS
Steyer Seeds	Steyer Morrin	307.0	Red	MS
Virginia Tech / VCIA	VA11W-108PA	296.0	Red	MS
Dyna-Gro Seed	Dyna-Gro 9611W	290.5	White	MS
Michigan State University	MI14W0245	290.0	White	MS
Syngenta AgriPro	SY 944	286.3	White	MS
Bio Town Seeds	Diener XW1601	285.3	Red	S
Michigan State University	MI14W0064	285.0	White	S
Michigan State University	MI14W0013	283.5	White	S
Michigan Crop Improvement Association	MCIA Whale	280.8	Red	S
Michigan State University	MI14R0267	276.3	Red	S

Brand	Variety	Falling Number	Grain Color	FN Category
Michigan State University	MI14W0652	270.0	White	S
Michigan State University	MI14W0334	268.0	White	S
Michigan Crop Improvement Association	Hopewell	259.8	Red	S
AgriMAXX Wheat Company	AgriMAXX 464	259.3	Red	S
DF Seeds, Inc.	Skeet	259.0	White	S
DF Seeds, Inc.	Ambassador	258.5	White	S
Dyna-Gro Seed	Dyna-Gro WX17702W	255.0	White	S
Michigan State University	MI14W0054	245.5	White	S
Dyna-Gro Seed	Dyna-Gro 9242W	234.5	White	S
Irrer Seed Farm	Curly	227.3	Red	VS
DF Seeds, Inc.	DF EX 1701	220.8	White	VS
Dyna-Gro Seed	Dyna-Gro 9772	217.5	Red	VS
DF Seeds, Inc.	DF EX 1702	210.3	White	VS
DF Seeds, Inc.	DF EX 1711	209.8	Red	VS

For white wheat growers, it is even more important to keep track of grain quality once wheat has reached maturity. Collect samples once grain moisture gets down to 24-25% and submit them to your local elevator for testing. If falling number is below 300, you will want to resample again in a few days. If number keeps going lower, harvest early and pay the drying cost. Leaving it in the field to dry will save drying costs, but if falling numbers fall below 240-260, the discounts will likely be much more costly than the drying cost. In the 2017 State Yield Trials, white wheat varieties had an average falling number of 306.3, while red wheat varieties averaged 344.0.

Table 2. Farmers have learned that white wheat can be more sensitive to PHS than red wheat. Listed below is the average of red and white varieties. White wheat did have a lower average falling number than red.

Grain Color	Avg. FN
White	306.3
Red	344.0
pvalue	0.0008
LSD	41.0

For questions or comments, please contact Dennis Pennington (pennin34@msu.edu).

Links
http://msue.anr.msu.edu/news/what_causes_low_falling_numbers_in_wheat
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