

# Request for release of 15VDH-FHB-MAS33-13

May 16, 2022

## I Parentage, Breeding History, and Cultivar Name

Line 15VDH-FHB-MAS33-13 is a soft red winter (SRW) wheat line derived from the topcross MD08-26-H2-7-12-9 / VA11W-278 // 'Hilliard', completed in spring of 2014. MD08-26-H2-7-12-9 has Ning7840 in its pedigree (SS8641//McCormick\*2/ Ning7840), as a source for the *Fhb1* allele that confers partial resistance to fusarium head blight. VA11W-278 is a sibling of 'USG 3118' (released 2017), with the pedigree NC00-15389 / GF951079-2E31 // 'USG 3555'. This cross was sent for Doubled Haploid (DH) production at Heartland Plant Innovations in the fall of 2014 as part of the U.S. Wheat and Barley Scab Initiative (USWBSI). DH lines from this cross were planted in headrows at the University of Georgia in the fall of 2015 through a cooperative effort. Selected headrows were harvested in the summer of 2016 for fall planting in Warsaw VA in the 2017 DH-FHB-MAS observation nursery. This line was advanced to the SRW Preliminary Nursery for the 2018 harvest season, tested in Blacksburg VA, Warsaw, VA and Painter, VA, and subsequently evaluated in the SRW Advanced Nursery for the 2019 harvest season. Excellent performance in the scab nursery in 2019 and great agronomic performance advanced the line to the Virginia official variety trial (OVT), where it was evaluated in 2020-2021 (Tables 1–3). Line 15VDH-FHB-MAS33-13 was also evaluated in the Gulf Atlantic regional nursery (8 locations, Table 4) in 2020. In 2021, 15VDH-FHB-MAS33-13 was evaluated in the USDA-ARS Uniform Southern Soft Red Winter Wheat Nursery (USSRWWN; 19 locations) and the Southern Uniform Winter Wheat Scab Nursery (SUWWSN; Tables 5–7).

## II Description of the Variety

Line 15VDH-FHB-MAS33-13 is a high-yielding, mid-season, semi-dwarf (Rht2) SRW wheat broadly adapted to the mid-Atlantic and Southern U.S. with high test weight and good milling and baking quality. Line 15VDH-FHB-MAS33-13 expresses high levels of resistance to Fusarium Head Blight (*Fusarium graminearum*), leaf rust (*Puccinia triticina*), and leaf blotch (*Septoria tritici* and *Septoria nodorum*) as well as moderate resistance stripe rust (*Puccinia striiformis*) and Barley Yellow Dwarf Virus (Tables 1–5, 7). Line 15VDH-FHB-MAS33-13 showed higher than average susceptibility to powdery mildew (*Blumeria graminis*) in the State OVT (1). Line 15VDH-FHB-MAS33-13 has strap-shaped awnleted blue-green heads, an erect twisted waxy green flag leaf, yellow anthers, yellow straw, and white chaff. Mean head emergence of 15VDH-FHB-MAS33-13 in Virginia is average (121 d) similar to Hilliard, 1 day earlier than 'Shirley' (PI 656753), and about 4 days later than 'Laverne' (PI

692615). Mean plant height is 36 inches, similar to that of 'MAS #143', 2 inches shorter than 'Hilliard', and 6 inches taller than 'Laverne'. Straw strength (0 = erect to 9 = completely lodged) is good at 0.4 across two years in Virginia (Table 1).

Across two years in the Virginia Tech Official Variety Test, 15VDH-FHB-MAS33-13 ranked 8th in mean grain yield (90.2 bu/ac) from 2020 to 2021, not significantly different from the highest yielding line, 'MAS #143' (93.3 bu/ac; Table 1). In 2020, 15VDH-FHB-MAS33-13 had a mean grain yield (97.3 bu/ac) over 6 locations that was significantly ( $P < 0.05$ ) higher (9%) than the overall trial average (89.2 bu/ac) and only significantly lower than the highest yielding line, 'MAS #143' (102.5; Table 2). In 2021, 15VDH-FHB-MAS33-13 had a mean grain yield (83.9) over 7 locations not significantly higher than the trial mean (81.9; Table 3). Across two years, the mean test weight of 15VDH-FHB-MAS33-13 (59.4 lb/bu) was significantly greater than the trial average (58.6 lb/bu; Tables 1–3). In the 2020 Gulf Atlantic Wheat Nursery, 15VDH-FHB-MAS33-13 ranked 22nd out of 54 entries for grain yield (76.4.9 bu/ac; trial mean = 75.8; Table 4). Line 15VDH-FHB-MAS33-13 ranked 2nd in the 2020 USDA-ARS Uniform Southern SRW wheat nursery for grain yield (84.4 bu/ac; Tables 5–6) among 46 entries evaluated over 19 locations, and did not differ significantly ( $P > 0.05$ ) from the highest yielding entry, 16VDH-SRW03-018 (85.1 bu/ac).

Grain samples of 15VDH-FHB-MAS33-13 produced in 5 crop environments (2017–2021) were evaluated for end use quality by the USDA-ARS Soft Wheat Quality Lab. 15VDH-FHB-MAS33-13 has expressed good milling and baking quality, consistently better than Hilliard (2017–2019 data not shown; 2020–2021 data in Tables 5 and 8), and close to that of the high quality check, 'Shirley'. This included A, B or C grades for flour yield and cookie diameter in most years.

### III Disease, Insect and Other Interactions

Reaction of 15VDH-FHB-MAS33-13 to various plant diseases and insect pests recorded over a diverse set of environments (Tables 1–5, 7). Line 15VDH-FHB-MAS33-13 has demonstrated excellent resistance to fusarium head blight, or scab, caused by *Fusarium graminearum* (Tables 1–5, 7), with lower index, Fusarium Diseased Kernels (FDK) and Deoxynivalenol (DON) toxin levels. This is due to marker assisted breeding efforts directly supported by the U.S. Wheat and Barley Scab Initiative (USWBSI). Line 15VDH-FHB-MAS33-13 has the largest effect FHB qtl identified to date, *Fhb1*, sourced from 'Ning7840', as well as the *Fhb3B* QTL from cultivar 'Bess'. Across and within years 2020 and 2021 in an inoculated misted nursery in Virginia, 15VDH-FHB-MAS33-13 had a significantly lower FDK (5;  $P < 0.05$ ), ISK index (9;  $P < 0.05$ ) and ranked 4th lowest DON value (0.6 ppm) out of 63 entries, with the resistant check 'Jamestown' having a higher DON value (1.16 ppm). 15VDH-FHB-MAS33-13 had the 9th lowest DON value in 2020 (0.56 ppm; N=133) and the 22nd lowest DON value in 2021 (0.48 ppm; N=132). Across 5 locations in 2021, similar performance was observed in the regional Southern Uniform Winter Wheat Scab nursery (SUWWSN), with 15VDH-FHB-MAS33-13 having a mean ISK of 7, 18% FDK, and 3ppm DON compared to the resistant check, 'Jamestown' with ISK of 19, 16% FDK, and 3 ppm DON (Table 7). In the Gulf Atlantic Nursery, 15VDH-FHB-MAS33-13 had an FDK of 6% and DON levels of 1 ppm in VA compared to Hilliard (MR) with FDK of 14% and DON of 3 ppm (Table 4).

Line 15VDH-FHB-MAS33-13 has also demonstrated high resistance to leaf rust (*Puccinia*

*triticina*) in the field, with an average rating of 0 in the Virginia OVT. 15VDH-FHB-MAS33-13 contains leaf rust resistance genes *Lr18* and *Lr24*, and is also highly resistant to leaf rust (*Puccinia triticina*) in the field, with average ratings ranging from 0 to 1.0. Seedlings of 15VDH-FHB-MAS33-13 were resistant (0; to ;1) to all races tested by the USDA-ARS Cereal Disease Lab in St. Paul, MN (KFBJG, TBBGS, MCTNB, TNBJS, MHDSB, TCRKG, TCGJG, MNPSD, TFTSB, TCBGS and MJBHG). 15VDH-FHB-MAS33-13 was also determined in the greenhouse at Virginia Tech to be resistant to race TCRKG, but susceptible to race TNRJJ. Line 15VDH-FHB-MAS33-13 showed above average, but still low, susceptibility to powdery mildew (*Blumeria graminis*) in the Virginia State OVT (Table 1-3).

Seedling stem rust (*Puccinia graminis*) disease screens of entries in the 2021 Uniform Eastern Nursery were conducted by the Cereal Disease Lab at St. Paul, MN, but data has yet to be distributed. Diagnostic markers for *Sr24* suggest that 15VDH-FHB-MAS33-13 will exhibit resistance to most races of stem rust. Line 15VDH-FHB-MAS33-13 was shown in 2020 to be moderately resistant to stripe rust (*Puccinia striiformis*) in field trials with a mean disease score (0-9) of 1 (Table 4). This supports the identification of diagnostic markers for the *Yr5* gene that confers resistance to most races in the U.S. In controlled environment trials conducted by USDA-ARS Wheat Genetics, Quality, Physiology, and Disease Research Unit at Pullman, WA in 2020, seedlings of 15VDH-FHB-MAS33-13 showed susceptibility to five tested races (PSTv-4, PSTv-14, PSTv-37, PSTv-40, and PSTv-51) of stripe rust. Average infection type (0-9) for adult plants of 15VDH-FHB-MAS33-13 were rated as mostly 3 for races PSTv-14 and PSTv-37, but was rated as 5 for PSTv-40. As such, it was determined to be moderately resistant. 15VDH-FHB-MAS33-13 had infection type (0-9) ratings of 8 and 5 in the Uniform Eastern for field trials conducted at one location in Washington State, indicating moderate resistance.

Response to *Septoria* was significantly below the trial average across two years in the Virginia OVT (Table 1), suggesting better than average resistance to leaf blotch. Line 15VDH-FHB-MAS33-13 also appears to have good resistance to Barley Yellow Dwarf Virus (score 0.0, Table 1). In growth chamber tests (Table 4) conducted by USDA-ARS at West Lafayette, IN, seedlings of 15VDH-FHB-MAS33-13 were shown to be resistant to Hessian Fly biotypes C and D, but susceptible to biotypes O and L. Reaction to biotype B is currently unknown. Reaction of 15VDH-FHB-MAS33-13 to Wheat Spindle Streak Mosaic Virus and Wheat Soil Borne Mosaic Virus is also not known; however, it was identified that 15VDH-FHB-MAS33-13 has the *Smb1* locus known to provide resistance to the latter.

#### IV Justification for Release

Line 15VDH-FHB-MAS33-13 like Hilliard is a widely adapted, high yielding, wheat variety with good milling and baking qualities and expresses moderate to high levels of resistance to most of the predominant diseases in the SRW wheat region, with the exception of powdery mildew and potentially some races of stripe rust. In comparison to Hilliard, 15VDH-FHB-MAS33-13 has a similar maturity, has significantly ( $P < 0.05$ ) higher test weight (59.4 versus 58.6 lb/bu), and has higher grain yield over multiple seasons (+3.0 bu/ac; LSD = 3.4 bu/ac; Table 1). Importantly, 15VDH-FHB-MAS33-13 is numerically more resistant to scab over multiple trials and years to moderately resistant cultivars 'Jamestown' and 'Hilliard' (Tables 1-4, 7). 15VDH-FHB-MAS33-13 is often among the most resistant lines under evaluation in

the nursery, and contains the largest effect resistance QTL, *Fhb1*, currently known.

## **V Areas of Adaptation**

15VDH-FHB-MAS33-13 appears most well adapted to the mid-Atlantic and parts of the southern U.S. 15VDH-FHB-MAS33-13 produced a two-year (2020 to 2020) mean yield that was significantly ( $P < 0.05$ ) higher than the trial average, ranking 8th for the Virginia State wheat test (Table 1). It ranked 2nd in the 2021 Uniform Southern Soft Red Winter Wheat Nursery producing mean yields that were 8% higher than trial averages across 19 locations. Performance of 15VDH-FHB-MAS33-13 was particularly good in IL, KY, MD, MS, TN and VA (Table 6). In the Gulf Atlantic Nursery, 15VDH-FHB-MAS33-13 placed at or above the mean in AR, GA, LA, TX and VA. Line 15VDH-FHB-MAS33-13 was entered into 2021-2022 Official Variety Trials in DE, MD, MI, NC, OH, PA, SC and VA to better determine where it should be marketed.

## **VI Breeder and Foundation Seed Available**

During the spring of 2020, increase plots of 15VDH-FHB-MAS33-13 were rouged and harvested for planting in a strip increase in the fall at the Virginia Crop Improvement Association (VCIA). This strip was carefully rouged in the spring of 2021, and resulting seed planted in 5.25 acres in the fall of 2021, with 420 bushels expected to be available for fall 2022 planting. In parallel, 400 headrows of 15VDH-FHB-MAS33-13 were planted in Warsaw, VA to produce a more pure source of breeder seed for 2023.

## **VII Regional Variety Release Committee**

No regional committee exists.

## **VIII Proposed Method and Agency Responsible for Distribution**

The Virginia Crop Improvement Association will be responsible for distribution of Foundation Seed of 15VDH-FHB-MAS33-13 through the Foundation Seed Farm at Mount Holly, Virginia, unless other arrangements are agreed upon.

## **IX Proposed Method and Agency Responsible for Maintenance of Breeder Seed**

Breeder Seed of 15VDH-FHB-MAS33-13 will be maintained under the School of Plant and Environmental Sciences in affiliation with the Virginia Agricultural Experiment Station located in Blacksburg, Virginia.

## **X Persons Submitting Request**

Nicholas Santantonio, School of Plant and Environmental Sciences

## **XI Parties Potentially Interested in Obtaining Marketing Rights**

Exclusive Release: JoMar Seeds, Inc. (USA and Ontario)

**Figure 1:** Increase plot of 15VDH-FHB-MAS33-13 grown in Warsaw in 2021 (May 26, 2021).



**Table 1:** Virginia State Official Variety Test across two years, 2020-2021, comprised of 13 site-years, with 6 sites in 2020 and 7 sites in 2021 across Virginia.

	Grain Yield (bu/a)	Test Weight (lb/bu)	Date Headed (Julian)	Mature Height (in)	Plant Lodging (0-9)	Leaf Rust (0-9)	Powdery Mildew (0-9)	BYD <sup>a</sup> Virus (0-9)	Septoria (0-9)	FDK <sup>b</sup> %	ISK <sup>c</sup>	DON <sup>d</sup> ppm
Line	(13)	(13)	(4)	(6)	(5)	(3)	(3)	(2)	(1)	(2)	(2)	(2)
MAS #143	93.3+	58.4	123+	36	0	1	0	0	2-	14	21	2
Dyna-Gro 9172	92.1+	58.4	123+	36	0	1	1	2	2-			
LW2169	91.7+	58.5	123+	36	0	2	1	0	1-			
PROGENY PGX 19-10	91+	57-	124+	35-	0	2	0	2	3			
MAS1407-056-6-3	90.8+	59.9+	123+	37+	0	0-	1+	0	2-	15	25	2
MBX 127	90.6+	58.3	123+	36	0	2	1	1	2-	10	15	1
USG 3329	90.3+	58.2-	121	36	0	4+	0	1	4	13	23	1
<b>15VDH-FHB-MAS33-13</b>	<b>90.2+</b>	<b>59.4+</b>	<b>121</b>	<b>36</b>	<b>0</b>	<b>0-</b>	<b>2+</b>	<b>1</b>	<b>1-</b>	<b>5-</b>	<b>9-</b>	<b>1</b>
Dyna-Gro 9120	89.9+	60.1+	120-	35-	0	2	0	3	3			
16VDH-SRW03-023	89.7+	58.4	121	37	0	0-	0	0	2-	21	39	2
14VDH-SRW14-150	89.6+	58.6	119-	36	0	0-	0	2	3	20	33	2
13VTK429-3	89.5+	59.6+	123+	37	0	0-	0	1	2	21	34	4
VA17W-75	89.5+	59.8+	118-	36	0	0-	0	2	2	13	16	1
DH15SRW65-53	89.4	59.7+	123+	33-	0	0-	0	1	3	31+	42+	4
MAS #86	89.1	57.3-	122	38+	0	3+	0	2	3	11	15	1
Progeny #CHAD	89.1	57.9-	120-	33-	1+	0-	0	1	4			
mean	86	58.6	121.1	36.1	0.2	1.3	0.5	1.6	3.1	18.4	27.9	2
CV	10	1.7	1	4						37.9	27.5	49.5
LSD	3.4	0.4	0.9	0.8	0.4	0.8	0.5	1.9	1.1	12	13.2	2.5

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A plus or minus sign indicates a performance significantly above or below the test average.

The 0-9 ratings indicate a genotype's response to disease or lodging where 0 = highly resistant and 9 = highly susceptible.

Parentheses below column headings indicate the number of site-years in which data were collected.

<sup>a</sup> Barley Yellow Dwarf

<sup>b</sup> Fusarium Diseased Kernels (percent).

<sup>c</sup> ISK Index =  $(0.3 \times \text{FHB Incidence} + 0.3 \times \text{FHB Severity} + 0.4 \times \text{Fusarium damaged kernels}) / 100$ .

<sup>d</sup> Deoxynivalenol concentration in the kernels (ppm).

Line	Grain Yield	Test Weight	Date Headed	Mature Height	Plant Lodging	Leaf Rust	Powdery Mildew	BYD <sup>a</sup> Virus	Septoria	FDK <sup>b</sup>	ISK <sup>c</sup>	DON <sup>d</sup>
MAS #316	88.7	58-	124+	37+	0	3+	1+	4+	3	11	16	1
AgriMAXX 473	88.6	58.2-	123+	37+	0	0-	0	3	2	5-	23	1
Featherstone 125	88.5	60.8+	122+	37	0	0-	1+	0	3	14	19	2
SY Viper	88.5	59.9+	119-	38+	1+	3+	0	0	3	10	27	1
15VDH-FHB-MAS25-15	88.4	59.6+	119-	35-	0	0-	1	1	3	11	16	1
AgriMAXX 502	88.4	58.5	120-	36	0	2	0	5+	3	15	25	2
Progeny #BULLET	88	58.3	123+	37+	0	1	0	2	3	14	24	1
VA17W-74	88	59.9+	118-	36	1	0-	0	2	3	11	20	1
Shirley	87.9	57.2-	122+	34-	0	0-	0	1	2-	34+	54+	3
Pioneer 26R45	87.8	58.2-	122	37	0	1	0	2	3	11	33	1
15VDH-FHB-MAS38-01	87.7	57.6-	116-	33-	0	0-	0	0	4	5-	10-	1
Dyna-Gro 9151	87.6	59.8+	123+	37	0	4+	0	4+	3			
MBX 223	87.6	58.2-	121	36	1+	3+	0	3	4	19	25	1
Progeny #BUSTER	87.6	58.8	122+	36	0	1	1	1	3	28	34	3
13VTK59-55	87.4	59.6+	122	35-	0	0-	0	0	2-	11	30	2
Pioneer 26R59	87.3	58.6	121	33-	0	2+	0	3	2	28	51+	2
SY 547	87.3	58.3	121	39+	0	1	0	2	3	19	28	1
Hilliard	87.2	58.6	121	38+	0	0-	0	1	3	17	23	3
LW2068	87.2	57.5-	122+	36	0	5+	0	2	3			
MAS #133	86.9	56.2-	123+	37	0	3+	0	3	3	12	26	1
SH 4400	86.8	59	124+	38+	0	2	2+	2	4	22	36	2
Dyna-Gro 9002	86.6	57.8-	122	37+	0	2	2+	0	3			
mean	86	58.6	121.1	36.1	0.2	1.3	0.5	1.6	3.1	18.4	27.9	2
CV	10	1.7	1	4						37.9	27.5	49.5
LSD	3.4	0.4	0.9	0.8	0.4	0.8	0.5	1.9	1.1	12	13.2	2.5

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The 0-9 ratings indicate a genotype's response to disease or lodging where 0 = highly resistant and 9 = highly susceptible.

Parentheses below column headings indicate the number of site-years in which data were collected.

<sup>a</sup> Barley Yellow Dwarf

<sup>b</sup> Fusarium Diseased Kernels (percent).

<sup>c</sup> ISK Index =  $(0.3 \times \text{FHB Incidence} + 0.3 \times \text{FHB Severity} + 0.4 \times \text{Fusarium damaged kernels}) / 100$ .

<sup>d</sup> Deoxynivalenol concentration in the kernels (ppm).

Line	Grain Yield	Test Weight	Date Headed	Mature Height	Plant Lodging	Leaf Rust	Powdery Mildew	BYD <sup>a</sup> Virus	Septoria	FDK <sup>b</sup>	ISK <sup>c</sup>	DON <sup>d</sup>	
∞	LW2848	86.4	58.1-	123+	37+	0	1	0	2	3	16	30	1
	16VDH-SRW09-025	86.2	58.6	120-	38+	0	0-	0	1	2-	18	33	2
	MBX 246	86.2	59+	122+	38+	0	2	0	3	3	14	16	1
	USG 3536	86.1	58.4	122+	37+	1	1	0	3	3	13	26	2
	Dyna-Gro 9070	86	58.3	121	36	0	2+	0	2	3			
	USG 3316	85.5	58.5	123+	37	0	4+	3+	1	4	13	23	2
	AgriMAXX 505	85.3	59.9+	123+	36	0	4+	0	5+	4+	11	18	2
	AgriMAXX 503	85	58.3	123+	37+	0	2	1+	1	3	8	16	0
	Liberty 5658	85	59.3+	120-	37+	0	0	0	0	5+	12	20	2
	SY Richie	85	58.6	118-	35-	0	0-	0	0	2	22	40	3
	USG 3118	85	59.8+	118-	33-	0	0-	0	1	3	14	26	1
	MBX 17-M-245	84.9	57.6-	120-	35-	0	2	0	3	2	24	39	1
	DH13SRW022-23	84.8	58.7	122+	34-	0	1	0	0	5+	15	25	1
	Laverne	84.6	58.4	117-	30-	0	0-	1	0	4+	30	45+	1
	MBX 176	84.6	57.5-	123+	36	0	4+	0	5+	3	13	17	1
	SY 007	84.6	58-	120-	37	0	1	0	1	3	14	18	2
	SY 576	84.4	57.6-	128+	37+	0	0	2+	2	4	36+	35	3
	LW2958	83.7	58.9	123+	38+	0	2	0	1	3	14	20	2
	CP8118	83.4	57.2-	119-	32-	0	0-	0	1	3	11	31	1
	16VDH-SRW05-205	82.8	58.8	121	34-	0	0-	0	2	3	23	36	4
	15VDH-SRW02-075	82.7	59.3+	123+	38+	0	0-	1	1	3	21	30	3
	EXP 2002	82.7	59.3+	118-	36	0	1	1	1	4	12	18	1
mean		86	58.6	121.1	36.1	0.2	1.3	0.5	1.6	3.1	18.4	27.9	2
CV		10	1.7	1	4						37.9	27.5	49.5
LSD		3.4	0.4	0.9	0.8	0.4	0.8	0.5	1.9	1.1	12	13.2	2.5

continued ...

A plus or minus sign indicates a performance significantly above or below the test average.

The 0-9 ratings indicate a genotype's response to disease or lodging where 0 = highly resistant and 9 = highly susceptible.

Parentheses below column headings indicate the number of site-years in which data were collected.

<sup>a</sup> Barley Yellow Dwarf

<sup>b</sup> Fusarium Diseased Kernels (percent).

<sup>c</sup> ISK Index =  $(0.3 \times \text{FHB Incidence} + 0.3 \times \text{FHB Severity} + 0.4 \times \text{Fusarium damaged kernels}) / 100$ .

<sup>d</sup> Deoxynivalenol concentration in the kernels (ppm).

Line	Grain Yield	Test Weight	Date Headed	Mature Height	Plant Lodging	Leaf Rust	Powdery Mildew	BYD <sup>a</sup> Virus	Septoria	FDK <sup>b</sup>	ISK <sup>c</sup>	DON <sup>d</sup>
FL14167LDH-158	81.4-	58.8	121	38+	0	0-	0	2	3	26	24	2
SH 7200	81.4-	59.5+	118-	38+	1+	0-	0	4+	2	36+	42+	2
USG 3230	81-	57.7-	121	36	0	1	1	1	4	31+	40	3
AgriMAXX 492	80.8-	59.8+	118-	35	0	0-	0	0	7+	12	22	1
FLLA10033C-6	80-	58-	122+	39+	0	0-	1	4+	4	45+	43+	5+
Progeny #BERKELEY	78.9-	58.3	118-	35-	0	1	0	1	4+	16	28	1
MAS #67	78.7-	56.8-	121	35-	0	2	1+	1	3	9	21	0
MAS #106	74.1-	58.4	115-	35-	1+	2	2+	1	4+	9	19	0
NC11546-14	72.3-	59.9+	121	37	0	0-	0	3	4+	14	18	1
Massey	68.2-	58.9	121	40+	2+	7+	0	1	3	14	17	1
mean	86	58.6	121.1	36.1	0.2	1.3	0.5	1.6	3.1	18.4	27.9	2
CV	10	1.7	1	4						37.9	27.5	49.5
LSD	3.4	0.4	0.9	0.8	0.4	0.8	0.5	1.9	1.1	12	13.2	2.5
mean	86	58.6	121.1	36.1	0.2	1.3	0.5	1.6	3.1	18.4	27.9	2
CV	10	1.7	1	4						37.9	27.5	49.5
LSD	3.4	0.4	0.9	0.8	0.4	0.8	0.5	1.9	1.1	12	13.2	2.5

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<sup>c</sup> ISK Index =  $(0.3 \times \text{FHB Incidence} + 0.3 \times \text{FHB Severity} + 0.4 \times \text{Fusarium damaged kernels}) / 100$ .

<sup>d</sup> Deoxynivalenol concentration in the kernels (ppm).

**Table 2:** Virginia State Official Variety Test across 6 locations, 2020

	Grain Yield (bu/a)	Test Weight (lb/bu)	Date Headed (Julian)	Mature Height (In)	Plant Lodging (0-9)	Leaf Rust (0-9)	Powdery Mildew (0-9)	Septoria (0-9)	FDK <sup>a</sup> %	ISK <sup>b</sup> ppm	DON <sup>c</sup>
Line	(6)	(6)	(2)	(3)	(5)	(2)	(1)	(1)	(1)	(1)	(1)
MAS #143	102.5+	58.7	121+	39	0	1	1	2	6	21	1
LCS 11719	100.2+	58.8	118	38	1	1	0	3	25	52+	5
MBX 127	100.1+	58.5	120+	39	0	2	1	2	9	17	1
USG 3790	100+	58.1	120+	38	0	2	0	3	25	56+	6
WX20731	99.1+	58.3	122+	39	1	1	1	2	6	22	1
LWX20C	98.4+	58.6	120+	40	0	2	1	1-	8	24	2
19-11	97.9+	58	120+	39	0	2	0	2	12	26	2
<b>15VDH-FHB-MAS33-13</b>	97.3+	59.9+	118	38	1	0-	3+	1-	6	11-	1
13VTK429-3	96.9+	59.4+	120+	40	0	0-	0	2	29	51+	7
19-10	96.8+	56.6-	121+	37-	0	2	0	3	19	24	4
LW2848	96.8+	58.4	122+	40	0	1	1	3	4-	30	2
PGX 18-8	96.8+	59.1	120+	37-	0	2	0	3	12	36	4
MAS1407-056-6-3	96+	59.9+	121+	40	0	1	2+	2	14	34	1
SY 547	95.8+	58.4	118	42+	0	1	0	3	20	36	2
Pioneer 26R45	95.5+	58.3	119+	39	1	1	0	3	8	36	1
MAS #136	95.4+	57.8-	122+	38	2+	3+	0	3	18	42	4
DH15SRW65-53	95.3+	59.5+	120+	36-	0	0-	1	3	25	46+	3
AgriMAXX 502	95.2+	58.6	116-	39	0	2	0	3	16	28	2
mean	89.2	58.5	117.9	38.8	0.4	1.3	0.9	3.2	17.2	30.8	2.3
CV	8.8	2	0.9	4					35.6	23.6	
LSD	4.6	0.7	1.1	1.2	0.7	1	0.9	1.2	12.1	14.4	

continued ...

A plus or minus sign indicates a performance significantly above or below the test average.

The 0-9 ratings indicate a genotype's response to disease or lodging where 0 = highly resistant and 9 = highly susceptible.

Parentheses below column headings indicate the number of site-years in which data were collected.

<sup>a</sup> Fusarium Diseased Kernels (percent).

<sup>b</sup> ISK Index =  $(0.3 \times \text{FHB Incidence} + 0.3 \times \text{FHB Severity} + 0.4 \times \text{Fusarium damaged kernels}) / 100$ .

<sup>c</sup> Deoxynivalenol concentration in the kernels (ppm).

Line	Grain Yield	Test Weight	Date Headed	Mature Height	Plant Lodging	Leaf Rust	Powdery Mildew	Septoria	FDK <sup>a</sup>	ISK <sup>b</sup>	DON <sup>c</sup>
LWX20A	95.2+	57.2-	120+	38	0	4+	0	3	6	19	3
MAS #140	95.1+	58	121+	41+	0	2	2+	3	4-	17	1
#Blaze	94.6+	58.5	120+	39	1	4+	1	4	12	26	2
MAS #128	94.6+	57.7-	123+	37-	0	3+	2	4	30+	52+	3
L11919	94.5+	58.6	115-	38	1	0	1	2	25	31	2
PGX 18-7	94.5+	58.5	119+	40	0	1	1	3			
15VDH-FHB-MAS25-15	94.4+	60.1+	116-	37-	0	0-	2	3	11	18	2
16VDH-SRW03-023	94.4+	58.4	118	39	0	0-	1	2	16	44	3
AgriMAXX 473	94.4+	58.5	121+	40	0	0	0	2	6	29	2
Featherstone 125	94.4+	61+	118	40	0	0-	2+	3	10	22	1
MAS #316	94.4+	58.1	122+	40+	0	2+	2+	3	8	23	2
19-15	94.3+	59.2+	118	37-	1	1	2	4	16	47+	2
USG 3329	94.3+	58.1	119	39	1	3+	1	4	15	28	1
SY 576	94.1+	57.6-	126+	41+	0	1	3+	4	18	38	1
#Bullet	94+	58.3	121+	40	1	1	0	3			
MBX 223	94+	58.5	118	39	1	3+	0	4	15	28	1
CROPLAN CP9606	93.7	57.9	118	38	0	2	2	4	15	40	2
SY Viper	93.7	60.1+	114-	40+	1	2+	0	3	12	24	1
MAS #133	93.6	56.4-	120+	40	0	2+	1	3	11	30	2
VA17W-74	93.2	60+	116-	39	1	0-	0	3	14	25	1
VA17W-75	93.1	59.9+	117	40	0	0-	0	2	9	16-	1
SH 4400	93	58.9	121+	41+	0	2	2+	4	30+	51+	4
mean	89.2	58.5	117.9	38.8	0.4	1.3	0.9	3.2	17.2	30.8	2.3
CV	8.8	2	0.9	4					35.6	23.6	
LSD	4.6	0.7	1.1	1.2	0.7	1	0.9	1.2	12.1	14.4	

continued ...

A plus or minus sign indicates a performance significantly above or below the test average.

The 0-9 ratings indicate a genotype's response to disease or lodging where 0 = highly resistant and 9 = highly susceptible.

Parentheses below column headings indicate the number of site-years in which data were collected.

<sup>a</sup> Fusarium Diseased Kernels (percent).

<sup>b</sup> ISK Index =  $(0.3 \times \text{FHB Incidence} + 0.3 \times \text{FHB Severity} + 0.4 \times \text{Fusarium damaged kernels}) / 100$ .

<sup>c</sup> Deoxynivalenol concentration in the kernels (ppm).

Line	Grain Yield	Test Weight	Date Headed	Mature Height	Plant Lodging	Leaf Rust	Powdery Mildew	Septoria	FDK <sup>a</sup>	ISK <sup>b</sup>	DON <sup>c</sup>
14VDH-SRW14-150	92.7	58.4	116-	39	0	0-	0	3	22	32	2
PGX 19-3	92.6	58.3	121+	40+	0	2	1	4	8	18	1
AgriMAXX 503	92.3	58	120+	40+	0	2	2+	3	12	18	1
EXP 2003	92.3	57.2-	119+	38	0	4+	0	3	4-	15-	2
WX20737	92.2	59.8+	117	38	0	2	0	3	12	20	2
15VTK-12-21	92	60.1+	121+	40	0	1	0	2	16	40	3
Dyna-Gro 9772	92	55.6-	120+	40	0	1	1	3	12	17	1
GA10268-17LE16	91.9	58.1	122+	39	5+	0-	0	3	52+	70+	10
WX19713	91.9	59.6+	120+	40	0	5+	1	3	12	27	2
GA10407-17E8	91.7	59.8+	118	39	1	0-	2+	4	30+	51+	3
MBX 246	91.6	59.1	120+	41+	0	2	1	3	10	16-	1
13VTK59-55	91.5	59.3+	119	38-	0	0-	1	2-	12	35	2
USG 3316	91.4	58.7	120+	39	0	4+	5+	4	15	34	3
VA17W-176	91.3	58	117-	39	1	0-	2	3	32+	42	3
FL14167LDH-158	91.1	58.7	116-	41+	0	0	0	3	22	30	3
MBX 176	91	57.3-	120+	38	0	5+	0	3	9	20	2
15VDH-FHB-MAS34-18	90.9	60.6+	116-	38	0	0-	0	2-	9	14-	1
19-17	90.9	57.9	116-	35-	1+	0-	0	4			
MAS #86	90.9	57.4-	119+	41+	0	2	0	3	6	18	1
9070	90.6	58.3	117	39	0	2	0	3	16	26	3
12VTK4-118	90.4	59.5+	117	39	0	1	1	2	16	27	2
AgriMAXX 495	90.4	58.9	120+	39	0	1	1	3	12	35	2
mean	89.2	58.5	117.9	38.8	0.4	1.3	0.9	3.2	17.2	30.8	2.3
CV	8.8	2	0.9	4					35.6	23.6	
LSD	4.6	0.7	1.1	1.2	0.7	1	0.9	1.2	12.1	14.4	

continued ...

A plus or minus sign indicates a performance significantly above or below the test average.

The 0-9 ratings indicate a genotype's response to disease or lodging where 0 = highly resistant and 9 = highly susceptible.

Parentheses below column headings indicate the number of site-years in which data were collected.

<sup>a</sup> Fusarium Diseased Kernels (percent).

<sup>b</sup> ISK Index =  $(0.3 \times \text{FHB Incidence} + 0.3 \times \text{FHB Severity} + 0.4 \times \text{Fusarium damaged kernels}) / 100$ .

<sup>c</sup> Deoxynivalenol concentration in the kernels (ppm).

Line	Grain Yield	Test Weight	Date Headed	Mature Height	Plant Lodging	Leaf Rust	Powdery Mildew	Septoria	FDK <sup>a</sup>	ISK <sup>b</sup>	DON <sup>c</sup>
SH 7510	90.1	58.5	119+	39	0	0-	1	3	22	48+	2
USG 3536	90.1	58.4	120+	39	1	1	0	3	8	21	4
KWS242	90	58.6	116-	39	0	5+	1	3	16	24	1
LW2958	90	58.9	120+	41+	0	2	0	3	10	24	2
19-12	89.9	56.7-	119	39	0	1	0	4	14	26	2
GA11656-17E11	89.9	60.5+	118	40+	1+	0-	1	3	35+	52+	5
MAS #35	89.6	58.6	121+	40	1	4+	2	3	18	32	2
Shirley	89.5	56.8-	119+	37-	0	0-	0	2-			
16VDH-SRW07-067	89.4	58.3	114-	35-	0	0-	0	4	15	22	3
Liberty 5658	89.1	59	117	40	0	1	1	5+	14	17	1
Pioneer 26R59	89	58.5	118	36-	0	2	1	2	38+	56+	3
Dyna-Gro 9932	88.8	59.1	120+	39	0	1	2	2	22	40	1
Dyna-Gro 9941	88.7	56.5-	119+	38	0	3+	2	3	15	22	2
Hilliard	88.7	58.5	117	41+	0	0-	0	3	16	25	3
SY 007	88.7	57.6-	116-	40	0	1	1	3	10	18	2
16VDH-SRW04-028	88.4	60.4+	116-	39	0	0-	0	3	15	20	1
13VTK59-148	88.3	59.3+	117-	40+	0	0-	1	3	12	23	2
MBX 17-M-245	88.2	57.7-	117-	38-	0	2	1	2	16	41	1
SY Richie	88.1	58.1	113-	37-	0	0	1	2	20	35	3
USG 3458	88	57.8-	118	38	0	2	1	3	20	47+	3
16VDH-SRW09-025	87.9	58.4	116-	41+	0	0-	0	2	22	39	3
AgriMAXX 505	87.9	59.5+	121+	39	0	4+	1	4	10	19	2
mean	89.2	58.5	117.9	38.8	0.4	1.3	0.9	3.2	17.2	30.8	2.3
CV	8.8	2	0.9	4					35.6	23.6	
LSD	4.6	0.7	1.1	1.2	0.7	1	0.9	1.2	12.1	14.4	

continued ...

A plus or minus sign indicates a performance significantly above or below the test average.

The 0-9 ratings indicate a genotype's response to disease or lodging where 0 = highly resistant and 9 = highly susceptible.

Parentheses below column headings indicate the number of site-years in which data were collected.

<sup>a</sup> Fusarium Diseased Kernels (percent).

<sup>b</sup> ISK Index =  $(0.3 \times \text{FHB Incidence} + 0.3 \times \text{FHB Severity} + 0.4 \times \text{Fusarium damaged kernels}) / 100$ .

<sup>c</sup> Deoxynivalenol concentration in the kernels (ppm).

Line	Grain Yield	Test Weight	Date Headed	Mature Height	Plant Lodging	Leaf Rust	Powdery Mildew	Septoria	FDK <sup>a</sup>	ISK <sup>b</sup>	DON <sup>c</sup>
USG 3118	87.7	60.1+	113-	35-	1	0-	1	3	10	25	1
AgriMAXX Exp 1902	87.5	56.6-	120+	37-	0	2	3+	3	26	41	3
PGX 18-9	87.4	56-	120+	38	0	6+	0	3	4-	17	1
15VDH-FHB-MAS38-01	86.8	57-	112-	35-	0	0	0	4	5-	8-	2
VA16W-202	86.7	57.2-	114-	34-	0	0-	0	3			
MBX 969	86.4	56.5-	120+	38	0	2	2	3	8	18	1
15VDH-SRW02-075	86.2	58.6	120+	41+	0	0-	1	3	15	34	5
DH13SRW022-23	85.7	58.3	119+	36-	0	1	0	5+	15	28	1
Featherstone 31	85.7	58.6	120+	38	0	1	0	2	22	48+	3
FLLA10033C-6	85.7	57.2-	120+	42+	0	0-	1	4	40+	54+	6
16VDH-SRW05-205	85.4	58.4	117	37-	0	0-	0	3	30+	48+	5
MAS #130	85.3	58	116-	38	0	5+	0	4	20	28	1
EXP 2002	85.2	59	114-	40	0	2	1	4	8	11-	1
TX15D9579	85	58.6	115-	40	0	0-	0	3	22	39	2
USG 3221	84.9	59	114-	39	0	3+	1	4	12	12-	1
NC15-21834	84.8	59.9+	120+	42+	3+	0-	0	3	6	25	2
USG 3230	84.8	57.6-	118	38	0	2	1	4	22	42	2
AgriMAXX 415	84.7	59	118	39	0	2	2+	3	12	28	2
NC15-21835	84.7	59.6+	120+	42+	1+	0-	0	3	16	36	2
15VDH-FHB-MAS22-15	84.6-	60.1+	111-	35-	0	0-	0	3	18	30	2
CROPLAN CP8081	84.1-	58.6	118	39	0	1	3+	3	22	25	1
VA15W-86	84.1-	57.7-	114-	38	1	0-	0	3	15	24	2
mean	89.2	58.5	117.9	38.8	0.4	1.3	0.9	3.2	17.2	30.8	2.3
CV	8.8	2	0.9	4					35.6	23.6	
LSD	4.6	0.7	1.1	1.2	0.7	1	0.9	1.2	12.1	14.4	

continued ...

A plus or minus sign indicates a performance significantly above or below the test average.

The 0-9 ratings indicate a genotype's response to disease or lodging where 0 = highly resistant and 9 = highly susceptible.

Parentheses below column headings indicate the number of site-years in which data were collected.

<sup>a</sup> Fusarium Diseased Kernels (percent).

<sup>b</sup> ISK Index =  $(0.3 \times \text{FHB Incidence} + 0.3 \times \text{FHB Severity} + 0.4 \times \text{Fusarium damaged kernels}) / 100$ .

<sup>c</sup> Deoxynivalenol concentration in the kernels (ppm).

Line	Grain Yield	Test Weight	Date Headed	Mature Height	Plant Lodging	Leaf Rust	Powdery Mildew	Septoria	FDK <sup>a</sup>	ISK <sup>b</sup>	DON <sup>c</sup>
9002	83.9-	57.8-	119	40+	0	2	3+	3	18	33	2
FL14078LDH-28	83.9-	60.2+	118	42+	1+	1	0	5+	50+	52+	5
USG 3895	83.7-	56.9-	118	38	0	1	3+	2	38+	58+	5
TX15D9597	83.2-	59.4+	115-	40	0	0	1	4	38+	54+	5
VA14HRW-25	82.9-	58.5	114-	41+	2+	0	1	5+	15	28	2
KWS333	82.7-	57.1-	116-	39	0	1	1	5+	10	18	1
Pioneer 26R10	82.6-	58.5	120+	40	0	3+	1	4	22	38	2
15VDH-FHB-MAS33-30	82.3-	61.1+	112-	37-	0	0	0	6+	8	15-	1
Laverne	82.2-	58.3	114-	33-	0	0-	1	4			
Berkeley	81.5-	57.8-	113-	38-	0	1	0	4			
TX15D9253	80.8-	56.2-	115-	40	2+	0-	1	5+	26	48+	6
SH 7200	80.7-	59	114-	39	1+	0-	1	2	30+	34	3
PGX 18-11	79.7-	58.5	113-	37-	0	0-	0	3	15	24	4
16VDH-SRW06-131	78.7-	59.2	113-	37-	1	1	1	3	12	15-	1
MAS #67	77.9-	56.5-	118	38	0	2	2+	3	3-	18	1
PGX 18-2	77.9-	58.2	117	38	0	0-	0	4	16	19	2
AgriMAXX 492	77.6-	59.5+	114-	38	0	0-	0	7+	11	18	1
FL15105-LDH145	76.5-	59.8+	114-	39	0	0-	1	3	10	14-	1
15VDH-FHB-MAS25-08	76.4-	59.2+	112-	37-	0	0-	1	4	3-	6-	2
FL15105-LDH110	76-	59.8+	114-	38	0	0-	0	3	8	8-	1
NC11546-14	74.8-	59.8+	117	39	1	0-	0	4	8	16	1
MAS #106	73.9-	58.3	112-	37-	0	1	3+	4	3-	7-	0
mean	89.2	58.5	117.9	38.8	0.4	1.3	0.9	3.2	17.2	30.8	2.3
CV	8.8	2	0.9	4					35.6	23.6	
LSD	4.6	0.7	1.1	1.2	0.7	1	0.9	1.2	12.1	14.4	

continued ...

A plus or minus sign indicates a performance significantly above or below the test average.

The 0-9 ratings indicate a genotype's response to disease or lodging where 0 = highly resistant and 9 = highly susceptible.

Parentheses below column headings indicate the number of site-years in which data were collected.

<sup>a</sup> Fusarium Diseased Kernels (percent).

<sup>b</sup> ISK Index =  $(0.3 \times \text{FHB Incidence} + 0.3 \times \text{FHB Severity} + 0.4 \times \text{Fusarium damaged kernels}) / 100$ .

<sup>c</sup> Deoxynivalenol concentration in the kernels (ppm).

Line	Grain Yield	Test Weight	Date Headed	Mature Height	Plant Lodging	Leaf Rust	Powdery Mildew	Septoria	FDK <sup>a</sup>	ISK <sup>b</sup>	DON <sup>c</sup>
Massey	65.7-	58.7	118	42+	2+	7+	0	3	22	27	2
mean	89.2	58.5	117.9	38.8	0.4	1.3	0.9	3.2	17.2	30.8	2.3
CV	8.8	2	0.9	4					35.6	23.6	
LSD	4.6	0.7	1.1	1.2	0.7	1	0.9	1.2	12.1	14.4	

A plus or minus sign indicates a performance significantly above or below the test average.

The 0-9 ratings indicate a genotype's response to disease or lodging where 0 = highly resistant and 9 = highly susceptible.

Parentheses below column headings indicate the number of site-years in which data were collected.

<sup>a</sup> Fusarium Diseased Kernels (percent).

<sup>b</sup> ISK Index =  $(0.3 \times \text{FHB Incidence} + 0.3 \times \text{FHB Severity} + 0.4 \times \text{Fusarium damaged kernels}) / 100$ .

<sup>c</sup> Deoxynivalenol concentration in the kernels (ppm).

**Table 3:** Virginia State Official Variety Test across 7 locations, 2021

Line	Grain	Test	Date	Mature	Plant	Leaf	Powdery	BYD <sup>a</sup>	FDK <sup>b</sup> %	ISK <sup>c</sup> (1)	DON <sup>d</sup> ppm (1)
	Yield	Weight	Headed	Height	Lodging	Rust	Mildew	Virus			
	(bu/a)	(lb/bu)	(Julian)	(In)	(0-9)	(0-9)	(0-9)	(0-9)			
	(7)	(7)	(2)	(3)	(7)	(7)	(1)	(2)	(1)	(1)	(1)
USG EXP 3000	90.8+	59.5+	125	33	0	0	0	2	28	23	1
Dyna-Gro 9002	89.1+	57.7-	125	34	0	2	0	0	4-	14	0
AgriMAXX 514	88.8+	57.4-	125	33	0	2	0	4+	14	11-	1
USG 3451	88.7+	59.8+	123-	34+	0	0	0	0	25	40+	1
15VDH-FHB-MAS38-01	88.6+	58.1-	120-	31-	0	0	0	0	5-	11-	1
CPX91221	88.6+	60+	125+	33	0	3	1+	1	25	37+	4
VA19FHB-05	88.3+	59.4+	123-	35+	0	4+	0	0	5-	11-	1
USG 3472	88+	58.4-	125+	34	0	2	0	0	14	12-	1
CP8045	87.9+	58.4-	125+	33	0	3	0	1	18	13	2
Dyna-Gro 9120	87.6+	60.4+	123-	32-	0	2	0	3	12	23	2
MAS #86	87.6+	57.2-	124	35+	0	4+	0	2	15	12-	0
Progeny #CHAD	87.5+	57.9-	124	31-	1+	0	0	1	11	28	1
VA19W-29	87.5+	58.7	124	34	0	2	0	3	35+	32	3
VA19W-79	87.2+	59.2	122-	35+	0	0	0	0	35+	38+	8
14VDH-SRW14-150	86.8+	58.8	122-	34	0	0	0	2	18	34	2
Laverne	86.8+	58.5	121-	28-	0	0	0	0	35+	50+	1
MAS1407-056-6-3	86.8+	59.9+	126+	35+	0	0	0	0	16	15	3
MBX 120	86.6+	59.1	128+	33	0	2	0	3	22	21	1
mean	81.9	58.8	124.5	33.2	0.1	1.4	0.1	1.7	19	24.4	1.6
CV	8.8	1.1	0.6	4					32.1	25	
LSD	3.9	0.4	0.8	1.1	0.3	1.7	0.5	1.9	12.1	12.1	

continued ...

A plus or minus sign indicates a performance significantly above or below the test average.

The 0-9 ratings indicate a genotype's response to disease or lodging where 0 = highly resistant and 9 = highly susceptible.

Parentheses below column headings indicate the number of site-years in which data were collected.

<sup>a</sup> Barley Yellow Dwarf<sup>b</sup> Fusarium Diseased Kernels (percent).<sup>c</sup> ISK Index =  $(0.3 \times \text{FHB Incidence} + 0.3 \times \text{FHB Severity} + 0.4 \times \text{Fusarium damaged kernels}) / 100$ .<sup>d</sup> Deoxynivalenol concentration in the kernels (ppm).

Line	Grain Yield	Test Weight	Date Headed	Mature Height	Plant Lodging	Leaf Rust	Powdery Mildew	BYD <sup>a</sup> Virus	FDK <sup>b</sup>	ISK <sup>c</sup>	DON <sup>d</sup>
Dyna-Gro WX20734	86.5+	58.7	128+	33	0	2	0	3	14	26	2
USG 3329	86.5+	58.2-	124-	34	0	4+	0	1	12	17	0
VA17W-75	86.3+	59.7+	119-	33	0+	0	0	2	18	16	1
Dyna-Gro 9172	86.2+	58.4-	125	33	0	2	0	2	11	13	2
Shirley	86.2+	57.6-	125	32-	0	1	0	1	28	47+	1
16VTK19-201	86+	59.6+	122-	34	0	0	0	1	9	10-	1
DH16-SRW120-064	86+	59.5+	125	30-	0	0	0	1	22	33	1
SH 9520	86+	59.1	128+	33	0	2	0	3	24	31	3
Hilliard	85.9+	58.7	124	35+	0	0	0	1	18	22	3
16VDH-SRW03-023	85.7	58.3-	124	34+	0	0	0	0	25	34	1
Pioneer 26R59	85.6	58.6	124	29-	0	2	0	3	18	46+	2
PROGENY 19-10	85.6	57.4-	126+	32-	0	2	0	2	18	16	2
LW2169	85.5	58.5	125	32	0	2	0	0	20	14	2
FS 601	85.2	57.2-	125	33	0	2	0	1	11	25	0
MAS #143	85.1	58.2-	125+	33	0	2	0	0	22	21	2
16VDH-SRW09-025	84.7	58.8	124	34+	0	0	0	1	15	27	2
17VDH-SRW03-143	84.7	60.9+	123-	34	0	0	0	2	18	13	2
15VTK-1-101	84.6	58.7	125+	29-	0	0	0	0	22	24	3
14VDH-HRW02-029	84.5	59.2+	126+	33	0	0	0	2	18	16	0
SY 100	84.4	56.8-	126+	32-	0	2	0	4+	30	42+	6
FS WX21B	84.3	58.3-	125+	33	0	3	0	0	11	16	1
17VDH-SRW05-170	84.2	58.3-	125+	32-	0	0	0	1	11	19	2
mean	81.9	58.8	124.5	33.2	0.1	1.4	0.1	1.7	19	24.4	1.6
CV	8.8	1.1	0.6	4						32.1	25
LSD	3.9	0.4	0.8	1.1	0.3	1.7	0.5	1.9	12.1	12.1	

continued ...

A plus or minus sign indicates a performance significantly above or below the test average.

The 0-9 ratings indicate a genotype's response to disease or lodging where 0 = highly resistant and 9 = highly susceptible.

Parentheses below column headings indicate the number of site-years in which data were collected.

<sup>a</sup> Barley Yellow Dwarf

<sup>b</sup> Fusarium Diseased Kernels (percent).

<sup>c</sup> ISK Index =  $(0.3 \times \text{FHB Incidence} + 0.3 \times \text{FHB Severity} + 0.4 \times \text{Fusarium damaged kernels}) / 100$ .

<sup>d</sup> Deoxynivalenol concentration in the kernels (ppm).

Line	Grain Yield	Test Weight	Date Headed	Mature Height	Plant Lodging	Leaf Rust	Powdery Mildew	BYD <sup>a</sup> Virus	FDK <sup>b</sup>	ISK <sup>c</sup>	DON <sup>d</sup>
DH13SRW022-216	84.1	59.3+	126+	34	0	0	0	1	15	18	0
AgriMAXX 492	84	60.1+	123-	33	0	0	0	0	14	26	1
DH13SRW022-23	84	59.1	126+	33	0	0	0	0	15	21	1
SY Viper	84	59.6+	124-	36+	1+	3	0	0	8	30	1
<b>15VDH-FHB-MAS33-13</b>	<b>83.9</b>	<b>59</b>	<b>124</b>	<b>33</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>4-</b>	<b>8-</b>	<b>0</b>
DH15SRW65-53	83.9	59.9+	125+	30-	0	0	0	1	38+	39+	4
16VDH-SRW03-018	83.8	60.3+	123-	34	0	0	0	1	18	19	2
AgriMAXX 513	83.8	58.7	125	33	0	2	0	2	25	19	0
MAS #316	83.8	57.9-	126+	35+	0	4+	0	4+	14	8-	1
15VDH-FHB-MAS25-15	83.6	59.1	123-	32-	0	0	0	1	11	13	1
Dyna-Gro 9151	83.6	59.9+	125+	33	0	4+	0	4+	6-	14	1
PROGENY PGX 20-2	83.6	61.1+	123-	34	1+	2	0	1	12	32	0
13VTK59-55	83.5	59.8+	124	33	0	0	0	0	10	25	1
AgriMAXX 516	83.5	58.4-	125+	32	0	4+	0	1	10	10-	3
13VTK429-3	83.4	59.8+	125+	34	0	0	0	1	14	17	2
Dyna-Gro WX21741	83.4	58.6	125	35+	0	2	0	2	25	16	1
VA17W-74	83.3	59.8+	119-	34	0+	0	0	2	9	16	1
AgriMAXX 473	83.2	57.9-	125	34	0	0	0	3	5-	17	1
KWS340	83.1	59.3+	126+	33	0	0	0	2	14	17	1
AgriMAXX 505	83	60.2+	125	34	0	4+	0	5+	12	17	1
Featherstone 125	83	60.7+	126+	34	0	0	0	0	18	16	2
AgriMAXX 502	82.9	58.3-	124	33	0	2	0	5+	10	21	2
mean	81.9	58.8	124.5	33.2	0.1	1.4	0.1	1.7	19	24.4	1.6
CV	8.8	1.1	0.6	4						32.1	25
LSD	3.9	0.4	0.8	1.1	0.3	1.7	0.5	1.9	12.1	12.1	

continued ...

A plus or minus sign indicates a performance significantly above or below the test average.

The 0-9 ratings indicate a genotype's response to disease or lodging where 0 = highly resistant and 9 = highly susceptible.

Parentheses below column headings indicate the number of site-years in which data were collected.

<sup>a</sup> Barley Yellow Dwarf

<sup>b</sup> Fusarium Diseased Kernels (percent).

<sup>c</sup> ISK Index =  $(0.3 \times \text{FHB Incidence} + 0.3 \times \text{FHB Severity} + 0.4 \times \text{Fusarium damaged kernels}) / 100$ .

<sup>d</sup> Deoxynivalenol concentration in the kernels (ppm).

Line	Grain Yield	Test Weight	Date Headed	Mature Height	Plant Lodging	Leaf Rust	Powdery Mildew	BYD <sup>a</sup> Virus	FDK <sup>b</sup>	ISK <sup>c</sup>	DON <sup>d</sup>
MBX 127	82.9	58.1-	125+	33	0	2	0	1	10	13	2
KWS263	82.8	57.5-	126+	34	0	0	0	1	22	24	2
MAS #139	82.7	57.5-	126+	31-	0	5+	0	3	42+	32	1
DH15SRW67-151	82.6	58-	127+	31-	0	0	0	1	16	15	1
USG 3118	82.6	59.4+	123-	31-	0	0	0	1	18	28	1
USG 3536	82.5	58.4	125	34	0	1	0	3	18	31	1
Progeny #BULLET	82.4	58.2-	125	35+	0	0	0	2	15	18	0
SY Richie	82.4	58.9	122-	32	0	0	0	0	25	46+	3
Pioneer 26R36	82.1	58.7	126+	33	0	0	1+	2	11	10-	1
SH 7200	82	60+	122-	35+	0	0	0	4+	42+	50+	2
Dyna-Gro 9070	81.9	58.4-	124	33	0	4+	0	2	6-	12-	1
MBX 17-M-245	81.9	57.6-	123-	32-	0	2	0	3	32+	37+	1
Progeny #BUSTER	81.5	58.9	125+	33	0	2	0	1	28	23	3
Liberty 5658	81.4	59.6+	123-	34	0	0	0	0	12	23	3
FS 875	81.3	57.6-	124	34	0	4+	0	1	18	16	0
MBX 246	81.3	58.9	125+	34+	0	2	0	3	18	16	1
MBX 223	81.2	57.8-	124	33	0	2	0	3	22	21	2
SREXP117	81.2	56.8-	123-	30-	0	1	0	0	8	33	1
SY 007	81.2	58.4-	123-	34	0	1	0	1	18	19	1
USG 3232	81.2	59.5+	122-	32	0	0	0	1	6-	15	0
MAS #133	81.1	56.1-	126+	33	0	4+	0	3	12	23	1
Dyna-Gro WX20738	81	58.4-	125	34	0	0	0	5+	18	25	1
mean	81.9	58.8	124.5	33.2	0.1	1.4	0.1	1.7	19	24.4	1.6
CV	8.8	1.1	0.6	4					32.1	25	
LSD	3.9	0.4	0.8	1.1	0.3	1.7	0.5	1.9	12.1	12.1	

continued ...

A plus or minus sign indicates a performance significantly above or below the test average.

The 0-9 ratings indicate a genotype's response to disease or lodging where 0 = highly resistant and 9 = highly susceptible.

Parentheses below column headings indicate the number of site-years in which data were collected.

<sup>a</sup> Barley Yellow Dwarf

<sup>b</sup> Fusarium Diseased Kernels (percent).

<sup>c</sup> ISK Index =  $(0.3 \times \text{FHB Incidence} + 0.3 \times \text{FHB Severity} + 0.4 \times \text{Fusarium damaged kernels}) / 100$ .

<sup>d</sup> Deoxynivalenol concentration in the kernels (ppm).

Line	Grain Yield	Test Weight	Date Headed	Mature Height	Plant Lodging	Leaf Rust	Powdery Mildew	BYD <sup>a</sup> Virus	FDK <sup>b</sup>	ISK <sup>c</sup>	DON <sup>d</sup>
VA19W-89	81	57.9-	123-	34	0	0	0	3	10	16	1
FS 624	80.9	58.7	126+	34+	0	4+	0	5+	8	21	1
SH 4400	80.8	59.1	127+	35+	0	2	1+	2	15	21	0
CP8118	80.7	57.3-	123-	30-	0	0	0	1	11	31	1
16VDH-SRW05-205	80.5	59.1	124	31-	0	0	0	2	16	24	2
AgriMAXX Exp 2002	80.5	59.5+	122-	32	0	0	0	1	18	25	1
Pioneer 26R45	80.4	58-	124	34	0	1	0	2	15	30	0
USG 3562	80.3	58.8	125+	34	0	2	0	1	10	16	1
USG 3316	80.2	58.4-	126+	34	0	6+	0	1	12	11-	0
GA10127-18E26	79.9	60+	127+	32	0	0	1+	0	32+	25	6
LW2068	79.7	57.8-	125	34	0	6+	0	2	10	10-	2
FS 891	79.6	58.6	125	33	0	3	0	3	25	34	2
15VDH-SRW02-075	79.5	59.9+	126+	35+	0	0	0	1	28	26	2
MAS #67	79.4	57.1-	124-	32-	0	2	0	1	15	24	0
Hardy 2519	79.3	59.8+	124	36+	0	0	0	1	14	26	1
MBX 176	79.2	57.7-	126+	33	0	4+	0	5+	18	13	1
VA19W-31	79.2	59.7+	124	33	1+	0	0	3	22	42+	1
SY 547	79.1	58.3-	123-	35+	0	1	0	2	18	19	1
LW2958	78.2	59	125	35+	0	2	0	1	18	16	1
MBX 242	77.8-	58.6	125	34	0	0	0	3	20	17	1
VA14HRW-41	77.7-	58.6	126+	35+	0	0	0	1	25	19	1
AgriMAXX 503	77.5-	58.7	126+	34	0+	2	0	1	4-	14	0
mean	81.9	58.8	124.5	33.2	0.1	1.4	0.1	1.7	19	24.4	1.6
CV	8.8	1.1	0.6	4						32.1	25
LSD	3.9	0.4	0.8	1.1	0.3	1.7	0.5	1.9	12.1	12.1	

continued ...

A plus or minus sign indicates a performance significantly above or below the test average.

The 0-9 ratings indicate a genotype's response to disease or lodging where 0 = highly resistant and 9 = highly susceptible.

Parentheses below column headings indicate the number of site-years in which data were collected.

<sup>a</sup> Barley Yellow Dwarf

<sup>b</sup> Fusarium Diseased Kernels (percent).

<sup>c</sup> ISK Index =  $(0.3 \times \text{FHB Incidence} + 0.3 \times \text{FHB Severity} + 0.4 \times \text{Fusarium damaged kernels}) / 100$ .

<sup>d</sup> Deoxynivalenol concentration in the kernels (ppm).

Line	Grain Yield	Test Weight	Date Headed	Mature Height	Plant Lodging	Leaf Rust	Powdery Mildew	BYD <sup>a</sup> Virus	FDK <sup>b</sup>	ISK <sup>c</sup>	DON <sup>d</sup>
USG 3230	77.4-	57.7-	123-	33	0	1	0	1	40+	37+	4
LW2848	77.1-	57.9-	125	34+	0	0	0	2	28	29	1
AgriMAXX Exp 2019 HRW	77-	61.4+	127+	30-	0	0	1+	5+	30	42+	2
SH 9310	77-	60.7+	123-	32	0	0	0	2	28	41+	2
VA19W-24	77-	59.3+	124	33	0	0	0	1	25	31	2
FS 878	76.6-	56.9-	124	32-	0	3	0	1	22	33	1
Progeny #BERKELEY	76.6-	58.7	123-	32	0	0	0	1	14	32	1
GA15VDH-FHB-MAS30-18ESc43F	76.3-	58.5	123-	31-	0	0	0	3	22	24	1
MAS #2	76.3-	59.6+	126+	38+	2+	1	0	2	42+	26	0
AgriMAXX Exp 2020 HRW	76.1-	60.4+	126+	31-	0	0	0	5+	25	40+	3
LW2148	75.5-	58.4-	126+	34	0+	4+	0	1	12	29	0
SY 576	75.5-	57.5-	129+	33	0	0	0	2	55+	31	4
KWS380	75.4-	59	125	32-	0	4+	0	3	15	18	2
FLLA10033C-6	75-	58.7	125	35+	0	0	0	4+	50+	32	4
NC12164-200T	74.4-	60.7+	124	33	0	1	0	1	30	39+	3
NC12642-81	74.4-	60.1+	122-	35+	0	2	0	2	16	33	0
MAS #106	74.2-	58.6	118-	32	1+	3	0	1	15	30	1
FL14167LDH-158	73.4-	58.9	125	35+	0	0	0	2	30	18	1
GA15VDH-FHB-MAS23-18LE43F	73.4-	59.3+	126+	31-	0	0	0	2	25	25	2
NC12164-97T	70.6-	60.2+	124	36+	1+	1	0	1	18	37+	1
Massey	70.4-	59.1	124	38+	1+	8+	0	1	8	6-	0
NC11546-14	69.9-	60+	124	34	0	0	0	3	20	20	0
mean	81.9	58.8	124.5	33.2	0.1	1.4	0.1	1.7	19	24.4	1.6
CV	8.8	1.1	0.6	4						32.1	25
LSD	3.9	0.4	0.8	1.1	0.3	1.7	0.5	1.9	12.1	12.1	

continued ...

A plus or minus sign indicates a performance significantly above or below the test average.

The 0-9 ratings indicate a genotype's response to disease or lodging where 0 = highly resistant and 9 = highly susceptible.

Parentheses below column headings indicate the number of site-years in which data were collected.

<sup>a</sup> Barley Yellow Dwarf

<sup>b</sup> Fusarium Diseased Kernels (percent).

<sup>c</sup> ISK Index =  $(0.3 \times \text{FHB Incidence} + 0.3 \times \text{FHB Severity} + 0.4 \times \text{Fusarium damaged kernels}) / 100$ .

<sup>d</sup> Deoxynivalenol concentration in the kernels (ppm).

Line	Grain Yield	Test Weight	Date Headed	Mature Height	Plant Lodging	Leaf Rust	Powdery Mildew	BYD <sup>a</sup> Virus	FDK <sup>b</sup>	ISK <sup>c</sup>	DON <sup>d</sup>
FLLA11004-7	67.4-	57.9-	128+	36+	0	0	0	1	30	36	2
mean	81.9	58.8	124.5	33.2	0.1	1.4	0.1	1.7	19	24.4	1.6
CV	8.8	1.1	0.6	4					32.1	25	
LSD	3.9	0.4	0.8	1.1	0.3	1.7	0.5	1.9	12.1	12.1	

A plus or minus sign indicates a performance significantly above or below the test average.

The 0-9 ratings indicate a genotype's response to disease or lodging where 0 = highly resistant and 9 = highly susceptible.

Parentheses below column headings indicate the number of site-years in which data were collected.

<sup>a</sup> Barley Yellow Dwarf

<sup>b</sup> Fusarium Diseased Kernels (percent).

<sup>c</sup> ISK Index =  $(0.3 \times \text{FHB Incidence} + 0.3 \times \text{FHB Severity} + 0.4 \times \text{Fusarium damaged kernels}) / 100$ .

<sup>d</sup> Deoxynivalenol concentration in the kernels (ppm).

**Table 4:** Performance of 15VDH-FHB-MAS33-13 in the 2020 Gulf Atlantic Nursery (AR, GA, LA, NC, SC, TX, VA)

Line	Yield % mean (8)	Yield Rank (8)	Grain Yield bu/ac (8)	Test Weight lb/bu (8)	Heading Date Jan 1 (6)	Plant Height in (4)	Plant Lodging (0-9) (4)
Hilliard	117	1	88.6+	58.2	98	39	0
15VDH-FHB-MAS38-01	109	5	82.8	56.5	91-	34-	2
Pioneer 26R41	107	10	81.3	58.1	103+	36	0
<b>15VDH-FHB-MAS33-13</b>	<b>101</b>	<b>22</b>	<b>76.4</b>	<b>59.2</b>	<b>99</b>	<b>38</b>	<b>0</b>
AGS3030	96	35	73	58.1	91-	35	0
SS8641	85	50	64.4-	57	95	37	1
mean			75.8	58.2	96.5	37.7	1
CV			15.1	3.1	3.8	7.1	130.4
LSD			11.3	1.8	4.2	3.8	1.7

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Line	Powdery Mildew (0-9) (2)	Stripe Rust (0-9) (2)	Leaf Rust (0-9) (1)	FHB score (0-9) (6)	FDK <sup>a</sup> % (6)	DON <sup>b</sup> ppm (3)
Hilliard	1	0	1.5	2	14	3
15VDH-FHB-MAS38-01	1	1	1.5	2	12	2
Pioneer 26R41	2	0	1.5	2	17	4
<b>15VDH-FHB-MAS33-13</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>6</b>	<b>1</b>
AGS3030	2	0	0	4	24	3
SS8641	0	0	0	6+	46+	6
mean	1.3	1.2	0.8	3.1	15.7	3.3
CV	90.8	171.4	95.0	62.3	77	72.6
LSD	2.4	4.2	1.6	2.2	13.8	3.8

A plus or minus sign indicates a performance significantly above or below the test average.

The 0-9 ratings indicate a genotype's response to disease or lodging where 0 = highly resistant and 9 = highly susceptible.

<sup>a</sup>Fusarium Diseased Kernels (percent).<sup>b</sup>Deoxynivalenol concentration in the kernels (ppm)

**Table 5:** Performance of 15VDH-FHB-MAS33-13 across 19 locations in the 2021 Uniform Southern Soft Winter Wheat Nursery.

Line	Grain Yield % mean (19)	Grain Yield rank (19)	Grain Yield bu/ac (19)	Test Weight lb/bu (15)	Heading Date Julian (14)	Plant Height in (12)	Flour Yield % (1)	Flour Yield Grade (1)	Cookie Diameter cm (1)	Cookie Diameter Grade (1)
16VDH-SRW03-018	109	1	85.1+	58.7+	117	36+	68.1	C	19.3	B
<b>15VDH-FHB-MAS33-13</b>	<b>108</b>	<b>2</b>	<b>84.4+</b>	<b>56.9</b>	<b>116</b>	<b>33</b>	<b>68.6</b>	<b>C</b>	<b>20.4</b>	<b>A</b>
KWS342	107	3	83.5+	57.1	118	33	70.5	B	19.5	A
Hilliard	107	4	83.3	57.1	116	33	66.7	D	18.7	C
KWS369	107	5	83.1	56.3	121+	32	69.6	B	20.2	A
LA13154D-WN1	106	6	82.6	56.7	117	36+	69.7	B	19.9	A
TX16DDH579	105	7	82.2	58.6	117	36+	71.1	A	20.0	A
TWR 09008	105	8	82	57.1	116	33	68.6	C	19.8	A
LA16020LDH-22	105	9	81.8	58.7+	113-	32	68.8	C	18.0	D
GA151313-LDH224-19E38	105	10	81.7	58.1	117	34	67.1	D	18.8	C
Pioneer Brand 26R41	105	11	81.7	57	119+	32-	68.9	C	19.5	A
TWR 09056	104	12	81.5	57.7	117	34	66.2	F	19.6	A
15VDH-FHB-MAS38-01	104	13	81.1	56.2-	111-	30-	68.8	C	19.5	A
LES19-0268	104	14	80.9	56.9	118	35	67.8	D	19.3	B
KWS338	103	15	80.4	57.2	117	32	67.3	D	19.3	B
15VTK-1-101	103	16	80.3	57.4	117	29-	66.8	D	19.5	A
LA15203-LDH274	103	17	80.3	57.7	112-	35	68.2	C	19.0	B
B16#04-8348	103	18	80.2	58.4	113-	31-	66.1	F	19.0	B
GA121012-13-19LE8	102	19	79.8	57.2	120+	37+	69.4	C	19.8	A
ARDH12753-103-1536M	102	20	79.7	57.2	118	34	68.4	C	19.9	A
B16#04-7370	102	21	79.2	56.7	117	30-	68.2	C	20.0	A
GA111055-1-19LE12	101	22	78.8	56.9	117	33	69.8	B	19.2	B
AR09485-10-1	101	23	78.6	57.7	115	38+	71.4	A	19.3	A
LES19-0493	100	24	78.1	58.5	119+	33	67.9	D	19.2	B
mean			78	57.4	116.9	33.8				
LSD			5.3	1.2	1.8	1.6				
CV			10.8	2.9	2	5.9				

continued ...

A plus or minus sign indicates a performance significantly above or below the test average.

The 0-9 ratings indicate a genotype's response to disease or lodging where 0 = highly resistant and 9 = highly susceptible.

Parentheses below column headings indicate the number of site-years in which data were collected.

Line	Grain Yield	Grain Yield	Grain Yield	Test Weight	Heading Date	Plant Height	Flour Yield	Flour Yield	Cookie Diameter	Cookie Diameter
NC12093-10	99	25	77.6	57.2	117	33	70.4	B	19.0	B
LA15203-LDH200	99	26	77.2	57.3	118	34	66.1	F	20.2	A
AR15V31-26-2285N	99	27	77	58.6+	116	35	67.3	D	19.2	B
TWR 09051	98	28	76.8	57.5	117	36+	68.6	C	19.6	A
NC11363-25	98	29	76.7	58.8+	117	34	66.7	D	19.3	B
20-UMD-20	98	30	76.2	57.2	116	31-	66.1	F	18.8	C
TX17D2452	97	31	76	57.2	120+	38+	69.6	B	19.9	A
Jamestown	97	32	76	59.5+	113-	32-	66.8	D	18.2	D
TN 2101	97	33	75.8	56.1-	117	36+	66.9	D	19.1	B
NC16-19288	96	34	74.9	58.9+	119+	34	68.0	C	19.0	B
GANC12642-12-19LE16F	96	35	74.6	56.4	116	34	64.8	F	19.0	B
20-UMD-18	96	36	74.5	58.6	117	30-	65.6	F	19.6	A
TX17D2337	95	37	74.2	57.2	116	33	66.4	F	20.0	A
TN 2103	95	38	74	57	118	33	68.6	C	20.2	A
TN 2102	94	39	73.4	55.8-	118	35	70.2	B	19.6	A
FLLA10033C-6	93	40	72.6-	56.1-	116	36+	66.8	D	18.1	D
20-UMD-133	93	41	72.6-	57.6	119+	31-	69.4	C	19.5	A
FLLA11004-7	93	42	72.6-	56.1-	119	38+	69.6	B	19.5	A
FL14167LDH-158	93	43	72.4-	56.1-	116	35	66.9	D	18.4	C
AGS 2000	93	44	72.4-	57	114-	35	70.4	B	19.5	A
AR11289-8-1	91	45	71.1-	59.9+	118	36+	70.3	B	19.4	A
TWR 09011	86	46	66.9-	57.6	119+	34	68.2	C	20.2	A
mean		78	57.4	116.9	33.8					
LSD		5.3	1.2	1.8	1.6					
CV		10.8	2.9	2	5.9					

A plus or minus sign indicates a performance significantly above or below the test average.

The 0-9 ratings indicate a genotype's response to disease or lodging where 0 = highly resistant and 9 = highly susceptible.

Parentheses below column headings indicate the number of site-years in which data were collected.

**Table 6:** Performance of 15VDH-FHB-MAS33-13 in each of 19 locations in the 2021 Uniform Southern Soft Winter Wheat Nursery.

Line Line	BIL <sup>†</sup> % mean	BIL rank	BIL bu/ac	BAL % mean	BAL rank	BAL bu/ac	BVA % mean	BVA rank	BVA bu/ac	BMS % mean	BMS rank	BMS bu/ac	CKY % mean	CKY rank	CKY bu/ac
<b>15VDH-FHB-MAS33-13</b>	113	4	110	98	28	86	106	13	85	118	3	106	100	23	94
Hilliard	106	15	103	116	3	102	109	11	87	110	10	98	98	29	92
15VDH-FHB-MAS38-01	112	5	109	103	19	90	120	2	96	87	39	79	102	18	95
mean			97			88			80			90			94
CV			9			13			12			10			6
LSD			13			16			19			12			13

Line Line	CIL % mean	CIL rank	CIL bu/ac	CSC % mean	CSC rank	CSC bu/ac	FSC % mean	FSC rank	FSC bu/ac	GTx % mean	GTx rank	GTx bu/ac	HIL % mean	HIL rank	HIL bu/ac
<b>15VDH-FHB-MAS33-13</b>	116	4	90	112	9	74	106	12	52	82	39	41	131	1	91
Hilliard	106	14	81	117	5	77	95	33	47	128	3	63	91	33	64
15VDH-FHB-MAS38-01	103	20	79	90	36	60	112	3	55	78	40	39	130	3	90
mean			77			66			49			50			70
CV			9			13			8			11			6
LSD			13			11			8			7			8

Line Line	MAR %mean	MAR rank	MAR bu/ac	MTN %mean	MTN rank	MTN bu/ac	PGA %mean	PGA rank	PGA bu/ac	PKY %mean	PKY rank	PKY bu/ac	RNC %mean	RNC rank	RNC bu/ac
<b>15VDH-FHB-MAS33-13</b>	98	31	67	117	1	109	103	14	91	117	2	91	101	24	82
Hilliard	114	4	79	110	4	103	109	7	95	92	36	72	119	7	97
15VDH-FHB-MAS38-01	75	46	52	96	36	89	116	1	102	96	30	75	105	17	86
mean			69			93			88			78			82
CV			9			10			10			8			16
LSD			10			18			3			12			31

Line Line	WVA % mean	WVA rank	WVA bu/ac	WLA % mean	WLA rank	WLA bu/ac	WKY % mean	WKY rank	WKY bu/ac	WMD % mean	WMD rank	WMD bu/ac
<b>15VDH-FHB-MAS33-13</b>	112	3	100	92	36	52	113	5	93	109	12	91
Hilliard	100	22	89	117	10	66	103	19	85	98	25	81
15VDH-FHB-MAS38-01	113	1	101	100	31	57	116	2	96	110	9	92
mean			89			57			83			83
CV			5			7			7			26
LSD			9			8			12			14

<sup>†</sup>Location abbreviations indicate the state abbreviation (first two letters) and city (last letter).

**Table 7:** Performance of 15VDH-FHB-MAS33-13 in the Southern Uniform Winter Wheat Scab Nursery in 2021.

Line	FHB Rating <sup>a</sup>	FHB Incidence <sup>b</sup>	FHB Severity <sup>c</sup>	FHB Index <sup>d</sup>	FDK <sup>e</sup>	ISK <sup>f</sup>	DON <sup>g</sup>
JAMESTOWN	3	32	15	5	16	19	3
15VDH-FHB-MAS22-14	2	16	6	1	20	4	3
15VDH-FHB-MAS38-01	2	22	7	2	24	8	3
<b>15VDH-FHB-MAS33-13</b>	<b>2</b>	<b>13</b>	<b>6</b>	<b>1</b>	<b>18</b>	<b>7</b>	<b>3</b>
ERNIE	3	22	10	2	21	10	7
BESS	2	26	7	1	21	13	7
COKER9835	6	66+	54+	48+	54+	64+	9
SS 8641	6	56	56+	47+	55+	68+	15+
mean	3	32	17	9	27	24	6
LSD	3	32	22	22	25	24	6
CV	45.3	50.3	64.9	121.3	48	48.7	48.1

<sup>a</sup>Fusarium head blight Rating is a 0-9 visual score<sup>b</sup>Fusarium head blight Incidence is the percent of heads with some visual disease<sup>c</sup>Fusarium head blight Severity is the average severity of head infection<sup>d</sup>Fusarium head blight Index = (Incidence × Severity)/100<sup>e</sup>Fusarium Diseased Kernels (percent)<sup>f</sup>ISK Index = (0.3 × FHB Incidence + 0.3 × FHB Severity + 0.4 × Fusarium damaged kernels) / 100<sup>g</sup>Deoxynivalenol concentration in the kernels (ppm)

**Table 8:** Milling and Baking quality measures from the Virginia State Official Variety Test in Warsaw VA, 2020.

Line	NIR Kernel Protein (at 12%)	SKCS Kernel Hardness	SKCS Kernel Diameter (mm)	SKCS Kernel Weight (mg)	Adjusted Flour Yield (%)	Adjusted Flour Yield Grade	Adjusted Flour Yield Rank	Softness Equivalent (%)	Flour Protein (at 14%)
Hilliard	9.6	20.7	2.9	41.9	67.4	D	107	56.4	7.5
Liberty 5658	9.3	28.3	2.9	41.6	69.0	C	73	56.4	7.6
CP 8118	9.5	34.7	2.8	40.2	67.0	D	119	53.7	8.1
SH 7222	9.1	31.1	2.8	39.5	69.8	B	44	55.6	7.5
VA17W-75	9.7	35.8	2.8	41.2	67.7	D	100	51.1	7.9
15VDH-FHB-MAS25-15	9.2	28.8	2.7	34.9	66.1	F	129	54.6	7.4
15VDH-FHB-MAS38-01	9.4	13.6	3.0	38.9	68.4	C	83	52.3	7.0
<b>15VDH-FHB-MAS33-13</b>	<b>9.5</b>	<b>22.5</b>	<b>2.8</b>	<b>35.8</b>	<b>69.9</b>	<b>B</b>	<b>42</b>	<b>56.4</b>	<b>7.5</b>
16VDH-SRW03-023	9.1	24.3	2.9	42.0	69.7	B	48	54.8	7.3
16VDH-SRW09-025	9.4	22.8	2.8	40.1	68.0	D	93	57.1	7.3
SY Viper	9.9	29.0	2.9	47.5	67.1	D	114	51.8	8.1
Laverne	9.8	24.4	2.9	46.3	68.8	C	77	48.5	6.5
Shirley	9.6	15.6	2.9	44.7	70.7	A	19	52.3	7.5
USG 3316	8.8	13.7	2.8	39.2	72.6	A	1	63.7	7.0
Pioneer 26R45	9.2	18.7	2.7	38.0	69.7	B	46	54.6	7.4

Line	Lactic Acid SRC (%)	Sodium Carbonate SRC (%)	Sucrose SRC (%)	Water SRC (%)	Cookie Diameter (cm)	Cookie Diameter Grade	Cookie Diameter Rank
Hilliard	107.8	75.3	101.3	57.3	17.7	F	116
Liberty 5658	123.7	72.6	96.6	55.8	18.0	D	103
CP 8118	109.1	80.6	105.4	59.9	17.5	F	122
SH 7222	113.1	77.9	98.7	58.1	18.1	D	98
VA17W-75	114.4	79.5	104.5	60.1	17.6	F	119
15VDH-FHB-MAS25-15	123.2	79.1	104.6	59.5	18.1	D	97
15VDH-FHB-MAS38-01	86.7	68.9	92.2	53.5	18.5	C	69
<b>15VDH-FHB-MAS33-13</b>	<b>115.9</b>	<b>69.9</b>	<b>94.9</b>	<b>54.9</b>	<b>18.4</b>	<b>C</b>	<b>81</b>
16VDH-SRW03-023	94.7	74.5	97.1	56.9	18.8	C	51
16VDH-SRW09-025	111.5	73.9	101.5	56.1	18.8	C	49
SY Viper	102.5	81.6	108.3	60.0	18.2	D	96
Laverne	89.7	73.9	100.6	60.1	18.3	D	88
Shirley	81.3	74.9	95.0	57.7	18.9	B	42
USG 3316	100.0	70.0	87.7	53.8	19.9	A	4
Pioneer 26R45	80.1	66.6	87.0	50.6	19.3	A	22