Report on the 2017-2018 Northern Uniform Winter Wheat Scab Nurseries (NUWWSN and PNUWWSN)

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INTRODUCTION

The objective of the Northern Uniform Winter Wheat Scab Nursery (NUWWSN) and the Preliminary Northern Uniform Winter Wheat Scab Nursery (PNUWWSN) is to screen winter wheat genotypes adapted to the northern portion of the eastern US for scab resistance. Breeders submit entries each also conducts the trial in inoculated and misted FHB nurseries within their programs. Data is then sent to the coordinator for summation and distribution. Public and private breeders submit lines using their own criteria for inclusion though all must be adapted. Entries vary in the degree of pretesting and selection and their purpose (germplasm, cultivars). Most of the entries have only native resistance though some have undergone MAS for *Fhb1* and other QTL.

MATERIAL AND METHODS

The locations that reported data and the traits assessed are listed in Tables 1, 2 and 3. The NUWWSN had 55 entries (51 lines & four checks, Table 4) from 11 programs and we obtained phenotypic data on seven FHB-related traits from 12 locations. The PNUWWSN had 46 entries (42 lines & four checks, Table 5) from 8 programs and we obtained phenotypic data from 10 locations. Cooperators collect replicated data and submit means to the coordinator. The means from individual locations are used in an analysis over locations. The genotype x environment interaction (GEI) term is the error and is used to calculate an LSD (0.05). The LSD value is used to determine if a particular entry mean is statistically equal to the lowest entry mean (such values are designated with an “l”) or the highest entry mean (such values are designated with an “h”) for each trait. Variance components were estimated using PROC MIXED from SAS considering entries and locations to be random.

Several cooperators scored FHB Index using a 0-9 scale (0=no disease, 9=severe disease). Several also rated incidence and severity on a 0-9 scale. This created issues with combining IND, INC, and SEV data over locations. For INC and SEV we transformed the 0-9 data to a percentage by multiplying the value by 10. These tables then present the data as reported values (eg the % data provided by the cooperator) and the calculated values (eg 0-9 x 10). Data for IND is report in two ways: 0-9 (referred to as “F09” trait) and as a %. For IND thereported 0-9 values were multiplied by 10 to provide a percentage value. For the “F09” trait the percent data was divided by 10.

Genomic estimated breeding values for all entries in the 2018 test were generated by Brian Ward of the USDA Eastern Regional Small Grains Genotyping Laboratory at NCSU. Marker and phenotypic data from the 204-2017 P+NUWWSN were used to build the genomic selection model (using rrBLUP) and that model was used to get GEBVs for all 2018 entries.

RESULTS

Disease Pressure (Table 3)

- Average IND > 20% in 7 of 11 NUWWSN tests and in 6 of 0 PNUWWSN tests
- Average DON > 20% in 4 of 6 NUWWSN tests and in 2 of 5 PNUWWSN tests

Trait Correlations and heritability (Tables 6, 7)

- The correlation among all FHB traits exceeded 0.40 in both tests
- HD was positively correlated with DON in both tests
- "h^2" exceeded 0.57 for all traits in both tests
- "h^2" was lowest for DON in both tests

Level of Resistance (Tables 10,12)

- ❖ There was greater resistance in the PNUWWSN than in the NUWWSN
- ❖ Relative to the checks, resistance was greatest for DON than the other FHB traits (see Fig. 1)
- ❖ Relative to the checks there does not appear to be a trend for increasing resistance for IND or DON from 2013 to 2018. Analyses of BLUPs from 1998 to 2018 show that IND scores are declining while DON has stayed relatively unchanged (analyses not shown)
- In the NUWWSN an average over all traits of 8% of the lines were superior to Truman
- In the NUWWSN an average over all traits of 50% of the lines were superior to Freedom
- In the NUWWSN, the % of lines with values < Truman ranged from 0% (IND) to 37% (DON)
- In the NUWWSN, the % of lines with values < Freedom ranged from 37% (F09,SEV) to 71% (DON)
- In the PNUWWSN an average over all traits of 15% of the lines were superior to Truman
- In the PNUWWSN an average over all traits of 68% of the lines were superior to Freedom
- In the PNUWWSN, the % of lines with values < Truman ranged from 0%(INC) to 49% (DON)
- In the PNUWWSN, the % of lines with values < Freedom ranged from 0%(INC) to 77% (DON)

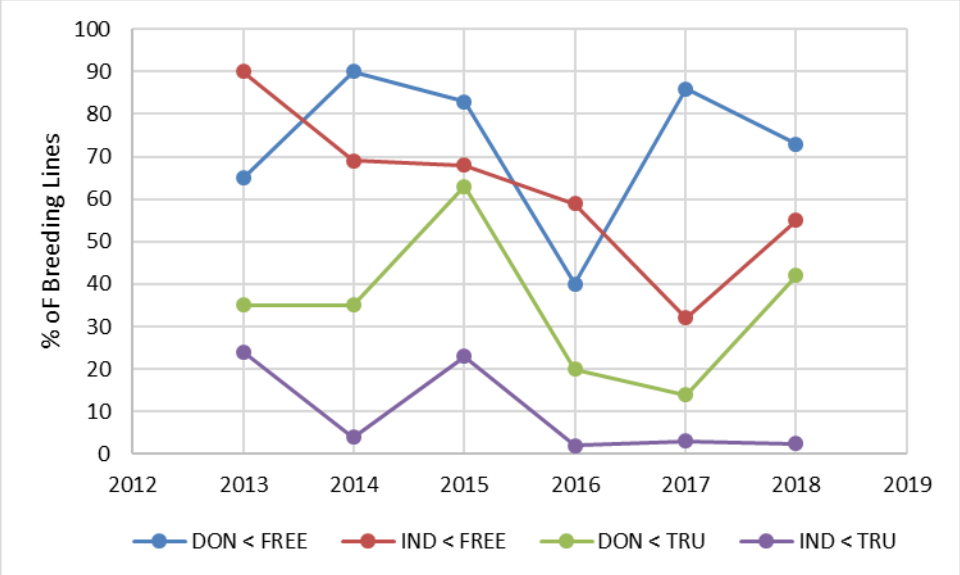

Figure 1. The percentage of P+NUWWSN breeding lines with IND or DON values that are les than that of Truman (TRU, the resistant check) or less than that of r Freedom (FREE, the moderately resistant check)

The tables in this report are created from excel files that are available from Clay Sneller (sneller.5@osu.edu).

Table 1. Fusarium Head Blight and other traits assessed in 2016-17 P+NUWWSN

Code	Trait	Description
INC	Disease incidence	% of heads with at least one infected spikelets
SEV	Disease severity from field tests	% of infected spikelets in an infected head.
IND	Disease index	IND = (SEVxINC)/100
F09	FHB Index rated on a 0-9 scale	0= no disease, 9-very severe disease
FDK	Fusarium damaged kernels	Either a visual assessment of the percent infected kernels, or a percent of scabby seed by weight
ISK	Composite of head and kernel traits	ISK Index = .3 (Severity) + .3 (Incidence)+.4 (FDK)
DON	DON (vomitoxin)	PPM of vomitoxin in grain
GH	Greenhouse severity	Same as SEV except from greenhouse
HD	Heading Date	Julian date when 50% of spikes have emerged from the boot
HGT	Plant Height	Height in inches from soil to top of spike of a typical plant

Table 2. Cooperators in the 2017-2018 P+NUWWSN

ENV CODE	LOCATION	NUWWSN	PNUWWSN	COOPERATORS	INSTITUTE	CODE
ILCHA	Champaign, IL	yes	yes	Jana Murche	KWS Cereals	KWS
INWLA	W. Lafayette, IN	yes	yes	Mohsen Mohammadi	Purdue University	PUR
KYLEX	Lexington, KY	yes	yes	David Van Sanford	University of Kentucky	UKY
MIELA	East Lansing, MI	yes	yes	Eric Olson, Lee Siler	Michigan State University	MSU
MOCOL	Columbia, MO	yes	yes	Anne McKendry,	University of Missouri	UMO
NELIN	Lincoln, NE	yes	no	Stephen Baenziger, S Wegulo	University of Nebraska	UNE
NYITH	Ithaca, NY	yes	no	Mark Sorrells, Gary Bergstrom	Cornell University	COR
INLAY	Layfayette, IN	yes	yes	Don Obert	Limagrain	LIM
OHWOO	Wooster, Ohio	yes	yes	Clay Sneller, Pierce Paul	The Ohio State University	OSU
VAMTH	Mt Hope, VA	yes	yes	Carl Griffey	Virginia Tech	VAT
VAWAR	Warsaw, VA	yes	yes	Carl Griffey	Virginia Tech	VAT

Table 3. Means for each trait and each location for the 2017-2018 P+NUWWSN. PM=powdery mildew, LR = leaf rust, YR = yellow rust, SLB=Stag Leaf Blotch, FR=Foliar health rating. Values in tan are calculated from reported value.

A. NUWWSN

LOC	INC	SEV	IND	F09	FDK	ISK	DON	HD	HGT	LDG	YLD	TW	SLB	PM	YR	FR
	%	%	%	0-9	%	%	ppm	days	inches	0-9	bu/ac	lbs/bu	0-9	0-9	0-9	0-9
ILCHA			32.7	3.3	3.1	20.9	0.3	140.0	31.9				2.9			
ILURB	19.4	39.7	10.4	1.0	19.0	27.2	2.1									
INLAY	45.5	35.4	18.3	1.8				136.6		1.3	92.1	58.0		0.1	0.2	
INWLA	70.1	26.3	21.5	2.2			3.5	135.4								
KYLEX			42.4	4.5	15.7	31.6	6.2	127.3	36.5							
MIELA	81.5	34.7	29.6	2.8				147.6								
MOCOL	89.1	27.1	25.0	2.7												
NELIN			4.8	0.5	1.7	3.6	0.7									
NYITH	50.3	16.3	9.0	0.9	64.3	45.7		150.0								
OHWOO			30.3	3.0				144.3								5.2
VAMTH	90.6	49.4	47.2	4.8	32.0	42.1	14.7	122.9						5.2		
VAWAR								153.5	34.5	2.7	57.4	56.8		2.0		

B. PNUWWSN

	INC	SEV	IND	F09	FDK	ISK	DON	HD	HGT	LDG	YLD	TW	SLB	PM	YR	FR
	%	%	%	0-9	%	%	ppm	days	inches	0-9	bu/ac	lbs/bu	0-9	0-9	0-9	0-9
ILCHA			31.9	3.2	3.0	20.3	0.2	139.4	31.8				3.0			
ILURB	12.4	34.7	6.1	0.6	16.6	21.8	1.3									
INLAY	40.3	34.7	16.8	1.7	25.0	32.5		136.2		0.1	90.4	58.5		0.4	0.2	
INWLA	68.4	16.5	12.0	1.2			1.1	134.9								
KYLEX			41.5	4.5	16.2	31.3	8.6	125.8	35.4							
MIELA	33.9	39.5	33.9	3.2				147.9								
MOCOL	92.8	28.3	26.8	2.8												
OHWOO			24.1	2.4				143.9								5.1
VAMTH	90.2	50.1	46.4	4.6	33.8	42.2	14.0	126.5						4.2		
VAWAR								152.7	35.0	3.8	60.3	56.4		1.7		

Table 4. Entries in the 2017-2018 NUWWSN

ENTRY	NAME	PEDIGREE
1	TRUMAN	
2	ERNIE	
3	FREEDOM	
4	PIONEER2545	
5	IL13-20616	IL01-34159/IL00-8530//IL04-8445/IL00-8530
6	IL14-11718	IL07-20728/IL06-23571
7	IL14-11848	IL07-20728/IL07-4348
8	IL14-28462	IL06-14262/IL06-23571//IL06-23571/IL05-4236
9	IL14-DC-64-95-118	MO081320/IL06-13721//IL07-4415/IL02-18228
10	VA15W-68	P992231A1-2-1(Patton//Patterson/Bizel/3/9346)/Shirley(VA03W-409)
11	VA16W-29	P992231A1-2-1(Patton//Patterson/Bizel/3/9346)/Shirley(VA03W-409)
12	VA16W-148	MO_080104(L910097/MO92-599)/Shirley(VA03W-409)
13	VA16W-149	MO_080104(L910097/MO92-599)/Shirley(VA03W-409)
14	13VA-FHB-DH252	MD03W61-09-7/Jamestown//GA04570-10E46
15	KY06C-1195-37-2-5	Pembroke08/02JH000014//KY96C-0770-3
16	X08C-1181-61-15-5	OH02-12686/IL02-19463
17	KY06C-1178-16-10-3	KY93C-0004-22-1/NC03-11458//KY97C-0519-04-05
18	KY07C-1145-94-12-5	IL99-15867/B990081//KY97C-0554-04-05
19	X08C-1077-11-18-3	SSMPV-57/P.03630A1-18
20	NY11013-10-72-1314	10011-6xAva=OH02-12686/Ava-6//Ava
21	NY11013-10-15-1312	10011-6xAva=OH02-12686/Ava-6//Ava
22	NY02008-807	NY7387/Cayuga/Superior
23	NY09095-16-928	(Pio25w41/Whatford//(NY7388/Pinb-a//NY73886///NY7388-3////NY7388-
24	NY02007-1206	NY7387/Cayuga/Caledonia
25	KWS152	W06-202B1/MO080104
26	KWS149	LCS19227/VA09W-75
27	KWS192	W06-202/USG3555
28	KWS191	W06-202/USG3555
29	KWS193	Shirley/P992231A1-2-1
30	MI14R0267	Oasis/D8006W
31	MI14W0190	Jupiter/3/E6003//FHB12/Ambassador
32	MI14W0906	MISCHDS-148/VA03W-412
33	MI14R1145	Hopewell/P03207A1-7
34	MO131753	110201SP
35	MO151163	APBranson/030291
36	MO151126	030291SP/010996
37	MO160132	981020//P92201D5-2-1/980725
38	MO160140	981020//P92201D5-2-1/980725
39	0566A1-3-1-1-63	INW0412/6/9017C1//92823A1/9218B4/3/P107/4/PATT/5/ACC3130/PATT/7/992060G1-1
40	04620A1-1-7-4-10	TRUMAN/9017C1//92823A1/9218B4/3/P107/4/PATT/5/INW9811/GLD//96204A1
41	0527A1-9-14-4-3-3	99751D8-2-3/96169RE2-3-6-1-4/3/7D(E)//97462A1-21-1-5-1-15/INW0412
42	0762A1-2-8	981129A1-45-3/99793RE2-3//INW0301/92145E8-7-7-3-57/3/981477A1/981312A1//INW0316
43	07419A1-16-1-1-16-1-1	981128A1-5-3-1/981477A1-10-2-1//VA98W-593/3/ChineseSprph1b/KS242-2(275-4)//ChineseSpr/4/99751D8-2-1-1/5/981128A1-5-3-1/981477A1-10-2-1//92145E8-7-7-1-9/6/MSUE1007-W
44	OH12-194-24	SHIRLEY/992178A3-1-1
45	OH12-195-22	SHIRLEY/992178A3-1-1
46	OH13-314-18	BRANSON/SHIRLEY
47	NE13604	SD00258-1/McGill
48	NW13493	SD98W175-1/NW03666
49	NE13515	HV9W00-B267/NI04421//NI04427
50	NE14494	OK06822W/HV9W96-1383W//NW03681
51	NE14696	NE05537/Overland
52	LES168062	MO111359/LCS19228
53	LES167062	LCS19227/IL07-20728
54	LES167906	KY05C-1600-92-9-5/19707
55	LES167499	DH14IND56-36

Table 5. Entries in the 2017-2018 PNUWWSN

ENTRY	NAME	PEDIGREE
1	TRUMAN	
2	ERNIE	
3	FREEDOM	
4	PIONEER2545	
5	IL14-3934	IL97-1828/MO080104
6	IL14-9542	IL07-4348/IL08-29878
7	IL14-11312	IL07-19334/MO081652
8	IL14-11911	IL07-20728/IL08-8844
9	IL14-11916	IL07-20728/IL08-8844
10	VA16W-224	P992231A1-2-1(Patton//Patterson/Bizel/3/9346)/LA01*425(P2571/Y91-6B)//Shirley(VA03W-409)
11	VA16W-196	USG3665/SS8415(VA07W-415)//Yorktown(VA08W-294)
12	13VTK429-3	VA08MAS-369(McCormick/GA881130LE5)/Yorktown(VA08W-294)//Hilliard(VA11W-108)
13	13VTK434-89	VA09W-75(Yorktown"S")/SY-Harrison//Hilliard(VA11W-108)
14	DH13SRW021-80	Yorktown(VA08W-294)/B050154(Hopewell/BL920520)
15	KY10-0178-1-2-5	Branson//Pembroke/KY02C-3005-25
16	KY09C-0128-72-2-1	SSMPV-57//IL02-19463/0128A1-22
17	X09-1021-47-19-3	KY97C-0519-04-07/KY02C-3007-41
18	KY10-0178-2-19-5	Branson//Pembroke/KY02C-3005-25
19	KY09C-1245-99-1-5	LA01-425/VA06W-558
20	KWS154	Branson/SE991036R-C13
21	KWS151	SE051206-49/Yorktown
22	KWS153	W06-202B1/MO080104
23	KWS074	unknown
24	KWS095	IL04-8445/Sunburst
25	KWS127	LA01*425/M04-4802
26	MI14W0742	UNKNOWN
27	MI15R0068	Ambassador//D6234/VA06W-553
28	MI15R0269	Hopewell/OH05-249-32
29	MI14W0860	Award/D8006
30	MI14W0833	D6234/NYBatavia
31	MI15R0428	UNKNOWN
32	MI15R0259	Hopewell/KY02C-3005-25
33	MO160438	0808074/081293,23K,F6#91
34	MO160455	MO121412,981114//940317/MV96-885
35	MO160458	081268/081791,21KF6#106
36	MO160471	081535/081652,19KF6#108
37	MO160959	981020//P92201D5-2-1/980725,080864RS
38	0527A1-7-7-3-1	99751D8-2-3/96169RE2-3-6-1-4/3/7D(E)//97462A1-21-1-5-1-15/INW0412
39	05247A1-7-7-3-1	99840C4/5/INW0315/3/INW0301MADSEN//INW0315/4/97395B1/6/99840C4//99794RA1
40	0566A1-3-1-63-3	INW0412/6/9017C1//92823A1/9218B4/3/P107/4/PATT/5/ACC3130/PATT/7/992060G1-1
41	02444A1-23-1-3-4	981129A1-45-3/99793RE2-3//INW0301/92145E8-7-7-3-57
42	0762A1-2-8	981129A1-45-3/99793RE2-3//INW0301/92145E8-7-7-3-57/3/981477A1/981312A1//INW0316
43	OH14-216-47	LA01*425 /IL04-8445
44	OH14-112-72	02444A1-23-9/IL04-8445
45	OH14-112-47	02444A1-23-9/IL04-8445
46	OH14-112-15	02444A1-23-9/IL04-8445
47	OH14-112-34	02444A1-23-9/IL04-8445

Table 6. Correlation of traits in the 2017-2018 P+NUWWSN. Values whose |r| > 0.23 are significant.

A. NUWWSN

	INC	SEV	IND	F09	FDK	ISK	DON	HD	HGT
INC		0.73	0.85	0.85	0.61	0.82	0.45	-0.27	-0.54
SEV	0.73		0.91	0.91	0.73	0.85	0.56	0.01	-0.22
IND	0.85	0.91		1.00	0.73	0.92	0.52	-0.11	-0.40
F09	0.85	0.91	1.00		0.73	0.92	0.52	-0.10	-0.39
FDK	0.61	0.73	0.73	0.73		0.86	0.57	0.19	-0.13
ISK	0.82	0.85	0.92	0.92	0.86		0.52	-0.07	-0.35
DON	0.45	0.56	0.52	0.52	0.57	0.52		0.42	0.01
HD	-0.27	0.01	-0.11	-0.10	0.19	-0.07	0.42		0.69
HGT	-0.54	-0.22	-0.40	-0.39	-0.13	-0.35	0.01	0.69	

B. PNUWWSN

	INC	SEV	IND	F09	FDK	ISK	DON	HD	HGT
INC		0.86	0.89	0.88	0.78	0.89	0.60	0.28	-0.40
SEV	0.86		0.95	0.95	0.81	0.92	0.77	0.33	-0.15
IND	0.89	0.95		1.00	0.83	0.96	0.73	0.30	-0.25
F09	0.88	0.95	1.00		0.83	0.96	0.73	0.30	-0.24
FDK	0.78	0.81	0.83	0.83		0.88	0.70	0.42	-0.11
ISK	0.89	0.92	0.96	0.96	0.88		0.72	0.30	-0.29
DON	0.60	0.77	0.73	0.73	0.70	0.72		0.50	0.01
HD	0.28	0.33	0.30	0.30	0.42	0.30	0.50		0.22
HGT	-0.40	-0.15	-0.25	-0.24	-0.11	-0.29	0.01	0.22	

Table 7. Summary of variance components and their ratios from the 2017-2018 P+NUWWSN. Entry mean h^2 was calculated as $V_g/(V_g+(V_{error}/e))$ where e is the number of environments.

A. NUWWSN

NUWWSN	INC	SEV	IND	F09	FDK	ISK	DON	HD	HGT
Genotype	95.50	59.80	60.70	0.60	47.90	34.00	1.28	3.65	10.98
Error	170.80	127.90	108.50	1.07	96.80	50.80	4.69	1.35	1.47
# Envs	7	7	11	11	6	6	5	9	3
Vg/(Vg+Verror)	0.36	0.32	0.36	0.36	0.33	0.40	0.21	0.73	0.88
Vg/Verror	0.56	0.47	0.56	0.56	0.49	0.67	0.27	2.70	7.47
"h2"	0.80	0.77	0.86	0.86	0.75	0.80	0.58	0.96	0.96

B. PNUWWSN

PNUWWSN	INC	SEV	IND	F09	FDK	ISK	DON	HD	HGT
Genotype	71.51	118.30	70.60	0.70	45.70	57.80	2.33	1.59	11.50
Error	127.70	134.70	106.00	1.03	75.30	52.90	6.76	1.01	1.62
# Envs	6	6	9	9	5	5	5	7	2
Vg/(Vg+Verror)	0.36	0.47	0.40	0.40	0.38	0.52	0.26	0.61	0.88
Vg/Verror	0.56	0.88	0.67	0.68	0.61	1.09	0.34	1.57	7.10
"h2"	0.77	0.84	0.86	0.86	0.75	0.85	0.63	0.92	0.93

Table 8. Best (top) and worst (bottom) entries in the 2017-2018 NUWWSN. Summary statistics are over all entries.

ENTRY	NAME	INC		SEV		IND		F09		FDK		ISK		DON		#l	#h	PC1	Fhb1
36	MO151126	42.8	l	15.8	l	11.6	l	1.2	l	7.9	l	14.6	l	2.3	l	7	0	-4.44	no
7	IL14-11848	51.0	l	12.0	l	11.4	l	1.2	l	10.5	l	17.8	l	1.2	l	7	0	-4.34	**YES**
35	MO151163	44.4	l	14.3	l	12.3	l	1.2	l	12.1	l	18.0	l	2.1	l	7	0	-3.90	no
1	TRUMAN	48.7	l	14.6	l	11.3	l	1.1	l	11.5	l	17.3	l	3.8	l	7	0	-3.81	no
37	MO160132	45.2	l	19.4	l	15.2	l	1.5	l	12.6	l	20.2	l	3.3	l	7	0	-3.13	no
34	MO131753	52.3	l	19.8	l	15.5	l	1.6	l	16.0	l	19.2	l	3.5	l	7	0	-2.70	no
5	IL13-20616	56.9		16.9	l	14.6	l	1.4	l	11.8	l	19.2	l	3	l	6	0	-3.13	**YES**
42	0762A1-2-8	49.9	l	15.2	l	17.5	l	1.7	l	20.2		24.0		1.8	l	5	0	-2.55	**YES**
30	MI14R0267	54.5	l	18.3	l	14.4	l	1.5	l	18.5	l	25.0		4.2		5	0	-2.13	no
38	MO160140	56.9		21.0	l	16.7	l	1.7	l	14.5	l	23.3		3.8	l	5	0	-2.09	no
17	KY06C-1178-16-10-3	55.8	l	20.0	l	15.6	l	1.6	l	22.1		22.2	l	4.3		5	0	-1.95	**HET**
4	PIONEER2545	78.2	h	43.3	h	41.4	h	4.1	h	33.0		41.3	h	7.2	h	0	6	4.60	no
55	LES167499	89.9	h	47.3	h	45.5	h	4.5	h	34.0	h	42.8	h	5.1	h	0	7	5.28	no
32	MI14W0906	77.8	h	47.6	h	47.0	h	4.7	h	45.0	h	46.4	h	4.9	h	0	7	5.68	no
100	AVERAGE	64.3		27.7		24.7		2.5		22.6		28.7		4.3					
101	MINUMUM	42.8		12.0		11.3		1.1		7.9		14.6		1.2					
102	MAXIMUM	89.9		47.6		47.0		4.7		45.0		46.4		7.4					
103	LSD(0.05)	23.7		12.1		8.9		0.9		11.4		8.2		2.7					
	# ENVIRONMENTS	7		7		11		11		6		6		5					

Table 9. Best and worst entries in the 2017-2018 PNUWWSN. Summary statistics are over all entries.

ENTRY	NAME	INC		SEV		IND		F09		FDK		ISK		DON		#l	#h	PC1	Fhb1
8	IL14-11911	39.8	l	15.9	l	12.8	l	1.3	l	10.6	l	16.2	l	2.8	l	7	0	-3.80	no
34	MO160455	37.7	l	22.9	l	16.1	l	1.6	l	8.8	l	18.4	l	2.4	l	7	0	-3.42	no
7	IL14-11312	44.7	l	19.7	l	16.0	l	1.6	l	10.3	l	17.2	l	2.1	l	7	0	-3.32	no
9	IL14-11916	43.3	l	17.9	l	13.2	l	1.3	l	9.0	l	18.1	l	4.3	l	7	0	-3.31	no
1	TRUMAN	36.2	l	22.0	l	14.4	l	1.5	l	11.8	l	18.3	l	4.8	l	7	0	-3.11	no
36	MO160471	42.0	l	22.6	l	14.3	l	1.5	l	12.7	l	17.6	l	3.7	l	7	0	-3.07	no
6	IL14-9542	45.6	l	21.4	l	18.7	l	1.9	l	6.6	l	19.2	l	2.2	l	7	0	-3.06	**YES**
16	KY09C-0128-72-2-1	43.8	l	16.1	l	16.3	l	1.6	l	10.0	l	20.5	l	3.7	l	7	0	-3.03	**YES**
33	MO160438	45.0	l	25.7	l	15.6	l	1.6	l	13.2	l	20.4	l	3.5	l	7	0	-2.61	no
35	MO160458	45.2	l	27.2	l	17.0	l	1.7	l	9.6	l	21.6	l	3.5	l	7	0	-2.55	no
5	IL14-3934	46.0	l	27.5	l	21.6	l	2.2	l	9.2	l	24.1	l	3.0	l	7	0	-2.08	no
42	0762A1-2-8	50.8		20.3	l	18.9	l	1.9	l	11.8	l	24.1	l	3.3	l	6	0	-2.22	**YES**
15	KY10-0178-1-2-5	57.2		26.4	l	21.1	l	2.1	l	13.0	l	24.8	l	3.4	l	6	0	-1.48	**YES**
13	13VTK434-89	56.0		27.6	l	18.8	l	1.9	l	17.5	l	25.2	l	3.7	l	6	0	-1.40	no
25	KWS127	78.4	h	57.3	h	44.4	h	4.4	h	37.0	h	47.0	h	5.5		0	6	4.92	no
4	PIONEER2545	72.5	h	59.2	h	49.3	h	4.9	h	36.0	h	44.9	h	8.1		0	6	5.46	no
26	MI14W0742	66.7	h	61.0	h	44.1	h	4.5	h	29.7	h	43.9	h	12.1	h	0	7	5.24	no
100	AVERAGE	56.3		34.0		26.6		2.7		18.9		29.6		5.0					
101	MINUMUM	36.2		15.9		12.8		1.3		6.6		16.2		2.1					
102	MAXIMUM	78.4		61.0		49.3		4.9		37.0		47.0		12.1					
103	LSD(0.05)	13.0		13.4		9.7		1.0		11.0		9.2		3.3					
	# ENVIRONMENTS	6		6		9		9		5		5		5					

Figure 2. Graph of first two PC from the analysis of the seven FHB traits from the NUWWSN. Checks are identified: TRU-Truman (R), FRE=Freedom (MR), ERN=Ernie (MR), PIO=Pioneer 2545 (S).

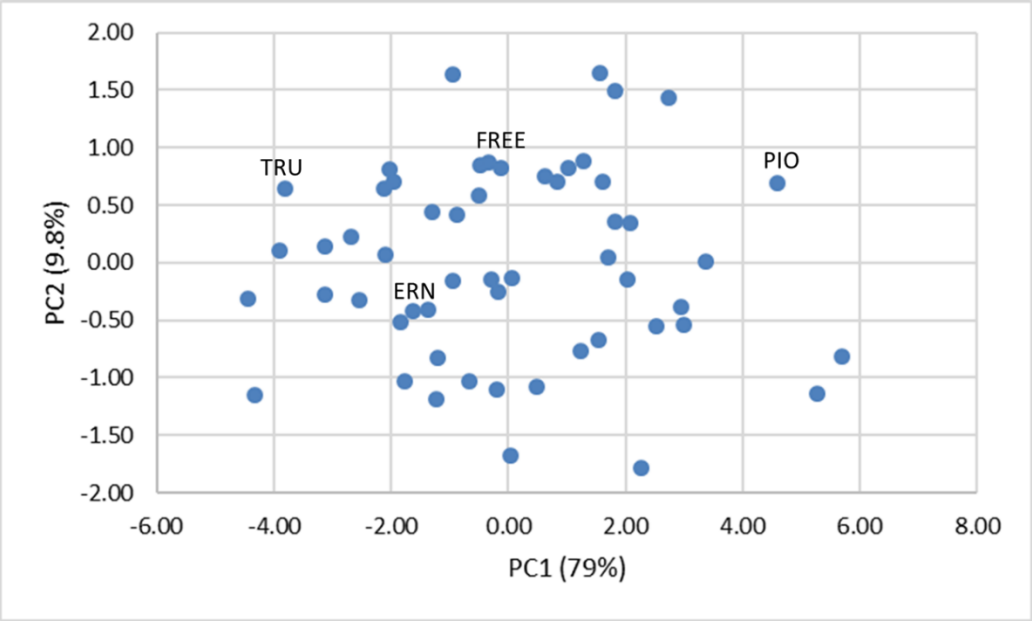

Figure 3. Graph of first two PC from the analysis of the seven FHB traits from the PNUWWSN. Checks are identified: TRU-Truman (R), FRE=Freedom (MR), ERN=Ernie (MR), PIO=Pioneer 2545 (S).

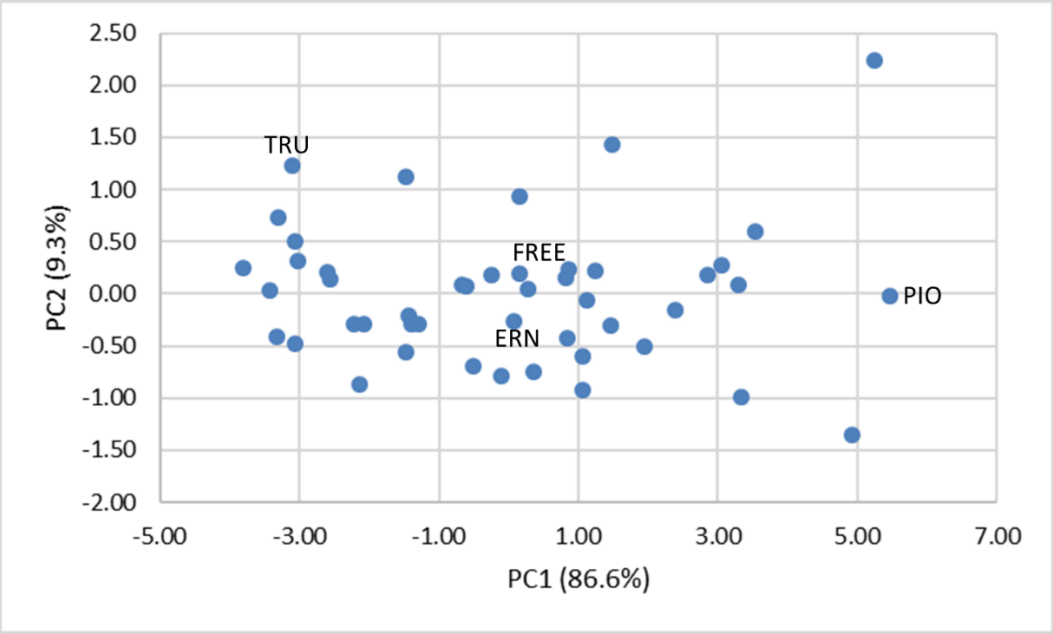

Table 10. Summary of all FHB traits from the 2017-2018 NUWWSN: " h" and "l" indicate means that are not significantly different from the highest (h) or lowest (l) mean in that column. Lower PC1 scores indicate more resistance.

NAME	INC	SEV	IND	F09	FDK	ISK	DON	#l	#h	PC1	Fhb1
TRUMAN	48.7 l	14.6 l	11.3 l	1.1 l	11.5 l	17.3 l	3.8 l	7	0	-3.81	no
ERNIE	54.6 l	23.5 l	20.9	2.1	15.6 l	27.4	3.3 l	4	0	-1.38	no
FREEDOM	61.7	24.5	21.7	2.2	25.0	30.4	5.2 h	0	1	-0.14	no
PIONEER2545	78.2 h	43.3 h	41.4 h	4.1 h	33.0	41.3 h	7.2 h	0	6	4.60	no
IL13-20616	56.9	16.9 l	14.6 l	1.4 l	11.8 l	19.2 l	3 l	6	0	-3.13	**YES**
IL14-11718	56.5 l	22.8 l	21.0	2.1	13.3 l	25.4	3.4 l	4	0	-1.62	no
IL14-11848	51.0 l	12.0 l	11.4 l	1.2 l	10.5 l	17.8 l	1.2 l	7	0	-4.34	**YES**
IL14-28462	64.3	28.6	27.7	2.8	16.1 l	28.6	3.1 l	2	0	-0.20	no
IL14-DC-64-95-118	58.5	26.1	21.1	2.1	13.3 l	23.9	2.5 l	2	0	-1.77	no
VA15W-68	74.7	33.4	27.9	2.8	25.8	31.4	7.3 h	0	1	1.83	no
VA16W-29	77.9 h	34.5	30.6	3.0	25.3	35.0	5.2 h	0	2	2.03	no
VA16W-148	74.0	26.8	26.1	2.6	32.0	32.5	7.1 h	0	1	1.56	no
VA16W-149	75.7	31.5	29.3	2.9	28.7	33.7	4	0	0	1.53	no
13VA-FHB-DH252	58.0	23.7 l	17.9 l	1.8 l	16.6 l	25.6	4.5	4	0	-1.29	no
KY06C-1195-37-2-5	70.5	29.0	22.1	2.3	21.6	25.1	4.2	0	0	-0.30	no
X08C-1181-61-15-5	69.8	29.6	27.9	2.8	31.8	35.2	3.4 l	1	0	1.23	no
KY06C-1178-16-10-3	55.8 l	20.0 l	15.6 l	1.6 l	22.1	22.2 l	4.3	5	0	-1.95	**HET**
KY07C-1145-94-12-5	67.9	20.6 l	21.6	2.2	16.4 l	27.8	2.6 l	3	0	-1.24	no
X08C-1077-11-18-3	68.7	22.9 l	24.2	2.4	19.3	27.7	2.9 l	2	0	-0.67	no
NY11013-10-72-1314	47.4 l	27.6	20.7	2.1	33.3	29.2	4.3	1	0	-0.47	no
NY11013-10-15-1312	44.2 l	34.2	20.1 l	2.1	30.8	29.1	4.3	2	0	-0.34	no
NY02008-807	49.2 l	24.8	20.6	2.1	21.4	25.8	6 h	1	1	-0.95	**YES**
NY09095-16-928	60.9	21.2 l	25.5	2.6	13.8 l	25.0	5.2 h	2	1	-0.88	**YES**
NY02007-1206	63.6	39.5 h	34.8	3.5	28.5	36.4	7.4 h	0	2	2.74	no
KWS152	79.3 h	35.8 h	33.4	3.3	31.2	35.1	4.5	0	2	2.53	no
KWS149	67.9	30.8	29.3	3.0	20.6	28.7	3.3 l	1	0	0.48	no
KWS192	60.4	27.6	22.7	2.3	15.7 l	24.7	2.9 l	2	0	-1.21	no
KWS191	70.1	28.5	25.0	2.5	29.3	31.8	5.7 h	0	1	1.02	no
KWS193	63.9	27.2	21.9	2.2	20.1	24.7	5.1 h	0	1	-0.50	no
MI14R0267	54.5 l	18.3 l	14.4 l	1.5 l	18.5 l	25.0	4.2	5	0	-2.13	no
MI14W0190	61.5	15.3 l	17.0 l	1.7 l	13.3 l	23.4	5.1 h	4	1	-2.04	**YES**
MI14W0906	77.8 h	47.6 h	47.0 h	4.7 h	45.0 h	46.4 h	4.9 h	0	7	5.68	no
MI14R1145	67.1	26.5	24.8	2.5	21.3	28.4	4.1	0	0	-0.18	no
MO131753	52.3 l	19.8 l	15.5 l	1.6 l	16.0 l	19.2 l	3.5 l	7	0	-2.70	no
MO151163	44.4 l	14.3 l	12.3 l	1.2 l	12.1 l	18.0 l	2.1 l	7	0	-3.90	no
MO151126	42.8 l	15.8 l	11.6 l	1.2 l	7.9 l	14.6 l	2.3 l	7	0	-4.44	no
MO160132	45.2 l	19.4 l	15.2 l	1.5 l	12.6 l	20.2 l	3.3 l	7	0	-3.13	no
MO160140	56.9	21.0 l	16.7 l	1.7 l	14.5 l	23.3	3.8 l	5	0	-2.09	no
0566A1-3-1-1-63	70.1	27.1	27.4	2.7	38.5 h	38.1	4.4	0	1	1.69	**YES**
04620A1-1-7-4-10	79.2 h	38.9 h	37.8	3.7	23.4	35.3	5.5 h	0	3	2.96	no
0527A1-9-14-4-3-3	60.6	17.6 l	18.6 l	1.9 l	20.7	25.4	2.9 l	4	0	-1.85	**YES**
0762A1-2-8	49.9 l	15.2 l	17.5 l	1.7 l	20.2	24.0	1.8 l	5	0	-2.55	**YES**
07419A1-16-1-1-16-1-1	65.3	20.3 l	17.8 l	1.8 l	24.3	28.3	3.5 l	4	0	-0.95	no
OH12-194-24	70.9	34.7	30.1	3.0	23.7	31.5	6.2 h	0	1	1.62	no
OH12-195-22	66.7	29.3	27.2	2.7	24.3	30.9	5.7 h	0	1	0.83	no
OH13-314-18	75.3	43.1 h	36.7	3.7	29.2	34.4	4.8 h	0	2	2.99	no
NE13604	70.8	32.4	27.2	2.8	27.6	29.9	6 h	0	1	1.29	no
NW13493	65.7	30.1	25.7	2.6	16.9 l	26.7	4.5	1	0	0.05	no
NE13515	71.6	36.0 h	30.8	3.1	30.9	32.5	5.4 h	0	2	2.08	no
NE14494	72.1	35.8 h	29.4	2.9	31.3	31.4	5.3 h	0	2	1.81	no
NE14696	64.7	30.5	25.6	2.6	30.3	27.2	5.3 h	0	1	0.63	no
LES168062	73.1	22.9 l	26.2	2.6	19.0 l	32.4	2.4 l	3	0	0.04	no
LES167062	75.4	38.5 h	36.8	3.7	23.3	35.9	3.1 l	1	1	2.26	no
LES167906	81.1 h	44.0 h	37.1	3.7	29.6	34.2	5.9 h	0	3	3.37	no
LES167499	89.9 h	47.3 h	45.5 h	4.5 h	34.0 h	42.8 h	5.1 h	0	7	5.28	no
AVERAGE	64.3	27.7	24.7	2.5	22.6	28.7	4.3				
MINUMUM	42.8	12.0	11.3	1.1	7.9	14.6	1.2				
MAXIMUM	89.9	47.6	47.0	4.7	45.0	46.4	7.4				
LSD(0.05)	23.7	12.1	8.9	0.9	11.4	8.2	2.7				
% < TRUMAN	10%	4%	0%	0%	4%	2%	37%			6%	
% < FREEDOM	39%	37%	39%	37%	63%	61%	71%			53%	
# ENVIRONMENTS	7	7	11	11	6	6	5				

Table 11. Genomic estimated breeding values (GEBV) of lines in the 2017-2018 NUWWSN. Phenotypic and genotypic data from 2014 through 2017 was used to train the model that was then used to predict the values of the 2018 entries

		GEBV							
ENTRY	NAME	INC	SEV	IND	FDK	ISK	DON	HD	HGT
6	IL14-11718	-3.76	-5.54	-3.96	-4.52	-4.73	-1.88	-0.28	-0.29
7	IL14-11848	-1.95	-5.36	-4.24	-4.32	-4.25	-2.48	-2.13	-0.77
8	IL14-28462	-3.48	-2.27	-2.34	-5.14	-4.23	-2.21	-1.64	-0.79
9	IL14-DC-64-95-118	-2.71	-1.76	-1.34	-1.30	-1.62	-0.81	-1.57	-1.57
10	VA15W-68	2.91	1.62	2.38	3.15	2.65	0.29	0.10	-1.13
11	VA16W-29	2.93	0.53	2.30	1.61	1.53	-0.03	0.37	-1.19
12	VA16W-148	-0.68	-1.85	-1.23	-3.83	-2.79	-1.73	-0.79	-0.97
13	VA16W-149	3.23	0.85	1.56	-0.54	1.22	-0.05	-1.01	-1.08
14	13VA-FHB-DH252	3.86	4.82	3.38	0.67	2.45	0.35	0.38	-1.45
16	X08C-1181-61-15-5	-0.22	-0.38	0.00	0.36	0.22	-0.86	-0.63	0.14
18	KY07C-1145-94-12-5	-0.41	-1.64	-1.18	-1.91	-2.23	-1.18	0.02	-0.51
19	X08C-1077-11-18-3	2.69	0.21	-0.20	-1.02	-0.50	-0.20	-1.27	-0.68
20	NY11013-10-72-1314	0.49	1.68	-0.52	2.72	0.72	-0.11	1.25	0.17
21	NY11013-10-15-1312	1.42	3.21	1.17	2.48	2.22	0.65	1.52	0.19
22	NY02008-807	1.50	2.14	1.77	1.62	2.70	0.61	2.59	1.07
23	NY09095-16-928	-0.63	2.37	2.69	-0.55	0.34	-0.09	2.05	-0.88
24	NY02007-1206	3.77	7.52	6.68	4.93	7.03	2.60	2.25	0.78
25	KWS152	-0.62	-2.41	-2.03	-1.17	-1.43	-0.46	0.22	0.05
26	KWS149	0.57	0.60	0.72	-1.32	0.40	-0.19	-0.88	-0.49
28	KWS191	1.45	2.05	3.14	7.15	5.19	1.94	-0.07	-0.65
31	MI14W0190	1.63	1.77	2.24	1.53	2.24	2.12	1.02	0.57
32	MI14W0906	2.75	3.33	4.28	5.61	5.70	2.05	2.09	0.49
33	MI14R1145	-0.22	-0.42	-0.39	2.52	0.59	-0.31	0.80	0.10
34	MO131753	-2.13	-2.75	-2.94	-3.17	-3.37	-1.40	-0.41	0.22
35	MO151163	-2.64	-2.14	-2.68	-4.38	-4.28	-1.87	0.00	-0.37
36	MO151126	-2.12	-4.16	-4.14	-5.17	-4.96	-2.14	-0.47	-0.36
37	MO160132	-4.42	-4.36	-4.66	-2.86	-5.18	-1.10	-0.23	1.29
38	MO160140	-4.52	-4.29	-4.72	-3.36	-5.48	-1.27	-0.18	1.26
46	OH13-314-18	5.33	5.03	5.14	5.77	6.16	0.35	-0.40	-1.53
48	NW13493	0.37	1.81	0.79	4.36	2.92	2.45	1.35	1.22
50	NE14494	-1.21	1.33	0.65	1.93	1.26	2.89	1.70	1.76
52	LES168062	0.15	2.93	1.23	-1.91	-0.09	-0.82	-1.98	-1.09
53	LES167062	1.15	1.05	0.91	-2.97	-0.75	-1.33	-1.70	-1.46
54	LES167906	0.08	-0.41	-1.05	1.74	0.39	-0.69	-0.82	-0.04
55	LES167499	0.66	0.24	0.54	0.00	0.59	-0.84	-1.70	1.12

Table 12. Summary of all FHB traits from the 2017-2018 PNUWWSN: " h" and "l" indicate means that are not significantly different from the highest (h) or lowest (l) mean in that column. Lower PC1 scores indicate more resistance.

NAME	INC		SEV		IND		F09		FDK		ISK		DON		#l	#h	PC1	Fhb1
TRUMAN	36.2	l	22.0	l	14.4	l	1.5	l	11.8	l	18.3	l	4.8	l	7	0	-3.11	no
ERNIE	56.4		35.6		28.1		2.8		16.4	l	31.3		4.6	l	2	0	0.08	no
FREEDOM	58.4		37.1		30.5		3.0		20.9		31.2		5.9		0	0	0.85	no
PIONEER2545	72.5	h	59.2	h	49.3	h	4.9	h	36.0	h	44.9	h	8.1		0	6	5.46	no
IL14-3934	46.0	l	27.5	l	21.6	l	2.2	l	9.2	l	24.1	l	3.0	l	7	0	-2.08	no
IL14-9542	45.6	l	21.4	l	18.7	l	1.9	l	6.6	l	19.2	l	2.2	l	7	0	-3.06	**YES**
IL14-11312	44.7	l	19.7	l	16.0	l	1.6	l	10.3	l	17.2	l	2.1	l	7	0	-3.32	no
IL14-11911	39.8	l	15.9	l	12.8	l	1.3	l	10.6	l	16.2	l	2.8	l	7	0	-3.80	no
IL14-11916	43.3	l	17.9	l	13.2	l	1.3	l	9.0	l	18.1	l	4.3	l	7	0	-3.31	no
VA16W-224	60.8		40.0		28.0		2.8		22.3		30.6		5.8		0	0	0.82	no
VA16W-196	72.1	h	52.8	h	39.5		3.9		25.7		42.5	h	5.3	l	1	3	3.33	no
13VTK429-3	66.1	h	38.9		29.6		2.9		23.7		31.5		4.8	l	1	1	1.07	no
13VTK434-89	56.0		27.6	l	18.8	l	1.9	l	17.5	l	25.2	l	3.7	l	6	0	-1.40	no
DH13SRW021-80	73.0	h	47.0		35.8		3.5		22.4		38.1	h	7.6		0	2	2.86	no
KY10-0178-1-2-5	57.2		26.4	l	21.1	l	2.1	l	13.0	l	24.8	l	3.4	l	6	0	-1.48	**YES**
KY09C-0128-72-2-1	43.8	l	16.1	l	16.3	l	1.6	l	10.0	l	20.5	l	3.7	l	7	0	-3.03	**YES**
X09-1021-47-19-3	55.6		29.5		22.7		2.3	l	20.3		26.1		4.7	l	2	0	-0.66	**YES**
KY10-0178-2-19-5	50.1		32.4		23.8		2.4		13.6	l	24.4	l	3.4	l	3	0	-1.29	**YES**
KY09C-1245-99-1-5	64.0		36.1		30.0		3.0		22.1		37.9	h	4.1	l	1	1	1.06	no
KWS154	51.7		28.4	l	24.1		2.4		24.1		31.5		4.9	l	2	0	-0.25	no
KWS151	63.7		34.5		28.7		2.8		24.9		31.7		4.9	l	1	0	0.83	no
KWS153	54.6		35.4		30.9		3.1		27.9	h	36.2		5.7		0	1	1.24	no
KWS074	62.3		41.0		33.0		3.3		20.0		36.3		5.4		0	0	1.45	no
KWS095	61.9		43.4		30.1		3.0		33.5	h	39.2	h	4.8	l	1	2	1.94	**YES**
KWS127	78.4	h	57.3	h	44.4	h	4.4	h	37.0	h	47.0	h	5.5		0	6	4.92	no
MI14W0742	66.7	h	61.0	h	44.1	h	4.5	h	29.7	h	43.9	h	12.1	h	0	7	5.24	no
MI15R0068	61.1		51.2	h	40.4	h	4.1	h	21.2		42.2	h	7.2		0	4	3.05	no
MI15R0269	64.4		55.6	h	41.6	h	4.1	h	23.1		38.8	h	7.0		0	4	3.30	no
MI14W0860	66.3	h	51.2	h	40.5	h	4.1	h	28.3	h	37.6		8.2		0	5	3.53	no
MI14W0833	63.9		37.3		30.5		3.0		20.0		33.5		5.9		0	0	1.13	no
MI15R0428	61.0		36.5		25.0		2.5		18.1		28.7		5.7		0	0	0.15	no
MI15R0259	58.8		29.3		29.6		2.9		27.2	h	29.4		3.7	l	1	1	0.35	**YES**
MO160438	45.0	l	25.7	l	15.6	l	1.6	l	13.2	l	20.4	l	3.5	l	7	0	-2.61	no
MO160455	37.7	l	22.9	l	16.1	l	1.6	l	8.8	l	18.4	l	2.4	l	7	0	-3.42	no
MO160458	45.2	l	27.2	l	17.0	l	1.7	l	9.6	l	21.6	l	3.5	l	7	0	-2.55	no
MO160471	42.0	l	22.6	l	14.3	l	1.5	l	12.7	l	17.6	l	3.7	l	7	0	-3.07	no
MO160959	52.0		26.3	l	18.1	l	1.8	l	15.1	l	21.7	l	6.3		5	0	-1.48	no
0527A1-7-7-3-1	54.3		34.1		25.2		2.5		20.2		29.7		6.7		0	0	0.15	no
05247A1-7-7-3-1	55.1		36.6		27.7		2.8		29.5	h	36.0		8.2		0	1	1.48	no
0566A1-3-1-63-3	56.9		26.2	l	28.2		2.8		21.6		33.3		5.4		1	0	0.28	no
02444A1-23-1-3-4	51.6		20.5	l	23.1		2.3		9.7	l	22.9	l	2.3	l	4	0	-2.14	**YES**
0762A1-2-8	50.8		20.3	l	18.9	l	1.9	l	11.8	l	24.1	l	3.3	l	6	0	-2.22	**YES**
OH14-216-47	67.9	h	45.4		34.0		3.4		26.6	h	37.0		6.3		0	2	2.40	no
OH14-112-72	62.4		31.3		28.0		2.8		14.9	l	29.7		3.9	l	2	0	-0.10	**HET**
OH14-112-47	52.1		23.4	l	23.3		2.3		11.4	l	27.2		3.9	l	3	0	-1.44	**YES**
OH14-112-15	60.5		35.0		24.9		2.5		12.5	l	28.7		3.7	l	2	0	-0.52	no
OH14-112-34	57.8		33.5		23.5		2.3		14.2	l	26.2		5.0	l	2	0	-0.62	**YES**
AVERAGE	56.3		34.0		26.6		2.7		18.9		29.6		5.0					
MINUMUM	36.2		15.9		12.8		1.3		6.6		16.2		2.1					
MAXIMUM	78.4		61.0		49.3		4.9		37.0		47.0		12.1					
LSD(0.05)	13.0		13.4		9.7		1.0		11.0		9.2		3.3					
% < TRUMAN	0%		16%		5%		5%		23%		9%		49%				9%	
% < FREEDOM	56%		70%		74%		88%		58%		58%		77%				63%	
# ENVIRONMENTS	6		6		9		9		5		5		5					

Table 13. Genomic estimated breeding values of lines in the 2017-2018 PNUWWSN. Phenotypic data from 2014 through 2017 was used to train te model that was then used to predict the values of the 2018 entries

		GEBV							
ENTRY	NAME	INC	SEV	IND	FDK	ISK	DON	HD	HGT
5	IL14-3934	-3.67	-2.49	-1.76	-5.27	-3.65	-2.45	-1.43	0.39
6	IL14-9542	-2.09	-1.05	-1.87	-3.88	-3.92	-2.38	-1.73	0.36
7	IL14-11312	-2.18	-3.74	-3.69	-5.07	-4.36	-1.81	-1.27	0.37
8	IL14-11911	-2.29	-4.83	-4.10	-4.37	-4.33	-1.46	-0.94	0.41
9	IL14-11916	-2.56	-5.83	-4.97	-5.01	-4.80	-1.99	-0.73	0.40
10	VA16W-224	2.80	4.98	4.12	4.79	4.79	1.28	-0.73	-1.26
11	VA16W-196	0.93	2.92	1.60	0.53	0.65	0.11	-0.74	-1.29
12	13VTK429-3	2.69	3.24	2.75	2.30	3.16	0.44	-1.03	-1.27
13	13VTK434-89	1.92	2.20	1.27	2.51	2.56	0.51	-0.80	-0.56
14	DH13SRW021-80	1.86	1.52	2.33	2.29	2.76	0.06	0.49	-1.17
15	KY10-0178-1-2-5	0.74	-1.02	-0.19	-0.02	0.06	-0.47	0.69	-0.23
17	X09-1021-47-19-3	-0.90	-2.24	-1.29	-0.80	-1.43	-0.18	1.71	-0.26
18	KY10-0178-2-19-5	-0.44	-0.36	-0.58	-0.62	-0.46	-0.41	-0.98	-0.39
19	KY09C-1245-99-1-5	-0.63	-0.04	0.16	-0.74	0.08	-0.83	-1.30	-1.08
21	KWS151	0.71	1.23	0.95	1.66	1.50	-0.80	-1.04	-1.53
22	KWS153	-3.51	-4.26	-4.46	-2.49	-3.66	-1.57	-0.95	0.12
26	MI14W0742	3.95	6.89	6.98	7.13	7.21	3.11	0.62	-0.22
27	MI15R0068	2.91	4.21	4.36	4.63	5.23	3.55	1.67	1.15
28	MI15R0269	2.22	4.34	4.39	5.08	4.79	1.46	0.71	0.10
29	MI14W0860	3.58	0.63	1.12	2.16	2.41	1.70	-0.69	-2.06
30	MI14W0833	3.16	2.34	3.56	2.98	3.58	0.95	0.26	0.03
31	MI15R0428	3.62	2.05	2.45	1.81	2.80	0.91	0.20	-1.50
32	MI15R0259	1.56	0.24	0.54	2.01	1.83	0.72	1.17	1.04
33	MO160438	-5.39	-4.53	-5.22	-4.98	-5.80	-2.62	-0.28	0.02
34	MO160455	-3.77	-3.55	-3.85	-5.77	-5.25	-1.95	-1.15	1.06
35	MO160458	-2.88	-4.30	-4.10	-6.04	-5.34	-2.47	-0.76	-0.29
36	MO160471	-2.60	-3.97	-4.43	-5.81	-5.27	-2.05	-1.79	-0.49
37	MO160959	-3.58	-3.32	-3.73	-2.49	-4.21	-1.04	-0.38	1.00
43	OH14-216-47	-0.36	0.63	1.02	1.80	1.12	0.07	-1.15	-1.40
44	OH14-112-72	-0.91	-0.75	-0.42	0.59	0.11	-1.82	-1.54	-1.47
45	OH14-112-47	-1.09	-1.64	-1.05	0.28	-0.77	-1.78	-1.36	-1.76
46	OH14-112-15	-0.55	-0.46	-0.15	1.43	-0.17	-1.20	-1.40	-2.39
47	OH14-112-34	-1.21	-0.61	-0.18	-0.21	-0.68	-1.32	-1.24	-1.24

Table 14. Summary of incidence (INC, %) from 2017-2018 NUWWSN.

	All		Reported						Calculated from 0-9
NAME	AVG		ILURB	INWLA	MIELA	MOCOL	NYITH	VAMTH	INLAY
TRUMAN	48.7	l	1.0	50.0	71.7	78.0	35.0	90.0	15.0
ERNIE	54.6	l	13.0	30.0	76.7	90.0	40.0	92.5	40.0
FREEDOM	61.7		30.0	50.0	75.0	93.0	46.3	97.5	40.0
PIONEER2545	78.2	h	32.0	85.0	95.0	98.0	72.5	100.0	65.0
IL13-20616	56.9		16.0	40.0	80.0	100.0	35.0	92.5	35.0
IL14-11718	56.5	l	30.0	35.0	66.7	95.0	41.3	92.5	35.0
IL14-11848	51.0	l	4.0	30.0	85.0	83.0	32.5	92.5	30.0
IL14-28462	64.3		27.0	65.0	91.7	95.0	51.3	100.0	20.0
IL14-DC-64-95-118	58.5		37.0	40.0	90.0	95.0	20.0	97.5	30.0
VA15W-68	74.7		18.0	95.0	93.3	100.0	66.3	95.0	55.0
VA16W-29	77.9	h	37.0	95.0	85.0	98.0	75.0	100.0	55.0
VA16W-148	74.0		26.0	90.0	85.0	93.0	66.3	97.5	60.0
VA16W-149	75.7		20.0	90.0	90.0	100.0	65.0	95.0	70.0
13VA-FHB-DH252	58.0		7.0	80.0	50.0	93.0	43.8	92.5	40.0
KY06C-1195-37-2-5	70.5		15.0	95.0	68.3	88.0	65.0	97.5	65.0
X08C-1181-61-15-5	69.8		25.0	75.0	93.3	90.0	62.5	87.5	55.0
KY06C-1178-16-10-3	55.8	l	9.0	50.0	88.3	78.0	32.5	87.5	45.0
KY07C-1145-94-12-5	67.9		28.0	60.0	93.3	95.0	61.3	97.5	40.0
X08C-1077-11-18-3	68.7		17.0	60.0	86.7	100.0	72.0	100.0	45.0
NY11013-10-72-1314	47.4	l	4.0	30.0	68.3	93.0	23.8	97.5	15.0
NY11013-10-15-1312	44.2	l	7.0	30.0	56.7	93.0	12.5	90.0	20.0
NY02008-807	49.2	l	12.0	65.0	68.3	53.0	41.3	95.0	10.0
NY09095-16-928	60.9		4.0	90.0	78.3	83.0	31.3	100.0	40.0
NY02007-1206	63.6		13.0	35.0	86.7	78.0	87.5	100.0	45.0
KWS152	79.3	h	52.0	85.0	95.0	93.0	72.5	92.5	65.0
KWS149	67.9		18.0	95.0	93.3	85.0	48.8	95.0	40.0
KWS192	60.4		28.0	75.0	86.7	48.0	37.5	92.5	55.0
KWS191	70.1		33.0	45.0	85.0	98.0	65.0	95.0	70.0
KWS193	63.9		12.0	90.0	90.0	78.0	40.0	97.5	40.0
MI14R0267	54.5	l	15.0	45.0	45.0	93.0	56.3	77.5	50.0
MI14W0190	61.5		6.0	30.0	81.7	83.0	80.0	100.0	50.0
MI14W0906	77.8	h	47.0	100.0	88.3	88.0	51.3	100.0	70.0
MI14R1145	67.1		1.0	95.0	83.3	83.0	62.5	100.0	45.0
MO131753	52.3	l	10.0	85.0	78.3	85.0	10.0	77.5	20.0
MO151163	44.4	l	6.0	50.0	64.0	88.0	15.0	67.5	20.0
MO151126	42.8	l	3.0	85.0	40.0	90.0	13.8	52.5	15.0
MO160132	45.2	l	4.0	40.0	53.3	80.0	33.8	90.0	15.0
MO160140	56.9		15.0	55.0	75.0	93.0	42.5	97.5	20.0
0566A1-3-1-1-63	70.1		15.0	100.0	88.3	95.0	55.0	97.5	40.0
04620A1-1-7-4-10	79.2	h	45.0	80.0	96.7	90.0	82.5	90.0	70.0
0527A1-9-14-4-3-3	60.6		1.0	55.0	83.3	100.0	75.0	85.0	25.0
0762A1-2-8	49.9	l	2.0	65.0	76.7	93.0	25.0	72.5	15.0
07419A1-16-1-1-16-1-1	65.3		10.0	85.0	93.3	90.0	43.8	85.0	50.0
OH12-194-24	70.9		28.0	90.0	90.0	88.0	55.0	100.0	45.0
OH12-195-22	66.7		17.0	95.0	76.7	88.0	45.0	100.0	45.0
OH13-314-18	75.3		25.0	100.0	93.3	85.0	61.3	97.5	65.0
NE13604	70.8		17.0	75.0	88.3	80.0	65.0	100.0	70.0
NW13493	65.7		27.0	70.0	80.0	88.0	40.0	95.0	60.0
NE13515	71.6		25.0	85.0	88.3	98.0	40.0	100.0	65.0
NE14494	72.1		22.0	85.0	83.3	88.0	56.3	100.0	70.0
NE14696	64.7		12.0	80.0	86.7	98.0	31.3	100.0	45.0
LES168062	73.1		43.0	80.0	91.7	83.0	61.3	92.5	60.0
LES167062	75.4		30.0	85.0	90.0	95.0	62.5	100.0	65.0
LES167906	81.1	h	37.0	95.0	95.0	93.0	62.5	100.0	85.0
LES167499	89.9	h	60.0	90.0	98.3	100.0	96.3	100.0	85.0
AVERAGE	64.3		20.0	70.1	81.5	89.1	50.3	93.4	45.5
MINUMUM	42.8		1.0	30.0	40.0	48.0	10.0	52.5	10.0
MAXIMUM	89.9		60.0	100.0	98.3	100.0	96.3	100.0	85.0
LSD(0.05)	23.7		.	.	.	.	.	.	.

Table 15. Summary of severity (SEV, %) data from the 2017-2018 NUWWSN

			Reported						Calculated from 0-9
NAME	AVG		INWLA	MIELA	MOCOL	NYITH	ILURB	VAMTH	INLAY
TRUMAN	14.6	l	15.0	13.3	7.4	9.5	7.0	31.0	25.0
ERNIE	23.5	l	12.0	26.7	25.0	15.5	60.0	39.0	40.0
FREEDOM	24.5		20.0	21.7	27.1	19.5	37.0	49.3	30.0
PIONEER2545	43.3	h	54.0	58.3	35.3	24.5	63.0	75.0	50.0
IL13-20616	16.9	l	8.0	26.7	23.8	10.3	13.0	33.5	15.0
IL14-11718	22.8	l	5.0	33.3	41.3	7.5	40.0	53.8	15.0
IL14-11848	12.0	l	5.0	23.3	11.3	7.3	7.0	26.3	10.0
IL14-28462	28.6		17.0	18.3	66.8	9.0	43.0	74.8	10.0
IL14-DC-64-95-118	26.1		11.0	43.3	32.5	11.0	27.0	62.3	20.0
VA15W-68	33.4		44.0	40.0	25.1	16.5	57.0	52.3	50.0
VA16W-29	34.5		49.0	20.0	21.7	24.0	57.0	65.8	55.0
VA16W-148	26.8		32.0	33.3	19.6	15.8	27.0	54.5	30.0
VA16W-149	31.5		50.0	23.3	20.9	15.3	50.0	65.8	40.0
13VA-FHB-DH252	23.7	l	27.0	30.0	16.2	17.8	77.0	42.3	25.0
KY06C-1195-37-2-5	29.0		24.0	25.0	33.4	22.3	37.0	39.3	55.0
X08C-1181-61-15-5	29.6		27.0	41.7	26.5	24.5	47.0	52.8	30.0
KY06C-1178-16-10-3	20.0	l	12.0	23.3	16.3	11.3	33.0	28.5	45.0
KY07C-1145-94-12-5	20.6	l	17.0	28.3	14.9	10.0	17.0	52.5	20.0
X08C-1077-11-18-3	22.9	l	14.0	25.0	44.1	14.0	20.0	31.0	30.0
NY11013-10-72-1314	27.6		4.0	50.0	31.6	16.0	40.0	57.5	30.0
NY11013-10-15-1312	34.2		5.0	45.0	39.6	32.0	70.0	46.0	65.0
NY02008-807	24.8		15.0	18.3	36.6	22.0	30.0	59.0	20.0
NY09095-16-928	21.2	l	27.0	21.7	11.6	9.5	10.0	52.5	25.0
NY02007-1206	39.5	h	4.0	68.3	27.1	38.8	40.0	74.0	60.0
KWS152	35.8	h	29.0	63.3	34.6	16.5	53.0	46.8	55.0
KWS149	30.8		39.0	38.3	33.3	13.3	57.0	51.3	35.0
KWS192	27.6		20.0	40.0	22.8	12.8	33.0	44.0	50.0
KWS191	28.5		8.0	40.0	34.1	21.5	43.0	51.5	40.0
KWS193	27.2		25.0	41.7	32.6	17.0	43.0	44.8	25.0
MI14R0267	18.3	l	9.0	10.0	15.6	20.8	40.0	38.5	30.0
MI14W0190	15.3	l	8.0	18.3	20.7	12.8	13.0	26.3	20.0
MI14W0906	47.6	h	82.0	46.7	31.6	26.5	57.0	81.0	60.0
MI14R1145	26.5		24.0	36.7	13.7	27.0	17.0	57.5	25.0
MO131753	19.8	l	35.0	15.0	25.9	7.0	30.0	28.0	25.0
MO151163	14.3	l	7.0	15.0	20.6	13.8	20.0	26.5	15.0
MO151126	15.8	l	15.0	15.0	22.8	6.0	33.0	28.5	20.0
MO160132	19.4	l	11.0	20.0	38.9	12.8	30.0	34.8	15.0
MO160140	21.0	l	9.0	33.3	32.3	17.8	43.0	30.3	20.0
0566A1-3-1-1-63	27.1		32.0	33.3	22.3	14.0	30.0	59.8	25.0
04620A1-1-7-4-10	38.9	h	28.0	73.3	54.4	15.3	60.0	65.5	30.0
0527A1-9-14-4-3-3	17.6	l	13.0	21.7	33.7	17.5	7.0	26.8	10.0
0762A1-2-8	15.2	l	21.0	25.0	16.3	12.0	10.0	21.3	10.0
7419A1-16-1-1-16-1-1	20.3	l	18.0	18.3	13.6	12.0	57.0	34.8	40.0
OH12-194-24	34.7		46.0	46.7	17.8	15.3	47.0	62.3	50.0
OH12-195-22	29.3		44.0	35.0	17.5	11.8	33.0	63.5	30.0
OH13-314-18	43.1	h	71.0	71.7	19.8	15.8	67.0	66.8	50.0
NE13604	32.4		39.0	35.0	33.4	14.3	40.0	51.3	50.0
NW13493	30.1		33.0	35.0	19.0	13.5	77.0	37.3	65.0
NE13515	36.0	h	46.0	40.0	36.3	17.5	63.0	55.8	50.0
NE14494	35.8	h	43.0	28.3	34.2	20.5	50.0	59.3	60.0
NE14696	30.5		26.0	23.3	49.6	8.3	43.0	51.8	50.0
LES168062	22.9	l	27.0	31.7	8.4	19.0	57.0	43.8	25.0
LES167062	38.5	h	44.0	55.0	18.9	12.8	57.0	77.8	55.0
LES167906	44.0	h	50.0	58.3	41.2	23.5	47.0	75.5	55.0
LES167499	47.3	h	45.0	83.3	20.8	26.5	67.0	89.0	60.0
AVERAGE	27.7		26.3	34.7	27.1	16.3	41.0	50.0	35.4
MINUMUM	12.0		4.0	10.0	7.4	6.0	7.0	21.3	10.0
MAXIMUM	47.6		82.0	83.3	66.8	38.8	77.0	89.0	65.0
LSD(0.05)	12.1		.	.	.	.	.	.	.

Table 16. Summary of index (IND, %) data from the 2017-2018 NUWWSN.

			Reported								Calculated from 0-9		
NAME	AVG		ILURB	INWLA	MIELA	MOCOL	NELIN	NYITH	OHWOO	VAMTH	ILCHA	INLAY	KYLEX
TRUMAN	11.3	l	0.0	8.0	9.5	5.6	9	3.5	11.7	27.9	15.0	3.8	30.0
ERNIE	20.9		8.5	4.0	20.5	23.8	13	6.4	21.1	36.2	35.0	16.0	45.0
FREEDOM	21.7		16.5	10.0	16.8	25.7	8	8.7	17.8	48.2	40.0	12.0	35.0
PIONEER2545	41.4	h	21.5	45.0	55.8	35.3	10	17.9	47.8	75.0	65.0	32.5	50.0
IL13-20616	14.6	l	3.2	3.0	22.4	23.8	2	4.2	15.6	30.7	20.0	5.3	30.0
IL14-11718	21.0		24.4	2.0	24.7	39.3	1	3.2	11.1	49.6	30.0	5.3	40.0
IL14-11848	11.4	l	0.0	2.0	19.3	8.4	1	2.4	10.6	24.2	20.0	3.0	35.0
IL14-28462	27.7		6.7	11.0	17.1	66.8	8	4.7	43.9	74.8	20.0	2.0	50.0
IL14-DC-64-95-118	21.1		12.6	4.0	39.0	32.5	2	2.2	12.8	60.8	20.0	6.0	40.0
VA15W-68	27.9		10.6	41.0	37.5	25.1	2	11.1	31.7	50.6	35.0	27.5	35.0
VA16W-29	30.6		20.9	46.0	17.0	21.7	8	18.1	28.3	65.8	35.0	30.3	45.0
VA16W-148	26.1		8.4	29.0	28.0	17.6	7	10.4	30.0	53.6	35.0	18.0	50.0
VA16W-149	29.3		10.0	45.0	21.0	20.9	1	10.1	38.9	62.9	25.0	28.0	60.0
13VA-FHB-DH252	17.9	l	5.9	21.0	14.0	14.6	0	8.1	18.9	39.0	15.0	10.0	50.0
KY06C-1195-37-2-5	22.1		6.3	23.0	16.8	25.1	0	15.4	29.4	38.6	20.0	35.8	33.0
X08C-1181-61-15-5	27.9		13.7	20.0	38.9	25.2	4	16.0	36.7	46.2	50.0	16.5	40.0
KY06C-1178-16-10-3	15.6	l	5.6	6.0	20.7	13.0	0	3.4	22.8	24.9	20.0	20.3	35.0
KY07C-1145-94-12-5	21.6		5.8	10.0	26.3	13.4	1	6.0	21.1	51.5	50.0	8.0	45.0
X08C-1077-11-18-3	24.2		4.2	8.0	21.6	44.1	10	10.2	38.9	31.0	50.0	13.5	35.0
NY11013-10-72-1314	20.7		1.8	1.0	35.7	28.4	5	3.4	27.2	55.8	25.0	4.5	40.0
NY11013-10-15-1312	20.1	l	5.2	2.0	25.3	33.7	0	3.4	22.8	41.0	20.0	13.0	55.0
NY02008-807	20.6		3.9	10.0	12.8	27.5	0	9.0	33.9	56.2	20.0	2.0	51.0
NY09095-16-928	25.5		0.5	25.0	17.1	8.1	4	3.1	60.0	52.5	45.0	10.0	55.0
NY02007-1206	34.8		6.1	1.0	59.3	21.7	0	34.4	53.9	74.0	35.0	27.0	70.0
KWS152	33.4		30.0	25.0	60.3	34.6	2	13.2	43.3	43.3	35.0	35.8	45.0
KWS149	29.3		16.5	37.0	35.9	26.7	4	6.4	47.2	49.1	45.0	14.0	40.0
KWS192	22.7		10.8	15.0	35.0	19.4	13	4.5	23.3	40.7	25.0	27.5	35.0
KWS191	25.0		15.2	3.0	34.5	32.4	1	14.5	32.2	49.0	30.0	28.0	35.0
KWS193	21.9		7.7	22.0	37.8	26.1	1	6.7	31.1	43.5	25.0	10.0	30.0
MI14R0267	14.4	l	8.0	4.0	5.8	14.8	2	11.5	12.8	29.9	20.0	15.0	35.0
MI14W0190	17.0	l	1.0	2.0	15.3	18.7	2	10.3	36.1	26.3	20.0	10.0	45.0
MI14W0906	47.0	h	29.3	82.0	41.0	28.5	18	14.4	61.1	81.0	70.0	42.0	50.0
MI14R1145	24.8		0.0	23.0	30.3	12.3	2	17.6	41.1	57.5	45.0	11.3	33.0
MO131753	15.5	l	3.8	30.0	11.7	24.6	0	0.9	12.8	22.1	25.0	5.0	35.0
MO151163	12.3	l	2.3	3.0	9.9	18.6	6	2.0	12.2	18.6	30.0	3.0	30.0
MO151126	11.6	l	0.8	13.0	6.3	21.7	7	1.1	14.4	14.9	25.0	3.0	20.0
MO160132	15.2	l	1.4	4.0	13.3	36.9	1	4.3	17.2	31.8	15.0	2.3	40.0
MO160140	16.7	l	8.5	5.0	25.3	29.1	3	7.7	17.2	29.3	10.0	4.0	45.0
0566A1-3-1-1-63	27.4		5.0	32.0	29.7	20.1	6	7.8	22.8	57.8	60.0	10.0	50.0
04620A1-1-7-4-10	37.8		32.2	22.0	71.0	54.4	10	12.6	53.3	59.0	40.0	21.0	40.0
0527A1-9-14-4-3-3	18.6	l	0.0	7.0	18.2	33.7	2	13.6	29.4	22.9	40.0	2.5	35.0
0762A1-2-8	17.5	l	0.0	14.0	19.7	15.5	6	3.2	31.7	15.5	40.0	1.5	45.0
7419A1-16-1-1-16-1-1	17.8	l	6.2	15.0	17.3	12.2	13	5.3	12.2	29.6	35.0	20.0	30.0
OH12-194-24	30.1		14.4	41.0	41.8	16.0	10	8.3	34.4	62.3	45.0	22.5	35.0
OH12-195-22	27.2		6.3	42.0	27.5	13.1	8	5.1	30.0	63.5	45.0	13.5	45.0
OH13-314-18	36.7		19.8	71.0	66.9	15.8	4	10.0	33.3	65.0	40.0	32.5	45.0
NE13604	27.2		6.3	29.0	30.9	26.8	4	10.4	25.6	51.3	25.0	35.0	55.0
NW13493	25.7		22.8	23.0	28.5	19.0	5	5.8	38.9	35.9	25.0	39.0	40.0
NE13515	30.8		18.5	39.0	35.8	34.5	2	6.8	38.9	55.8	20.0	32.5	55.0
NE14494	29.4		10.6	36.0	23.8	32.5	0	11.7	42.2	59.3	20.0	42.0	45.0
NE14696	25.6		5.0	21.0	20.3	49.6	5	3.5	37.8	51.8	20.0	22.5	45.0
LES168062	26.2		28.9	22.0	29.3	5.5	10	12.5	35.0	40.4	50.0	15.0	40.0
LES167062	36.8		18.1	38.0	49.5	18.0	6	7.6	48.9	77.8	60.0	35.8	45.0
LES167906	37.1		17.0	47.0	55.4	39.2	5	15.8	26.7	75.5	35.0	46.8	45.0
LES167499	45.5	h	42.9	41.0	82.0	20.8	9	25.6	38.9	89.0	35.0	51.0	65.0
AVERAGE	24.7		10.8	21.5	29.6	25.0	4.8	9.0	30.3	47.6	32.7	18.3	42.4
MINUMUM	11.3		0.0	1.0	5.8	5.5	0	0.9	10.6	14.9	10.0	1.5	20.0
MAXIMUM	47.0		42.9	82.0	82.0	66.8	18	34.4	61.1	89.0	70.0	51.0	70.0
LSD(0.05)	8.9		.	.	.	.	.	.	.	.	.	.	.

Table 17. Summary of FHB score on a 0-9 scale (0=no disease, 9-severe disease) in the 2017-18 NUWWSN

	All		Reported					Calculated from 0-9					
NAME	AVG		ILCHA	INLAY	KYLEX	MIELA	MOCOL	ILURB	INWLA	NELIN	NYITH	OHWOO	VAMTH
TRUMAN	1.1	l	1.5	0.4	3.0	0.9	0.7	0.0	0.8	0.9	0.4	1.2	2.8
ERNIE	2.1		3.5	1.6	4.5	1.9	2.5	0.9	0.4	1.3	0.6	2.1	3.6
FREEDOM	2.2		4.0	1.2	3.5	1.6	2.7	1.7	1.0	0.8	0.9	1.8	4.8
PIONEER2545	4.1	h	6.5	3.3	5.0	5.3	3.5	2.2	4.5	1.0	1.8	4.8	7.5
IL13-20616	1.4	l	2.0	0.5	3.0	2.1	2.4	0.3	0.3	0.2	0.4	1.6	3.1
IL14-11718	2.1		3.0	0.5	4.0	2.3	4.1	2.4	0.2	0.1	0.3	1.1	5.0
IL14-11848	1.2	l	2.0	0.3	3.5	1.8	1.1	0.0	0.2	0.1	0.2	1.1	2.4
IL14-28462	2.8		2.0	0.2	5.0	1.6	6.7	0.7	1.1	0.8	0.5	4.4	7.5
IL14-DC-64-95-118	2.1		2.0	0.6	4.0	3.7	3.2	1.3	0.4	0.2	0.2	1.3	6.1
VA15W-68	2.8		3.5	2.8	3.5	3.5	2.5	1.1	4.1	0.2	1.1	3.2	5.1
VA16W-29	3.0		3.5	3.0	4.5	1.6	2.2	2.1	4.6	0.8	1.8	2.8	6.6
VA16W-148	2.6		3.5	1.8	5.0	2.6	2.0	0.8	2.9	0.7	1.0	3.0	5.4
VA16W-149	2.9		2.5	2.8	6.0	2.0	2.1	1.0	4.5	0.1	1.0	3.9	6.3
13VA-FHB-DH252	1.8	l	1.5	1.0	5.0	1.3	1.6	0.6	2.1	0.0	0.8	1.9	3.9
KY06C-1195-37-2-5	2.3		2.0	3.6	3.3	1.6	3.3	0.6	2.3	0.0	1.5	2.9	3.9
X08C-1181-61-15-5	2.8		5.0	1.7	4.0	3.7	2.7	1.4	2.0	0.4	1.6	3.7	4.6
KY06C-1178-16-10-3	1.6	l	2.0	2.0	3.5	2.0	1.6	0.6	0.6	0.0	0.3	2.3	2.5
KY07C-1145-94-12-5	2.2		5.0	0.8	4.5	2.5	1.5	0.6	1.0	0.1	0.6	2.1	5.2
X08C-1077-11-18-3	2.4		5.0	1.4	3.5	2.0	4.4	0.4	0.8	1.0	1.0	3.9	3.1
NY11013-10-72-1314	2.1		2.5	0.5	4.0	3.4	3.2	0.2	0.1	0.5	0.3	2.7	5.6
NY11013-10-15-1312	2.1		2.0	1.3	5.5	2.4	4.0	0.5	0.2	0.0	0.3	2.3	4.1
NY02008-807	2.1		2.0	0.2	5.1	1.2	3.7	0.4	1.0	0.0	0.9	3.4	5.6
NY09095-16-928	2.6		4.5	1.0	5.5	1.6	1.2	0.1	2.5	0.4	0.3	6.0	5.3
NY02007-1206	3.5		3.5	2.7	7.0	5.6	2.7	0.6	0.1	0.0	3.4	5.4	7.4
KWS152	3.3		3.5	3.6	4.5	5.7	3.5	3.0	2.5	0.2	1.3	4.3	4.3
KWS149	3.0		4.5	1.4	4.0	3.4	3.3	1.7	3.7	0.4	0.6	4.7	4.9
KWS192	2.3		2.5	2.8	3.5	3.3	2.3	1.1	1.5	1.3	0.5	2.3	4.1
KWS191	2.5		3.0	2.8	3.5	3.3	3.4	1.5	0.3	0.1	1.5	3.2	4.9
KWS193	2.2		2.5	1.0	3.0	3.6	3.3	0.8	2.2	0.1	0.7	3.1	4.4
MI14R0267	1.5	l	2.0	1.5	3.5	0.5	1.6	0.8	0.4	0.2	1.2	1.3	3.0
MI14W0190	1.7	l	2.0	1.0	4.5	1.4	2.1	0.1	0.2	0.2	1.0	3.6	2.6
MI14W0906	4.7	h	7.0	4.2	5.0	3.9	3.2	2.9	8.2	1.8	1.4	6.1	8.1
MI14R1145	2.5		4.5	1.1	3.3	2.9	1.4	0.0	2.3	0.2	1.8	4.1	5.8
MO131753	1.6	l	2.5	0.5	3.5	1.1	2.6	0.4	3.0	0.0	0.1	1.3	2.2
MO151163	1.2	l	3.0	0.3	3.0	0.9	2.1	0.2	0.3	0.6	0.2	1.2	1.9
MO151126	1.2	l	2.5	0.3	2.0	0.6	2.3	0.1	1.3	0.7	0.1	1.4	1.5
MO160132	1.5	l	1.5	0.2	4.0	1.3	3.9	0.1	0.4	0.1	0.4	1.7	3.2
MO160140	1.7	l	1.0	0.4	4.5	2.4	3.2	0.9	0.5	0.3	0.8	1.7	2.9
0566A1-3-1-1-63	2.7		6.0	1.0	5.0	2.8	2.2	0.5	3.2	0.6	0.8	2.3	5.8
04620A1-1-7-4-10	3.7		4.0	2.1	4.0	6.7	5.4	3.2	2.2	1.0	1.3	5.3	5.9
0527A1-9-14-4-3-3	1.9	l	4.0	0.3	3.5	1.7	3.4	0.0	0.7	0.2	1.4	2.9	2.3
0762A1-2-8	1.7	l	4.0	0.2	4.5	1.9	1.6	0.0	1.4	0.6	0.3	3.2	1.6
07419A1-16-1-1-16-1-1	1.8	l	3.5	2.0	3.0	1.6	1.4	0.6	1.5	1.3	0.5	1.2	3.0
OH12-194-24	3.0		4.5	2.3	3.5	4.0	1.8	1.4	4.1	1.0	0.8	3.4	6.2
OH12-195-22	2.7		4.5	1.4	4.5	2.6	1.7	0.6	4.2	0.8	0.5	3.0	6.4
OH13-314-18	3.7		4.0	3.3	4.5	6.3	2.0	2.0	7.1	0.4	1.0	3.3	6.5
NE13604	2.8		2.5	3.5	5.5	2.9	3.3	0.6	2.9	0.4	1.0	2.6	5.1
NW13493	2.6		2.5	3.9	4.0	2.7	1.9	2.3	2.3	0.5	0.6	3.9	3.6
NE13515	3.1		2.0	3.3	5.5	3.4	3.6	1.9	3.9	0.2	0.7	3.9	5.6
NE14494	2.9		2.0	4.2	4.5	2.3	3.4	1.1	3.6	0.0	1.2	4.2	5.9
NE14696	2.6		2.0	2.3	4.5	1.9	5.0	0.5	2.1	0.5	0.4	3.8	5.2
LES168062	2.6		5.0	1.5	4.0	2.8	0.8	2.9	2.2	1.0	1.3	3.5	4.0
LES167062	3.7		6.0	3.6	4.5	4.7	1.9	1.8	3.8	0.6	0.8	4.9	7.8
LES167906	3.7		3.5	4.7	4.5	5.2	4.1	1.7	4.7	0.5	1.6	2.7	7.6
LES167499	4.5	h	3.5	5.1	6.5	7.8	2.1	4.3	4.1	0.9	2.6	3.9	8.9
AVERAGE	2.5		3.3	1.8	4.2	2.8	2.7	1.1	2.2	0.5	0.9	3.0	4.8
MINUMUM	1.1		1.0	0.2	2.0	0.5	0.7	0.0	0.1	0.0	0.1	1.1	1.5
MAXIMUM	4.7		7.0	5.1	7.0	7.8	6.7	4.3	8.2	1.8	3.4	6.1	8.9
LSD(0.05)	0.9		.	.	.	.	.	.	.	.	.	.	.

Table 18. Summary of Fusarium Damaged Kernel (FDK, %) data from the 2017-2018 NUWWSN.

NAME	AVG		ILCHA	ILURB	KYLEX	NELIN	NYITH	VAMTH
TRUMAN	11.5	l	0.0	1.3	12.5	0.0	35.0	20.0
ERNIE	15.6	l	1.5	7.7	10.0	2.0	50.0	22.5
FREEDOM	25.0		3.0	28.3	12.5	6.0	70.0	30.0
PIONEER2545	33.0		9.0	36.7	15.0	5.0	85.0	47.5
IL13-20616	11.8	l	1.0	5.7	12.5	0.0	40.0	11.5
IL14-11718	13.3	l	1.0	11.7	12.5	2.0	45.0	7.5
IL14-11848	10.5	l	0.0	12.0	7.5	1.0	35.0	7.5
IL14-28462	16.1	l	0.0	18.4	5.0	1.0	60.0	12.5
IL14-DC-64-95-118	13.3	l	1.5	11.0	5.0	0.0	55.0	7.5
VA15W-68	25.8		3.0	33.3	22.5	1.0	70.0	25.0
VA16W-29	25.3		2.0	20.0	15.0	2.0	80.0	32.5
VA16W-148	32.0		6.5	36.7	22.5	1.0	65.0	60.0
VA16W-149	28.7		1.5	26.0	35.0	2.0	75.0	32.5
13VA-FHB-DH252	16.6	l	1.5	8.3	25.0	0.0	35.0	30.0
KY06C-1195-37-2-5	21.6		2.5	18.3	10.0	1.0	55.0	42.5
X08C-1181-61-15-5	31.8		15.0	40.0	20.0	8.0	75.0	32.5
KY06C-1178-16-10-3	22.1		2.0	11.0	5.0	2.0	75.0	37.5
KY07C-1145-94-12-5	16.4	l	1.0	9.3	12.5	3.0	45.0	27.5
X08C-1077-11-18-3	19.3		6.5	9.3	5.0	0.0	60.0	35.0
NY11013-10-72-1314	33.3		9.0	35.0	30.0	1.0	75.0	50.0
NY11013-10-15-1312	30.8		5.0	30.0	17.5	2.0	70.0	60.0
NY02008-807	21.4		5.0	18.3	15.0	0.0	45.0	45.0
NY09095-16-928	13.8	l	2.0	10.0	5.0	1.0	45.0	20.0
NY02007-1206	28.5		2.0	16.0	22.5	3.0	75.0	52.5
KWS152	31.2		3.5	45.0	25.0	6.0	70.0	37.5
KWS149	20.6		1.0	9.3	12.5	1.0	55.0	45.0
KWS192	15.7	l	1.5	12.7	7.5	1.0	50.0	21.5
KWS191	29.3		1.0	35.0	15.0	0.0	90.0	35.0
KWS193	20.1		0.0	6.3	7.5	2.0	75.0	30.0
MI14R0267	18.5	l	3.0	6.0	7.5	3.0	80.0	11.5
MI14W0190	13.3	l	5.0	2.7	5.0	2.0	55.0	10.0
MI14W0906	45.0	h	5.0	73.3	40.0	4.0	90.0	57.5
MI14R1145	21.3		2.0	23.3	10.0	0.0	65.0	27.5
MO131753	16.0	l	0.5	9.7	7.5	1.0	55.0	22.5
MO151163	12.1	l	1.0	1.4	10.0	0.0	45.0	15.0
MO151126	7.9	l	1.5	8.3	5.0	1.0	20.0	11.5
MO160132	12.6	l	1.0	1.0	5.0	1.0	55.0	12.5
MO160140	14.5	l	1.0	5.3	10.0	3.0	55.0	12.5
0566A1-3-1-1-63	38.5	h	1.0	56.7	37.5	6.0	90.0	40.0
04620A1-1-7-4-10	23.4		2.5	20.0	10.0	3.0	85.0	20.0
0527A1-9-14-4-3-3	20.7		1.0	14.9	7.5	2.0	85.0	14.0
0762A1-2-8	20.2		2.5	8.7	22.5	1.0	80.0	6.5
07419A1-16-1-1-16-1-1	24.3		1.5	26.7	17.5	0.0	75.0	25.0
OH12-194-24	23.7		4.0	13.3	15.0	0.0	70.0	40.0
OH12-195-22	24.3		2.0	20.0	17.5	1.0	70.0	35.0
OH13-314-18	29.2		1.0	25.0	35.0	2.0	65.0	47.5
NE13604	27.6		6.5	10.7	25.0	1.0	60.0	62.5
NW13493	16.9	l	3.5	23.3	7.5	2.0	35.0	30.0
NE13515	30.9		6.5	33.3	22.5	3.0	75.0	45.0
NE14494	31.3		9.0	17.7	20.0	1.0	90.0	50.0
NE14696	30.3		7.5	21.0	10.0	1.0	75.0	67.5
LES168062	19.0	l	3.5	7.3	7.5	1.0	75.0	20.0
LES167062	23.3		6.0	16.7	12.5	2.0	75.0	27.5
LES167906	29.6		3.5	31.7	12.5	0.0	75.0	55.0
LES167499	34.0	h	2.0	26.7	40.0	0.0	75.0	60.0
AVERAGE	22.6		3.1	19.4	15.3	1.7	64.3	31.7
MINUMUM	7.9		0.0	1.0	5.0	0.0	20.0	6.5
MAXIMUM	45.0		15.0	73.3	40.0	8.0	90.0	67.5
LSD(0.05)	11.4		.	.	.	.	.	.

Table 19. Summary of INC/SEV/FDK (ISK, %) data from the 2017-2018 NUWWSN

NAME	AVG		ILCHA	ILURB	KYLEX	NELIN	NYITH	VAMTH
TRUMAN	17.3	l	9.0	3.0	23.0	5.2	27.4	36.4
ERNIE	27.4		21.6	26.9	31.0	8.4	36.7	39.5
FREEDOM	30.4		25.2	32.5	26.0	7.0	47.7	44.1
PIONEER2545	41.3	h	42.6	45.3	36.0	7.9	63.1	52.7
IL13-20616	19.2	l	12.4	11.4	23.0	0.9	29.6	37.8
IL14-11718	25.4		18.4	27.0	29.0	1.6	32.6	43.9
IL14-11848	17.8	l	12.0	8.2	24.0	1.0	25.9	35.7
IL14-28462	28.6		12.0	27.8	32.0	5.3	42.1	52.5
IL14-DC-64-95-118	23.9		12.6	24.3	26.0	1.2	31.3	48.0
VA15W-68	31.4		22.2	37.7	30.0	1.4	52.8	44.3
VA16W-29	35.0		21.8	37.9	33.0	5.9	61.7	49.9
VA16W-148	32.5		23.6	31.3	39.0	4.8	50.6	45.8
VA16W-149	33.7		15.6	33.1	50.0	1.3	54.1	48.4
13VA-FHB-DH252	25.6		9.6	30.9	40.0	0.1	32.5	40.5
KY06C-1195-37-2-5	25.1		13.0	24.0	23.5	0.5	48.2	41.2
X08C-1181-61-15-5	35.2		36.0	39.0	32.0	5.8	56.1	42.2
KY06C-1178-16-10-3	22.2	l	12.8	18.3	23.0	1.1	43.1	35.0
KY07C-1145-94-12-5	27.8		30.4	17.8	32.0	1.9	39.4	45.1
X08C-1077-11-18-3	27.7		32.6	15.4	23.0	5.9	49.8	39.4
NY11013-10-72-1314	29.2		18.6	28.5	36.0	3.4	41.9	46.7
NY11013-10-15-1312	29.1		14.0	37.3	40.0	0.9	41.4	41.0
NY02008-807	25.8		14.0	20.8	36.5	0.1	37.0	46.4
NY09095-16-928	25.0		27.8	8.6	35.0	2.7	30.2	45.8
NY02007-1206	36.4		21.8	23.7	51.0	1.5	67.9	52.4
KWS152	35.1		22.4	51.3	37.0	3.5	54.7	41.9
KWS149	28.7		27.4	28.1	29.0	3.1	40.6	44.1
KWS192	24.7		15.6	24.7	24.0	8.0	35.1	41.0
KWS191	31.8		18.4	38.4	27.0	0.8	62.0	44.1
KWS193	24.7		15.0	20.7	21.0	1.4	47.1	42.8
MI14R0267	25.0		13.2	20.2	24.0	2.7	55.1	34.8
MI14W0190	23.4		14.0	7.2	29.0	2.2	49.8	37.9
MI14W0906	46.4	h	44.0	62.2	46.0	12.5	59.3	54.5
MI14R1145	28.4		27.8	17.6	23.5	1.2	52.9	47.4
MO131753	19.2	l	15.2	17.0	24.0	0.4	27.1	31.7
MO151163	18.0	l	18.4	9.1	22.0	3.6	26.6	28.3
MO151126	14.6	l	15.6	15.2	14.0	4.8	13.9	24.3
MO160132	20.2	l	9.4	11.5	26.0	0.8	36.0	37.5
MO160140	23.3		6.4	21.1	31.0	2.8	40.1	38.4
0566A1-3-1-1-63	38.1		36.4	37.2	45.0	6.0	56.7	47.3
04620A1-1-7-4-10	35.3		25.0	41.5	28.0	7.5	63.3	46.7
0527A1-9-14-4-3-3	25.4		24.4	6.9	24.0	2.0	61.8	33.6
0762A1-2-8	24.0		25.0	7.5	36.0	4.1	43.1	28.2
07419A1-16-1-1-16-1-1	28.3		21.6	32.6	25.0	7.9	46.7	36.0
OH12-194-24	31.5		28.6	29.4	27.0	6.3	49.1	48.8
OH12-195-22	30.9		27.8	24.1	34.0	5.0	45.0	49.2
OH13-314-18	34.4		24.4	39.7	41.0	3.0	49.1	49.5
NE13604	29.9		17.6	22.6	43.0	2.9	47.8	45.6
NW13493	26.7		16.4	42.9	27.0	3.9	30.1	39.8
NE13515	32.5		14.6	42.0	42.0	2.5	47.3	46.9
NE14494	31.4		15.6	30.2	35.0	0.5	59.0	48.0
NE14696	27.2		15.0	26.3	31.0	3.1	41.9	45.8
LES168062	32.4		31.4	34.8	27.0	6.4	54.1	41.0
LES167062	35.9		38.4	34.5	32.0	4.4	52.6	53.4
LES167906	34.2		22.4	39.2	32.0	2.8	55.8	52.9
LES167499	42.8	h	21.8	50.9	55.0	5.6	66.8	56.9
AVERAGE	28.7		20.9	27.2	31.6	3.6	45.7	43.1
MINUMUM	14.6		6.4	3.0	14.0	0.1	13.9	24.3
MAXIMUM	46.4		44.0	62.2	55.0	12.5	67.9	56.9
LSD(0.05)	8.2		.	.	.	.	.	.

Table 20. Summary of deoxynivalenol (DON, ppm) data from the 2017-2018 NUWWSN.

NAME	AVG		ILCHA	ILURB	INWLA	KYLEX	NELIN	VAMTH
TRUMAN	3.8	l	0.1	0.4	2.8	6	0.6	13.2
ERNIE	3.3	l	0.4	0.6	1.7	4	0.4	12.8
FREEDOM	5.2	h	0.3	1.5	8.5	7.2	0.3	13.7
PIONEER2545	7.2	h	0.9	4.3	4.2	7.2	0.5	26.1
IL13-20616	3	l	0.2	0.7	1.1	3	0.2	12.9
IL14-11718	3.4	l	0.2	1.1	2.7	3.9	0.1	12.4
IL14-11848	1.2	l	0.1	0.6	0.7	1.4	0.2	4
IL14-28462	3.1	l	0.3	0.2	4.2	3	0.1	11
IL14-DC-64-95-118	2.5	l	0.1	0.8	1.9	2.7	0.1	9.4
VA15W-68	7.3	h	0.3	3.1	4.4	10.3	0.8	25
VA16W-29	5.2	h	0.2	2.6	1.5	7	0.1	19.7
VA16W-148	7.1	h	0.2	2.5	10.8	9.5	0.6	19.1
VA16W-149	4		0.2	0.8	6.1	5.1	0.4	11.2
13VA-FHB-DH252	4.5		0.1	0.6	2.8	8.8	1.5	13.2
KY06C-1195-37-2-5	4.2		0.3	1.5	1.5	6.5	1.5	13.7
X08C-1181-61-15-5	3.4	l	0.3	1.7	2.1	5.2	0.7	10.3
KY06C-1178-16-10-3	4.3		0.1	1.3	5.1	3.9	1.4	13.8
KY07C-1145-94-12-5	2.6	l	0.4	0.9	1	4.1	0.5	8.6
X08C-1077-11-18-3	2.9	l	0.3	0.9	2.7	3.5	0.1	10.1
NY11013-10-72-1314	4.3		0.2	0.7	0.6	6.1	0.8	17.3
NY11013-10-15-1312	4.3		0.2	0.6	0.8	6.9	2.8	14.7
NY02008-807	6	h	0.6	1.8	1.7	13.1	2.1	16.9
NY09095-16-928	5.2	h	0.2	1.3	6.3	4.3	0.1	18.9
NY02007-1206	7.4	h	0.6	3.1	1.5	13.2	2	23.8
KWS152	4.5		0.2	1.7	1.6	9.3	2.5	12
KWS149	3.3	l	0.4	2	2.2	3.6	0.6	10.8
KWS192	2.9	l	0.1	1.5	0.7	2.7	0.5	12.1
KWS191	5.7	h	0.4	2.7	3.4	6.9	0.3	20.5
KWS193	5.1	h	0.1	1	4.3	5.3	1.1	18.6
MI14R0267	4.2		0.4	1.5	3.6	4.2	0.5	15.3
MI14W0190	5.1	h	0.2	0.8	1.2	7.1	0.4	21.1
MI14W0906	4.9	h	0.2	2.4	1.6	8.5	0.5	16
MI14R1145	4.1		0.2	1.7	3.7	6.3	1	11.7
MO131753	3.5	l	0.2	0.3	2.4	4	1.5	12.9
MO151163	2.1	l	0.4	1.2	2.6	0.3	10.1	.
MO151126	2.3	l	0.1	1	2.2	0.6	0.2	9.4
MO160132	3.3	l	0.1	0.5	0.9	4.4	0.8	13
MO160140	3.8	l	0.1	0.6	1.6	6.6	0.4	13.3
0566A1-3-1-1-63	4.4		0.1	1.1	2.1	5.8	0.3	16.9
04620A1-1-7-4-10	5.5	h	0.5	2.4	6.7	5.1	0.4	18.1
0527A1-9-14-4-3-3	2.9	l	0.2	0.3	4.3	3.7	0.7	7.9
0762A1-2-8	1.8	l	0.2	2.3	4	0	6.6	.
07419A1-16-1-1-16-1-1	3.5	l	0.2	1.5	1.4	5.7	0.2	12.1
OH12-194-24	6.2	h	0.3	2.2	5.6	7.5	0.2	21.3
OH12-195-22	5.7	h	0.3	0.9	11.6	5.7	0.3	15.6
OH13-314-18	4.8	h	0.4	1.8	3.9	7	0.3	15.4
NE13604	6	h	0.4	1.1	5.1	7.8	0.8	21
NW13493	4.5		0.4	2	3.3	5	2	14.5
NE13515	5.4	h	0.3	2.1	7.4	5.1	2.7	15
NE14494	5.3	h	0.1	1.4	7.2	6.7	0.8	15.7
NE14696	5.3	h	0.2	0.6	6.7	7	0.1	17
LES168062	2.4	l	0.4	1.3	1.9	2.1	0.3	8.4
LES167062	3.1	l	0.5	1.5	2.3	3.9	0.9	9.5
LES167906	5.9	h	0.3	2.4	8.6	8.6	0.9	14.5
LES167499	5.1	h	0.7	2.1	3.8	6.6	0.4	17
AVERAGE	4.3		0.3	1.4	3.5	5.6	1	.
MINUMUM	1.2		0.1	0.2	0.6	0	0.1	.
MAXIMUM	7.4		0.9	4.3	11.6	13.2	10.1	.
LSD(0.05)	2.7		.	.	.	.	.	.

Table 21. Summary of greenhouse severity (GHSEV, %) data from the 2017-2018 NUWWSN.

DATA NOT PROVIDED FOR THE 2017-2018 TESTS

Table 22. Summary of heading date (HD, Julian days) height (HGT, inches), and lodging (LDG) data from the 2017-2018 NUWWSN

	Heading Date											Height				Lodging	
NAME	AVG		ILCHA	INLAY	INWLA	KYLEX	MIELA	NYITH	OHWOO	VAMTH	VAWAR	AVG	ILCHA	VAWAR	KYLEX	INLAY	VAWAR
TRUMAN	143.1		143	137	137	136	148	152	147	131	157	39.7	36.0	39	44.0	0	2
ERNIE	139.0		139	135	132	131	146	149	141	126	152	36.3	35.0	35	39.0	0	4
FREEDOM	141.0		141	136	136	132	149	151	144	128	153	37.2	35.0	36	40.5	0	5
PIONEER2545	140.1		139	137	133	132	148	149	143	127	154	34.0	31.0	35	36.0	0	4
IL13-20616	137.3	l	136	134	131	128	146	147	140	124	150	30.8	27.0	30	35.5	0	2
IL14-11718	138.2	l	137	134	132	131	146	148	142	125	150	32.2	30.0	30	36.5	0	3
IL14-11848	140.1		139	136	134	132	147	149	143	128	154	32.5	29.0	33	35.5	0	3
IL14-28462	137.2	l	136	133	132	128	146	147	140	125	150	30.7	26.0	33	33.0	0	1
IL14-DC-64-95-118	138.0	l	136	133	132	129	146	147	141	128	151	33.8	30.0	36	35.5	0	3
VA15W-68	140.1		140	137	135	132	147	149	144	125	152	31.2	28.0	32	33.5	0	1
VA16W-29	140.6		140	137	135	132	147	150	143	128	154	33.0	31.0	33	35.0	0	1
VA16W-148	141.4		141	138	136	134	148	150	146	127	154	34.0	30.0	35	37.0	0	1
VA16W-149	140.3		140	137	135	132	147	149	145	126	152	32.5	31.0	32	34.5	0	1
13VA-FHB-DH252	142.0		142	137	136	133	148	152	147	128	155	36.3	35.0	34	40.0	0	3
KY06C-1195-37-2-5	141.1		141	137	136	132	148	150	147	126	153	34.7	33.0	35	36.0	0	5
X08C-1181-61-15-5	139.8		140	136	133	132	146	149	145	125	152	33.0	29.0	35	35.0	0	2
KY06C-1178-16-10-3	140.7		140	137	135	132	148	150	145	128	152	34.3	31.0	35	37.0	0	3
KY07C-1145-94-12-5	139.1		138	135	133	130	147	149	143	125	152	34.2	31.0	36	35.5	0	5
X08C-1077-11-18-3	141.2		141	137	135	132	149	152	146	126	153	34.8	30.0	36	38.5	7	2
NY11013-10-72-1314	145.6	h	146	141	140	140	149	153	149	134	159	39.5	36.0	38	44.5	8	1
NY11013-10-15-1312	143.8		143	141	139	137	148	150	147	132	158	39.7	37.0	38	44.0	0	5
NY02008-807	145.8	h	147	141	142	128	151	157	151	134	161	38.7	37.0	39	40.0	0	1
NY09095-16-928	141.3		140	138	136	133	148	151	145	128	154	34.5	31.0	35	37.5	5	2
NY02007-1206	145.7	h	145	142	140	137	151	153	151	133	159	35.8	34.0	36	37.5	4	0
KWS152	140.2		141	137	134	130	148	149	145	126	152	30.8	25.0	34	33.5	0	5
KWS149	140.5		141	137	134	132	147	151	146	126	151	31.8	27.0	33	35.5	0	2
KWS192	140.0		139	137	134	131	148	149	144	127	152	35.3	33.0	36	37.0	0	3
KWS191	140.1		140	136	133	132	149	150	145	126	151	33.2	31.0	33	35.5	0	1
KWS193	140.7		140	136	136	131	147	151	144	128	154	32.7	29.0	34	35.0	0	1
MI14R0267	140.1		139	137	137	130	146	149	143	127	154	37.7	34.0	37	42.0	0	2
MI14W0190	144.1		143	139	139	138	149	152	147	132	158	36.8	34.0	37	39.5	8	1
MI14W0906	140.5		140	137	135	131	148	151	145	125	153	36.2	34.0	36	38.5	0	3
MI14R1145	140.6		141	137	135	132	147	149	143	128	155	34.2	32.0	33	37.5	0	1
MO131753	141.5		142	137	137	133	149	151	145	127	154	38.0	36.0	37	41.0	0	3
MO151163	139.1		138	136	135	130	147	150	141	125	152	37.5	35.0	37	40.5	0	6
MO151126	139.3		139	136	134	130	147	149	143	124	152	37.7	33.0	38	42.0	0	4
MO160132	142.0		141	138	138	134	148	152	145	129	154	38.0	37.0	36	41.0	9	4
MO160140	142.1		141	138	137	133	148	153	146	128	155	37.5	37.0	35	40.5	9	5
0566A1-3-1-1-63	139.6		138	136	136	129	148	149	142	126	153	31.3	29.0	31	34.0	0	2
04620A1-1-7-4-10	139.5		139	136	134	131	148	148	144	125	152	30.0	26.0	30	34.0	0	1
0527A1-9-14-4-3-3	139.1		138	136	134	131	147	149	142	125	151	31.7	29.0	32	34.0	0	1
0762A1-2-8	139.8		139	137	134	131	148	150	145	125	150	31.3	29.0	31	34.0	0	3
07419A1-16-1-1-16-1-1	139.5		140	136	135	131	147	149	142	125	151	34.8	32.0	36	36.5	0	2
OH12-194-24	139.5		139	136	134	129	147	149	144	126	152	33.3	30.0	35	35.0	0	3
OH12-195-22	140.1		139	136	135	132	148	150	143	127	152	33.7	31.0	34	36.0	0	2
OH13-314-18	139.5		139	135	134	130	148	150	143	126	151	32.7	31.0	32	35.0	0	3
NE13604	144.5		142	140	141	135	149	152	147	134	160	38.2	37.0	33	44.5	4	4
NW13493	140.8		140	136	137	134	151	145		127	156	37.2	35.0	34	42.5	0	3
NE13515	142.3		142	138	137	136	148	151	146	127	157	36.8	35.0	34	41.5	3	2
NE14494	142.7		141	138	137	134	148	150	146	132	158	38.0	35.0	35	44.0	3	2
NE14696	143.8		141	140	140	136	149	151	146	133	159	40.2	38.0	36	46.5	8	2
LES168062	138.0	l	136	135	133	129	146	147	141	125	150	36.0	35.0	35	38.0	5	4
LES167062	140.3		139	137	136	132	148	149	144	125	153	34.2	32.0	33	37.5	0	5
LES167906	139.1		138	135	134	129	146	150	143	126	152	30.2	26.0	33	31.5	0	3
LES167499	137.4	l	137	134	133	128	146	147	139	124	149	29.5	26.0	31	31.5	0	6
AVERAGE	139.1		140	137	135	132	148	150	144	127		34.7	31.9	34.5	37.7		2.7
MINUMUM	135.7		136	133	131	128	146	145	127	124			25.0		31.5		
MAXIMUM	144.0		147	142	142	140	151	157	151	134			38.0		46.5		
LSD(0.05)	1.2		.	.	.	.	.	.	.	.			.		.		

Table 23. Summary of other traits collected on the 2017-2018 NUWWSN including powdery mildew (PM), , yellow rust (YR), Stagonospora Leaf Blotch, and foliar rating of general foliage health.

	FOLIAR RATING (0-9)	STAG LEAF BLOTCH (0-9)	PM (0-9)			YR (0-9)	YIELD (BU/ACRE)		TW (LBS/BU)	
NAME	OHWOO	ILCHA	VAMTH	VAWAR	INLAY	INLAY	INLAY	VAWAR	INLAY	VAWAR
TRUMAN	4.9	2.0	6.5	0	0.0	0.0		53.3		57.7
ERNIE	4.4	2.5	7.0	2	0.5	0.5		49.7		55.4
FREEDOM	3.7	3.0	7.0	2	0.0	0.0		54.8		55.1
PIONEER2545	6.4	3.0	7.0	2	0.0	0.5		58.0		56.3
IL13-20616	8.8	3.5	4.0	1	0.0	1.0	87.9	53.3	59.8	59.3
IL14-11718	5.4	3.0	3.0	1	0.0	0.5	81.2	61.2	59.1	55.3
IL14-11848	4.7	2.5	6.5	1	0.0	0.5	83.2	59.2	57.5	58.1
IL14-28462	8.8	3.0	2.5	0	0.0	3.5	96.1	57.0	58.7	55.5
IL14-DC-64-95-118	5.8	3.0	2.0	1	0.0	0.0	93.4	73.7	60.0	58.1
VA15W-68	4.0	3.0	1.0	0	0.0	0.0	82.7	67.7	57.7	58.0
VA16W-29	4.0	3.0	0.0	0	0.0	0.0	97.0	76.5	57.6	56.2
VA16W-148	6.0	3.0	1.0	0	0.5	0.0	91.7	68.4	57.6	59.1
VA16W-149	5.0	3.5	5.0	0	0.0	0.0	83.9	66.0	54.6	57.4
13VA-FHB-DH252	3.3	2.5	2.0	2	0.0	0.0	98.0	67.9	58.8	60.3
KY06C-1195-37-2-5	4.9	4.0	9.0	4	0.0	0.0		55.3		58.4
X08C-1181-61-15-5	5.6	3.0	4.5	2	0.0	0.5		59.5		57.0
KY06C-1178-16-10-3	4.6	2.0	3.0	3	0.0	0.0		72.4		57.7
KY07C-1145-94-12-5	4.0	2.5	6.0	3	0.0	0.0		72.7		57.9
X08C-1077-11-18-3	4.6	3.5	0.5	0	0.0	0.0		67.1		57.1
NY11013-10-72-1314	5.2	3.0	1.0	0	0.0	0.0		39.2		56.1
NY11013-10-15-1312	3.9	2.5	3.5	3	0.0	0.0		45.8		55.3
NY02008-807	4.8	3.0	0.5	1	0.0	0.0		30.2		54.0
NY09095-16-928	6.6	3.0	1.0	3	0.0	0.5		48.4		55.0
NY02007-1206	8.4	2.5	2.5	0	0.0	0.0		34.8		57.7
KWS152	6.0	3.0	6.0	3	0.0	0.0		61.7		57.1
KWS149	5.3	2.0	1.5	0	0.0	0.0		53.5		54.6
KWS192	4.0	2.5	6.0	3	0.0	0.0		64.4		58.0
KWS191	7.3	2.5	7.0	5	0.0	0.0		73.6		56.5
KWS193	4.0	2.0	2.0	0	0.0	0.0		56.6		57.3
MI14R0267	6.4	3.0	4.0	0	0.0	0.5		69.7		57.6
MI14W0190	3.9	3.0	0.0	0	0.0	0.0		57.7		58.7
MI14W0906	6.7	3.0	5.0	2	0.0	0.0		67.8		54.8
MI14R1145	4.7	3.0	4.5	3	0.0	0.0		46.6		58.3
MO131753	3.6	3.0	4.5	4	0.0	0.0		58.1		57.6
MO151163	4.8	3.0	5.5	5	0.0	0.0		61.2		59.1
MO151126	5.0	2.5	3.0	2	0.0	0.0		59.0		58.2
MO160132	4.3	2.0	3.5	5	0.0	0.0		56.1		57.9
MO160140	3.6	3.0	6.5	3	0.0	0.0		55.2		58.1
0566A1-3-1-1-63	4.7	3.5	2.0	0	0.0	0.5		57.5		54.5
04620A1-1-7-4-10	4.7	2.0	6.0	2	0.0	0.5		66.3		55.7
0527A1-9-14-4-3-3	5.4	3.0	7.5	5	1.0	0.0		49.8		53.8
0762A1-2-8	5.0	2.5	6.0	4	0.0	0.0		62.1		54.4
07419A1-16-1-1-16-1-1	4.4	3.5	1.0	0	0.0	0.5		60.2		56.3
OH12-194-24	5.3	3.5	0.0	0	0.5	0.5	100.2	59.7	58.3	53.9
OH12-195-22	4.4	3.0	1.0	0	0.0	0.0	100.4	56.4	58.9	53.1
OH13-314-18	5.0	3.0	2.5	0	0.0	0.0	98.5	76.8	57.7	55.1
NE13604	4.9	2.0	6.5	4	1.5	0.0		29.7		58.1
NW13493	7.3	3.0	6.5	5	0.0	0.5		39.7		57.6
NE13515	5.6	2.5	5.0	4	1.5	0.5		34.5		58.0
NE14494	4.3	3.0	7.5	5	0.0	0.0		35.9		57.3
NE14696	4.3	2.5	7.0	3	0.0	0.0		52.6		58.2
LES168062	5.8	3.0	8.5	4	2.0	0.0	101.6	61.0	59.7	56.6
LES167062	4.7	2.5	5.5	2	0.0	0.0	85.6	60.9	58.0	57.9
LES167906	5.7	4.0	5.0	4	0.0	0.0	92.8	69.2	55.0	55.6
LES167499	8.2	3.5	4.0	4	0.0	0.0	90.7	53.1	57.2	53.6

Table 24. Summary of incidence (INC, %) from 2017-2018 PNUWWSN.

	All		Reported					Calculated from 0-9
NAME	AVG		ILURB	INWLA	MIELA	MOCOL	VAMTH	INLAY
TRUMAN	36.2	l	5.0	45.0	17.0	70.0	70.0	10.0
ERNIE	56.4		15.0	75.0	25.9	100.0	92.5	30.0
FREEDOM	58.4		13.0	85.0	17.5	100.0	100.0	35.0
PIONEER2545	72.5	h	30.0	95.0	59.8	100.0	100.0	50.0
IL14-3934	46.0	l	7.0	65.0	18.8	75.0	95.0	15.0
IL14-9542	45.6	l	4.0	35.0	22.0	100.0	97.5	15.0
IL14-11312	44.7	l	0.0	65.0	26.0	85.0	82.5	10.0
IL14-11911	39.8	l	7.0	40.0	11.9	90.0	75.0	15.0
IL14-11916	43.3	l	12.0	40.0	10.5	85.0	97.5	15.0
VA16W-224	60.8		6.0	75.0	48.6	95.0	90.0	50.0
VA16W-196	72.1	h	30.0	80.0	60.2	95.0	92.5	75.0
13VTK429-3	66.1	h	12.0	75.0	64.3	90.0	95.0	60.0
13VTK434-89	56.0		12.0	75.0	18.8	100.0	85.0	45.0
DH13SRW021-80	73.0	h	17.0	85.0	70.8	100.0	95.0	70.0
KY10-0178-1-2-5	57.2		18.0	90.0	20.4	100.0	75.0	40.0
KY09C-0128-72-2-1	43.8	l	1.0	65.0	6.8	90.0	90.0	10.0
X09-1021-47-19-3	55.6		8.0	80.0	23.3	100.0	82.5	40.0
KY10-0178-2-19-5	50.1		6.0	55.0	34.5	100.0	75.0	30.0
KY09C-1245-99-1-5	64.0		40.0	65.0	44.0	80.0	90.0	65.0
KWS154	51.7		15.0	50.0	22.8	90.0	97.5	35.0
KWS151	63.7		18.0	55.0	61.6	100.0	92.5	55.0
KWS153	54.6		13.0	55.0	34.8	70.0	100.0	55.0
KWS074	62.3		16.0	60.0	65.3	75.0	97.5	60.0
KWS095	61.9		22.0	70.0	34.5	100.0	95.0	50.0
KWS127	78.4	h	37.0	95.0	63.4	95.0	100.0	80.0
MI14W0742	66.7	h	18.0	90.0	52.3	85.0	100.0	55.0
MI15R0068	61.1		16.0	70.0	37.8	90.0	97.5	55.0
MI15R0269	64.4		5.0	60.0	56.7	100.0	100.0	65.0
MI14W0860	66.3	h	20.0	80.0	37.5	90.0	100.0	70.0
MI14W0833	63.9		13.0	85.0	30.3	100.0	100.0	55.0
MI15R0428	61.0		3.0	90.0	28.0	100.0	95.0	50.0
MI15R0259	58.8		6.0	75.0	31.5	100.0	100.0	40.0
MO160438	45.0	l	6.0	60.0	24.0	85.0	65.0	30.0
MO160455	37.7	l	2.0	30.0	23.9	90.0	70.0	10.0
MO160458	45.2	l	8.0	50.0	15.5	100.0	82.5	15.0
MO160471	42.0	l	6.0	60.0	10.9	85.0	75.0	15.0
MO160959	52.0		9.0	90.0	10.5	95.0	82.5	25.0
0527A1-7-7-3-1	54.3		4.0	60.0	36.7	100.0	100.0	25.0
05247A1-7-7-3-1	55.1		5.0	65.0	28.1	100.0	97.5	35.0
0566A1-3-1-63-3	56.9		9.0	75.0	20.2	85.0	97.5	55.0
02444A1-23-1-3-4	51.6		1.0	75.0	28.5	100.0	80.0	25.0
0762A1-2-8	50.8		12.0	75.0	20.5	95.0	82.5	20.0
OH14-216-47	67.9	h	18.0	90.0	57.0	85.0	92.5	65.0
OH14-112-72	62.4		15.0	85.0	34.3	95.0	95.0	50.0
OH14-112-47	52.1		10.0	55.0	32.6	95.0	80.0	40.0
OH14-112-15	60.5		15.0	65.0	42.8	100.0	90.0	50.0
OH14-112-34	57.8		17.0	55.0	52.3	100.0	92.5	30.0
AVERAGE	56.3		12.4	68.4	33.9	92.8	90.2	40.3
MINUMUM	36.2		0.0	30.0	6.8	70.0	65.0	10.0
MAXIMUM	78.4		40.0	95.0	70.8	100.0	100.0	80.0
LSD(0.05)	13.0		.	.	.	.	.	.

Table 25. Summary of severity (SEV, %) data from the 2017-2018 PNUWWSN

	All		Reported					Calculated from 0-9
NAME	AVG		ILURB	INWLA	MIELA	MOCOL	VAMTH	INLAY
TRUMAN	22.0	l	30.0	8.3	27.0	12.1	34.5	20.0
ERNIE	35.6		27.0	21.3	30.0	29.9	65.5	40.0
FREEDOM	37.1		30.0	22.8	21.7	42.5	75.5	30.0
PIONEER2545	59.2	h	70.0	20.0	66.7	69.0	74.5	55.0
IL14-3934	27.5	l	30.0	9.5	21.7	14.7	69.3	20.0
IL14-9542	21.4	l	7.0	9.0	25.0	26.1	46.5	15.0
IL14-11312	19.7	l	0.0	10.5	30.0	14.4	48.0	15.0
IL14-11911	15.9	l	10.0	9.2	18.3	20.5	27.5	10.0
IL14-11916	17.9	l	10.0	7.9	15.0	12.5	46.8	15.0
VA16W-224	40.0		43.0	36.5	55.0	35.4	40.0	30.0
VA16W-196	52.8	h	63.0	25.5	66.7	33.3	58.5	70.0
13VTK429-3	38.9		27.0	15.5	70.0	23.4	47.5	50.0
13VTK434-89	27.6	l	33.0	16.6	25.0	22.7	28.5	40.0
DH13SRW021-80	47.0		50.0	19.0	73.3	25.3	49.3	65.0
KY10-0178-1-2-5	26.4	l	40.0	12.8	25.0	38.5	22.3	20.0
KY09C-0128-72-2-1	16.1	l	10.0	8.4	11.7	20.1	36.3	10.0
X09-1021-47-19-3	29.5		23.0	12.5	28.3	34.6	48.8	30.0
KY10-0178-2-19-5	32.4		17.0	9.4	50.0	32.9	40.3	45.0
KY09C-1245-99-1-5	36.1		57.0	16.8	50.0	11.0	56.8	25.0
KWS154	28.4	l	40.0	9.5	30.0	13.6	52.5	25.0
KWS151	34.5		27.0	12.8	68.3	22.5	36.3	40.0
KWS153	35.4		30.0	19.8	36.7	14.6	86.5	25.0
KWS074	41.0		23.0	13.6	68.3	12.9	73.0	55.0
KWS095	43.4		60.0	13.4	36.7	24.1	71.3	55.0
KWS127	57.3	h	67.0	28.5	71.7	38.3	63.5	75.0
MI14W0742	61.0	h	67.0	31.0	63.3	57.1	77.8	70.0
MI15R0068	51.2	h	60.0	32.3	43.3	45.3	66.5	60.0
MI15R0269	55.6	h	59.0	11.4	61.7	59.0	82.8	60.0
MI14W0860	51.2	h	37.0	28.1	45.0	70.8	76.3	50.0
MI14W0833	37.3		43.0	18.5	35.0	46.0	56.0	25.0
MI15R0428	36.5		47.0	23.0	30.0	23.8	55.0	40.0
MI15R0259	29.3		23.0	11.3	35.0	44.0	47.8	15.0
MO160438	25.7	l	37.0	14.5	28.3	16.5	38.0	20.0
MO160455	22.9	l	33.0	11.3	28.3	15.7	39.3	10.0
MO160458	27.2	l	33.0	8.2	21.7	17.2	53.0	30.0
MO160471	22.6	l	30.0	15.3	16.7	17.5	36.3	20.0
MO160959	26.3	l	33.0	14.0	18.3	31.6	35.8	25.0
0527A1-7-7-3-1	34.1		47.0	18.9	45.0	24.9	38.8	30.0
05247A1-7-7-3-1	36.6		63.0	24.0	35.0	31.8	41.0	25.0
0566A1-3-1-63-3	26.2	l	13.0	14.7	23.3	15.3	55.8	35.0
02444A1-23-1-3-4	20.5	l	10.0	8.3	35.0	30.3	24.3	15.0
0762A1-2-8	20.3	l	20.0	12.0	25.0	19.9	30.0	15.0
OH14-216-47	45.4		37.0	30.5	63.3	23.3	53.5	65.0
OH14-112-72	31.3		33.0	27.5	40.0	21.5	40.5	25.0
OH14-112-47	23.4	l	20.0	9.8	35.0	19.6	31.3	25.0
OH14-112-15	35.0		37.0	16.6	46.7	23.3	41.5	45.0
OH14-112-34	33.5		27.0	7.3	60.0	29.9	32.0	45.0
AVERAGE	34.0		34.7	16.5	39.5	28.3	50.1	34.7
MINUMUM	15.9		0.0	7.3	11.7	11.0	22.3	10.0
MAXIMUM	61.0		70.0	36.5	73.3	70.8	86.5	75.0
LSD(0.05)	13.4		.	.	.	.	.	.

Table 26. Summary of index (IND, %) data from the 2017-2018 PNUWWSN.

	All		Reported							Calculated from 0-9		
NAME	AVG		ILCHA	ILURB	INWLA	MIELA	MOCOL	OHWOO	VAMTH	ILCHA	INLAY	KYLEX
TRUMAN	14.4	l	15.0	3.2	3.7	17.0	8.5	25.6	24.7	15.0	2.0	30.0
ERNIE	28.1		40.0	5.7	15.9	25.9	29.9	17.8	60.7	40.0	12.0	45.0
FREEDOM	30.5		35.0	4.6	19.3	17.5	42.5	29.4	75.5	35.0	10.5	40.0
PIONEER2545	49.3	h	60.0	24.4	19.0	59.8	69.0	59.4	74.5	60.0	27.5	50.0
IL14-3934	21.6	l	25.0	1.7	6.2	18.8	11.0	22.8	65.7	25.0	3.0	40.0
IL14-9542	18.7	l	20.0	1.0	3.2	22.0	26.1	13.3	45.3	20.0	2.3	35.0
IL14-11312	16.0	l	20.0	0.0	6.8	26.0	12.2	12.2	40.0	20.0	1.5	25.0
IL14-11911	12.8	l	10.0	0.8	3.7	11.9	18.5	13.3	20.7	10.0	1.5	35.0
IL14-11916	13.2	l	15.0	1.3	3.1	10.5	10.6	10.0	46.0	15.0	2.3	20.0
VA16W-224	28.0		30.0	3.4	27.4	48.6	33.6	18.3	36.1	30.0	15.0	40.0
VA16W-196	39.5		30.0	20.0	20.4	60.2	31.7	30.6	54.7	30.0	52.5	55.0
13VTK429-3	29.6		10.0	3.5	11.6	64.3	21.1	30.0	45.9	10.0	30.0	50.0
13VTK434-89	18.8	l	15.0	4.1	12.5	18.8	22.7	13.9	24.3	15.0	18.0	40.0
DH13SRW021-80	35.8		30.0	9.4	16.2	70.8	25.3	22.8	47.3	30.0	45.5	55.0
KY10-0178-1-2-5	21.1	l	40.0	10.7	11.5	20.4	38.5	13.9	16.9	40.0	8.0	30.0
KY09C-0128-72-2-1	16.3	l	35.0	0.1	5.4	6.8	18.1	12.2	32.6	35.0	1.0	35.0
X09-1021-47-19-3	22.7		20.0	2.0	10.0	23.3	34.6	20.6	41.6	20.0	12.0	40.0
KY10-0178-2-19-5	23.8		45.0	1.4	5.1	34.5	32.9	26.7	30.1	45.0	13.5	25.0
KY09C-1245-99-1-5	30.0		45.0	25.2	10.9	44.0	8.8	18.9	51.1	45.0	16.3	50.0
KWS154	24.1		30.0	7.2	4.8	22.8	12.2	30.0	51.6	30.0	8.8	50.0
KWS151	28.7		30.0	4.8	7.0	61.6	22.5	26.7	34.1	30.0	22.0	50.0
KWS153	30.9		40.0	4.4	10.9	34.8	10.2	22.2	86.5	40.0	13.8	55.0
KWS074	33.0		35.0	6.2	8.2	65.3	9.6	13.3	71.3	35.0	33.0	55.0
KWS095	30.1		35.0	14.8	9.3	34.5	24.1	17.8	67.9	35.0	27.5	40.0
KWS127	44.4	h	35.0	27.4	27.1	63.4	36.3	32.2	63.5	35.0	60.0	55.0
MI14W0742	44.1	h	40.0	13.3	27.9	52.3	48.6	33.3	77.8	40.0	38.5	65.0
MI15R0068	40.4	h	55.0	9.9	22.6	37.8	40.8	34.4	64.9	55.0	33.0	65.0
MI15R0269	41.6	h	40.0	2.5	6.8	56.7	59.0	37.8	82.8	40.0	39.0	50.0
MI14W0860	40.5	h	30.0	8.5	22.5	37.5	63.7	45.6	76.3	30.0	35.0	45.0
MI14W0833	30.5		40.0	5.3	15.7	30.3	46.0	17.8	56.0	40.0	13.8	50.0
MI15R0428	25.0		25.0	2.0	20.7	28.0	23.8	17.8	52.4	25.0	20.0	35.0
MI15R0259	29.6		35.0	2.1	8.4	31.5	44.0	61.7	47.8	35.0	6.0	30.0
MO160438	15.6	l	20.0	3.2	8.7	24.0	14.0	15.6	24.1	20.0	6.0	25.0
MO160455	16.1	l	25.0	1.5	3.4	23.9	14.1	12.8	28.1	25.0	1.0	35.0
MO160458	17.0	l	25.0	2.9	4.1	15.5	17.2	15.0	44.0	25.0	4.5	25.0
MO160471	14.3	l	20.0	2.1	9.2	10.9	14.9	19.4	28.9	20.0	3.0	20.0
MO160959	18.1	l	10.0	3.4	12.6	10.5	30.0	25.6	29.6	10.0	6.3	35.0
0527A1-7-7-3-1	25.2		30.0	2.3	11.3	36.7	24.9	30.0	38.8	30.0	7.5	45.0
05247A1-7-7-3-1	27.7		30.0	2.9	15.6	28.1	31.8	27.2	40.1	30.0	8.8	65.0
0566A1-3-1-63-3	28.2		55.0	1.7	11.0	20.2	13.0	39.4	54.1	55.0	19.3	40.0
02444A1-23-1-3-4	23.1		40.0	0.1	6.2	28.5	30.3	34.4	19.8	40.0	3.8	45.0
0762A1-2-8	18.9	l	40.0	6.6	9.0	20.5	18.9	11.7	25.0	40.0	3.0	35.0
OH14-216-47	34.0		35.0	7.6	27.5	57.0	19.8	17.8	49.4	35.0	42.3	50.0
OH14-112-72	28.0		45.0	6.5	23.4	34.3	20.5	31.1	38.5	45.0	12.5	40.0
OH14-112-47	23.3		55.0	3.0	5.4	32.6	18.6	18.9	26.0	55.0	10.0	40.0
OH14-112-15	24.9		30.0	5.8	10.8	42.8	23.3	15.6	38.3	30.0	22.5	35.0
OH14-112-34	23.5		30.0	6.7	4.0	52.3	29.9	16.1	29.4	30.0	13.5	30.0
AVERAGE	26.6		31.9	6.1	12.0	33.9	26.8	24.1	46.4	31.9	16.8	41.5
MINUMUM	12.8		10.0	0.0	3.1	6.8	8.5	10.0	16.9	10.0	1.0	20.0
MAXIMUM	49.3		60.0	27.4	27.9	70.8	69.0	61.7	86.5	60.0	60.0	65.0
LSD(0.05)	9.7		.	.	.	.	.	.	.	.	.	.

Table 27. Summary of FHB score on a 0-9 scale (0=no disease, 9-severe disease) in the 2017-18 PNUWWSN

	All		Reported as 0-9			Calculated From Percentage Data					
NAME	AVG		ILCHA	INLAY	KYLEX	ILURB	INWLA	MIELA	MOCOL	OHWOO	VAMTH
TRUMAN	1.5	l	1.5	0.2	3.0	0.3	0.4	1.6	1.2	2.6	2.5
ERNIE	2.8		4.0	1.2	4.5	0.6	1.6	2.4	3.0	1.8	6.1
FREEDOM	3.0		3.5	1.1	4.0	0.5	1.9	1.7	4.3	2.9	7.6
PIONEER2545	4.9	h	6.0	2.8	5.0	2.4	1.9	5.7	6.9	5.9	7.5
IL14-3934	2.2	l	2.5	0.3	4.0	0.2	0.6	1.8	1.5	2.3	6.6
IL14-9542	1.9	l	2.0	0.2	3.5	0.1	0.3	2.1	2.6	1.3	4.5
IL14-11312	1.6	l	2.0	0.2	2.5	0.0	0.7	2.5	1.4	1.2	4.0
IL14-11911	1.3	l	1.0	0.2	3.5	0.1	0.4	1.1	2.1	1.3	2.1
IL14-11916	1.3	l	1.5	0.2	2.0	0.1	0.3	1.0	1.3	1.0	4.6
VA16W-224	2.8		3.0	1.5	4.0	0.3	2.7	4.6	3.5	1.8	3.6
VA16W-196	3.9		3.0	5.3	5.5	2.0	2.0	5.7	3.3	3.1	5.5
13VTK429-3	2.9		1.0	3.0	5.0	0.4	1.2	6.1	2.3	3.0	4.6
13VTK434-89	1.9	l	1.5	1.8	4.0	0.4	1.2	1.8	2.3	1.4	2.4
DH13SRW021-80	3.5		3.0	4.6	5.5	0.9	1.6	6.7	2.5	2.3	4.7
KY10-0178-1-2-5	2.1	l	4.0	0.8	3.0	1.1	1.1	1.9	3.9	1.4	1.7
KY09C-0128-72-2-1	1.6	l	3.5	0.1	3.5	0.0	0.5	0.6	2.0	1.2	3.3
X09-1021-47-19-3	2.3	l	2.0	1.2	4.0	0.2	1.0	2.2	3.5	2.1	4.2
KY10-0178-2-19-5	2.4		4.5	1.4	2.5	0.1	0.5	3.3	3.3	2.7	3.0
KY09C-1245-99-1-5	3.0		4.5	1.6	5.0	2.5	1.1	4.2	1.1	1.9	5.1
KWS154	2.4		3.0	0.9	5.0	0.7	0.5	2.2	1.4	3.0	5.2
KWS151	2.8		3.0	2.2	5.0	0.5	0.7	5.8	2.3	2.7	3.4
KWS153	3.1		4.0	1.4	5.5	0.4	1.1	3.3	1.5	2.2	8.7
KWS074	3.3		3.5	3.3	5.5	0.6	0.8	6.2	1.3	1.3	7.1
KWS095	3.0		3.5	2.8	4.0	1.5	0.9	3.3	2.4	1.8	6.8
KWS127	4.4	h	3.5	6.0	5.5	2.7	2.7	6.0	3.8	3.2	6.4
MI14W0742	4.5	h	4.0	3.9	6.5	1.3	2.8	5.0	5.7	3.3	7.8
MI15R0068	4.1	h	5.5	3.3	6.5	1.0	2.3	3.6	4.5	3.4	6.5
MI15R0269	4.1	h	4.0	3.9	5.0	0.3	0.7	5.4	5.9	3.8	8.3
MI14W0860	4.1	h	3.0	3.5	4.5	0.9	2.2	3.5	7.1	4.6	7.6
MI14W0833	3.0		4.0	1.4	5.0	0.5	1.6	2.9	4.6	1.8	5.6
MI15R0428	2.5		2.5	2.0	3.5	0.2	2.1	2.6	2.4	1.8	5.2
MI15R0259	2.9		3.5	0.6	3.0	0.2	0.8	3.0	4.4	6.2	4.8
MO160438	1.6	l	2.0	0.6	2.5	0.3	0.9	2.3	1.7	1.6	2.4
MO160455	1.6	l	2.5	0.1	3.5	0.2	0.3	2.3	1.6	1.3	2.8
MO160458	1.7	l	2.5	0.5	2.5	0.3	0.4	1.5	1.7	1.5	4.4
MO160471	1.5	l	2.0	0.3	2.0	0.2	0.9	1.0	1.8	1.9	2.9
MO160959	1.8	l	1.0	0.6	3.5	0.3	1.3	1.0	3.2	2.6	3.0
0527A1-7-7-3-1	2.5		3.0	0.8	4.5	0.2	1.1	3.5	2.5	3.0	3.9
05247A1-7-7-3-1	2.8		3.0	0.9	6.5	0.3	1.6	2.7	3.2	2.7	4.0
0566A1-3-1-63-3	2.8		5.5	1.9	4.0	0.2	1.1	1.9	1.5	3.9	5.4
02444A1-23-1-3-4	2.3		4.0	0.4	4.5	0.0	0.6	2.7	3.0	3.4	2.0
0762A1-2-8	1.9	l	4.0	0.3	3.5	0.7	0.9	1.9	2.0	1.2	2.5
OH14-216-47	3.4		3.5	4.2	5.0	0.8	2.7	5.4	2.3	1.8	4.9
OH14-112-72	2.8		4.5	1.3	4.0	0.7	2.3	3.2	2.2	3.1	3.9
OH14-112-47	2.3		5.5	1.0	4.0	0.3	0.5	3.1	2.0	1.9	2.6
OH14-112-15	2.5		3.0	2.3	3.5	0.6	1.1	4.1	2.3	1.6	3.8
OH14-112-34	2.3		3.0	1.4	3.0	0.7	0.4	5.0	3.0	1.6	2.9
AVERAGE	2.7		3.2	1.7	4.1	0.6	1.2	3.2	2.8	2.4	4.6
MINUMUM	1.3		1.0	0.1	2.0	0.0	0.3	0.6	1.1	1.0	1.7
MAXIMUM	4.9		6.0	6.0	6.5	2.7	2.8	6.7	7.1	6.2	8.7
LSD(0.05)	1.0		.	.	.	.	.	.	.	.	.

Table 28. Summary of Fusarium Damaged Kernel (FDK, %) data from the 2017-2018 PNUWWSN.

NAME	AVG		ILCHA	ILURB	INLAY	KYLEX	VAMTH
TRUMAN	11.8	l	0.5	13.7	7.3	10.0	27.5
ERNIE	16.4	l	2.0	8.7	23.8	25.0	22.5
FREEDOM	20.9		5.0	15.0	21.9	20.0	42.5
PIONEER2545	36.0	h	17.5	40.0	24.8	22.5	75.0
IL14-3934	9.2	l	2.0	3.7	10.4	7.5	22.5
IL14-9542	6.6	l	1.0	3.7	9.3	5.0	14.0
IL14-11312	10.3	l	2.0	10.3	11.5	7.5	20.0
IL14-11911	10.6	l	2.5	4.0	8.8	10.0	27.5
IL14-11916	9.0	l	1.0	11.0	8.1	7.5	17.5
VA16W-224	22.3		3.5	14.3	48.5	12.5	32.5
VA16W-196	25.7		3.5	33.3	34.4	35.0	22.5
13VTK429-3	23.7		3.5	23.3	36.7	20.0	35.0
13VTK434-89	17.5	l	2.0	9.0	18.8	17.5	40.0
DH13SRW021-80	22.4		0.5	25.0	29.2	30.0	27.5
KY10-0178-1-2-5	13.0	l	1.0	15.0	8.8	15.0	25.0
KY09C-0128-72-2-1	10.0	l	0.0	6.0	14.2	12.5	17.5
X09-1021-47-19-3	20.3		6.5	15.0	24.8	12.5	42.5
KY10-0178-2-19-5	13.6	l	2.0	7.6	23.4	10.0	25.0
KY09C-1245-99-1-5	22.1		1.0	7.3	47.2	20.0	35.0
KWS154	24.1		1.0	13.3	36.4	20.0	50.0
KWS151	24.9		5.0	23.3	26.1	17.5	52.5
KWS153	27.9	h	1.0	16.7	39.2	17.5	65.0
KWS074	20.0		0.5	17.0	32.4	22.5	27.5
KWS095	33.5	h	0.5	46.7	42.9	17.5	60.0
KWS127	37.0	h	2.5	43.3	59.0	25.0	55.0
MI14W0742	29.7	h	6.5	28.3	38.9	20.0	55.0
MI15R0068	21.2		1.5	21.7	35.3	17.5	30.0
MI15R0269	23.1		2.5	25.0	30.5	12.5	45.0
MI14W0860	28.3	h	2.5	20.0	51.3	15.0	52.5
MI14W0833	20.0		10.0	13.3	24.4	12.5	40.0
MI15R0428	18.1		2.0	10.0	21.0	15.0	42.5
MI15R0259	27.2	h	4.5	53.3	23.1	12.5	42.5
MO160438	13.2	l	1.0	7.3	20.1	10.0	27.5
MO160455	8.8	l	1.0	2.3	5.8	5.0	30.0
MO160458	9.6	l	4.0	3.7	10.3	7.5	22.5
MO160471	12.7	l	1.0	5.6	9.6	7.5	40.0
MO160959	15.1	l	2.0	13.3	12.8	15.0	32.5
0527A1-7-7-3-1	20.2		4.0	18.3	26.1	22.5	30.0
05247A1-7-7-3-1	29.5	h	2.5	35.0	39.8	25.0	45.0
0566A1-3-1-63-3	21.6		7.5	30.0	25.5	10.0	35.0
02444A1-23-1-3-4	9.7	l	4.0	2.3	14.4	20.0	8.0
0762A1-2-8	11.8	l	2.5	15.0	19.9	15.0	6.5
OH14-216-47	26.6	h	4.0	18.3	35.5	25.0	50.0
OH14-112-72	14.9	l	2.0	3.7	21.3	20.0	27.5
OH14-112-47	11.4	l	4.0	8.3	14.6	15.0	15.0
OH14-112-15	12.5	l	2.0	3.7	24.1	20.0	12.5
OH14-112-34	14.2	l	2.0	16.7	24.8	10.0	17.5
AVERAGE	18.9		3.0	16.6	25.0	16.0	33.8
MINUMUM	6.6		0.0	2.3	5.8	5.0	6.5
MAXIMUM	37.0		17.5	53.3	59.0	35.0	75.0
LSD(0.05)	11.0		.	.	.	.	.

Table 29. Summary of INC/SEV/FDK (ISK, %) data from the 2017-2018 PNUWWSN

NAME	AVG		ILCHA	ILURB	INLAY	KYLEX	VAMTH
TRUMAN	18.3	l	9.2	17.1	11.9	22.0	31.5
ERNIE	31.3		24.8	16.8	30.5	37.0	47.5
FREEDOM	31.2		23.0	20.0	28.2	32.0	52.8
PIONEER2545	44.9	h	43.0	48.3	41.4	39.0	52.7
IL14-3934	24.1	l	15.8	13.6	14.7	27.0	49.4
IL14-9542	19.2	l	12.4	4.8	12.7	23.0	43.3
IL14-11312	17.2	l	12.8	4.1	12.1	18.0	39.2
IL14-11911	16.2	l	7.0	7.0	11.0	25.0	30.9
IL14-11916	18.1	l	9.4	10.4	12.2	15.0	43.3
VA16W-224	30.6		19.4	21.9	43.4	29.0	39.1
VA16W-196	42.5	h	19.4	43.4	57.3	47.0	45.4
13VTK429-3	31.5		7.4	21.7	47.7	38.0	42.9
13VTK434-89	25.2	l	9.8	18.2	33.0	31.0	34.2
DH13SRW021-80	38.1	h	18.2	31.7	52.2	45.0	43.4
KY10-0178-1-2-5	24.8	l	24.4	24.9	21.5	24.0	29.3
KY09C-0128-72-2-1	20.5	l	21.0	6.0	11.7	26.0	37.9
X09-1021-47-19-3	26.1		14.6	16.3	30.9	29.0	39.5
KY10-0178-2-19-5	24.4	l	27.8	8.6	31.9	19.0	34.7
KY09C-1245-99-1-5	37.9	h	27.4	33.8	45.9	38.0	44.2
KWS154	31.5		18.4	23.2	32.6	38.0	45.2
KWS151	31.7		20.0	23.7	39.0	37.0	38.8
KWS153	36.2		24.4	20.7	39.7	40.0	56.2
KWS074	36.3		21.2	19.3	47.5	42.0	51.3
KWS095	39.2	h	21.2	45.2	48.7	31.0	50.1
KWS127	47.0	h	22.0	50.6	70.1	43.0	49.3
MI14W0742	43.9	h	26.6	39.1	53.1	47.0	53.5
MI15R0068	42.2	h	33.6	33.4	48.6	46.0	49.3
MI15R0269	38.8	h	25.0	29.3	49.7	35.0	55.0
MI14W0860	37.6		19.0	26.2	56.5	33.0	53.1
MI14W0833	33.5		28.0	23.8	33.8	35.0	47.0
MI15R0428	28.7		15.8	20.3	35.4	27.0	45.2
MI15R0259	29.4		22.8	30.8	25.7	23.0	44.5
MO160438	20.4	l	12.4	16.8	23.0	19.0	31.0
MO160455	18.4	l	15.4	12.5	8.3	23.0	32.9
MO160458	21.6	l	16.6	15.1	17.6	18.0	40.7
MO160471	17.6	l	12.4	12.7	14.3	15.0	33.5
MO160959	21.7	l	6.8	19.1	20.1	27.0	35.6
0527A1-7-7-3-1	29.7		19.6	24.2	26.9	36.0	41.7
05247A1-7-7-3-1	36.0		19.0	36.5	33.9	49.0	41.7
0566A1-3-1-63-3	33.3		36.0	19.1	37.2	28.0	46.1
02444A1-23-1-3-4	22.9	l	25.6	4.6	17.8	35.0	31.3
0762A1-2-8	24.1	l	25.0	16.2	18.5	27.0	33.8
OH14-216-47	37.0		22.6	25.1	53.2	40.0	44.0
OH14-112-72	29.7		27.8	17.1	31.0	32.0	40.8
OH14-112-47	27.2		34.6	12.9	25.3	30.0	33.4
OH14-112-15	28.7		18.8	18.2	38.2	29.0	39.5
OH14-112-34	26.2		18.8	20.6	32.4	22.0	37.4
AVERAGE	29.6		20.3	21.8	32.5	31.3	42.2
MINUMUM	16.2		6.8	4.1	8.3	15.0	29.3
MAXIMUM	47.0		43.0	50.6	70.1	49.0	56.2
LSD(0.05)	9.2		.	.	.	.	.

Table 30. Summary of deoxynivalenol (DON, ppm) data from the 2017-2018 PNUWWSN.

NAME	AVG		ILCHA	ILURB	INWLA	KYLEX	VAMTH
TRUMAN	4.8	l	0.2	0.6	0.7	7.7	14.7
ERNIE	4.6	l	0.3	0.6	0.7	10.1	11.1
FREEDOM	5.9		0.2	1.2	0.9	10.7	16.6
PIONEER2545	8.1		0.4	2.6	1.6	10.2	25.5
IL14-3934	3.0	l	0.1	0.4	0.4	4.7	9.3
IL14-9542	2.2	l	0.0	0.2	0.2	3.4	7.4
IL14-11312	2.1	l	0.1	0.7	0.3	3.0	6.3
IL14-11911	2.8	l	0.1	0.9	0.3	4.6	8.3
IL14-11916	4.3	l	0.1	2.0	0.5	5.4	13.6
VA16W-224	5.8		0.3	1.8	1.4	11.0	14.4
VA16W-196	5.3	l	0.4	2.4	1.5	10.3	12.0
13VTK429-3	4.8	l	0.2	1.2	2.2	9.8	10.4
13VTK434-89	3.7	l	0.1	0.6	0.4	10.0	7.6
DH13SRW021-80	7.6		0.5	2.6	0.5	15.1	19.4
KY10-0178-1-2-5	3.4	l	0.1	0.4	0.3	7.0	9.2
KY09C-0128-72-2-1	3.7	l	0.1	0.5	0.4	5.5	12.1
X09-1021-47-19-3	4.7	l	0.0	0.8	0.6	6.5	15.8
KY10-0178-2-19-5	3.4	l	0.3	0.3	0.4	6.3	9.9
KY09C-1245-99-1-5	4.1	l	0.1	1.0	0.6	5.9	13.1
KWS154	4.9	l	0.2	1.3	1.1	8.2	13.6
KWS151	4.9	l	0.2	1.9	1.4	6.4	14.5
KWS153	5.7		0.2	1.2	1.6	6.4	19.3
KWS074	5.4		0.2	1.2	1.3	10.4	14.0
KWS095	4.8	l	0.2	1.5	0.6	9.6	12.1
KWS127	5.5		0.4	2.5	1.2	12.4	11.0
MI14W0742	12.1	h	0.5	3.2	2.5	21.6	32.9
MI15R0068	7.2		0.1	2.5	2.3	14.0	16.9
MI15R0269	7.0		0.4	2.7	0.7	10.6	20.4
MI14W0860	8.2		0.4	2.2	5.6	8.4	24.2
MI14W0833	5.9		0.7	1.9	2.0	9.9	14.9
MI15R0428	5.7		0.2	1.0	0.9	7.4	18.9
MI15R0259	3.7	l	0.1	1.0	1.2	6.1	10.1
MO160438	3.5	l	0.1	0.8	1.1	5.4	10.0
MO160455	2.4	l	0.0	0.4	0.6	2.7	8.3
MO160458	3.5	l	0.1	0.6	0.5	5.1	11.1
MO160471	3.7	l	0.2	0.6	0.8	4.2	12.7
MO160959	6.3		0.1	1.2	4.3	7.8	18.1
0527A1-7-7-3-1	6.7		0.1	2.0	1.5	10.6	19.4
05247A1-7-7-3-1	8.2		0.2	1.9	1.0	12.9	24.9
0566A1-3-1-63-3	5.4		0.0	1.0	1.1	5.7	19.1
02444A1-23-1-3-4	2.3	l	0.1	0.6	0.4	4.5	6.0
0762A1-2-8	3.3	l	0.2	1.3	0.3	4.9	9.7
OH14-216-47	6.3		0.2	1.4	1.9	13.7	14.3
OH14-112-72	3.9	l	0.1	0.5	1.6	7.3	10.2
OH14-112-47	3.9	l	0.1	0.5	0.3	8.9	9.9
OH14-112-15	3.7	l	0.1	0.8	1.0	7.9	8.9
OH14-112-34	5.0	l	0.1	1.0	0.8	8.7	14.3
AVERAGE	5.0		0.2	1.3	1.1	8.3	14.0
MINUMUM	2.1		0.0	0.2	0.2	2.7	6.0
MAXIMUM	12.1		0.7	3.2	5.6	21.6	32.9
LSD(0.05)	3.3		.	.	.	.	.

Table 31. Summary of greenhouse severity (GHSEV, %) data from the 2017-2018 PNUWWSN.

DATA NOT PROVIDED FOR THE 2017-2018 TESTS

Table 32. Summary of heading date (HD, Julian days) height (HGT, inches), and lodging (LDG) data from the 2017-2018 PNUWWN

	Heading Date											Height					Lodging	
NAME	AVG		ILCHA	INLAY	INWLA	KYLEX	MIELA	OHWOO	VAMTH	VAWAR		AVG		ILCHA	KYLEX	VAWAR	INLAY	VAWAR
TRUMAN	142.2	h	142.0	137.5	137.0	137.0	148.0	147	132.0	157		38.5	h	35.0	41.5	39	0.0	5
ERNIE	138.5		139.0	136.0	136.0	130.0	146.7	143	125.0	152		36.2		35.0	37.5	36	0.0	6
FREEDOM	140.0		141.0	136.0	136.0	131.0	149.0	145	127.8	154		36.8	h	36.0	38.5	36	0.0	7
PIONEER2545	139.1		139.0	136.5	134.0	130.0	148.0	144	127.3	154		35.3		33.0	37.0	36	0.0	4
IL14-3934	137.5	l	137.0	135.5	133.0	129.0	146.7	142	125.0	152		35.3		34.0	38.0	34	0.0	6
IL14-9542	136.8	l	136.0	134.5	132.0	128.0	146.0	141	125.0	152		32.5		30.0	35.5	32	0.0	4
IL14-11312	136.8	l	137.0	134.0	132.0	128.5	146.0	141	124.5	151		33.3		31.0	35.0	34	0.0	1
IL14-11911	139.3		140.0	137.0	135.0	131.0	147.6	142	128.0	154		35.7		31.0	39.0	37	0.0	3
IL14-11916	136.6	l	137.0	133.5	132.0	128.5	146.0	141	124.5	150		34.0		29.0	38.0	35	0.0	6
VA16W-224	140.2		140.0	137.0	137.0	132.0	148.7	146	127.0	154		35.0		32.0	37.0	36	0.0	2
VA16W-196	141.1	h	142.0	138.0	137.0	131.5	149.3	149	127.8	154		31.2	l	30.0	33.5	30	2.0	1
13VTK429-3	139.7		141.0	137.0	136.0	131.0	148.3	146	126.0	152		34.2		32.0	35.5	35	0.0	1
13VTK434-89	138.2		139.0	136.0	134.0	130.5	148.3	143	125.0	150		36.5		35.0	38.5	36	0.0	2
DH13SRW021-80	139.0		140.0	136.5	135.0	131.0	147.6	145	126.0	151		31.7	l	30.0	34.0	31	0.0	4
KY10-0178-1-2-5	138.5		139.0	136.0	133.0	131.0	147.6	144	125.0	152		32.8		30.0	36.5	32	0.0	4
KY09C-0128-72-2-1	140.2		140.0	137.0	137.0	132.5	148.3	146	126.5	154		37.5		33.0	40.5	39	0.0	4
X09-1021-47-19-3	140.3		141.0	136.5	137.0	131.0	148.0	147	128.0	154		32.7		31.0	34.0	33	0.0	6
KY10-0178-2-19-5	139.0		139.0	136.0	135.0	130.5	148.3	145	125.8	152		37.0		35.0	38.0	38	0.0	4
KY09C-1245-99-1-5	137.8		138.0	135.5	133.0	129.0	148.0	142	125.0	152		32.5		31.0	34.5	32	0.0	8
KWS154	138.7		139.0	135.5	133.0	131.0	149.0	144	126.0	152		35.0		32.0	37.0	36	0.0	3
KWS151	139.7		141.0	136.5	135.0	131.0	148.3	147	126.5	152		32.2	l	30.0	33.5	33	2.0	6
KWS153	137.5	l	138.0	135.5	133.0	130.0	146.7	142	124.0	151		32.2	l	29.0	34.5	33	0.0	3
KWS074	137.9		138.0	135.5	133.0	130.0	148.0	143	125.0	151		32.2	l	29.0	33.5	34	0.0	3
KWS095	138.2		140.0	136.5	126.0	132.0	148.3	144	126.8	152		35.7		34.0	37.0	36	0.0	4
KWS127	140.5		141.0	137.5	137.0	132.5	149.0	146	128.0	153		35.0		32.0	36.0	37	3.0	5
MI14W0742	140.8		141.0	137.0	136.0	133.0	149.7	146	129.0	155		36.2		33.0	39.5	36	0.0	4
MI15R0068	140.5		141.0	137.0	137.0	132.5	148.3	145	129.3	154		34.8		33.0	38.5	33	0.0	7
MI15R0269	137.2		139.0	136.0	134.0	129.5	142.0		128.0	152		34.2		32.0	36.5	34	0.0	7
MI14W0860	141.0		141.0	137.0	138.0	133.5	148.7	146	128.5	155		35.0		31.0	39.0	35	0.0	9
MI14W0833	137.4	l	138.0	135.0	134.0	129.5	147.0	142	124.0	150		36.0		33.0	39.0	36	0.0	6
MI15R0428	140.0		141.0	137.0	136.0	131.0	148.7	144	128.0	154		30.7	l	28.0	32.0	32	0.0	1
MI15R0259	140.7		140.0	137.0	137.0	133.0	149.3	146	129.0	154		37.0		35.0	38.0	38	0.0	2
MO160438	138.3		139.0	136.0	134.0	130.0	147.6	143	125.0	152		35.5		33.0	37.5	36	0.0	2
MO160455	137.9		138.0	135.5	134.0	129.5	147.0	142	124.8	152		36.5		34.0	38.5	37	0.0	3
MO160458	137.7		139.0	135.5	134.0	130.0	146.7	142	123.5	151		36.2		33.0	38.5	37	0.0	2
MO160471	138.5		139.0	135.5	136.0	129.5	146.7	144	125.5	152		39.5	h	37.0	41.5	40	0.0	4
MO160959	140.6		141.0	137.0	136.0	133.5	147.6	146	127.5	156		38.3	h	36.0	41.0	38	0.0	4
0527A1-7-7-3-1	140.5		142.0	137.0	137.0	132.0	148.0	145	129.0	154		34.5		32.0	36.5	35	0.0	1
05247A1-7-7-3-1	140.9	h	142.0	137.0	138.0	134.0	149.0	144	129.0	154		34.8		32.0	36.5	36	0.0	1
0566A1-3-1-63-3	139.6		139.0	136.5	136.0	131.0	149.0	143	128.0	154		32.2		29.0	35.5	32	0.0	3
02444A1-23-1-3-4	138.0		139.0	136.0	135.0	129.0	148.0	142	125.0	150		33.0		30.0	35.0	34	0.0	1
0762A1-2-8	138.6		140.0	136.5	135.0	131.0	147.6	143	125.0	151		33.0		31.0	34.0	34	0.0	4
OH14-216-47	139.8		140.0	136.5	136.0	132.0	148.7	143	128.0	154		34.0		32.0	36.0	34	0.0	1
OH14-112-72	139.1		140.0	136.0	135.0	130.5	146.7	144	127.3	153		31.3	l	28.0	33.0	33	0.0	2
OH14-112-47	137.4	l	138.0	134.5	133.0	130.0	146.3	142	124.0	151		33.7		32.0	35.0	34	0.0	3
OH14-112-15	138.8		140.0	137.0	135.0	131.0	148.3	142	124.8	152		34.8		32.0	36.5	36	0.0	3
OH14-112-34	139.4		140.0	136.5	136.0	131.0	148.3	143	127.5	153		34.5		33.0	36.5	34	0.0	6
AVERAGE	137.1		139.6	136.2	134.9	131.0	147.8	143.6	126.5			34.5		32.1	36.8			3.8
MINUMUM	134.6		136.0	133.5	126.0	128.0	142.0	128	123.5			30.0		28.0	32.0			
MAXIMUM	140.1		142.0	138.0	138.0	137.0	149.7	149	132.0			39.3		37.0	41.5			
LSD(0.05)	1.1		.	.	.	.	.	.	.			2.1		.	.			

Table 33. Summary of other traits collected on the 2017-2018 PNUWWSN including yield (YLD, bu/ac), test weight (TW, lbs/bu), powdery mildew (PM), yellow rust (YR), Stagonsopora leaf blotch, and foliar rating (FR) of general foliage health.

	FOLIAR RATING (0-9)	STAG LEAF BLOTCH (0-9)	PM (0-9)			YR (0-9)	YIELD (BU/AC)		TW (LBS/BU)	
NAME	OHWOO	ILCHA	VAMTH	VAWAR	INLAY	INLAY	INLAY	VAWAR	INLAY	VAWAR
TRUMAN	4.7	3.0	6.0	3	0.0	0.5		50.6		57.5
ERNIE	4.3	3.0	8.0	3	1.0	0.5		48.8		55.7
FREEDOM	3.7	3.0	4.5	3	0.0	0.5		54.4		54.6
PIONEER2545	7.3	3.5	4.0	3	0.0	0.5		58.1		56.0
IL14-3934	6.3	2.5	6.0	4	0.0	0.5	80.7	59.1	57.9	56.5
IL14-9542	5.0	2.5	9.0	5	3.0	0.5	68.2	55.1	57.0	55.6
IL14-11312	6.3	3.0	7.0	3	1.5	0.5	94.9	56.1	59.4	56.5
IL14-11911	6.0	3.0	4.5	1	1.5	1.5	72.9	64.1	57.2	59.8
IL14-11916	5.0	3.0	6.0	4	0.5	0.0	63.9	52.4	53.9	57.5
VA16W-224	3.3	2.0	0.5	0	0.0	0.0	102.1	77.3	56.6	55.2
VA16W-196	6.0	2.0	3.0	0	0.0	0.0	83.9	52.8	57.2	56.2
13VTK429-3	5.3	2.0	0.5	0	0.0	0.0	103.2	78.6	60.8	56.3
13VTK434-89	5.3	2.0	1.0	0	0.5	0.0	98.0	66.4	60.4	58.9
DH13SRW021-80	4.3	2.5	1.5	0	0.5	0.0	88.7	68.7	58.7	56.9
KY10-0178-1-2-5	4.0	2.5	2.5	0	0.5	0.0		73.5		58.6
KY09C-0128-72-2-1	4.3	2.5	2.5	0	0.5	0.0		58.0		57.6
X09-1021-47-19-3	6.3	4.0	6.0	2	0.0	0.0		54.2		52.3
KY10-0178-2-19-5	4.3	3.0	6.5	5	0.0	1.0		67.4		56.7
KY09C-1245-99-1-5	4.0	3.0	3.5	2	0.0	0.0		54.4		56.1
KWS154	4.3	2.5	4.0	3	0.0	1.5		70.9		55.6
KWS151	4.7	2.5	2.0	0	0.0	0.0		71.9		56.5
KWS153	5.3	3.0	4.5	1	0.0	0.0		65.3		54.5
KWS074	5.7	3.0	2.0	0	0.0	0.5		53.1		54.9
KWS095	5.7	2.5	7.0	6	0.0	0.0		60.6		55.9
KWS127	6.0	2.5	1.5	1	0.0	0.0		67.4		53.8
MI14W0742	5.3	3.0	2.0	1	0.0	0.5		54.1		54.2
MI15R0068	6.0	3.5	3.0	3	0.0	1.0		60.6		55.0
MI15R0269	7.0	2.0	4.5	1	0.0	0.0		54.2		53.3
MI14W0860	5.7	3.0	5.5	0	0.0	0.0		38.0		55.7
MI14W0833	5.3	3.0	4.0	0	0.0	0.0		56.7		55.2
MI15R0428	4.7	3.0	3.5	0	0.0	0.0		58.6		60.0
MI15R0259	7.0	3.5	3.0	0	0.0	0.0		54.6		55.5
MO160438	4.7	2.5	7.5	2	0.0	0.0		50.6		59.2
MO160455	4.3	3.0	7.0	3	0.0	0.0		60.5		58.8
MO160458	5.3	2.5	7.5	4	0.0	0.0		57.7		57.1
MO160471	4.0	2.0	4.5	2	0.0	0.0		62.5		59.2
MO160959	4.0	3.0	6.5	4	0.0	0.0		57.3		57.8
0527A1-7-7-3-1	4.0	2.5	0.5	0	0.0	0.0		65.4		57.8
05247A1-7-7-3-1	4.3	2.0	1.5	0	0.0	0.0		64.3		58.2
0566A1-3-1-63-3	5.3	5.0	4.0	1	0.0	0.0		68.3		54.3
02444A1-23-1-3-4	4.7	4.0	7.5	3	3.5	0.0		66.8		54.5
0762A1-2-8	3.7	4.0	7.5	3	1.5	0.0		75.1		54.7
OH14-216-47	5.0	4.0	1.0	0	0.5	0.0	101.1	8.7	60.3	58.4
OH14-112-72	5.0	4.5	7.5	4	1.5	0.0	104.3	73.5	59.3	57.8
OH14-112-47	7.0	4.0	1.0	0	0.0	0.0	97.5	54.4	60.1	56.7
OH14-112-15	5.0	5.5	2.5	1	0.0	0.0	102.0	76.9	59.8	57.8
OH14-112-34	4.3	3.0	4.0	1	0.0	0.0	95.2	77.7	58.9	54.7

Table 34. Presence or absence of FHB QTL in the 2017-2018 NUWWSN entries. Entries were also genotyped for Rht, Ppd, Vrn,rust, PM, Hessian Fly, BYDV, rye translocation, and quality genes. That data is available in an excel file from sneller.5@osu.edu. Data is from the USDA Eastern Regional Small Grains Genotyping Lab , Raleigh NC. The % or resistant alleles is calculated only for the 56 entries (no checks).

Name	Fhb1	Fhb 3B Massey	Fhb 5A Ernie	Fhb 5A Ning7840	Fhb 2DL Wuhan1/ W14	Fhb 1B Jamestown	Fhb 1A Neuse	Fhb 4A Neuse	Fhb 6A Neuse	Fhb 2B Bess	Fhb 3B Bess
TRUMAN	no	no	no	no	no	**YES**	**YES**	no	no	**YES**	**YES**
ERNIE	no	**HET**	**HET**	no	no	no	**YES**	**H**	**YES**	no	no
FREEDOM	no	**HET**	no	no	no	no	**YES**	no	no	no	no
PIONEER2545	no	no	no	no	no	no	no	**YES**	no	no	no
IL13-20616	**YES**	no	**YES**	no	no	no	**YES**	no	no	**YES**	no
IL14-11718	no	no	no	no	no	no	no	**YES**	**YES**	no	no
IL14-11848	**YES**	no	no	no	no	no	**HET**	no	no	no	no
IL14-28462	no	no	no	no	no	no	no	no	no	**YES**	**YES**
IL14-DC-64-95-118	no	no	**YES**	no	no	no	**YES**	no	no	no	no
VA15W-68	no	no	no	no	no	no	no	**YES**	no	no	no
VA16W-29	no	no	no	no	no	no	no	no	no	no	no
VA16W-148	no	no	no	no	no	no	**YES**	no	no	no	no
VA16W-149	no	no	no	no	no	**YES**	**YES**	no	no	no	no
13VA-FHB-DH252	no	no	no	no	no	**YES**	**YES**	no	no	no	no
KY06C-1195-37-2-5	no	no	**HET**	no	no	no	**YES**	no	**YES**	no	no
X08C-1181-61-15-5	no	no	no	no	no	no	no	no	no	no	no
KY06C-1178-16-10-3	**HET**	no	no	no	no	no	no	no	no	no	no
KY07C-1145-94-12-5	no	**HET**	no	no	no	**YES**	**HET**	**YES**	no	no	no
X08C-1077-11-18-3	no	no	no	no	no	no	no	no	no	no	no
NY11013-10-72-1314	no	no	no	no	no	no	no	no	no	**YES**	no
NY11013-10-15-1312	no	no	no	no	no	no	no	no	no	**YES**	no
NY02008-807	**YES**	no	no	no	no	no	no	no	no	no	no
NY09095-16-928	**YES**	no	no	no	no	no	no	no	no	no	no
NY02007-1206	no	no	no	no	no	no	**YES**	no	**YES**	no	no
KWS152	no	**HET**	no	no	no	**HET**	**YES**	**YES**	no	no	no
KWS149	no	no	no	no	no	no	no	**YES**	no	no	no
KWS192	no	no	no	no	no	no	no	no	no	no	no
KWS191	no	no	no	no	no	no	no	no	no	no	no
KWS193	no	no	no	no	no	no	no	**YES**	no	no	no
MI14R0267	no	**YES**	no	no	no	**YES**	**YES**	**YES**	no	no	no
MI14W0190	**YES**	no	no	no	no	no	no	**YES**	**YES**	no	no
MI14W0906	no	no	no	no	no	**YES**	**YES**	**YES**	no	no	no
MI14R1145	no	no	no	no	no	no	**YES**	no	**YES**	no	no
MO131753	no	no	no	no	no	**YES**	**HET**	**H**	**HET**	**HET**	**HET**
MO151163	no	**YES**	**HET**	no	no	**HET**	**HET**	**YES**	**HET**	no	no
MO151126	no		no	no	no				no	no	no
MO160132	no	no	no	no	no	**YES**	no	no	**YES**	**YES**	**YES**
MO160140	no	no	no	no	no	**YES**	no	no	**YES**	**YES**	**YES**
0566A1-3-1-1-63	**YES**	no	**HET**	no	no	no	**YES**	no	no	no	no
04620A1-1-7-4-10	no	no	no	no	no	**YES**	**YES**	no	no	no	**HET**
0527A1-9-14-4-3-3	**YES**	no	no	no	no	no	**YES**	**YES**	no	no	no
0762A1-2-8	**YES**		**	**	**	no	**YES**		no	no	no
07419A1-16-1-1-16-1-1	no	no	no	no	no			no			
OH12-194-24	no	no	no	no	no	no	no	**HEY**	no	no	no
OH12-195-22	no	no	no	no	no	no	**HET**	**YES**	no	no	no
OH13-314-18	no	no	no	no	no	no	**YES**	no	no	no	no
NE13604	no	no	no	no	no	no	**YES**	no	no	no	no
NW13493_	no	no	no	no	**YES**	no	**HET**	**YES**	**YES**	no	no
NE13515	no	no	no	no	no	no	no	**H**	no	**HET**	no
NE14494	no	no	no	no	no	no	**YES**	**YES**	**YES**	**YES**	no
NE14696	no	no	no	no	no			no			
LES168062	no	**YES**	no	no	no	**YES**	**YES**	no	no	**YES**	no
LES167062	no	no	no	no	no	**YES**	no	no	**YES**	no	no
LES167906	no	no	no	no	no	no	no	**HET**	no	no	no
LES167499	no	no	no	no	no	no	no	no	no	no	no
Frequency of "R" allele	0.17	0.08	0.07	0.00	0.02	0.24	0.43	0.28	0.22	0.18	0.08

Table 35. Presence or absence of FHB QTL in the 2017-2018 PNUWWSN entries. Entries were also genotyped for Rht, Ppd, Vrn,rust, PM, Hessian Fly, BYDV, rye translocation, and quality genes. That data is available in an excel file from sneller.5@osu.edu. Data is from the USDA Eastern Regional Small Grains Genotyping Lab, Raleigh NC. The frequency of resistant alleles is calculated only for the 42 entries (no checks).

Cultivar_Designation	Fhb1	Fhb 3B Massey	Fhb 5A Ernie	Fhb 5A Ning7840	Fhb 2DL Wuhan1/ W14	Fhb 1B Jamestown	Fhb 1A Neuse	Fhb 4A Neuse	Fhb 6A Neuse	Fhb 2B Bess	Fhb 3B Bess
TRUMAN	no	no	no	no	no	YES	YES	no	no	YES	YES
ERNIE	no	YES	HET	no	no	no	YES	YES	HET	no	no
FREEDOM	no	HET	no	no	no	no	YES	no	no	no	no
PIONEER2545	no	no	no	no	no	no	HET	YES	no	no	no
IL14-3934	no	no	no	no	no	no	no	YES	no	no	HET
IL14-9542	YES	no	no	no	no	YES	YES	no	no	no	no
IL14-11312	no	no	no	no	no	YES	HET	HET	no		no
IL14-11911	no	no	no	no	no	no	no	no	no	no	no
IL14-11916	no	no	no	no	no	YES	YES	no	YES	no	no
VA16W-224	no	YES	no	no	no	no	YES	YES	no	no	no
VA16W-196	no	no	no	no	no	no	no	no	no	no	no
13VTK429-3	no	no	no	no	**	YES	YES	no	no	no	no
13VTK434-89	no	no	no	no	no	YES	no	no	no	no	no
DH13SRW021-80	no	no	no	no	no	no	no	no	no	no	no
KY10-0178-1-2-5	YES	no	no	no	no	no	YES	no	no	no	no
KY09C-0128-72-2-1	YES	no	no	no	**	no	no	HET	YES		no
X09-1021-47-19-3	YES	no	no	no	no	no	no	YES	no	no	no
KY10-0178-2-19-5	YES	no	no	no	no	no	YES	YES	YES		no
KY09C-1245-99-1-5	no	YES	YES	no	no	no	YES	YES	no		no
KWS151	no	no	no	no	**	no	no	no	no	no	no
KWS154	no	HET	no	no	no	no	YES	no	YES	no	no
KWS153	no	no	no	no	no	no	YES	YES	no	no	YES
KWS074	no	no	no	no	no		no	YES	no	no	no
KWS095	YES	no	no	no	no	no	no	no	no	no	no
KWS127	no	no	no	no	no	no	YES	YES	no	no	no
MI14W0742	no	no	no	no	no	no	YES	no	no	no	no
MI15R0068	no	no	no	no	no	no	HET	HET	no	no	no
MI15R0269	no	no	no	no	no	no	YES	no	YES	no	no
MI14W0860	no	no	no	no	no	no	no	no	no	YES	no
MI14W0833	no	no	YES	no	no	no	YES	no	no	no	no
MI15R0428	no	no	no	no	no	no	YES	HET	no	no	no
MI15R0259	YES	no	no	no	no	no	YES	no	no	no	no
MO160438	no	no	no	no	no	YES	no	no	YES	YES	no
MO160455	no	no	no	no	no	YES	YES	no	no		HET
MO160458	no	no	no	no	no	YES	YES	HET	HET	HET	HET
MO160471	no	no	no	no	no	YES	HET	HET	no	no	YES
MO160959	no	no	no	no	no	YES	no	no	YES	ES	HET
0527A1-7-7-3-1	no	HET	YES	no	no	no	HET	YES	YES	no	no
05247A1-7-7-3-1	no	YES	YES	no	no	no	no	YES	YES	no	no
0566A1-3-1-63-3	no	no	no	no	no	no	YES	no	no	no	no
02444A1-23-1-3-4	YES	no	no	no	no	no	YES	YES	no	no	no
0762A1-2-8	YES	no	no	no	no	no	YES	no	no	no	no
OH14-216-47	no	no	no	no	no	no	YES	no	no	no	no
OH14-112-72	HET	no	no	no	no	no	YES	no	no	no	no
OH14-112-47	YES	no	no	no	no	no	YES	YES	no	no	no
OH14-112-15	no	no	no	no	no	no	YES	no	no	no	no
OH14-112-34	YES	no	no	no	no	no	YES	no	no	no	no
Frequency of "R" allele	0.27	0.09	0.09	0.00	0.00	0.23	0.63	0.35	0.22	0.06	0.09

Table 36. Quality parameters for the 2017-2018 NUWWSN. Data is from the USDA Soft Wheat Quality Lab. Additional analytical data is available in an excel file from sneller.5@osu.edu.

Entry	Test Weight (LB/BU)	NIR Kernel Protein (at 12%)	SKCS Kernel Hardness	SKCS Kernel Diameter (mm)	SKCS Kernel Weight (mg)	Adjusted Flour Yield (%)	Softness Equivalent (%)	Flour Protein (at 14%)	Lactic Acid SRC (%)	Sodium Carbonate SRC (%)
Tribute	59.4	12.1	17.0	2.7	33.9	64.5	54.4	9.4	128.3	74.1
TRUMAN	56.9	10.4	9.8	2.4	28.7	65.8	58.7	8.1	100.0	68.6
ERNIE	56.1	12.2	2.4	2.7	31.4	65.4	58.8	9.6	128.8	69.5
FREEDOM	55.2	11.3	12.2	2.6	30.6	65.2	56.3	8.5	102.2	67.6
PIONEER2545	56.6	11.5	19.5	2.6	31.0	64.9	55.0	9.3	95.0	68.9
IL13-20616	58.6	12.3	6.1	2.6	33.0	62.9	55.5	10.1	159.8	76.4
IL14-11718	57.3	12.1	-0.9	2.7	34.1	65.4	58.9	9.6	127.7	70.5
IL14-11848	58.7	12.2	8.2	2.5	27.2	67.0	57.8	9.5	130.2	67.4
IL14-28462	57.5	12.8	1.8	2.6	30.9	65.9	59.5	10.0	103.9	65.4
IL14-DC-64-95-118	58.0	11.1	6.5	2.5	28.5	65.7	57.6	8.4	134.5	74.0
VA15W-68	57.6	11.7	7.4	2.7	34.2	66.7	54.4	9.0	89.9	68.3
VA16W-29	56.5	10.7	6.2	2.7	33.6	68.7	58.4	8.1	92.4	68.0
VA16W-148	59.6	12.0	20.1	2.7	35.8	62.3	56.4	8.8	105.2	81.5
VA16W-149	57.6	10.8	8.1	2.6	31.0	65.2	61.3	7.9	136.7	73.2
13VA-FHB-DH252	59.6	12.2	11.6	2.5	30.3	67.4	53.5	9.2	132.8	64.8
KY06C-1195-37-2-5	59.0	10.8	8.0	2.8	34.1	66.7	56.7	8.3	112.6	68.0
X08C-1181-61-15-5	57.2	11.9	18.6	2.6	31.5	65.1	53.5	9.2	105.3	70.8
KY06C-1178-16-10-3	57.8	11.4	8.0	2.7	37.6	67.9	54.6	8.6	126.5	67.2
KY07C-1145-94-12-5	57.9	10.3	1.0	2.5	26.9	66.8	64.1	8.2	138.5	75.4
X08C-1077-11-18-3	57.6	11.6	13.1	2.8	33.9	63.7	54.2	9.3	99.0	75.6
NY11013-10-72-1314	56.6	12.5	22.3	2.6	32.3	63.4	57.1	9.9	96.4	73.3
NY11013-10-15-1312	55.8	12.0	23.6	2.5	28.9	63.5	57.9	9.5	94.0	72.4
NY02008-807	54.6	12.9	20.4	2.5	29.1	62.3	59.6	10.1	91.5	74.3
NY09095-16-928	56.1	11.7	7.1	2.6	28.3	65.2	65.7	8.7	107.1	73.8
NY02007-1206	55.5	12.1	17.5	2.5	27.5	64.5	59.0	9.3	88.9	70.5
Branson	55.3	11.3	1.0	2.5	30.8	66.6	63.2	8.5	136.0	71.8
Hilliard	57.4	11.9	13.6	2.6	31.9	64.9	58.3	8.6	122.6	72.4
KWS152	58.2	10.5	9.9	2.6	31.9	64.5	60.1	7.7	137.7	76.0
KWS149	55.7	13.1	26.7	2.6	33.8	62.1	54.2	9.6	118.4	80.5
KWS192	58.7	11.7	4.6	2.6	36.4	66.8	55.2	9.1	118.0	66.6
KWS191	56.8	10.5	0.2	2.6	33.1	69.4	62.4	7.4	112.4	67.7
KWS193	57.5	13.2	19.2	2.7	33.9	63.5	52.2	9.8	102.8	73.2
MI14R0267	57.2	11.6	0.8	2.8	35.3	69.1	59.6	8.8	133.5	65.6
MI14W0190	57.8	12.1	19.7	2.6	30.5	66.9	52.4	9.2	113.7	63.9
MI14W0906	54.7	11.2	-3.6	2.8	36.0	66.8	64.7	8.9	122.3	79.8
MI14R1145	58.2	12.6	19.2	2.5	28.6	65.6	56.8	9.7	132.3	70.5
MO131753	57.3	10.5	11.1	2.5	28.3	66.9	59.7	8.0	106.9	69.2
MO151163	59.0	10.9	6.9	2.6	28.3	67.7	59.9	8.4	128.5	66.6
MO151126	58.9	12.2	13.9	2.6	30.7	62.7	56.0	9.4	149.3	74.8
MO160132	57.7	10.7	12.7	2.5	28.2	66.4	58.7	8.0	104.9	67.7
MO160140	57.9	10.4	11.9	2.5	28.6	66.7	58.7	7.6	102.5	66.9
0566A1-3-1-1-63	54.9	11.4	6.1	2.7	30.7	65.2	59.9	8.4	125.5	70.5
04620A1-1-7-4-10	56.1	11.0	10.5	2.7	31.0	65.5	56.7	8.0	111.5	71.4
0527A1-9-14-4-3-3	55.2	11.6	4.1	2.7	32.8	64.5	56.3	9.1	127.6	74.0
0762A1-2-8	54.0	10.4	-0.8	2.7	32.1	66.5	60.0	8.1	122.0	72.3
07419A1-16-1-1-16-1-1	56.0	11.9	11.8	2.7	33.6	64.9	56.8	9.5	135.1	70.4
OH12-194-24	54.4	12.2	6.6	2.5	29.3	63.1	57.9	9.2	100.8	75.6
OH12-195-22	54.8	12.2	10.4	2.6	30.8	63.0	57.4	9.4	100.3	76.6
OH13-314-18	54.2	10.8	0.4	2.6	32.5	66.3	61.4	7.9	107.7	69.4
Shirley	55.6	10.9	0.3	2.6	34.4	67.1	59.2	7.9	97.8	70.3
Hilliard	57.3	11.6	13.1	2.6	32.0	64.5	58.1	8.5	123.0	72.3
NE13604	56.9	12.2	68.2	2.6	29.2	64.6	37.2	10.7	134.2	82.0
NW13493	58.3	11.1	54.8	2.5	27.9	66.7	41.5	9.3	144.6	81.4
NE13515	57.8	12.6	66.2	2.6	27.5	65.9	43.8	11.0	148.9	86.4
NE14494	57.2	11.8	62.4	2.6	30.2	67.3	43.5	10.6	161.7	89.3
NE14696	57.3	11.9	60.4	2.5	26.3	66.9	42.1	10.1	141.6	80.9
LES168062	56.8	10.8	-1.1	2.7	34.2	68.6	63.2	8.5	119.9	71.1
LES167062	58.7	11.4	13.8	2.6	31.2	68.4	58.4	9.1	131.6	68.9
LES167906	55.6	11.8	1.2	2.6	31.5	65.2	57.6	9.3	134.6	74.3
LES167499	54.6	12.7	3.6	2.5	30.1	66.0	59.4	10.1	127.0	76.6

Table 37. Quality parameters for the 2017-2018 PNUWWSN. Data is from the USDA Soft Wheat Quality Lab. Additional analytical data is available in an excel file from sneller.5@osu.edu.

Entry	Test Weight (LB/BU)	NIR Kernel Protein (at 12%)	SKCS Kernel Hardness	SKCS Kernel Diameter (mm)	SKCS Kernel Weight (mg)	Adjusted Flour Yield (%)	Softness Equivalent (%)	Flour Protein (at 14%)	Lactic Acid SRC (%)	Sodium Carbonate SRC (%)
TRUMAN	56.9	11.4	13.5	2.4	27.7	65.8	57.6	8.8	97.3	70.4
ERNIE	55.8	12.7	0.8	2.6	30.5	65.6	59.5	9.9	132.1	70.9
FREEDOM	55.2	11.9	10.5	2.6	31.3	65.8	56.7	8.8	104.6	67.7
PIONEER2545	56.5	11.4	15.7	2.5	31.0	65.2	56.8	9.3	102.3	69.0
IL14-3934	57.0	11.3	0.2	2.5	26.4	66.9	62.2	8.8	129.1	68.8
IL14-9542	56.1	10.9	-1.9	2.5	26.5	66.5	62.7	8.7	151.8	75.7
IL14-11312	57.9	11.6	16.2	2.5	28.4	65.3	58.3	8.9	134.6	72.7
IL14-11911	59.9	10.9	9.1	2.5	27.6	69.4	59.3	8.9	144.3	65.2
IL14-11916	57.9	12.0	5.3	2.5	29.1	67.8	58.1	9.6	150.6	67.7
VA16W-224	55.6	10.5	1.2	2.6	31.7	64.7	59.5	7.8	108.4	73.3
VA16W-196	56.2	11.2	9.8	2.5	28.4	66.3	64.4	8.5	128.5	74.5
13VTK429-3	58.2	11.5	15.2	2.6	33.3	66.5	58.6	8.7	139.4	74.4
13VTK434-89	58.0	12.0	8.6	2.6	33.2	64.0	59.2	8.9	126.3	72.6
DH13SRW021-80	57.6	12.3	16.7	2.6	33.4	64.4	53.7	10.2	133.9	71.9
KY10-0178-1-2-5	58.3	11.7	9.1	2.7	31.7	64.9	59.2	9.0	126.1	70.1
KY09C-0128-72-2-1	58.3	13.8	24.8	2.7	34.2	65.2	48.5	11.2	106.7	69.6
X09-1021-47-19-3	58.2	12.5	16.8	2.6	30.3	65.7	54.9	9.6	131.9	67.3
KY10-0178-2-19-5	57.1	12.8	8.4	2.6	33.1	66.2	58.8	9.8	112.4	75.2
KY09C-1245-99-1-5	56.8	13.2	14.6	2.6	30.2	62.9	55.2	10.7	118.8	76.6
Branson	54.9	12.6	4.8	2.5	29.7	64.8	61.7	9.8	140.4	73.3
Hilliard	58.1	12.7	12.7	2.6	33.2	64.8	58.1	9.6	133.0	65.7
KWS154	56.3	11.6	3.9	2.6	33.3	66.4	61.1	9.1	129.7	72.7
KWS151	57.3	12.1	27.1	2.4	29.7	63.9	57.1	8.7	118.8	73.7
KWS153	56.7	11.3	9.5	2.5	29.2	66.2	57.6	8.8	142.4	76.1
KWS074	55.9	12.7	16.5	2.5	27.9	63.6	58.8	9.9	143.9	76.7
KWS095	56.8	11.8	12.5	2.5	30.4	68.4	59.3	9.1	120.5	65.7
KWS127	54.1	11.0	12.1	2.5	29.6	67.6	60.3	9.1	149.6	69.6
MI14W0742	55.2	11.0	9.7	2.6	30.8	65.3	60.8	8.4	100.4	72.3
MI15R0068	55.1	12.4	15.9	2.4	27.3	65.0	60.5	8.9	124.4	72.7
MI15R0269	54.6	13.0	-0.7	2.6	31.0	65.5	58.1	10.0	149.7	72.7
MI14W0860	55.8	13.2	18.9	2.7	29.5	62.7	58.0	11.2	127.3	76.1
MI14W0833	56.4	13.0	5.5	2.7	34.0	63.5	54.6	10.9	108.4	70.6
MI15R0428	60.9	11.7	32.8	2.7	34.4	62.4	51.8	9.5	108.8	75.2
MI15R0259	55.6	11.8	25.5	2.6	30.6	65.1	56.9	9.3	125.5	69.0
MO160438	59.4	11.8	17.6	2.5	29.4	65.8	58.0	9.3	113.2	66.9
MO160455	59.8	11.7	16.2	2.7	31.6	64.3	57.5	8.8	133.4	72.9
MO160458	58.2	11.9	19.2	2.6	29.3	62.9	56.4	8.6	121.2	72.0
MO160471	59.5	11.3	7.8	2.7	33.2	66.0	58.7	8.7	122.5	71.8
MO160959	57.9	10.4	12.4	2.5	29.4	66.9	58.1	8.0	97.4	66.9
0527A1-7-7-3-1	57.8	11.8	22.0	2.6	30.3	67.3	56.4	8.7	95.8	70.9
05247A1-7-7-3-1	58.2	11.4	22.1	2.6	30.4	67.5	56.2	8.5	93.4	68.8
0566A1-3-1-63-3	54.5	10.9	7.8	2.6	29.1	65.2	62.1	8.0	118.3	69.6
02444A1-23-1-3-4	56.1	11.3	3.0	2.8	36.3	64.7	56.6	8.2	124.5	77.3
0762A1-2-8	54.9	10.4	0.5	2.7	31.7	66.2	59.2	8.0	114.4	73.3
OH14-216-47	58.6	10.7	19.0	2.6	32.3	66.0	56.6	8.1	109.8	69.0
OH14-112-72	57.7	10.7	9.4	2.5	29.0	65.6	58.7	7.9	124.4	71.6
OH14-112-47	56.8	11.7	13.4	2.5	29.3	63.1	58.0	9.0	131.1	79.4
OH14-112-15	58.0	11.7	18.5	2.5	30.8	64.8	52.0	9.5	136.5	72.6
OH14-112-34	54.8	11.3	7.8	2.5	27.5	64.9	58.7	9.0	139.5	73.3