Report on the 2013-2014 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 and 2. The NUWWSN had 56 entries (& four checks, Table 3) and we obtained phenotypic data on seven traits from 12 locations. The PNUWWSN had 56 entries (& four checks, Table 4) 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.

RESULTS

The mean for each entry over all environments for all FHB traits are shown in tables 8 and 9. We observed good levels of FHB resistance in the 2014 uniform tests though not as good as in the 2013 trials.

- Over 69% of the entries in the PNUWWSN and the NUWWSN had an FHB index < that of Freedom (this was 90% last year)
- Just 2% of the PNUWWSN and 5% of the NUWWSN entries had an FHB index < that of Truman (vs 35% and 14% last year)
- 90% of the PNUWWSN and 65% of the NUWWSN entries had less DON than Freedom
- 63% of the PNUWWSN and 35% of the NUWWSN entries had less DON than Truman

In the NUWWSN, 4 of 60 entries were not significantly different than the most resistant entry for all six FHB traits with an LSD while 13 of 60 entries in the PNUWWSN were not different than the most resistant entry for all six FHB traits (Tables 7a,7b): this is also lower than 2013. This data along with a trend over years suggests that 2014 entries were not as resistant as the 2013 entries: 2013 was one of our best years.

Most of the entries have only native resistance (eg not from Asia, or South America). In the NUWWSN, seven entries had conclusive molecular marker evidence the Asian allele for resistance at Fhb1, two had 5A from Ning and two had 2DL from Wuhan. Over all traits, these seven lines had 87% of the scores of non-FHB1 lines, ranging from 106% for INC (eg. 6% more INC than non-FHB1) to 55% for GHSEV. Two lines (entries 45, 46) had all three Asian QTL. Over all traits these lines had just 66% of the disease that the non-Asian QTL lines had. This ranged from 93% for INC to 43% for IND. These two lines were the most resistant lines in the NUWWSN (Table 7a). There were four entries in the PNUWWSN had conclusive evidence of an Asian QTL at FHB1 (Tables 29). These lines had 3% more disease than the 56 lines without FHB when averaged over all FHB traits.

Most of FHB traits were positively correlated in the NUWWSN and PNUWWSN where the correlations among INC, SEV, IND, FDK, ISK, and DON all exceeded 0.36 and 35 of 42 correlations exceeded 0.50 (Table 5a).

Using means over all environments, HD was only moderately correlated ($r > 0.50$) to DON in the PNUWWSN. The correlation of HD with FHB traits varied by environment (Table 5b). There were 86 possible correlations of HD and FHB traits within environments and tests (Table 5b). Of these 86, 52 were positive and significant while just two were negative and significant (INC with HD in MOCOL-NUWWSN and ONRID-PNUWWSN). I would say this was the most consistency of the correlation of HD with FHB traits over environments that I have seen.

Analysis of changes in FHB resistance from 1998-2014 in the P+NUWWSN

Objective: assess the change in FHB resistance for the entries in the PNUWWSN and NUWWSN.

Methods:

1) I used FHB data from 1998 to 2014 PNUWWSN and NUWWSN trials.

2) Raw data consisted for means of each entry from each test, from each year, and from each location.

3) The mean phenotype of the i^{th} line at the j^{th} environment (y_{ij}) was standardized as

$$y'_{ij} = \frac{y_{ij} - \overline{X}_j}{\sigma_j}$$

where y'_{ij} is the standardized phenotype of the i^{th} line at the j^{th} environment, $\overline{X}_j$ is the mean of all lines in the j^{th} environment (env=test/year/location combination) and σ_j is the standard deviation of all lines in the j^{th} environment.

4) Next the standardized data was used to obtain BLUPs.

5) For each line I determined the first year it entered the testing. This is referred to as "year". I then obtained the mean BLUP for all lines with the same "year" and then expressed "Year" as a deviation from 1998 (eg 1998=0, 1999=1, etc). The mean was then regressed on the "year".

6) I used raw data to determine % of lines that a) had trait values ≤ that of resistant check (Truman), b) had trait values ≤ that of moderate resistant checks (average of Ernie and Freedom), c) had trait values ≥ that of susceptible check (PIO 2545).

Results/Discussion:

It should be noted that this analysis of the trends in the P+NUWWSN is not equal to a detailed analysis of gains from selection for FHB resistance. The lines are submitted from multiple breeders for multiple reasons: the entries are not necessarily their most resistant lines from a given stage of selection, they are just lines they want more information on. The criteria that breeders use to decide to enter a line can vary by breeder and by year: one year could be elite material, another could be germplasm.

In the analysis of trends over years, data from 2000 was omitted as it was a distinct outlier for all traits. Using the standardized BLUPs there was trend for decreasing trait value with increasing "year": lines entered later in the trials were more resistant. When analyzed over all years this trend was only significant for SEV, IND (Fig 1). I have been told that in the early years of the FHB trials that there was primarily an interest in finding resistance while ignoring yield. In later years (say year 5 onward), breeders started testing lines that could combine yield and FHB resistance. Thus around years 4 to 6, FHB scores appeared to increase, perhaps due to submitting lines with less FHB resistance but more yield, and then begin to decline. Analysis the trends from years 5 to year 16 showed a significant increase of resistance for all traits except FDK and GHSEV (Fig 1).

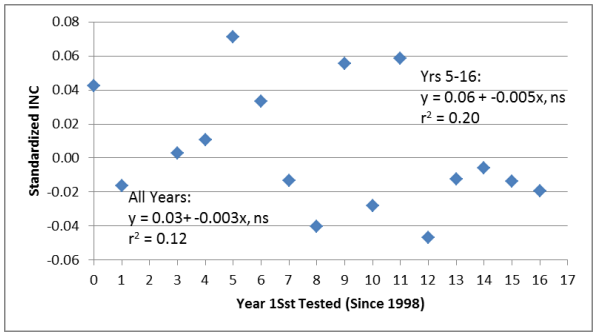
The trend described above is also visible when looking at % lines with trait values < the MR checks (average of Ernie, Freedom). This percentage appears to increase for all traits except DON and GHSEV (Fig. 2). It is particularly noticeable for SEV and IND. For IND and DON the % of lines ≥ than the susceptible check has decreased in recent years (Fig. 3).

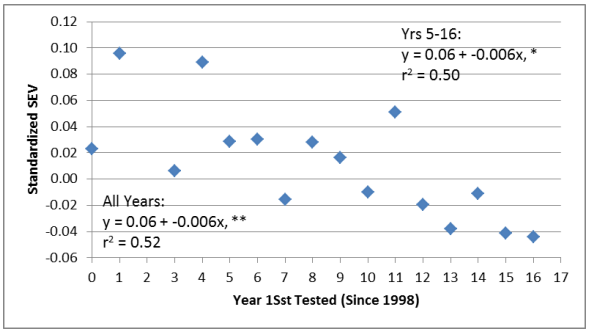
Conclusion:

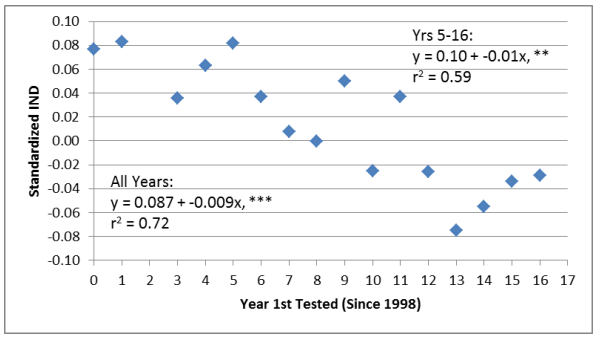
Breeders are improving resistance with the biggest impact being seen for FHB Index.

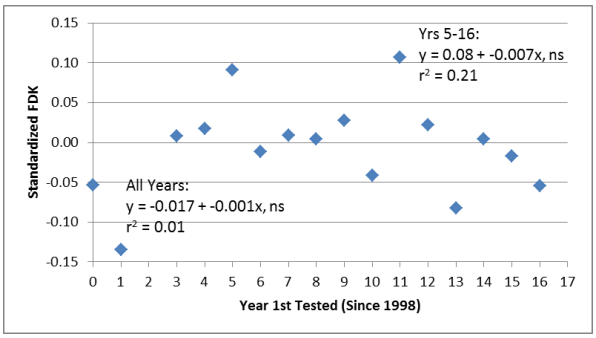
Supplementary Table 1. Percentage of entries in a test that had scores ≤the resistant check, ≥ the MR checks, or ≥ the Susceptible check.

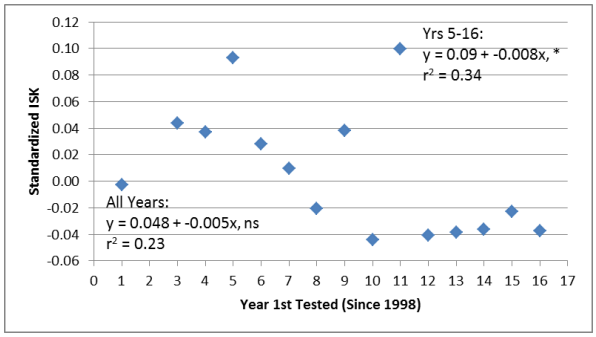
		% < Resistant check (Truman)							% < MR checks (Ernie, Freedom)							% > Susceptible check (PIO 2545)							
YEAR	TEST	INC	SEV	IND	FDK	ISK	DON	GHS	INC	SEV	IND	FDK	ISK	DON	GHS	INC	SEV	IND	FDK	ISK	DON	GHS	No entries in test/yr
1998	NUWWSN								30.3	18.2	18.2	60.6	36.4	63.6		21.2	18.2	18.2	0.0	6.1	15.2		33
1999	NUWWSN								42.9	14.3	21.4	60.7	39.3	57.1		3.6	17.9	10.7	3.6	0.0	0.0		28
2000	NUWWSN	16.7	33.3	16.7	20.0	10.0	20.0	16.7	26.7	30.0	40.0	63.3	50.0	66.7	33.3	3.3	13.3	6.7	0.0	6.7	3.3	10.0	30
2001	NUWWSN	0.0	10.2	2.0	2.0	0.0	10.2	8.2	42.9	30.6	36.7	40.8	36.7	53.1	40.8	2.0	8.2	2.0	10.2	0.0	20.4	4.1	49
2002	NUWWSN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	47.8	8.7	39.1	41.3	37.0	65.2	15.2	15.2	6.5	17.4	0.0	0.0	0.0	17.4	46
2003	NUWWSN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	20.4	37.0	38.9	31.5	74.1	18.5	0.0	14.8	14.8	3.7	1.9	7.4	51.9	54
2004	NUWWSN	1.8	0.0	0.0	12.5	1.8	12.5	0.0	44.6	46.4	44.6	44.6	48.2	41.1	16.1	0.0	1.8	0.0	7.1	1.8	14.3	23.2	56
2005	NUWWSN	13.2	18.9	11.3	18.9	5.7	37.7	20.8	50.9	34.0	26.4	45.3	35.8	56.6	34.0	1.9	1.9	3.8	0.0	1.9	15.1	34.0	53
2005	PNUWWSN	47.1	0.0	2.9	0.0	23.5	32.4	0.0	41.2	35.3	47.1	32.4	32.4	32.4	52.9	14.7	5.9	8.8	0.0	5.9	11.8	20.6	34
2006	NUWWSN	3.4	0.0	8.6	12.1	10.3	24.1	0.0	39.7	62.1	58.6	46.6	55.2	58.6	43.1	1.7	5.2	0.0	0.0	0.0	3.4	24.1	58
2006	PNUWWSN	5.0	7.5	2.5	5.0	12.5	10.0	25.0	42.5	50.0	42.5	37.5	37.5	52.5	42.5	2.5	10.0	0.0	2.5	0.0	2.5	10.0	40
2007	NUWWSN	6.7	0.0	1.7	3.3	1.7	16.7	0.0	48.3	41.7	30.0	51.7	40.0	60.0	36.7	3.3	1.7	1.7	5.0	3.3	1.7	5.0	60
2007	PNUWWSN	0.0	0.0	0.0	18.2	9.1	6.8	22.7	22.7	47.7	34.1	50.0	47.7	65.9	27.3	2.3	9.1	6.8	6.8	4.5	20.5	97.7	44
2008	NUWWSN	5.0	3.3	5.0	6.7	8.3	15.0	1.7	46.7	38.3	41.7	46.7	50.0	45.0	38.3	1.7	1.7	1.7	5.0	1.7	3.3	8.3	60
2008	PNUWWSN	3.3	11.7	15.0	11.7	30.0	50.0	21.7	28.3	25.0	31.7	45.0	48.3	46.7	40.0	1.7	0.0	1.7	1.7	0.0	3.3	0.0	60
2009	NUWWSN	5.0	3.3	3.3	6.7	6.7	33.3	0.0	40.0	20.0	23.3	55.0	33.3	61.7	20.0	1.7	1.7	0.0	0.0	0.0	10.0	15.0	60
2009	PNUWWSN	0.0	10.9	13.0	6.5	4.3	6.5	10.9	39.1	41.3	45.7	43.5	37.0	82.6	50.0	2.2	6.5	4.3	4.3	6.5	4.3	2.2	46
2010	NUWWSN	10.0	35.0	21.7	0.0	10.0	21.7	5.0	50.0	35.0	58.3	41.7	45.0	55.0	31.7	0.0	6.7	1.7	0.0	5.0	5.0	33.3	60
2010	PNUWWSN	3.9	7.8	5.9	0.0	3.9	2.0	31.4	51.0	45.1	51.0	41.2	51.0	58.8	27.5	5.9	0.0	0.0	5.9	3.9	15.7	9.8	51
2011	NUWWSN	1.7	15.0	0.0	1.7	0.0	11.7	8.3	83.3	48.3	68.3	66.7	56.7	70.0	46.7	3.3	1.7	1.7	0.0	0.0	0.0	38.3	60
2011	PNUWWSN	0.0	0.0	0.0	0.0	0.0	25.0	0.0	42.5	60.0	72.5	72.5	70.0	82.5	47.5	7.5	0.0	0.0	0.0	0.0	5.0	0.0	40
2012	NUWWSN	3.3	1.7	15.0	13.3	6.7	53.3	11.7	51.7	43.3	68.3	45.0	55.0	41.7	25.0	0.0	1.7	0.0	6.7	0.0	6.7	3.3	60
2012	PNUWWSN	51.0	55.1	34.7	16.3	34.7	75.5	4.1	57.1	59.2	87.8	75.5	71.4	71.4	30.6	0.0	20.4	2.0	4.1	2.0	6.1	44.9	49
2013	NUWWSN	1.7	1.7	1.7	20.0	10.0	26.7	1.7	51.7	31.7	36.7	53.3	46.7	53.3	55.0	3.3	1.7	1.7	1.7	1.7	1.7	10.0	60
2013	PNUWWSN	2.2	0.0	0.0	2.2	0.0	23.9	0.0	56.5	52.2	56.5	58.7	50.0	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3	46
2014	NUWWSN	1.7	3.3	5.0	20.0	10.0	40.0	16.7	63.3	45.0	40.0	51.7	38.3	61.7	50.0	11.7	1.7	1.7	1.7	3.3	1.7	20.0	60
2014	PNUWWSN	5.0	6.7	1.7	41.7	20.0	70.0	10.0	85.0	71.7	73.3	96.7	91.7	80.0	46.7	0.0	0.0	0.0	1.7	0.0	3.3	0.0	60

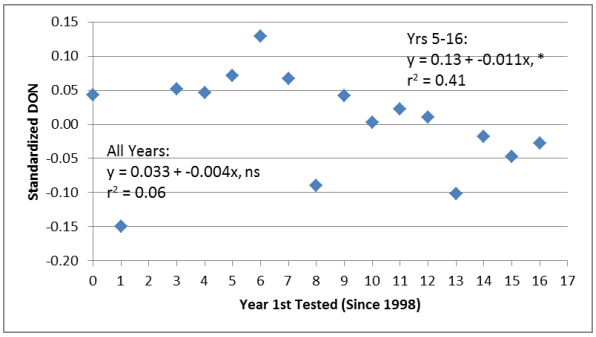


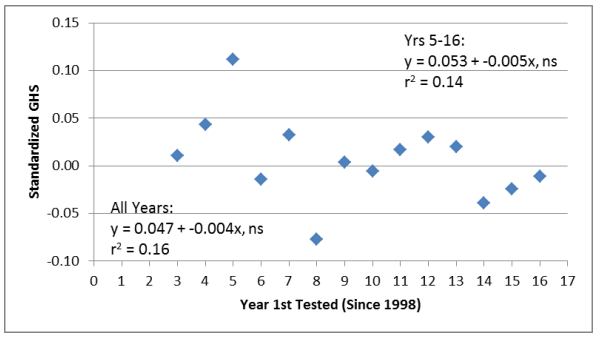












*,** indicate significant regressions at p=0.05, 0.01

Figure 1. Regression of average disease scores of lines first tested in a particular year, on the year they were first tested. Regression was done 1) over all years, and 2) over just years 5 to 16.

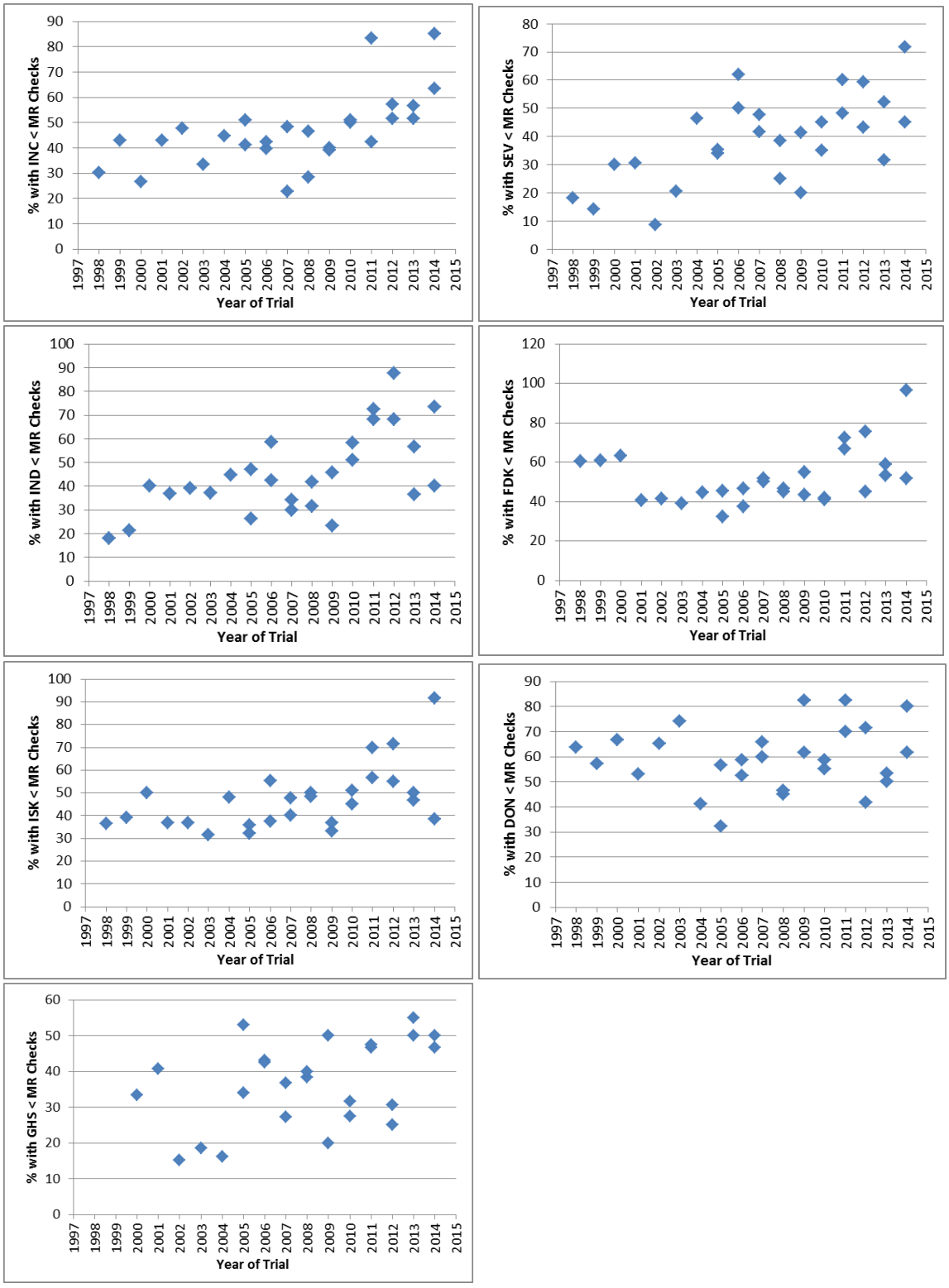
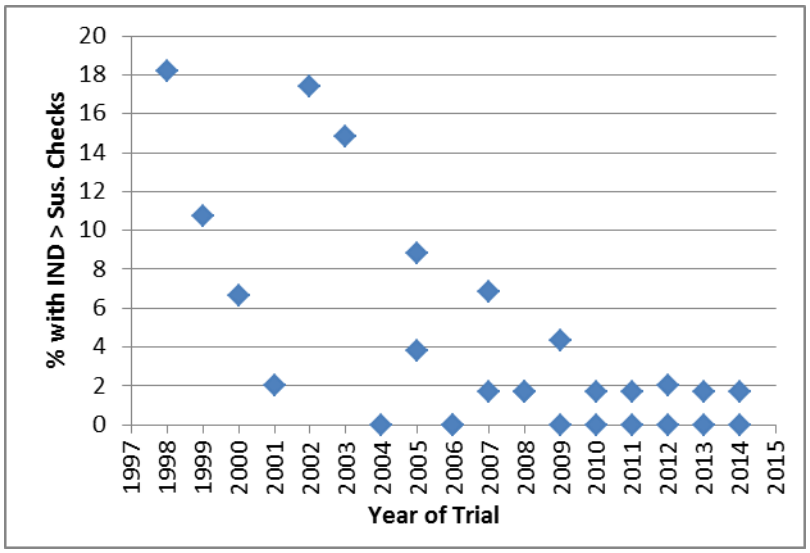


Figure 2. Percentage of entries with disease scores ≤ that of the MR checks (average of Ernie and Freedom) in each year of testing. Starting in 2005 there are two data points per year, one for the NUWWSN and one for the PNUWWSN.



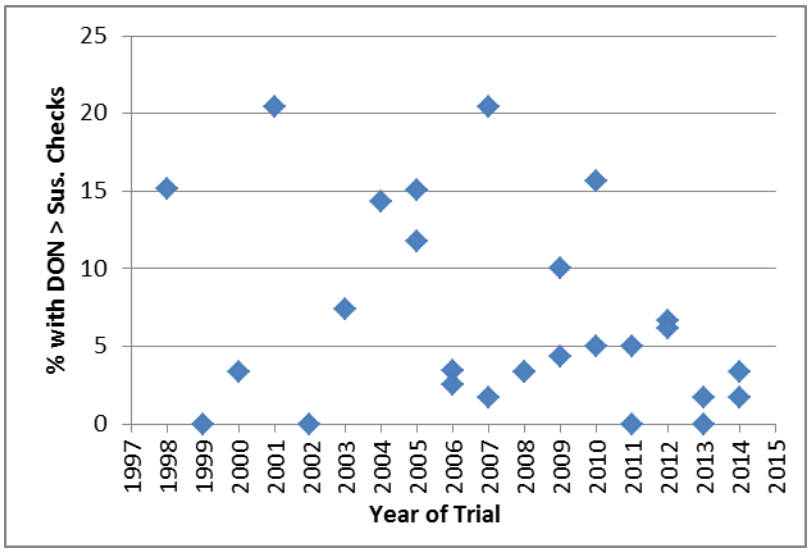


Figure 3. Percentage of entries with disease scores ≥ that of the susceptible check (Pioneer 2545) in each year of testing. Starting in 2005 there are two data points per year, one for the NUWWSN and one for the PNUWWSN.

Table 1. Cooperators in the 2013-2014 P+NUWWSN

ENV CODE	LOCATION	NUWWSN	PNUWWSN	COOPERATORS	INSTITUTE	CODE
ILCHA	Champaign, IL	yes	yes	Jana Murche	KWS Cereals	KWS
ILURB	Urbana, IL	yes	yes	Fred Kolb, Eric Brucker	University of Illinois	UIL
INWLA	W. Lafayette, IN	yes	yes	Herb Ohm	Purdue University	PUR
INHIG	High Bottom, IN	yes	no	Jennifer Vonderwall	Syngenta	SYN
INTHO	,IN	no	yes	Jennifer Vonderwall	Syngenta	SYN
KYLEX	Lexington, KY	yes	yes	David Van Sanford	Unversity of Kentucky	UKY
MIELA	East Lansing, MI	yes	yes	Russ Freed, Lee Siler	Michigan State University	MSU
MOCOL	Columbia, MO	yes	yes	Anne McKendry, David Teague	University of Missouri	UMO
NEMEA	Mead, NE	yes	no	Stephen Baenziger, S Wegulo	University of Nebraska	UNE
NYITH	Ithaca, NY	yes	no	Mark Sorrells, Gary Bergstrom	Cornell University	COR
OHWOO	Wooster, Ohio	yes	yes	Clay Sneller, Pierce Paul	The Ohio State University	OSU
ONRID	Ridgetwon, Ontartio	yes	yes	Lily Tamburic	University of Guelph Ridgetown	UGR
VABLA	Blacksburg, VA	yes	yes	Carl Griffey	Virginia Tech	VAT

Table 2. Traits assessed in 2012-13 P+NUWWSN

Code	Trait	Description	PNUWWSN Locations	NUWWSN Locations
INC	Disease incidence	% of heads with at least one infected spikelets	KY,VA,IL,IL,OH,MI MO,ON,IN,IN	KY,VA,IL,IL,OH,MI, MO,NY,ON,IN,IN,NE
SEV	Disease severity from field tests	% of infected spikelets in an infected head.	KY,VA,IL,IL,OH,MI MO,ON,IN	KY,VA,IL,IL,OH,MI, MO,NY,ON,IN,NE
IND	Disease index	IND = (SEVxINC)/100	KY,VA,IL,IL,OH,MI MO,ON,IN	KY,VA,IL,IL,OH,MI, MO,NY,ON,IN,NE
FDK	Fusarium damaged kernels	Either a visual assessment of the percent infected kernels, or a percent of scabby seed by weight	KY,VA,IL,OH,MI, IN,IN	KY,VA,IL,OH,MI, NE,IN,IN
ISK	Composite of head and kernel traits	ISK Index = .3 (Severity) + .3 (Incidence)+.4 (FDK)	KY,VA,IL,OH,MI, IN	KY,VA,IL,OH,MI, NE,IN
DON	DON (vomitoxin)	PPM of vomitoxin in grain	KY,VA,IL,OH,MI IN	KY,VA,IL,OH,MI, IN,NE*
GH	Greenhouse severity	Same as SEV except from greenhouse	MO	MO
HD	Heading Date	Julian date when 50% of spikes have emerged from the boot	KY,VA,IL,IL,OH,MI MO,ON,IN	KY,VA,IL,IL,OH,MI, MO,NY,ON,IN
HGT	Plant Height	Height in inches from soil to top of spike of a typical plant	KY,MI	KY,MI

* data was reported but not used due to very low levels.

Table 3. Entries in the 2013-2014 NUWWSN

ENTRY	NAME	PEDIGREE
1	TRUMAN	
2	ERNIE	
3	FREEDOM	
4	PIONEER2545	
5	NY01016-AN	Caledonia x D8006
6	NY01066-278	Pio 2737W Composite: 96006,14,33,70,76,157
7	NY99059-249	NY87048W-7387/Caledonia (13+18+20)
8	NY99069-249	NY88024-117 x Va96W-250(sisson)
9	NY99069-352	NY88024-117 x Va96W-250(sisson)
10	KWS023	B990399 / M00-3701
11	KWS024	Sunburst / SE97 1054-2
12	KWS025	90C-054-6 /x McCormick / 2552*
13	KWS028	Va03W-409 / X00-1079
14	L29230	B980582/G390299
15	LCS321	IL99-26442/VA02W-555
16	E6012	Caledonia / Pioneer Brand 25W33
17	F0036R	D6234/W14//E0038-1/3/E0038-1
18	F0039	D8006/CJ 9306//Caledonia/3/Caledonia/4/Caledonia
19	F1014	D6234/W14//E0038-1/3/E0038-1
20	OH07-263-3	OH748/BRAVO
21	OH08-206-69	P.92226E2-5-3/OH751
22	OH08-269-58	P.92226E2-5-3/OH708
23	0570A1-2-32-5-1-4	INW0412/6/9017C1//92823A1/9218B4/3/P107/4/PATT/5/ACC3130/PATT/7/99751D8/04302A
24	0762A1-2-8	981129A1-45-3/99793RE2-3//INW0301/92145E8-7-7-3-57/3/981477A1/981312A1//INW0316
25	08334A1-31	IL0134159//INW 0411/011007A1-14-2
26	10641B1-9-11-7	07117B1-29-7-1-1/Wheatear//Roane
27	B08-91993	Coker 9553/VA02W-555
28	B09*900256	VA98W-706/K90C-292-4-1
29	M09L-9547	CRAWFORD/PATTON
30	M10-1100#	MILTON//BRANSON/P 25R47
31	M11-1027#	M04-4802//M03-3149/P 25R47
32	M11-2298	M03-3397/M03-3291
33	GL133	25R56 x Huntley
34	GL164	25R56 x Huntley
35	UGRCC2-78	25R47 x ADV Dyno
36	UGRCC5-116	25R56 x Emmit
37	IL09-24328	IL00-8633/ IL01-11445//IL00-8530
38	IL09-3264	B 990081/ IL00-8109
39	IL10-19464	Bess / IL00-8530 // IL00-8530
40	IL10-6855	DH79-002T-B-B / IL00-8530
41	KY05C-1020-4-6-5	981517A1-1-5-2/25R18
42	KY05C-1105-43-6-1	Roane/Truman//KY98C-1440-01
43	KY06C-3003-43-13-3	Truman/McCormick//KY97C-0519-04-05
44	KY204604	KY97C-0321-05-2*4/VA01W476
45	MD08-22-22-13-4	MD08-22-22-13-4
46	MD08-22-22-13-10	MD08-22-22-13-10
47	MD09W272-8-4-13-3	MD09W272-8-4-13-3
48	MDC07026-12-28	MDC07026-12-28
49	MO120194	081320 SP RS (MO 980525//MO981020/AP Patton)
50	MO120452	960827//Roane/Ning 7840
51	MO120794	981020/P92201D5-2-80/980525
52	MO121183	002246/011174
53	NE06545	KS92-946-B-15-1=(ABI86*3414/JAG//K92)/ALLIANCE
54	NE08499	CDL 91185-1/NE99469 (=NE97V106/NE88588//KARL 92)
55	NE10478	NI03418/Camelot
56	NI12702W	N03Y2014/NW03681//NuHills 10005
57	VA10W-140	VA01W-210[L890714(SAL/FL74265-10-A2-B2) /VA91-54-346 (N71761A4-31-5-48//71-54-147/ MCN1813)// Pocahontas] / SS 520 // TRIBUTE
58	VA11W-106†	PIONEER 25R47 / JAMESTOWN [VA02W-370= ROANE (VA93-54-429)/ PION2691]
59	VA11W-301	PIONEER 25R47 / NC00-15389 (GA85240-6 /NC96BGTA5): R-LR // JAMESTOWN [VA02W-370= ROANE (VA93-54-429)/ PION2691]
60	VA12FHB-53	VA04W-433 [NING 7840/PION2684//96-54-244 (CK9803/FREEDOM)] / BRANSON [M00-3701= Pio2737W/891-4584A (Pike/FL302)]

†Indicates a restriction on crossing

Table 4. Entries in the 2013-2014 PNUWWSN

ENTRY	NAME	PEDIGREE
1	TRUMAN	
2	ERNIE	
3	FREEDOM	
4	PIONEER2545	
5	KWS014	Unknown
6	KWS029	COSSACK / X00-1058
7	KWS030	Sunburst / SE97 1054-2
8	KWS031	B990399 / M00-3701
9	KWS032	Patton / M98-2152
10	KWS033	D6234/P2552
11	KWS034	Unknown
12	OH07-264-35	OH708/P.92145E8-7-7-1-9
13	OH08-235-33	OH738/OH740
14	OH09-281-10	OH743/P.984RE1-57-5
15	OH10-194-16	CECIL/OH02-12686
16	OH10-219-65	B980582/OH02-12686
17	OH10-222-78	B980582/OH02-12686
18	OH10-305-39	IL97-6268/OH776
19	05251A1-1-77-8-2	INW0412//3/NY87048-7388/92226*2//91202/4/INW0412/3/981312A1-6-2-2-1
20	0566A1-3-1-52	INW0412/6/9017C1//92823A1/9218B4/3/P107/4/PATT/5/ACC3130/PATT/7/992060G1-1
21	082A1-3-1	INW0411/961341A3-1-4-6
22	1042A1-1-2	99751D8-2-3/96169RE2-3-6-4-1/3/7D(E)//97462A1-21-1-5-1-15/INW0412/4/981477A1-10-2-1/981312A1-6-2-1//INW0316
23	10512RA1-8	02444/06265-89-4-26//0570A1-2-32-5/3/0527A1-9-12/0175A1-31-4-3
24	10565C1-1	Branson//07469A1-10-1/0527A1-9-15-1
25	B09-2949	B990081/P961341A3-2-2
26	M10-1615	IL99-15867/M03-3002
27	M10-1659	COKER 9511/B980006
28	M12-2019#	LA01*425/P 25R56//W1104
29	M12-3189	M03-3616/COKER 9511
30	M12-3326L	IL01-16170/W1-018
31	DH4-12	RCATL31 x 25R51
32	GL119	25R56 x Huntley
33	GL39	25R56 x Huntley
34	OACSnow	25R18 x AC Ron
35	UGRCDH5-15	25R56 x Emmit
36	UGRCDH5-28	25R56 x Emmit
37	IL10-17672	IL04-31573 / IL02-23168
38	IL10-17707	IL04-31573 / IL02-23168
39	IL10-21934	IL97-1828 / IL03-18438 // IL00-8633
40	IL10-21937	IL97-1828 / IL03-18438 // IL00-8633
41	IL10-29145	IL03-18438 / IL00-8633 // IL00-8641
42	KY03C-1237-32	Pioneer Brand 25R18/KY92C-0010-17//KY96C-0767-1
43	KY06C-1003-140-3-3	Truman/McCormick//25R37
44	KY06C-1061-3-18-1	KY96C-0399-5/KY98C-1161-03//25R37
45	KY06C-1065-4-13-3	KY96C-0399-5/SAU-28//KY97C-0299-13-01
46	KY06C-1116-10-2-1	981517A1-1-5-2/E2057//KY97C-0299-13-01
47	KY06C-2020-11-12-1	IL99-15867/B990081
48	MO100172	960304/960815
49	MO120150	081652 SP RS
50	MO120487	980525//980525/IL 95-4162
51	MO120846	002246/011174
52	MO121280	Ernie/980525
53	MO121539	981020//981020/IL 95-4162
54	MO121983	Roane/000917
55	VA11MAS-9409-8-2-798	VA04W-433 / SS 8404 // VA02W-398
56	VA12FHB-34†	GA 991109-4-1-3 (Ernie/Pion2684// GA901146) / PIONEER 26R15
57	VA12FHB-4	IL99-15867 (IL93-2879/P881705A-1-X-60) / VA04W-433 [NING 7840/ PION2684//96-54-244 (CK9803/ FREEDOM)]
58	VA12FHB-55	VA04W-433 [NING 7840/PION2684//96-54-244 (CK9803/FREEDOM)] / BRANSON [M00-3701= Pio2737W/891-4584A (Pike/FL302)]
59	VA12FHB-77†	IL99-15867 (IL93-2879/P881705A-1-X-60) / VA04W-433 [NING 7840/ PION2684 //96-54-244(CK9803/ FREEDOM)] //SS8404
60	VA12FHB-8	IL99-27048 (IL90-6364/Pioneer 2571)/ VA04W-486 [ERNIE//INW 9824 (P92823A1-1-4-4-5=CLARK*4/ NING7840)/McCormick] // SHIRLEY (VA03W-409)

Table 5a. Correlation of traits in the 2013-2014 P+NUWWSN. Above diagonal are correlations of means from the NUWWSN. Below diagonal are correlations of entry means from the PNUWWSN. Grey values are significant at p <0.05.

	INC	SEV	IND	FDK	ISK	DON	GH	HD	HGT
INC	1.00	0.75	0.80	0.65	0.81	0.51	0.43	0.06	-0.29
SEV	0.74	1.00	0.99	0.74	0.87	0.65	0.70	0.22	0.06
IND	0.81	0.98	1.00	0.75	0.88	0.66	0.70	0.22	0.00
FDK	0.69	0.66	0.69	1.00	0.92	0.78	0.49	0.26	-0.05
ISK	0.79	0.84	0.86	0.92	1.00	0.71	0.59	0.25	-0.10
DON	0.59	0.63	0.65	0.70	0.71	1.00	0.42	0.50	0.08
GH	0.42	0.52	0.52	0.37	0.46	0.40	1.00	0.17	0.14
HD	0.25	0.22	0.23	0.36	0.35	0.58	0.22	1.00	0.28
HGT	-0.46	-0.24	-0.29	-0.13	-0.16	-0.04	-0.13	0.32	1.00

Table 5b. Correlation of FHB traits with heading date by environment in the 2013-2014 P+NUWWSN. Grey values are significant at p <0.05. Black squares indicate correlation could not calculate as data on one or both traits was missing.

	NUWWSN									
	ILCHA	ILURB	INLAF	KYLEX	MIELA	MOCOL	NYITH	OHWOO	ONRID	VABLA
INC with HD	0.49	0.12	-0.16	0.54	-0.09	-0.45	0.38	0.29	-0.10	0.34
SEV with HD	0.26	0.26		0.43	0.03	-0.21	0.34	0.5	-0.12	0.41
IND with HD	0.37	0.25		0.52	0.03	-0.23	0.4	0.51	-0.12	0.38
FDK with HD		0.31	0.31	0.10	-0.01			0.23		0.54
ISK with HD		0.39		0.44	-0.01			0.38		0.50
DON with HD		0.57	0.44	0.36	0.29			0.36		0.59

	PNUWWSN									
	ILCHA	ILURB	INLAF	KYLEX	MIELA	MOCOL	NYITH	OHWOO	ONRID	VABLA
INC with HD	0.62	0.50	0.00	0.50	0.04	-0.01		0.34	-0.29	0.19
SEV with HD	0.58	0.33		0.41	0.21	0.04		0.55	-0.03	0.51
IND with HD	0.53	0.34		0.54	0.11	0.04		0.56	-0.11	0.46
FDK with HD		0.70	0.44	0.13	0.17			0.37		0.42
ISK with HD		0.61		0.44	0.23			0.49		0.45
DON with HD		0.68	0.62	0.56	-0.04			0.45		0.54

Table 6. Summary of genotype (V_g) and error (V_{error}) variances from the ANOVA of the 2013-2014 P+NUWWSN

	NUWWSN					PNUWWSN				
	# env	Vg	Verror	Vg/Verror	"h2" of entry mean	# env	Vg	Verror	Vg/Verror	"h2" of entry mean
INC	12	24.9	202.4	0.12	0.60	10	28.2	146.8	0.19	0.66
SEV	11	78.1	138.2	0.57	0.86	9	54.6	134.7	0.41	0.78
IND	11	72.0	135.1	0.53	0.85	9	47.8	128.8	0.37	0.77
FDK	8	41.4	183.5	0.23	0.64	7	46.0	169.3	0.27	0.66
ISK	7	48.3	78.1	0.62	0.81	6	35.4	68.1	0.52	0.76
DON	6	7.3	24.6	0.30	0.64	6	7.9	13.2	0.60	0.78
HD	10	1.7	2.0	0.87	0.90	9	28.3	5.1	5.60	0.98
HGT	2	3.5	1.0	3.62	0.88	2	2.78	6.73	0.41	0.45

Table 7a. Best (top) and worst (bottom) entries in the 2013-2014 NUWWSN. Summary statistics are over all 60 entries.

ENTRY	NAME	INC		SEV		IND		FDK		ISK		DON		GHSEV	HD		HGT		#ls	#hs	PC1	PC2
46	MD08-22-22-13-10	47.2	l	14.4	l	9.2	l	21.9	l	33.5	l	6.6	l	15.0	145.9		27.8		6	0	-2.10	0.23
45	MD08-22-22-13-4	58.2	l	16.5	l	11.7	l	15.3	l	34.2	l	5	l	19.4	145.6		26.9	l	6	0	-1.90	1.15
1	TRUMAN	48.6	l	19.7	l	13.3	l	27.9	l	37.6	l	9.1	l	11.6	148.0	h	33.3	h	6	0	-1.60	-0.61
24	0762A1-2-8	54.2	l	19.8	l	11.5	l	27.6	l	39.7	l	5.7	l	12.8	145.2		25.7	l	6	0	-1.47	-0.23
40	IL10-6855	56.0	l	25.6		15.8	l	17.8	l	35.7	l	6.4	l	10.9	144.0	l	28.8		5	0	-1.64	0.53
39	IL10-19464	56.7	l	25.0		17.6	l	18.5	l	38.4	l	5.7	l	11.0	143.3	l	27.9		5	0	-1.55	0.60
37	IL09-24328	63.9		23.7	l	17.4	l	25	l	41.4	l	5.4	l	11.2	143.1	l	30.3		5	0	-1.23	0.13
50	MO120452	58.7	l	29.6		18.7	l	21.7	l	39.4	l	8	l	13.4	147.3	h	34.0	h	5	0	-1.19	0.30
38	IL09-3264	59.8		24.4		16.8	l	20.4	l	38.1	l	4.9	l	12.9	143.3	l	27.9		4	0	-1.50	0.70
51	MO120794	53.4	l	27.9		18.3	l	26.4	l	40.1	l	10.7		13.1	146.4		32.9	h	4	0	-1.13	-0.48
59	VA11W-301	73.5	h	47.3		40.2		43.3	1	59.3		14.8	1	42.3	145.7		26.2	l	0	3	1.37	0.27
44	KY204604	79.7	h	48.4		42.7		40.9	1	60.9	1	16.9	1	37.9	147.2		28.7		0	4	1.62	-0.26
4	PIONEER2545	71.4	h	53.3		44.6		50.4	1	63.9	1	17.8	1	40.2	144.7		28.0		0	4	1.87	-0.58
18	F0039	78.3	h	64.6	h	56.2	h	52	1	69.2	1	19.3	1	49.7	148.1	h	28.4		0	6	3.05	0.01
100	AVERAGE	64.2		35.6		27.6		34.9		50.4		10.5		21.5	145.3		29.2					
101	MINUMUM	47.2		14.4		9.2		15.3		33.5		4.9		10.9	142.8		25.7				-2.10	-0.61
102	MAXIMUM	79.7		64.6		56.2		52		69.2		19.3		49.7	148.7		34.0				3.05	1.15
103	LSD(0.05)	11.6		10.0		9.9		13.5		9.4		5.7			1.3		2.0					
	Number of Envs	12		11		11		8		7		6		1	10		2					

Table 7b. Best and worst entries in the 2013-2014 PNUWWSN

ENTRY	NAME	INC		SEV		IND		FDK		ISK		DON		GHSEV		HD		HGT		#l	#h	PC1	PC2
38	IL10-17707	54.9	l	24.2	l	16.8	l	23.2	l	36.5	l	4.7	l	11.8		141.4	l	27.3		6	0	-1.71	0.09
49	MO120150	53.0	l	23.8	l	17.1	l	18.7	l	38.2	l	5.2	l	20.0		142.5	l	29.8	h	6	0	-1.70	1.05
41	IL10-29145	57.7	l	24.4	l	16.6	l	21.7	l	37.9	l	4.7	l	14.6		141.8	l	28.8	h	6	0	-1.60	0.34
39	IL10-21934	55.5	l	25.6	l	16.8	l	18.0	l	38.5	l	7.1	l	20.8		142.3	l	30.8	h	6	0	-1.50	1.00
40	IL10-21937	58.3	l	26.9	l	18.6	l	21.3	l	40.6	l	6.4	l	30.3		141.7	l	30.3	h	6	0	-1.16	1.77
37	IL10-17672	62.6	l	29.8	l	19.5	l	20.1	l	41	l	6.0	l	19.4		143.2		29.8	h	6	0	-1.12	0.73
26	M10-1615	60.5	l	28.5	l	20.8	l	21.2	l	40	l	7.8	l	16.7		142.3	l	28.3	h	6	0	-1.12	0.35
18	OH10-305-39	57.9	l	24.4	l	17.3	l	28.1	l	43.6	l	6.8	l	23.4		145.2		31.3	h	6	0	-1.09	0.62
52	MO121280	57.4	l	26.6	l	18.8	l	27.8	l	45.9	l	8.5	l	9.4		144.1		31.0	h	6	0	-1.04	-0.89
47	KY06C-2020-11-12-1	60.2	l	29.8	l	22.8	l	22.6	l	43.4	l	6.0	l	17.3		144.1		28.3	h	6	0	-1.01	0.40
48	MO100172	62.0	l	29.8	l	21.3	l	25.1	l	41.5	l	6.2	l	16.2		141.6	l	27.9		6	0	-1.01	0.19
19	05251A1-1-77-8-2	63.7	l	21.5	l	15.1	l	31.4	l	44.4	l	7.3	l	19.8		143.6		27.3		6	0	-0.99	-0.10
29	M12-3189	61.3	l	27.2	l	19.9	l	29.5	l	45.4	l	8.4	l	9.7		144.8		30.0	h	6	0	-0.88	-0.97
42	KY03C-1237-32	63.8		26.7	l	19.5	l	23.6	l	41	l	7.8	l	32.5		144.4		25.4	l	5	0	-0.86	1.69
50	MO120487	58.4	l	26.2	l	19.1	l	31.8	l	47.4		8.7	l	12.8		146.1		30.3	h	5	0	-0.85	-0.81
57	VA12FHB-4	66.4		31.4	l	23.3	l	26.0	l	43.4	l	6.4	l	20.6		143.7		26.7		5	0	-0.68	0.47
1	TRUMAN	56.5	l	24.3	l	15.7	l	34.8		43.7	l	9.8		12.1		147.6		33.4	h	4	0	-1.01	-1.10
54	MO121983	61.6	l	32.9		25.0	l	23.8	l	46.3		5.1	l	16.5		142.6	l	31.4	h	4	0	-0.81	0.28
27	M10-1659	61.0	l	26.5	l	20.0	l	32.9		48.7		6.2	l	14.4		142.3	l	29.8	h	4	0	-0.80	-0.61
43	KY06C-1003-140-3-3	61.5	l	34.5		22.9	l	31.4	l	47		7.5	l	11.1		143.1		28.5	h	4	0	-0.59	-0.78
51	MO120846	56.8	l	28.5	l	20.4	l	36.3		50.1		7.9	l	22.8		145.0		30.7	h	4	0	-0.57	0.02
5	KWS014	74.7	h	51.1	h	40.7	h	34.0		55.8		13.8	h	30.8		148.3	h	31.2	h	0	4	1.35	0.55
3	FREEDOM	76.6	h	42.0		34.7		56.6	h	64.9	h	14.5	h	17.0		146.6		29.4	h	0	4	1.65	-2.38
44	KY06C-1061-3-18-1	71.6	h	46.9		38.7		45.5	h	60.5	h	15.1	h	40.3		145.0		29.0	h	0	4	1.66	0.72
33	GL39	73.2	h	53.9	h	46.2	h	42.0		61.7	h	10.2		33.1		143.6		25.5	l	0	4	1.68	0.58
4	PIONEER2545	82.4	h	58.9	h	50.8	h	54.3	h	66.7	h	17.0	h	51.9		144.4		21.8	l	0	6	3.05	1.26
100	AVERAGE	65.9		34.7		26.6		34.6		50.6		9.3		23.1		144.4		28.6					
101	MINUMUM	53.0		21.5		15.1		18.0		36.5		4.7		9.4		141.4		21.3					
102	MAXIMUM	82.4		58.9		50.8		56.6		66.7		17.6		51.9		149.2		33.4					
103	LSD(0.05)	10.8		10.9		10.7		13.9		9.5		4.2		.		1.3		5.2					
	Number of Envs	10		9		9		7		6		6		1		9		2					

Table 8. Summary of all FHB traits from the 2013-2014 NUWWSN: " h" and "l" indicate means that are not significantly different from the highest (h) or lowest (l) mean in that column. Positive PC1 scores indicate great susceptibility.

ENTRY	NAME	INC		SEV		IND		FDK		ISK		DON		GHSEV	HD		HGT		#ls	#hs	PC1	PC2
1	TRUMAN	48.6	l	19.7	l	13.3	l	27.9	l	37.6	l	9.1	l	11.6	148.0	h	33.3	h	6	0	-1.60	-0.61
2	ERNIE	62.4		31.2		21.8		28.9		44.3		9.6	l	13.1	143.8	l	28.4		1	0	-0.70	-0.50
3	FREEDOM	67.6		38.4		30.6		44.9	h	58.1		12.1		28.9	147.3		29.5		0	1	0.90	-0.69
4	PIONEER2545	71.4	h	53.3		44.6		50.4	h	63.9	h	17.8	h	40.2	144.7		28.0		0	4	1.87	-0.58
5	NY01016-AN	58.7	l	37.7		29.5		47.3	h	55.3		15.3	h	47.5	146.8		32.1	h	1	2	0.71	0.03
6	NY01066-278	67.4		49.7		40.2		42.3	h	57.8		16.6	h	42.1	147.4	h	32.0		0	2	1.33	0.07
7	NY99059-249	63.2		40.3		32.2		30.8		49.4		10.8		36.1	147.0		31.7		0	0	0.13	1.15
8	NY99069-249	65.4		43.1		35.0		40.2	h	53.6		12.1		48.0	145.1		27.9		0	1	0.75	1.24
9	NY99069-352	65.4		39.0		32.4		39.8	h	54.6		15.2	h	13.8	145.8		28.6		0	2	0.46	-1.79
10	KWS023	60.4		39.6		30.2		36.8		53.1		8.2	l	40.4	145.5		32.0		1	0	0.15	1.45
11	KWS024	75.7	h	38.9		33.1		39.8	h	55.7		10.2	l	43.8	145.6		26.3	l	1	2	1.03	1.01
12	KWS025	64.2		45.8		34.6		34.2		53.2		8.6	l	47.0	144.1	l	30.6		1	0	0.47	2.17
13	KWS028	59.9		41.7		30.6		36.9		52.9		9.8	l	28.4	146.1		32.3	h	1	0	0.13	0.46
14	L29230	67.8		43.4		33.9		37.4		52.6		9.1	l	36.8	143.9	l	29.3		1	0	0.47	1.15
15	LCS321	61.7		38.5		30.8		34.9		51.8		12.7		45.1	143.8	l	29.8		0	0	0.35	1.08
16	E6012	64.8		41.9		32.2		33.4		54.1		10.6		37.5	145.7		29.0		0	0	0.37	1.06
17	F0036R	66.4		41.4		32.5		42.4	h	57		12.8		15.7	146.2		27.3	l	0	1	0.52	-1.31
18	F0039	78.3	h	64.6	h	56.2	h	52	h	69.2	h	19.3	h	49.7	148.1	h	28.4		0	6	3.05	0.01
19	F1014	69.1	h	33.9		27.2		41.9	h	54		16.6	h	9.2	148.7	h	29.3		0	3	0.63	-2.72
20	OH07-263-3	68.3	h	35.3		27.1		31.7		49.2		8.5	l	47.1	144.3		31.4		1	1	0.09	1.91
21	OH08-206-69	71.2	h	38.3		29.8		43.5	h	58		8.7	l	32.5	144.3		28.5		1	2	0.56	0.23
22	OH08-269-58	71.4	h	48.1		39.6		41.4	h	61.5	h	8.8	l	41.4	145.6		31.4		1	3	1.07	1.32
23	0570A1-2-32-5-1-4	60.7		27.2		18.8	l	40.1	h	49.8		14.2	h	31.4	145.7		31.0		1	2	0.14	-0.97
24	0762A1-2-8	54.2	l	19.8	l	11.5	l	27.6	l	39.7	l	5.7	l	12.8	145.2		25.7	l	6	0	-1.47	-0.23
25	08334A1-31	63.1		31.4		21.8		33.3		45		6.6	l	14.1	144.8		28.5		1	0	-0.56	-0.27
26	10641B1-9-11-7	61.1		24.0	l	15.8	l	42.8	h	48.4		13.8	h	8.2	143.7	l	30.5		2	2	-0.20	-2.69
27	B08-91993	66.0		38.7		31.1		35.3		48.4		9.3	l	21.8	143.9	l	30.5		1	0	0.01	0.16
28	B09*900256	68.2	h	42.7		35.0		41.5	h	57.6		11.4		27.5	145.3		26.5	l	0	2	0.69	-0.17
29	M09L-9547	61.4		34.3		26.0		37.9		52.9		10.2	l	11.1	143.7	l	29.9		1	0	-0.19	-1.12
30	M10-1100#	68.5	h	37.5		30.8		38.4		54.2		9.4	l	19.8	145.8		27.6	l	1	1	0.21	-0.33
31	M11-1027#	61.7		31.2		22.8		33.6		50.1		8.8	l	23.0	144.7		29.8		1	0	-0.40	0.02
32	M11-2298	62.5		27.9		21.2		29.3		43.5		10.1	l	16.5	144.3		29.8		1	0	-0.72	-0.38
33	GL133	79.6	h	45.4		39.7		36.9		57.9		10.4	l	16.4	143.3	l	26.8	l	1	1	0.85	-0.41
34	GL164	60.7		35.9		28.0		29.9		44.4		10	l	27.1	144.6		27.9		1	0	-0.34	0.66
35	UGRCC2-78	70.9	h	47.8		40.2		40.9	h	60.1	h	13		32.8	144.7		30.2		0	3	1.11	0.10
36	UGRCC5-116	62.5		37.9		28.9		30.3		49.8		7.3	l	16.5	145.4		31.1		1	0	-0.34	0.37
37	IL09-24328	63.9		23.7	l	17.4	l	25	l	41.4	l	5.4	l	11.2	143.1	l	30.3		5	0	-1.23	0.13
38	IL09-3264	59.8		24.4		16.8	l	20.4	l	38.1	l	4.9	l	12.9	143.3	l	27.9		4	0	-1.50	0.70
39	IL10-19464	56.7	l	25.0		17.6	l	18.5	l	38.4	l	5.7	l	11.0	143.3	l	27.9		5	0	-1.55	0.60
40	IL10-6855	56.0	l	25.6		15.8	l	17.8	l	35.7	l	6.4	l	10.9	144.0	l	28.8		5	0	-1.64	0.53
41	KY05C-1020-4-6-5	64.4		24.3	l	18.5	l	34.9		47.4		13.4		10.6	146.4		27.0	l	2	0	-0.51	-1.90
42	KY05C-1105-43-6-1	63.9		28.0		20.8		28	l	44.5		7.4	l	15.3	144.7		28.7		2	0	-0.82	0.03
43	KY06C-3003-43-13-3	59.7		31.3		23.9		29.7		44.3		8.8	l	20.6	146.6		29.4		1	0	-0.65	0.25
44	KY204604	79.7	h	48.4		42.7		40.9	h	60.9	h	16.9	h	37.9	147.2		28.7		0	4	1.62	-0.26
45	MD08-22-22-13-4	58.2	l	16.5	l	11.7	l	15.3	l	34.2	l	5	l	19.4	145.6		26.9	l	6	0	-1.90	1.15
46	MD08-22-22-13-10	47.2	l	14.4	l	9.2	l	21.9	l	33.5	l	6.6	l	15.0	145.9		27.8		6	0	-2.10	0.23
47	MD09W272-8-4-13-3	67.9		28.2		22.5		35.5		50.1		9.7	l	10.8	146.5		28.3		1	0	-0.24	-1.33
48	MDC07026-12-28	60.8		27.0		18.4	l	27	l	43.1		7	l	19.0	144.5		26.9	l	3	0	-0.99	0.37
49	MO120194	59.0		24.8		18.6	l	25.8	l	44.1		6	l	8.4	143.5	l	28.4		3	0	-1.22	-0.15
50	MO120452	58.7	l	29.6		18.7	l	21.7	l	39.4	l	8	l	13.4	147.3	h	34.0	h	5	0	-1.19	0.30
51	MO120794	53.4	l	27.9		18.3	l	26.4	l	40.1	l	10.7		13.1	146.4		32.9	h	4	0	-1.13	-0.48
52	MO121183	71.5	h	34.7		28.2		31.5		52.7		7.8	l	15.8	143.7	l	27.3	l	1	1	-0.10	-0.08
53	NE06545	61.7		38.3		31.5		40.9	h	55		10.5	l	28.2	144.3		30.6		1	1	0.29	-0.03
54	NE08499	62.6		39.0		30.8		36.5		52.2		12.4		35.2	144.6		31.4		0	0	0.31	0.39
55	NE10478	67.3		35.5		27.8		47.6	h	56.7		10.4	l	17.1	142.8	l	26.0	l	1	1	0.35	-1.35
56	NI12702W	64.2		42.9		32.0		34.4		53.6		14.6	h	22.3	147.4	h	31.4		0	1	0.40	-0.63
57	VA10W-140	65.3		43.5		35.4		37.9		55.3		9.1	l	37.6	145.8		27.9		1	0	0.65	1.00
58	VA11W-106†	67.5		36.5		29.6		36.1		54.7		12.2		46.0	145.6		27.4	l	0	0	0.63	0.78
59	VA11W-301	73.5	h	47.3		40.2		43.3	h	59.3		14.8	h	42.3	145.7		26.2	l	0	3	1.37	0.27
60	VA12FHB-53	59.9		31.4		21.3		37.8		49.6		11.8		11.3	145.7		26.9	l	0	0	-0.38	-1.49
100	AVERAGE	64.2		35.6		27.6		34.9		50.4		10.5		25.3	145.3		29.2					
101	MINUMUM	47.2		14.4		9.2		15.3		33.5		4.9		8.2	142.8		25.7				-2.10	-2.72
102	MAXIMUM	79.7		64.6		56.2		52		69.2		19.3		49.7	148.7		34.0				3.05	2.17
103	LSD(0.05)	11.6		10.0		9.9		13.5		9.4		5.7			1.3		2.0					
	Number of Envs	12		11		11		8		7		6		1	10		2					

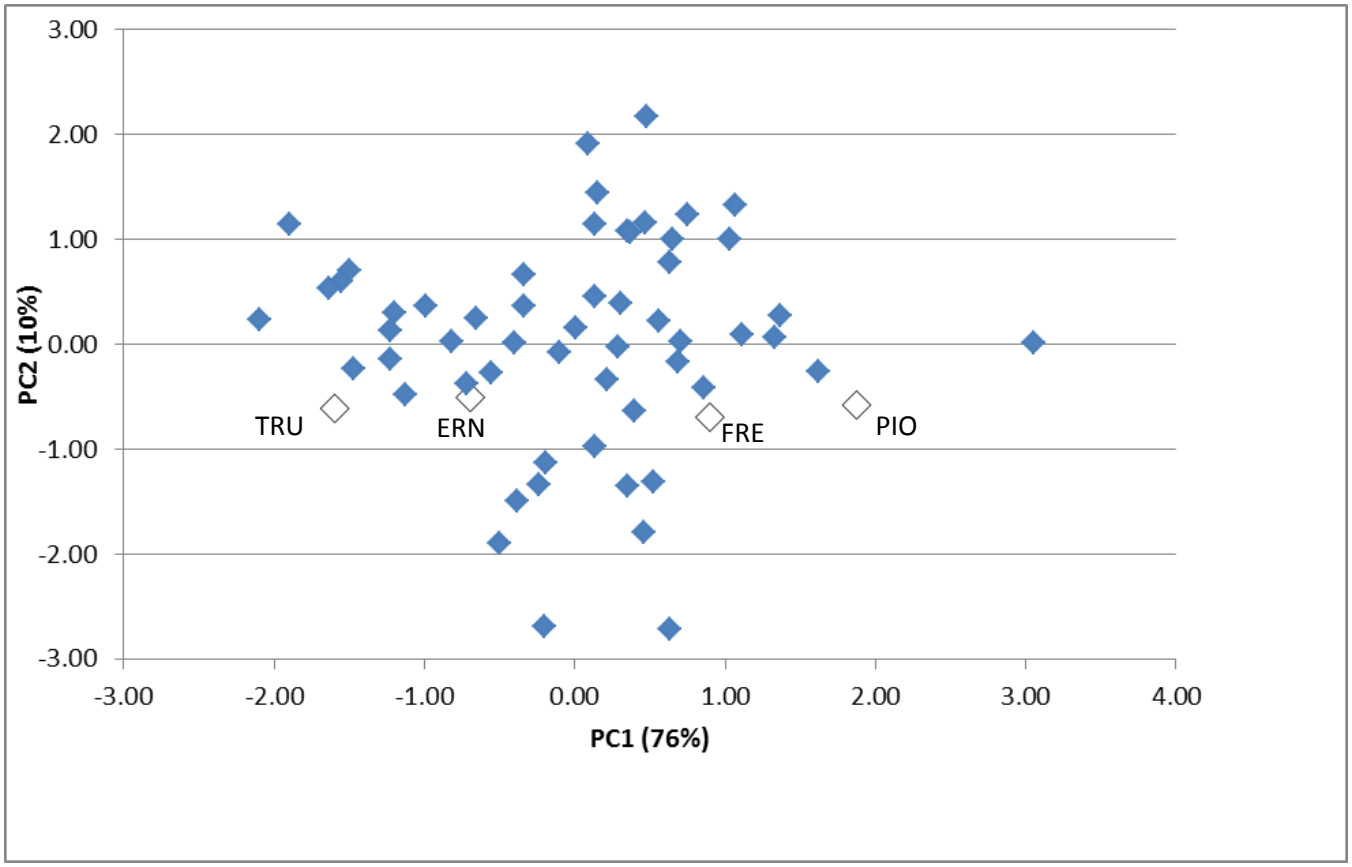


Figure 4. Principal component score of the 60 entries in the 2014 NUWWSN. All seven FHB traits were highly positively correlated to PC1 with all coefficients > 0.7: more susceptible lines had more positive scores. FDK and DON were slightly negatively correlated to PC2 while GHSEV was highly correlated to PC2 (r=0.65). Checks are identified.

Table 9. Summary of all FHB traits from the 2013-2014 PNUWWSN: " h" and "l" indicate means that are not significantly different from the highest (h) or lowest (l) mean in that column.

ENTRY	NAME	INC		SEV		IND		FDK		ISK		DON		GHSEV		HD		HGT		#l	#h	PC1	PC2
1	TRUMAN	56.5	l	24.3	l	15.7	l	34.8		43.7	l	9.8		12.1		148		33	h	4	0	-1.01	-1.10
2	ERNIE	67.8		35.4		27.1		37.0		52.2		8.6	l	23.1		143		27		1	0	0.13	-0.13
3	FREEDOM	76.6	h	42.0		34.7		56.6	h	64.9	h	14.5	h	17.0		147		29	h	0	4	1.65	-2.38
4	PIONEER2545	82.4	h	58.9	h	50.8	h	54.3	h	66.7	h	17.0	h	51.9		144		22	l	0	6	3.05	1.26
5	KWS014	74.7	h	51.1	h	40.7	h	34.0		55.8		13.8	h	30.8		148	h	31	h	0	4	1.35	0.55
6	KWS029	69.4		34.7		27.7		41.9		56.7		9.1		23.8		145		32	h	0	0	0.42	-0.48
7	KWS030	70.7		40.0		31.7		39.8		55.5		12.1		21.6		144		25	l	0	0	0.71	-0.67
8	KWS031	63.1	l	42.6		32.1		42.2		57.8	h	9.8		26.2		145		32	h	1	1	0.64	-0.08
9	KWS032	66.5		42.0		31.2		38.5		55.3		12.0		34.3		145		27		0	0	0.74	0.76
10	KWS033	76.6	h	43.5		38.6		40.4		56.7		15.7	h	29.4		149	h	28		0	2	1.41	-0.18
11	KWS034	72.2	h	45.6		38.3		38.0		57.7	h	17.6	h	45.1		149	h	29	h	0	3	1.58	1.43
12	OH07-264-35	69.3		46.9		37.2		46.6	h	58.9	h	9.0		30.6		143		31	h	0	2	1.13	0.19
13	OH08-235-33	64.1		41.7		30.6		39.8		56.3		9.8		45.4		145		31	h	0	0	0.73	1.94
14	OH09-281-10	75.1	h	33.4		27.3		31.5	l	50.5		7.6	l	24.3		145		27		2	1	0.09	0.20
15	OH10-194-16	65.7		35.0		27.4		29.0	l	52.2		9.3		24.8		145		30	h	1	0	-0.03	0.39
16	OH10-219-65	69.8		38.2		29.8		40.0		53.8		7.8	l	36.4		143		30	h	1	0	0.52	1.10
17	OH10-222-78	64.7		40.4		30.8		36.7		56.1		9.3		18.1		145		32	h	0	0	0.33	-0.62
18	OH10-305-39	57.9	l	24.4	l	17.3	l	28.1	l	43.6	l	6.8	l	23.4		145		31	h	6	0	-1.09	0.62
19	05251A1-1-77-8-2	63.7	l	21.5	l	15.1	l	31.4	l	44.4	l	7.3	l	19.8		144		27		6	0	-0.99	-0.10
20	0566A1-3-1-52	68.6		34.8		27.3		39.9		53.4		6.8	l	13.2		143		24	l	1	0	0.04	-1.18
21	082A1-3-1	67.5		32.0	l	24.0	l	34.7		51.6		11.0		9.6		142	l	27		2	0	-0.12	-1.57
22	1042A1-1-2	67.5		33.5		25.1	l	40.5		52.1		8.3	l	27.3		145		28		2	0	0.13	0.12
23	10512RA1-8	65.7		23.8	l	18.1	l	42.8	h	51.7		14.0	h	27.6		146		31	h	2	2	0.03	-0.48
24	10565C1-1	69.6		36.3		27.7		44.1	h	54.1		17.4	h	20.5		146		29	h	0	2	0.81	-1.35
25	B09-2949	78.9	h	39.5		33.7		40.1		56.7		8.4	l	22.8		144		21	l	1	1	0.84	-0.49
26	M10-1615	60.5	l	28.5	l	20.8	l	21.2	l	40	l	7.8	l	16.7		142	l	28	h	6	0	-1.12	0.35
27	M10-1659	61.0	l	26.5	l	20.0	l	32.9		48.7		6.2	l	14.4		142	l	30	h	4	0	-0.80	-0.61
28	M12-2019#	64.6		30.0	l	22.1	l	39.2		50.5		8.3	l	13.2		142	l	29	h	3	0	-0.31	-1.20
29	M12-3189	61.3	l	27.2	l	19.9	l	29.5	l	45.4	l	8.4	l	9.7		145		30	h	6	0	-0.88	-0.97
30	M12-3326L	69.2		31.9	l	26.1		29.4	l	49.2		7.6	l	14.5		142	l	29	h	3	0	-0.31	-0.56
31	DH4-12	58.7	l	24.9	l	18.3	l	33.5		48.9		9.0		36.4		144		29	h	3	0	-0.53	1.36
32	GL119	66.8		49.0	h	37.3		39.1		55.3		10.2		15.2		143		30	h	0	1	0.76	-0.91
33	GL39	73.2	h	53.9	h	46.2	h	42.0		61.7	h	10.2		33.1		144		26	l	0	4	1.68	0.58
34	OACSnow	71.7	h	37.7		29.8		39.2		55.5		13.1		21.7		146		30	h	0	1	0.68	-0.76
35	UGRCDH5-15	71.8	h	42.6		34.1		38.4		54.7		14.0	h	15.8		146		30	h	0	2	0.84	-1.25
36	UGRCDH5-28	63.9		38.4		29.0		34.8		51.4		11.0		19.1		146		25	l	0	0	0.15	-0.43
37	IL10-17672	62.6	l	29.8	l	19.5	l	20.1	l	41	l	6.0	l	19.4		143		30	h	6	0	-1.12	0.73
38	IL10-17707	54.9	l	24.2	l	16.8	l	23.2	l	36.5	l	4.7	l	11.8		141	l	27		6	0	-1.71	0.09
39	IL10-21934	55.5	l	25.6	l	16.8	l	18.0	l	38.5	l	7.1	l	20.8		142	l	31	h	6	0	-1.50	1.00
40	IL10-21937	58.3	l	26.9	l	18.6	l	21.3	l	40.6	l	6.4	l	30.3		142	l	30	h	6	0	-1.16	1.77
41	IL10-29145	57.7	l	24.4	l	16.6	l	21.7	l	37.9	l	4.7	l	14.6		142	l	29	h	6	0	-1.60	0.34
42	KY03C-1237-32	63.8		26.7	l	19.5	l	23.6	l	41	l	7.8	l	32.5		144		25	l	5	0	-0.86	1.69
43	KY06C-1003-140-3-3	61.5	l	34.5		22.9	l	31.4	l	47		7.5	l	11.1		143		29	h	4	0	-0.59	-0.78
44	KY06C-1061-3-18-1	71.6	h	46.9		38.7		45.5	h	60.5	h	15.1	h	40.3		145		29	h	0	4	1.66	0.72
45	KY06C-1065-4-13-3	67.1		30.7	l	24.5	l	39.8		50.2		10.0		13.3		147		27		2	0	-0.09	-1.33
46	KY06C-1116-10-2-1	65.2		32.8		24.8	l	27.1	l	47.9		5.6	l	15.7		144		24	l	3	0	-0.60	-0.10
47	KY06C-2020-11-12-1	60.2	l	29.8	l	22.8	l	22.6	l	43.4	l	6.0	l	17.3		144		28	h	6	0	-1.01	0.40
48	MO100172	62.0	l	29.8	l	21.3	l	25.1	l	41.5	l	6.2	l	16.2		142	l	28		6	0	-1.01	0.19
49	MO120150	53.0	l	23.8	l	17.1	l	18.7	l	38.2	l	5.2	l	20.0		143	l	30	h	6	0	-1.70	1.05
50	MO120487	58.4	l	26.2	l	19.1	l	31.8	l	47.4		8.7	l	12.8		146		30	h	5	0	-0.85	-0.81
51	MO120846	56.8	l	28.5	l	20.4	l	36.3		50.1		7.9	l	22.8		145		31	h	4	0	-0.57	0.02
52	MO121280	57.4	l	26.6	l	18.8	l	27.8	l	45.9	l	8.5	l	9.4		144		31	h	6	0	-1.04	-0.89
53	MO121539	67.4		29.5	l	23.9	l	40.7		53.8		8.4	l	16.1		143		29	h	3	0	-0.05	-1.13
54	MO121983	61.6	l	32.9		25.0	l	23.8	l	46.3		5.1	l	16.5		143	l	31	h	4	0	-0.81	0.28
55	VA11MAS-9409-8-2-798	78.3	h	38.5		31.3		40.4		53.1		7.8	l	48.5		146		27		1	1	0.91	2.17
56	VA12FHB-34†	59.6	l	34.6		25.2	l	39.4		51.5		9.8		26.7		144		30	h	2	0	-0.01	0.18
57	VA12FHB-4	66.4		31.4	l	23.3	l	26.0	l	43.4	l	6.4	l	20.6		144		27		5	0	-0.68	0.47
58	VA12FHB-55	71.3		31.8	l	24.9	l	34.6		51.4		7.8	l	10.0		145		27		3	0	-0.16	-1.38
59	VA12FHB-77†	66.7		38.0		27.3		36.8		53.8		8.6	l	46.3		146		28	h	1	0	0.46	2.20
60	VA12FHB-8	72.1	h	44.1		36.0		39.3		56.7		9.9		23.6		145		27		0	1	0.88	-0.28
100	AVERAGE	65.9		34.7		26.6		34.6		50.6		9.3		23.1		144		29					
101	MINUMUM	53.0		21.5		15.1		18.0		36.5		4.7		9.4		141		21					
102	MAXIMUM	82.4		58.9		50.8		56.6		66.7		17.6		51.9		149		33					
103	LSD(0.05)	10.8		10.9		10.7		13.9		9.5		4.2		.		1		5					
	Number of Envs	10		9		9		7		6		6		1		9		2					

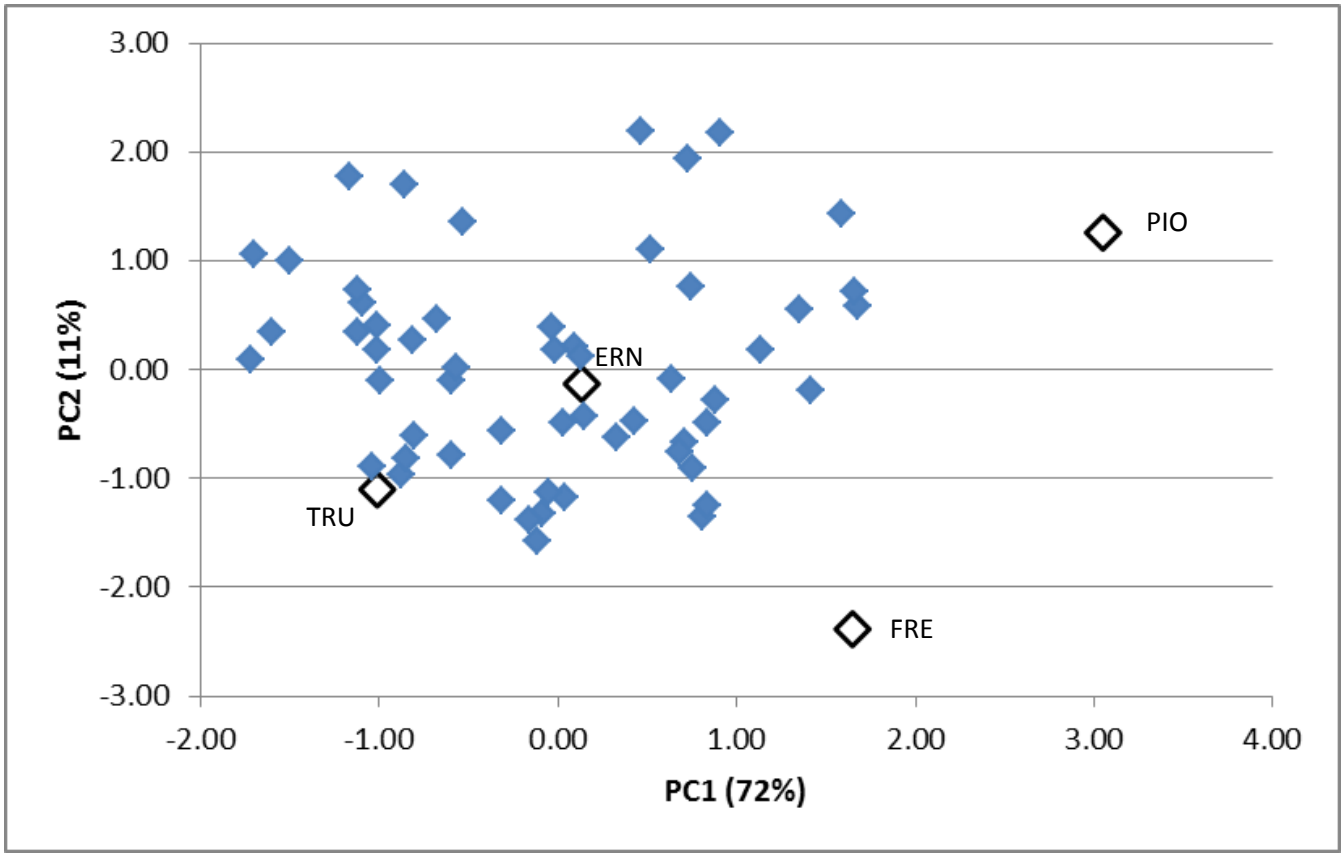


Figure 5. Principal component score of the 60 entries in the 2014 PNUWWSN. All seven FHB traits were highly positively correlated to PC1 with all coefficients > 0.8: more susceptible lines had more positive scores. FDK was slightly negatively correlated to PC2, while GHSEV was highly correlated to PC2 (r=0.77). Checks are identified.

Table 10. Summary of incidence (INC, %) from 2013-2014 NUWWSN.

ENTRY	NAME	AVG		ILCHA	ILURB	INTHO	INWLA	KYLEX	MIELA	MOCOL	NEMEA	NYITH	OHWOO	ONRID	VABLA
1	TRUMAN	48.6	l	45.0	73.3	50.0	10.0	75.0	83.3	85.0	0.0	30.0	100.0	6.7	25.0
2	ERNIE	62.4		70.0	93.3	55.0	20.0	47.5	93.3	100.0	70.0	37.0	100.0	30.0	32.5
3	FREEDOM	67.6		62.5	97.7	80.0	30.0	75.0	96.7	85.0		47.0	98.3	23.3	72.5
4	PIONEER2545	71.4	h	92.5	99.7	80.0	30.0	82.5	96.7	100.0	10.0	50.0	100.0	40.0	75.0
5	NY01016-AN	58.7	l	85.0	96.3	50.0	25.0	67.5	100.0	73.0	0.0	33.0	100.0	15.0	60.0
6	NY01066-278	67.4		75.0	99.0	90.0	25.0	92.5	96.7	78.0	25.0	53.0	100.0	31.7	42.5
7	NY99059-249	63.2		75.0	96.3	85.0	25.0	82.5	100.0	88.0	0.0	42.0	100.0	25.0	40.0
8	NY99069-249	65.4		67.5	98.3	60.0	30.0	90.0	93.3	100.0	25.0	36.0	100.0	36.7	47.5
9	NY99069-352	65.4		55.0	98.0	75.0	25.0	92.5	100.0	73.0	0.0	63.0	100.0	18.3	85.0
10	KWS023	60.4		55.0	86.7	75.0	5.0	87.5	93.3	100.0	45.0	22.0	96.7	18.3	40.0
11	KWS024	75.7	h	77.5	100.0	90.0	35.0	87.5	96.7	100.0		53.0	100.0	58.3	60.0
12	KWS025	64.2		75.0	100.0	70.0	15.0	65.0	96.7	93.0	40.0	42.0	96.7	21.7	55.0
13	KWS028	59.9		52.5	91.7	65.0	45.0	70.0	96.7	80.0	15.0	29.0	100.0	18.3	55.0
14	L29230	67.8		87.5	95.0	80.0	35.0	82.5	90.0	95.0	35.0	40.0	95.0	38.3	40.0
15	LCS321	61.7		40.0	90.0	90.0	10.0	77.5	96.7	100.0	20.0	31.0	98.3	21.7	65.0
16	E6012	64.8		62.5	93.0	75.0	20.0	90.0	100.0	80.0	40.0	44.0	100.0	25.0	47.5
17	F0036R	66.4		95.0	96.0	60.0	15.0	92.5	96.7	78.0	5.0	59.0	100.0	40.0	60.0
18	F0039	78.3	h	75.0	99.0	75.0	20.0	100.0	100.0	100.0		86.0	100.0	61.7	70.0
19	F1014	69.1	h	70.0	95.0	70.0	10.0	100.0	93.3	100.0		60.0	100.0	31.7	55.0
20	OH07-263-3	68.3	h	55.0	95.0	70.0	25.0	72.5	86.7	100.0	100.0	42.0	100.0	33.3	40.0
21	OH08-206-69	71.2	h	70.0	99.7	70.0	30.0	82.5	86.7	100.0	80.0	40.0	96.7	28.3	70.0
22	OH08-269-58	71.4	h	60.0	100.0	90.0	5.0	92.5	100.0	98.0	85.0	41.0	98.3	30.0	57.5
23	0570A1-2-32-5-1-4	60.7		55.0	83.3	65.0	25.0	90.0	100.0	80.0		51.0	98.3	10.0	35.0
24	0762A1-2-8	54.2	l	27.5	91.7	50.0	25.0	90.0	83.3	68.0	10.0	51.0	90.0	16.7	47.5
25	08334A1-31	63.1		60.0	90.0	65.0	15.0	75.0	96.7	100.0	50.0	51.0	100.0	20.0	35.0
26	10641B1-9-11-7	61.1		65.0	91.7	60.0	10.0	55.0	93.3	95.0		25.0	100.0	36.7	65.0
27	B08-91993	66.0		82.5	90.0	90.0	35.0	62.5	100.0	100.0	15.0	45.0	100.0	36.7	35.0
28	B09*900256	68.2	h	82.5	100.0	75.0	5.0	75.0	100.0	70.0	30.0	72.0	100.0	56.7	52.5
29	M09L-9547	61.4		40.0	88.3	65.0	25.0	67.5	96.7	98.0	45.0	14.0	100.0	21.7	75.0
30	M10-1100#	68.5	h	72.5	98.0	80.0	35.0	90.0	100.0	95.0	20.0	54.0	100.0	20.0	57.5
31	M11-1027#	61.7		45.0	88.3	60.0	15.0	75.0	100.0	93.0	50.0	25.0	100.0	16.7	72.5
32	M11-2298	62.5		47.5	85.0	85.0	15.0	62.5	100.0	100.0	15.0	42.0	100.0	40.0	57.5
33	GL133	79.6	h	87.5	98.3	90.0	15.0	80.0	100.0	98.0	100.0	61.0	100.0	60.0	65.0
34	GL164	60.7		35.0	93.3	75.0	25.0	80.0	100.0	98.0	0.0	53.0	98.3	33.3	37.5
35	UGRCC2-78	70.9	h	50.0	100.0	90.0	35.0	85.0	100.0	98.0	60.0	35.0	100.0	15.0	82.5
36	UGRCC5-116	62.5		50.0	93.3	70.0	25.0	85.0	93.3	95.0	45.0	33.0	100.0	15.0	45.0
37	IL09-24328	63.9		32.5	78.3	80.0	40.0	55.0	96.7	93.0	85.0	29.0	100.0	16.7	60.0
38	IL09-3264	59.8		55.0	86.7	60.0	25.0	32.5	96.7	93.0	100.0	29.0	91.7	25.0	22.5
39	IL10-19464	56.7	l	17.5	86.7	85.0	15.0	47.5	93.3	90.0	65.0	39.0	100.0	18.3	22.5
40	IL10-6855	56.0	l	90.0	75.0	55.0	5.0	25.0	80.0	75.0	85.0	21.0	96.7	26.7	37.5
41	KY05C-1020-4-6-5	64.4		55.0	91.7	85.0	25.0	75.0	93.3	90.0	45.0	50.0	100.0	23.3	40.0
42	KY05C-1105-43-6-1	63.9		77.5	78.3	80.0	5.0	80.0	90.0	95.0	45.0	34.0	98.3	36.7	47.5
43	KY06C-3003-43-13-3	59.7		55.0	88.3	75.0	25.0	82.5	83.3	100.0	15.0	28.0	100.0	16.7	47.5
44	KY204604	79.7	h	97.5	97.7	90.0	30.0	95.0	96.7	85.0	65.0	72.0	100.0	60.0	67.5
45	MD08-22-22-13-4	58.2	l	15.0	63.3	65.0	20.0	82.5	80.0	100.0	85.0	22.0	100.0	17.5	47.5
46	MD08-22-22-13-10	47.2	l	10.0	80.0	40.0	15.0	85.0	80.0	68.0	0.0	25.0	96.7	21.7	45.0
47	MD09W272-8-4-13-3	67.9		85.0	96.3	80.0	25.0	97.5	93.3	75.0	50.0	39.0	100.0	18.3	55.0
48	MDC07026-12-28	60.8		72.5	68.3	45.0	20.0	80.0	83.3	90.0	80.0	27.0	100.0	28.3	35.0
49	MO120194	59.0		15.0	85.0	85.0	20.0	77.5	100.0	78.0	55.0	43.0	85.0	16.7	47.5
50	MO120452	58.7	l	45.0	80.0	65.0	55.0	77.5	76.7	88.0	50.0	16.0	100.0	13.3	37.5
51	MO120794	53.4	l	55.0	81.7	60.0	20.0	70.0	80.0	85.0	5.0	21.0	98.3	30.0	35.0
52	MO121183	71.5	h	25.0	100.0	85.0	60.0	77.5	96.7	83.0	65.0	55.0	100.0	33.3	77.5
53	NE06545	61.7		30.0	95.0	89.5	15.0	97.5	90.0	100.0	25.0	37.0	100.0	16.7	45.0
54	NE08499	62.6		35.0	96.7	90.0	20.0	92.5	100.0	98.0	30.0	37.0	100.0	26.7	25.0
55	NE10478	67.3		50.0	98.3	90.0	40.0	75.0	96.7	95.0	35.0	52.0	100.0	28.3	47.5
56	NI12702W	64.2		60.0	93.3	70.0	30.0	95.0	83.3	78.0	30.0	62.0	100.0	18.3	50.0
57	VA10W-140	65.3		90.0	96.3	85.0	40.0	80.0	100.0	90.0	5.0	40.0	100.0	16.7	40.0
58	VA11W-106†	67.5		75.0	94.7	80.0	25.0	92.5	100.0	93.0	20.0	62.0	100.0	13.3	55.0
59	VA11W-301	73.5	h	90.0	97.7	80.0	25.0	85.0	96.7	95.0	10.0	68.0	100.0	50.0	85.0
60	VA12FHB-53	59.9		50.0	95.2	45.0	10.0	90.0	93.3	98.0	10.0	41.0	100.0	28.3	57.5
100	AVERAGE	64.2		59.8	91.5	73.2	23.4	78.8	93.9	90.5	40.3	46.9	92.6	29.8	50.6
101	MINUMUM	47.2		10.0	63.3	40.0	5.0	25.0	76.7	68.0	0.0	14.0	10.0	6.7	22.5
102	MAXIMUM	79.7		97.5	100.0	90.0	60.0	100.0	100.0	100.0	100.0	100.0	100.0	72.5	85.0
103	LSD(0.05)	11.6		.	.	.	.	.	.	.	.	.	.	.	.

Table 11. Summary of severity (SEV, %) data from the 2013-2014 NUWWSN

ENTRY	NAME	AVG		ILCHA	ILURB	INTHO	KYLEX	MIELA	MOCOL	NEMEA	NYITH	OHWOO	ONRID	VABLA
1	TRUMAN	19.7	l	12.5	21.2	35.0	38.2	33.1	10.5	0.0	12.4	33.7	6.7	13.7
2	ERNIE	31.2		27.5	42.8	55.0	29.0	59.5	21.7	14.0	12.2	31.0	30.0	20.5
3	FREEDOM	38.4		27.5	68.6	60.0	45.9	62.0	25.9		16.0	42.0	31.7	28.1
4	PIONEER2545	53.3		45.0	78.3	70.0	57.8	51.2	65.6	16.0	14.8	74.8	55.0	57.9
5	NY01016-AN	37.7		50.0	75.5	40.0	41.2	56.9	14.1	0.0	8.6	54.9	23.3	50.0
6	NY01066-278	49.7		50.0	84.8	65.0	61.0	66.1	16.2	7.0	28.0	74.8	48.3	46.0
7	NY99059-249	40.3		45.0	70.6	75.0	40.0	52.9	16.2	0.0	12.6	59.7	28.3	42.5
8	NY99069-249	43.1		35.0	63.6	55.0	43.2	63.6	67.6	8.0	14.2	62.3	30.0	31.2
9	NY99069-352	39.0		30.0	44.9	70.0	50.1	59.4	11.4	0.0	15.6	71.3	25.0	51.2
10	KWS023	39.6		35.0	72.0	85.0	47.8	47.9	32.1	11.0	16.6	51.0	23.3	14.0
11	KWS024	38.9		35.0	43.8	80.0	26.3	50.5	37.7		15.0	37.8	46.7	39.7
12	KWS025	45.8		55.0	78.0	45.0	46.7	55.2	21.0	13.0	30.4	65.2	20.0	74.5
13	KWS028	41.7		32.5	62.9	75.0	46.7	62.3	24.8	7.0	10.4	61.6	20.0	55.2
14	L29230	43.4		47.5	48.3	80.0	51.6	58.1	36.3	11.0	24.0	55.5	46.7	18.5
15	LCS321	38.5		32.5	41.9	80.0	41.7	54.3	44.6	3.0	8.6	53.8	21.7	41.0
16	E6012	41.9		27.5	58.6	80.0	51.2	55.8	17.0	9.0	11.4	65.3	36.7	48.7
17	F0036R	41.4		35.0	66.0	60.0	39.9	49.8	11.7	5.0	14.8	74.4	33.3	65.2
18	F0039	64.6	h	45.0	83.7	75.0	65.5	72.6	58.5		55.5	76.5	66.7	70.5
19	F1014	33.9		20.0	20.5	70.0	53.9	35.5	40.5		16.8	55.7	30.0	20.1
20	OH07-263-3	35.3		30.0	35.9	55.0	34.5	57.3	52.6	20.0	15.8	30.0	35.0	22.2
21	OH08-206-69	38.3		30.0	50.7	70.0	35.1	44.3	31.6	11.0	16.4	34.0	33.3	64.5
22	OH08-269-58	48.1		25.0	55.2	90.0	49.1	67.3	48.6	23.0	11.2	58.7	60.0	41.5
23	0570A1-2-32-5-1-4	27.2		20.0	32.6	90.0	34.0	33.6	12.8		15.6	20.1	10.0	26.9
24	0762A1-2-8	19.8	l	10.0	12.8	60.0	18.2	28.4	10.3	8.0	9.8	17.2	23.3	19.6
25	08334A1-31	31.4		35.0	37.0	75.0	26.2	41.9	24.5	12.0	14.4	24.0	33.3	22.0
26	10641B1-9-11-7	24.0	l	20.0	19.5	80.0	22.4	28.5	23.4		8.6	14.4	25.0	21.8
27	B08-91993	38.7		42.5	40.6	75.0	37.8	53.5	47.0	10.0	13.2	47.7	38.3	20.3
28	B09*900256	42.7		30.0	68.9	80.0	23.1	64.4	8.4	15.0	17.2	69.8	48.3	45.1
29	M09L-9547	34.3		17.5	34.7	75.0	31.1	58.3	37.4	9.0	7.2	42.8	20.0	44.8
30	M10-1100#	37.5		20.0	53.6	75.0	37.8	52.4	40.4	12.0	17.4	54.0	20.0	29.9
31	M11-1027#	31.2		32.5	24.3	80.0	28.9	26.7	25.7	10.0	11.8	54.0	10.0	39.1
32	M11-2298	27.9		15.0	35.8	35.0	21.7	44.1	32.6	6.0	13.6	35.9	38.3	28.6
33	GL133	45.4		42.5	46.2	70.0	40.8	55.1	38.8	33.0	18.4	63.3	73.3	18.5
34	GL164	35.9		22.5	43.7	50.0	29.2	68.0	60.8	0.0	16.0	37.1	43.3	24.8
35	UGRCC2-78	47.8		50.0	67.1	60.0	44.9	57.0	62.4	13.0	20.2	80.8	20.0	50.1
36	UGRCC5-116	37.9		32.5	50.9	55.0	39.8	58.1	37.0	13.0	12.8	57.9	17.5	42.2
37	IL09-24328	23.7	l	12.5	27.7	40.0	22.9	51.3	20.5	17.0	12.0	16.8	18.3	21.4
38	IL09-3264	24.4		25.0	32.0	50.0	14.3	43.8	17.2	22.0	16.0	15.8	20.0	12.6
39	IL10-19464	25.0		15.0	18.6	80.0	26.1	35.3	26.6	16.0	9.2	17.3	18.3	12.9
40	IL10-6855	25.6		20.0	17.0	75.0	17.2	36.1	10.0	21.0	7.6	25.2	36.7	15.9
41	KY05C-1020-4-6-5	24.3	l	5.0	16.2	65.0	25.6	30.4	18.2	6.0	9.2	44.8	25.0	21.8
42	KY05C-1105-43-6-1	28.0		10.0	17.0	75.0	30.1	50.9	23.6	15.0	10.2	21.2	28.3	26.9
43	KY06C-3003-43-13-3	31.3		20.0	42.5	35.0	28.9	56.9	57.1	3.0	7.0	40.9	25.0	27.7
44	KY204604	48.4		60.0	76.5	75.0	48.3	45.4	31.6	10.0	25.2	73.4	35.0	51.9
45	MD08-22-22-13-4	16.5	l	4.0	10.3	20.0	19.6	18.4	31.3	18.0	8.6	17.8	20.0	13.2
46	MD08-22-22-13-10	14.4	l	4.0	10.3	30.0	20.7	33.3	11.0	0.0	9.0	14.5	13.3	11.8
47	MD09W272-8-4-13-3	28.2		30.0	16.5	75.0	39.4	44.6	15.9	8.0	9.6	27.0	16.7	27.6
48	MDC07026-12-28	27.0		20.0	18.2	70.0	20.1	50.8	14.7	30.0	6.8	33.3	20.0	13.1
49	MO120194	24.8		7.5	20.5	65.0	32.8	57.6	18.8	19.0	10.2	12.5	16.7	11.9
50	MO120452	29.6		32.5	18.6	70.0	37.6	25.4	31.8	24.0	11.4	29.8	28.3	16.1
51	MO120794	27.9		10.0	40.2	55.0	35.0	40.1	27.6	3.0	8.0	34.6	33.3	19.6
52	MO121183	34.7		7.5	52.6	75.0	33.8	40.9	18.3	25.0	15.0	47.1	30.0	36.9
53	NE06545	38.3		12.5	51.7	80.0	46.9	59.4	51.0	20.0	13.8	43.5	15.0	27.8
54	NE08499	39.0		25.0	49.9	85.0	34.7	61.8	49.8	13.0	10.0	40.4	26.7	32.3
55	NE10478	35.5		25.0	35.5	75.0	39.4	47.8	35.4	8.0	16.4	44.0	30.0	34.4
56	NI12702W	42.9		30.0	71.7	85.0	40.9	53.0	15.6	15.0	27.6	62.5	23.3	47.4
57	VA10W-140	43.5		45.0	62.8	70.0	48.8	67.1	34.2	3.0	15.4	62.3	23.3	46.6
58	VA11W-106†	36.5		12.5	45.8	80.0	44.0	54.6	25.0	6.0	14.2	48.8	18.3	52.2
59	VA11W-301	47.3		42.5	69.9	80.0	31.5	56.5	28.1	15.0	23.0	75.2	48.3	50.6
60	VA12FHB-53	31.4		12.5	36.3	60.0	32.6	45.2	27.5	5.0	9.6	45.8	31.7	38.7
100	AVERAGE	35.6		27.5	44.9	66.7	36.7	49.9	30.1	12.5	16.7	45.0	29.5	33.6
101	MINUMUM	14.4		4.0	10.3	20.0	14.3	18.4	8.4	0.0	6.8	10.0	6.7	11.8
102	MAXIMUM	64.6		60.0	84.8	90.0	65.5	72.6	67.6	55.5	76.5	80.8	73.3	74.5
103	LSD(0.05)	10.0		.	.	.	.	.	.	.	.	.	.	.

Table 12. Summary of index (IND, %) data from the 2013-2014 NUWWSN.

ENTRY	NAME	AVG		ILCHA	ILURB	INTHO	KYLEX	MIELA	MOCOL	NEMEA	NYITH	OHWOO	ONRID	VABLA
1	TRUMAN	13.3	l	5.6	15.5	17.0	28.8	28.2	9.0	0.0	3.7	33.7	0.5	3.8
2	ERNIE	21.8		19.3	39.6	29.5	13.4	55.3	21.7	10.0	4.5	31.0	9.7	5.9
3	FREEDOM	30.6		17.2	67.1	48.0	35.0	60.1	22.0		7.5	41.3	8.0	20.6
4	PIONEER2545	44.6		41.6	78.1	56.0	48.0	49.7	65.6	2.0	7.4	74.8	23.0	44.5
5	NY01016-AN	29.5		42.5	72.9	20.0	26.8	56.9	10.2	0.0	2.8	54.9	3.8	34.0
6	NY01066-278	40.2		37.5	83.9	58.5	57.0	64.3	12.6	2.0	14.8	74.8	15.8	20.9
7	NY99059-249	32.2		33.8	67.8	63.5	32.9	52.9	14.2	0.0	5.3	59.7	7.3	16.6
8	NY99069-249	35.0		23.6	62.4	33.0	38.9	59.0	67.6	2.0	5.1	62.3	11.4	20.0
9	NY99069-352	32.4		16.5	44.2	52.0	46.4	59.4	8.3	0.0	9.8	71.3	6.1	42.8
10	KWS023	30.2		19.3	62.3	64.0	41.6	45.4	32.1	5.0	3.7	49.2	4.3	5.4
11	KWS024	33.1		27.1	43.8	72.0	23.1	48.8	37.7		8.0	37.8	30.3	23.8
12	KWS025	34.6		41.3	78.0	31.5	30.6	53.7	19.5	5.0	12.8	62.7	4.4	41.0
13	KWS028	30.6		17.1	57.8	48.5	32.9	60.7	19.9	1.0	3.0	61.6	3.8	29.9
14	L29230	33.9		41.6	45.9	64.0	42.6	51.7	34.6	4.0	9.6	53.1	18.3	7.6
15	LCS321	30.8		13.0	37.7	72.0	31.5	51.8	44.6	1.0	2.7	53.1	5.0	26.7
16	E6012	32.2		17.2	54.0	60.5	46.5	55.8	13.6	3.0	5.0	65.3	10.2	23.5
17	F0036R	32.5		33.3	64.2	30.0	36.9	48.5	9.1	0.0	8.7	74.4	13.3	38.8
18	F0039	56.2	h	33.8	82.9	56.0	65.5	72.6	58.5		47.7	76.5	40.5	49.4
19	F1014	27.2		14.0	19.5	47.0	53.9	31.5	40.5		10.1	55.7	9.8	10.8
20	OH07-263-3	27.1		16.5	34.2	38.5	25.2	50.1	52.6	20.0	6.6	30.0	12.1	11.9
21	OH08-206-69	29.8		21.0	50.5	49.0	30.1	40.1	31.6	9.0	6.6	33.0	9.5	47.0
22	OH08-269-58	39.6		15.0	55.2	81.0	45.0	67.3	47.4	20.0	4.6	57.7	18.3	24.1
23	0570A1-2-32-5-1-4	18.8	l	11.0	27.4	58.5	30.6	33.6	10.2		8.0	19.9	1.0	9.1
24	0762A1-2-8	11.5	l	2.8	12.0	30.0	16.4	22.9	7.0	1.0	5.0	16.2	3.7	9.6
25	08334A1-31	21.8		21.0	33.3	48.5	19.8	39.8	24.5	6.0	7.3	24.0	7.5	7.7
26	10641B1-9-11-7	15.8	l	13.0	17.9	47.0	12.3	26.7	22.2		2.2	14.4	9.3	14.5
27	B08-91993	31.1		35.1	36.8	67.5	23.6	53.5	47.0	2.0	5.9	47.7	14.2	8.8
28	B09*900256	35.0		24.8	68.9	60.0	17.2	64.4	5.9	5.0	12.4	69.8	28.3	28.4
29	M09L-9547	26.0		7.0	30.9	48.5	20.9	56.4	36.5	4.0	1.0	42.8	4.3	33.7
30	M10-1100#	30.8		14.5	52.1	60.0	34.5	52.4	38.4	2.0	9.4	54.0	4.5	16.9
31	M11-1027#	22.8		14.6	21.5	48.0	22.5	26.7	23.8	5.0	3.0	54.0	1.7	29.9
32	M11-2298	21.2		7.1	30.9	29.5	14.8	44.1	32.6	1.0	5.7	35.9	15.3	16.7
33	GL133	39.7		37.2	45.5	63.0	32.9	55.1	37.8	33.0	11.2	63.3	44.7	12.6
34	GL164	28.0		7.9	40.7	37.0	23.3	68.0	59.3	0.0	8.5	36.5	16.7	10.1
35	UGRCC2-78	40.2		25.0	67.1	54.0	38.6	57.0	60.9	8.0	7.1	80.8	3.0	40.4
36	UGRCC5-116	28.9		16.3	47.7	38.5	33.7	54.5	35.1	6.0	4.2	57.9	3.0	21.4
37	IL09-24328	17.4	l	4.1	21.7	32.0	13.1	49.9	19.1	15.0	3.5	16.8	3.0	13.6
38	IL09-3264	16.8	l	13.8	28.2	31.0	4.9	42.4	15.9	22.0	4.6	14.3	5.0	2.9
39	IL10-19464	17.6	l	2.6	16.1	68.0	11.9	33.4	23.9	10.0	3.6	17.3	3.4	3.6
40	IL10-6855	15.8	l	18.0	12.8	41.0	4.0	29.3	7.5	18.0	1.6	24.8	10.3	6.5
41	KY05C-1020-4-6-5	18.5	l	2.8	14.8	55.0	18.9	28.6	16.4	3.0	4.6	44.8	5.9	8.7
42	KY05C-1105-43-6-1	20.8		7.8	13.2	60.0	24.8	45.8	22.4	7.0	3.5	20.9	10.5	13.2
43	KY06C-3003-43-13-3	23.9		11.0	37.8	27.0	23.8	46.0	57.1	1.0	2.0	40.9	3.9	12.8
44	KY204604	42.7		58.5	74.9	67.5	46.3	44.0	26.8	6.0	18.1	73.4	19.3	34.8
45	MD08-22-22-13-4	11.7	l	0.6	6.7	13.5	16.3	14.4	31.3	15.0	1.9	17.8	4.3	6.7
46	MD08-22-22-13-10	9.2	l	0.4	8.4	12.0	17.7	30.8	7.4	0.0	2.3	14.2	3.0	5.5
47	MD09W272-8-4-13-3	22.5		25.5	15.9	60.0	38.4	39.3	11.9	4.0	3.7	27.0	3.5	18.3
48	MDC07026-12-28	18.4	l	14.5	13.9	30.0	16.0	45.0	13.3	24.0	1.8	33.3	6.4	4.6
49	MO120194	18.6	l	1.1	17.5	54.5	25.2	57.6	14.6	10.0	4.4	10.6	3.0	5.6
50	MO120452	18.7	l	14.6	14.9	46.0	29.2	21.1	27.8	12.0	1.8	29.8	2.2	5.9
51	MO120794	18.3	l	5.5	32.3	31.5	24.5	32.1	23.5	0.0	1.7	34.2	9.3	6.4
52	MO121183	28.2		1.9	52.6	64.0	25.9	40.1	15.1	16.0	8.3	47.1	10.0	28.7
53	NE06545	31.5		3.8	49.6	71.6	45.9	53.8	51.0	5.0	5.1	43.5	2.2	15.3
54	NE08499	30.8		8.8	48.4	76.5	32.2	61.8	48.5	4.0	3.7	40.4	6.7	8.1
55	NE10478	27.8		12.5	35.0	67.5	30.0	46.6	33.6	3.0	8.5	44.0	9.5	16.1
56	NI12702W	32.0		18.0	66.8	59.5	39.4	45.4	12.1	4.0	17.1	62.5	3.4	24.1
57	VA10W-140	35.4		40.5	60.6	59.5	39.3	67.1	30.8	0.0	6.2	62.3	4.0	18.7
58	VA11W-106†	29.6		9.4	43.6	64.0	40.8	54.6	23.2	1.0	8.8	48.8	2.5	28.5
59	VA11W-301	40.2		38.3	68.3	64.0	26.7	54.9	26.7	2.0	15.6	75.2	27.0	43.0
60	VA12FHB-53	21.3		6.3	34.5	24.0	29.3	41.4	16.8	1.0	3.9	45.8	9.1	22.0
100	AVERAGE	27.6		18.4	42.3	49.4	30.0	47.4	28.2	7.1	9.7	42.9	10.3	19.2
101	MINUMUM	9.2		0.4	6.7	12.0	4.0	14.4	5.9	0.0	1.0	1.0	0.5	2.9
102	MAXIMUM	56.2		58.5	83.9	81.0	65.5	72.6	67.6	47.7	76.5	80.8	49.4	47.0
103	LSD(0.05)	9.9		.	.	.	.	.	.	.	.	.	.	.

Table 13. Summary of Fusarium Damaged Kernel (FDK, %) data from the 2013-2014 NUWWSN.

ENTRY	NAME	AVG		ILURB	INHIG	INWLA	KYLEX	MIELA	NEMEA	OHWOO	VABLA
1	TRUMAN	27.9	l	22.5	96.1	7.5	11.5	26.1	17.0	40.0	2.7
2	ERNIE	28.9		40.0	76.2	15.5	27.6	30.0	17.0	20.0	4.5
3	FREEDOM	44.9	h	55.0	91.3	12.5	33.2	38.0		80.0	15.0
4	PIONEER2545	50.4	h	57.5	77.0	3.0	45.9	26.3	90.0	85.0	18.3
5	NY01016-AN	47.3	h	50.0	100.0	10.5	21.9	43.5	100.0	40.0	12.1
6	NY01066-278	42.3	h	72.5	79.7	10.0	41.2	37.1		50.0	16.5
7	NY99059-249	30.8		30.0	90.3	20.0	20.3	21.8	8.0	50.0	6.3
8	NY99069-249	40.2	h	50.0	82.7	15.5	31.7	21.0	68.0	45.0	7.5
9	NY99069-352	39.8	h	27.5	100.0	12.5	38.8	32.5		65.0	12.9
10	KWS023	36.8		57.5	91.2	5.0	27.4	30.6	28.0	50.0	5.0
11	KWS024	39.8	h	42.5	100.0	10.5	27.2	31.8	21.0	60.0	25.5
12	KWS025	34.2		40.0	100.0	20.5	32.4	23.1	11.0	40.0	6.4
13	KWS028	36.9		20.0	60.3	20.5	29.1	23.6	69.0	65.0	7.6
14	L29230	37.4		37.5	92.9	12.5	36.7	27.0	30.0	55.0	7.5
15	LCS321	34.9		37.5	74.3	10.5	27.9	40.5	32.0	50.0	6.7
16	E6012	33.4		30.0	100.0	3.0	28.3	27.5	36.0	40.0	2.7
17	F0036R	42.4	h	52.5	88.7	7.5	34.6	34.3	28.0	75.0	18.4
18	F0039	52.0	h	60.0	100.0	17.5	43.4	33.5		95.0	25.6
19	F1014	41.9	h	50.0	100.0	10.5	28.2	19.2		75.0	21.0
20	OH07-263-3	31.7		17.5	100.0	7.5	22.6	21.6	41.0	30.0	13.7
21	OH08-206-69	43.5	h	65.0	94.7	1.0	30.5	20.0	92.0	40.0	4.5
22	OH08-269-58	41.4	h	25.0	94.4	15.0	33.2	52.5	40.0	50.0	21.2
23	0570A1-2-32-5-1-4	40.1	h	64.3	100.0	20.0	21.1	31.0		40.0	14.8
24	0762A1-2-8	27.6	l	30.0	100.0	7.5	22.3	13.7		25.0	5.6
25	08334A1-31	33.3		45.0	99.3	20.0	26.0	22.6		25.0	6.0
26	10641B1-9-11-7	42.8	h	72.5	94.4	12.5	18.2	34.0		75.0	3.5
27	B08-91993	35.3		25.0	100.0	20.0	21.8	31.2	23.0	60.0	1.0
28	B09*900256	41.5	h	67.5	100.0	5.5	33.7	23.5	20.0	70.0	11.5
29	M09L-9547	37.9		37.5	100.0	5.0	26.3	39.0	8.0	80.0	7.5
30	M10-1100#	38.4		27.5	87.1	15.5	28.9	17.4	44.0	70.0	17.0
31	M11-1027#	33.6		30.0	90.8	1.0	27.7	25.1	5.0	70.0	19.5
32	M11-2298	29.3		15.0	80.4	15.5	23.8	18.3	3.0	70.0	8.5
33	GL133	36.9		42.5	96.1	3.0	36.6	29.3	4.0	80.0	3.8
34	GL164	29.9		27.5	54.5	20.5	29.2	20.2	2.0	70.0	15.0
35	UGRCC2-78	40.9	h	27.5	100.0	20.5	40.5	42.0	4.0	80.0	13.0
36	UGRCC5-116	30.3		22.5	76.4	10.5	29.1	32.0	3.0	50.0	19.0
37	IL09-24328	25.0	l	12.5	82.1	40.0	14.5	22.9	5.0	20.0	2.9
38	IL09-3264	20.4	l	17.5	62.1	15.5	14.6	20.5	3.0	25.0	5.0
39	IL10-19464	18.5	l	15.0	61.9	5.5	15.7	28.6	3.0	15.0	3.0
40	IL10-6855	17.8	l	15.0	40.8	20.0	8.6	23.3	6.0	25.0	4.0
41	KY05C-1020-4-6-5	34.9		40.0	84.3	5.5	22.7	41.9	6.0	70.0	9.0
42	KY05C-1105-43-6-1	28.0	l	17.5	75.1	10.5	27.7	17.8	20.0	50.0	5.1
43	KY06C-3003-43-13-3	29.7		15.0	100.0	15.5	19.9	23.1	16.0	40.0	8.0
44	KY204604	40.9	h	57.5	90.5	10.5	34.3	44.4	11.0	60.0	19.0
45	MD08-22-22-13-4	15.3	l	12.5	53.1	10.0	9.8	15.0	0.0	20.0	2.0
46	MD08-22-22-13-10	21.9	l	37.5	72.7	3.0	13.0	15.5	4.0	25.0	4.1
47	MD09W272-8-4-13-3	35.5		67.5	88.3	10.5	22.9	26.2		40.0	3.5
48	MDC07026-12-28	27.0	l	62.5	49.1	17.5	23.8	15.2	5.0	40.0	2.5
49	MO120194	25.8	l	12.5	66.6	3.0	23.3	19.3	49.0	25.0	7.5
50	MO120452	21.7	l	25.0	62.4	15.5	14.0	22.8	7.0	20.0	7.0
51	MO120794	26.4	l	17.5	100.0	5.0	27.4	21.2	6.0	30.0	3.9
52	MO121183	31.5		32.5	94.8	17.5	27.8	25.3	14.0	35.0	5.4
53	NE06545	40.9	h	37.5	89.3	17.5	36.4	33.1	14.0	80.0	19.5
54	NE08499	36.5		35.0	84.2	17.5	29.2	26.9	6.0	80.0	13.1
55	NE10478	47.6	h	57.5	100.0	10.5	44.4	21.0	55.0	85.0	7.7
56	NI12702W	34.4		32.5	75.0	12.5	32.7	21.2	5.0	85.0	11.0
57	VA10W-140	37.9		45.0	97.1	25.5	22.8	30.8		50.0	4.5
58	VA11W-106	36.1		40.0	95.1	20.0	26.3	17.4		60.0	4.8
59	VA11W-301	43.3	h	60.0	100.0	10.5	31.0	37.5	6.0	85.0	16.4
60	VA12FHB-53	37.8		50.6	90.4	10.0	28.4	21.2	20.0	75.0	6.5
100	AVERAGE	34.9		38.2	86.4	12.6	27.2	27.2	29.8	44.3	9.4
101	MINUMUM	15.3		12.5	40.8	1.0	8.6	13.7	0.0	3.5	1.0
102	MAXIMUM	52.0		72.5	100.0	40.0	45.9	52.5	100.0	85.0	25.5
103	LSD(0.05)	13.5		.	.	.	.	.	.	.	.

Table 14. Summary of INC/SEV/FDK (ISK, %) data from the 2013-2014 NUWWSN

ENTRY	NAME	AVG		ILURB	INHIG	KYLEX	MIELA	NEMEA	OHWOO	VABLA
1	TRUMAN	37.6	l	39.9	63.9	38.6	45.3	6.8	56.1	12.7
2	ERNIE	44.3		57.5	63.5	34.0	57.9	32.0	47.3	17.7
3	FREEDOM	58.1		72.8	78.5	49.5	62.8		74.1	36.2
4	PIONEER2545	63.9	h	78.4	75.8	60.4	54.9	43.9	86.4	47.2
5	NY01016-AN	55.3		73.9	67.0	41.4	64.5	40.0	62.5	37.8
6	NY01066-278	57.8		85.1	78.4	62.5	63.7	9.6	72.4	33.2
7	NY99059-249	49.4		63.8	84.1	44.9	54.6	3.2	67.9	27.3
8	NY99069-249	53.6		68.7	67.6	52.7	55.5	37.1	66.7	26.6
9	NY99069-352	54.6		56.4	83.5	58.3	60.8	0.0	77.4	46.0
10	KWS023	53.1		70.9	84.5	51.5	54.6	28.0	64.3	18.2
11	KWS024	55.7		61.5	91.0	45.0	56.9		65.3	40.1
12	KWS025	53.2		70.2	74.5	46.5	54.8	20.2	64.6	41.4
13	KWS028	52.9		55.6	66.1	46.6	57.1	34.1	74.5	36.1
14	L29230	52.6		59.4	85.1	54.9	55.2	25.8	67.2	20.5
15	LCS321	51.8		53.7	80.7	46.9	61.5	19.7	65.6	34.5
16	E6012	54.1		56.6	86.5	53.7	57.7	29.0	65.6	29.9
17	F0036R	57.0		74.6	71.5	53.6	57.7	14.2	82.3	44.9
18	F0039	69.2	h	79.8	85.0	67.0	65.2		91.0	52.4
19	F1014	54.0		56.1	82.0	57.4	46.3		76.7	30.9
20	OH07-263-3	49.2		46.1	77.5	41.1	51.8	52.5	51.0	24.1
21	OH08-206-69	58.0		69.7	79.9	47.5	47.3	64.1	55.2	42.2
22	OH08-269-58	61.5	h	57.9	91.7	55.8	71.2	48.4	67.1	38.2
23	0570A1-2-32-5-1-4	49.8		63.8	86.5	45.6	52.5		51.5	24.5
24	0762A1-2-8	39.7	l	45.8	73.0	41.4	39.0		42.2	22.4
25	08334A1-31	45.0		55.7	81.7	40.7	50.6		47.2	19.5
26	10641B1-9-11-7	48.4		63.6	79.8	30.5	50.2		64.3	27.4
27	B08-91993	48.4		50.2	89.5	38.8	58.5	16.7	68.3	17.0
28	B09*900256	57.6		80.5	86.5	42.9	58.7	21.5	78.9	33.9
29	M09L-9547	52.9		53.0	82.0	40.1	62.1	19.4	74.8	38.9
30	M10-1100#	54.2		61.1	81.3	49.9	52.7	27.1	74.2	33.0
31	M11-1027#	50.1		46.7	78.3	42.3	48.0	19.9	74.2	41.3
32	M11-2298	43.5		45.1	68.2	34.8	50.6	7.6	68.8	29.2
33	GL133	57.9		60.6	86.4	50.9	58.3	41.6	81.0	26.6
34	GL164	44.4		54.7	59.3	44.5	58.5	0.8	68.6	24.7
35	UGRCC2-78	60.1	h	62.2	85.0	55.2	63.9	23.4	86.2	45.0
36	UGRCC5-116	49.8		53.2	68.0	49.1	58.2	18.7	67.4	33.8
37	IL09-24328	41.4	l	36.9	68.8	29.2	53.6	32.6	43.0	25.6
38	IL09-3264	38.1	l	45.9	57.8	19.9	50.3	37.7	42.3	12.5
39	IL10-19464	38.4	l	37.8	74.3	28.3	50.0	25.5	41.2	11.8
40	IL10-6855	35.7	l	35.9	55.3	16.1	44.1	34.2	46.6	17.6
41	KY05C-1020-4-6-5	47.4		48.6	78.7	39.3	53.9	17.8	71.4	22.1
42	KY05C-1105-43-6-1	44.5		34.9	76.5	44.1	49.4	26.0	55.9	24.4
43	KY06C-3003-43-13-3	44.3		48.1	73.0	41.4	51.3	11.9	58.3	25.8
44	KY204604	60.9	h	77.2	85.7	56.7	60.4	26.8	76.0	43.4
45	MD08-22-22-13-4	34.2	l	29.5	46.7	34.6	35.5	30.8	43.3	19.0
46	MD08-22-22-13-10	33.5	l	43.9	50.1	36.9	40.2	1.6	43.4	18.7
47	MD09W272-8-4-13-3	50.1		61.9	81.8	50.2	51.9		54.1	26.2
48	MDC07026-12-28	43.1		54.9	54.2	39.5	46.3	35.1	56.0	15.4
49	MO120194	44.1		37.7	71.6	42.4	55.0	41.8	39.3	20.8
50	MO120452	39.4	l	39.6	65.4	40.1	39.8	24.9	46.9	18.9
51	MO120794	40.1	l	44.9	74.5	42.4	44.5	4.7	51.9	17.9
52	MO121183	52.7		59.9	85.9	44.5	51.4	32.5	58.1	36.5
53	NE06545	55.0		58.7	86.6	57.9	58.0	19.1	75.1	29.6
54	NE08499	52.2		58.5	86.2	49.8	59.3	15.3	74.1	22.4
55	NE10478	56.7		64.1	89.5	52.1	51.7	34.9	77.2	27.6
56	NI12702W	53.6		63.8	76.5	53.8	49.4	15.4	82.8	33.6
57	VA10W-140	55.3		65.1	85.4	47.7	62.4		68.7	27.8
58	VA11W-106	54.7		60.1	86.0	51.5	53.3		68.6	34.1
59	VA11W-301	59.3		75.1	88.0	47.4	61.0	9.9	86.6	47.2
60	VA12FHB-53	49.6		63.5	67.7	48.1	50.0	12.5	73.7	31.4
100	AVERAGE	50.4		57.5	76.5	45.5	54.0	31.7	58.7	29.1
101	MINUMUM	33.5		29.5	46.7	16.1	35.5	0.0	19.5	11.8
102	MAXIMUM	69.2		85.1	91.7	67.0	71.2	91.0	86.6	47.2
103	LSD(0.05)	9.4		.	.	.	.	.	.	.

Table 15. Summary of deoxynivalenol (DON, ppm) data from the 2013-2014 NUWWSN.

ENTRY	NAME	AVG		ILURB	INWLA	KYLEX	MIELA	OHWOO	VABLA
1	TRUMAN	9.1	l	14.8	0.7	16.1	3.0	18.8	1.2
2	ERNIE	9.6	l	13.8	2.8	14.7	9.0	16.5	0.5
3	FREEDOM	12.1		22.3	1.4	16.5	8.1	19.8	4.6
4	PIONEER2545	17.8	h	44.1	0.4	16.9	14.8	24.2	6.3
5	NY01016-AN	15.3	h	35.2	1.5	15.7	15.1	21.6	2.7
6	NY01066-278	16.6	h	36.3	1.3	14.9	18.4	21.0	7.5
7	NY99059-249	10.8		15.7	0.9	13.8	13.6	19.4	1.3
8	NY99069-249	12.1		22.7	1.6	12.7	7.9	24.5	3.1
9	NY99069-352	15.2	h	20.6	1.7	22.7	10.5	31.3	4.6
10	KWS023	8.2	l	14.3	1.5	11.6	6.4	14.8	0.4
11	KWS024	10.2	l	12.0	2.4	12.5	6.0	24.3	4.0
12	KWS025	8.6	l	10.3	1.4	14.2	6.2	16.7	3.0
13	KWS028	9.8	l	8.6	1.7	13.9	8.2	24.4	1.8
14	L29230	9.1	l	11.5	2.1	12.8	8.5	19.1	0.4
15	LCS321	12.7		17.8	1.1	21.8	5.9	26.0	3.5
16	E6012	10.6		14.8	0.4	16.3	9.5	20.9	1.9
17	F0036R	12.8		32.0	1.1	13.1	6.4	17.4	7.1
18	F0039	19.3	h	46.5	2.1	19.8	14.3	26.0	7.1
19	F1014	16.6	h	40.6	0.8	17.9	6.9	29.9	3.6
20	OH07-263-3	8.5	l	7.1	1.5	15.1	9.9	16.3	1.3
21	OH08-206-69	8.7	l	12.8	1.8	11.6	9.0	15.5	1.6
22	OH08-269-58	8.8	l	7.9	4.2	16.1	8.2	13.9	2.6
23	0570A1-2-32-5-1-4	14.2	h	30.4	3.7	21.6	7.6	20.6	1.5
24	0762A1-2-8	5.7	l	7.5	1.4	7.7	2.9	13.7	0.7
25	08334A1-31	6.6	l	7.4	2.8	12.2	2.8	14.0	0.7
26	10641B1-9-11-7	13.8	h	20.7	1.5	13.4	5.6	41.1	0.4
27	B08-91993	9.3	l	9.0	2.1	11.3	15.2	17.3	0.8
28	B09*900256	11.4		18.5	1.0	17.3	13.1	14.6	3.7
29	M09L-9547	10.2	l	10.0	1.0	15.7	5.3	26.9	2.6
30	M10-1100#	9.4	l	15.1	2.1	10.8	6.6	16.8	4.8
31	M11-1027#	8.8	l	12.0	0.6	11.9	2.3	23.3	3.0
32	M11-2298	10.1	l	8.7	2.2	12.4	2.9	32.1	2.1
33	GL133	10.4	l	10.5	1.2	15.9	5.8	25.8	3.0
34	GL164	10.0	l	6.2	1.8	13.4	7.7	27.5	3.4
35	UGRCC2-78	13.0		9.0	3.1	15.5	9.5	36.1	4.9
36	UGRCC5-116	7.3	l	6.9	1.6	9.5	3.2	21.7	0.6
37	IL09-24328	5.4	l	4.0	3.6	7.5	3.9	13.4	0.2
38	IL09-3264	4.9	l	5.1	3.0	6.2	2.6	12.3	0.1
39	IL10-19464	5.7	l	6.5	0.6	8.1	5.8	12.6	0.7
40	IL10-6855	6.4	l	5.9	2.0	6.3	5.3	18.0	1.1
41	KY05C-1020-4-6-5	13.4		13.6	1.3	15.4	7.2	41.1	1.7
42	KY05C-1105-43-6-1	7.4	l	8.0	2.6	12.2	1.9	18.2	1.7
43	KY06C-3003-43-13-3	8.8	l	7.4	3.2	12.1	3.7	23.3	3.2
44	KY204604	16.9	h	33.8	2.1	17.2	8.2	35.0	5.2
45	MD08-22-22-13-4	5.0	l	3.4	1.3	6.7	1.5	16.1	0.7
46	MD08-22-22-13-10	6.6	l	7.4	1.5	6.8	5.1	17.4	1.4
47	MD09W272-8-4-13-3	9.7	l	18.6	1.7	9.6	5.2	19.5	3.3
48	MDC07026-12-28	7.0	l	10.1	0.8	6.3	3.3	21.6	0.1
49	MO120194	6.0	l	4.4	0.8	13.8	2.8	14.0	0.4
50	MO120452	8.0	l	11.4	1.8	11.0	3.5	18.8	1.2
51	MO120794	10.7		14.2	1.7	13.4	4.3	28.8	2.1
52	MO121183	7.8	l	14.4	2.1	7.3	4.5	15.9	2.4
53	NE06545	10.5	l	12.0	1.9	11.0	8.0	26.1	4.1
54	NE08499	12.4		10.7	1.9	13.6	16.6	29.1	2.4
55	NE10478	10.4	l	18.5	3.3	11.6	5.8	22.8	0.5
56	NI12702W	14.6	h	15.6	1.9	19.3	11.7	34.7	4.7
57	VA10W-140	9.1	l	11.4	3.3	9.3	8.7	20.1	2.0
58	VA11W-106	12.2		18.7	2.3	13.1	7.6	29.5	2.2
59	VA11W-301	14.8	h	24.0	0.8	12.1	8.2	37.4	6.1
60	VA12FHB-53	11.8		18.0	0.7	10.1	5.8	34.9	1.5
100	AVERAGE	10.5		15.5	1.8	13.2	7.3	22.6	2.5
101	MINUMUM	4.9		3.4	0.4	6.2	1.5	12.3	0.1
102	MAXIMUM	19.3		46.5	4.2	22.7	18.4	41.1	7.5
103	LSD(0.05)	5.7		.	.	.	.	.	.

Table 16. Summary of greenhouse severity (GHSEV, %) data from the 2013-2014 NUWWSN.

ENTRY	NAME	GHSEV
1	TRUMAN	11.6
2	ERNIE	13.1
3	FREEDOM	28.9
4	PIONEER2545	40.2
5	NY01016-AN	47.5
6	NY01066-278	42.1
7	NY99059-249	36.1
8	NY99069-249	48.0
9	NY99069-352	13.8
10	KWS023	40.4
11	KWS024	43.8
12	KWS025	47.0
13	KWS028	28.4
14	L29230	36.8
15	LCS321	45.1
16	E6012	37.5
17	F0036R	15.7
18	F0039	49.7
19	F1014	9.2
20	OH07-263-3	47.1
21	OH08-206-69	32.5
22	OH08-269-58	41.4
23	0570A1-2-32-5-1-4	31.4
24	0762A1-2-8	12.8
25	08334A1-31	14.1
26	10641B1-9-11-7	8.2
27	B08-91993	21.8
28	B09*900256	27.5
29	M09L-9547	11.1
30	M10-1100#	19.8
31	M11-1027#	23.0
32	M11-2298	16.5
33	GL133	16.4
34	GL164	27.1
35	UGRCC2-78	32.8
36	UGRCC5-116	16.5
37	IL09-24328	11.2
38	IL09-3264	12.9
39	IL10-19464	11.0
40	IL10-6855	10.9
41	KY05C-1020-4-6-5	10.6
42	KY05C-1105-43-6-1	15.3
43	KY06C-3003-43-13-3	20.6
44	KY204604	37.9
45	MD08-22-22-13-4	19.4
46	MD08-22-22-13-10	15.0
47	MD09W272-8-4-13-3	10.8
48	MDC07026-12-28	19.0
49	MO120194	8.4
50	MO120452	13.4
51	MO120794	13.1
52	MO121183	15.8
53	NE06545	28.2
54	NE08499	35.2
55	NE10478	17.1
56	NI12702W	22.3
57	VA10W-140	37.6
58	VA11W-106†	46.0
59	VA11W-301	42.3
60	VA12FHB-53	11.3
100	AVERAGE	25.3
101	MINIMUM	8.2
102	MAXIMUM	49.7
103	LSD(0.05)	

Table 17. Summary of heading date (HD, Julian days) and height (HGT, inches) data from the 2013-2014 NUWWSN

				HD										HGT			
ENTRY	NAME	AVG		ILCHA	ILURB	INWLA	KYLEX	MOCOL	NYITH	OHWOO	ONRID	VABLA		AVG		KYLEX	MIELA
1	TRUMAN	148.0	h	154	148	141	141	150	155	149	160	134		33.3	h	38.5	28.2
2	ERNIE	143.8	l	148	144	141	132.5	143	152	147	156	131		28.4		34.5	22.2
3	FREEDOM	147.3		155	147	140.5	139	147	154	148	161	134		29.5		34.5	24.5
4	PIONEER2545	144.7		149	146	140	135	143	152	148	156	133		28.0		34.0	22.0
5	NY01016-AN	146.8		152	147	143.5	134.5	147	154	150	158	135		32.1	h	38.5	25.7
6	NY01066-278	147.4	h	154	148	140	140	147	155	150	158	135		32.0		38.5	25.5
7	NY99059-249	147.0		152	147	142	137	147	155	149	159	135		31.7		37.0	26.3
8	NY99069-249	145.1		150	145	140	134.5	143	153	149	159	132		27.9		33.0	22.8
9	NY99069-352	145.8		149	145	140.5	136	147	153	149	159	134		28.6		33.5	23.7
10	KWS023	145.5		152	147	142.5	134	142	151	148	160	133		32.0		37.0	27.0
11	KWS024	145.6		150	145	144.5	134	143	154	148	158	134		26.3	l	31.5	21.0
12	KWS025	144.1	l	147	145	141	134	141	152	148	156	133		30.6		37.0	24.2
13	KWS028	146.1		150	146	141	136.5	145	154	150	158	134		32.3	h	38.0	26.5
14	L29230	143.9	l	148	143	141.5	133.5	142	152	147	156	132		29.3		34.5	24.0
15	LCS321	143.8	l	147	144	140.5	134	143	151	147	155	133		29.8		36.5	23.0
16	E6012	145.7		150	147	139.5	135	147	154	149	157	133		29.0		34.0	24.0
17	F0036R	146.2		152	148	141	135	147	154	149	156	134		27.3	l	33.5	21.0
18	F0039	148.1	h	156	149	142	138	149	156	150	158	135		28.4		33.5	23.3
19	F1014	148.7	h	153	150	141	142	149	156	151	160	136		29.3		34.5	24.0
20	OH07-263-3	144.3		147	144	142	133.5	143	153	148	155	133		31.4		38.0	24.7
21	OH08-206-69	144.3		152	145	141	133.5	142	151	147	155	132		28.5		33.5	23.5
22	OH08-269-58	145.6		147	145	144	135	143	154	148	158	136		31.4		37.0	25.8
23	0570A1-2-32-5-1-4	145.7		149	147	143.5	135	145	155	148	156	133		31.0		38.0	24.0
24	0762A1-2-8	145.2		149	147	140.5	135	145	153	148	156	133		25.7	l	31.0	20.3
25	08334A1-31	144.8		150	146	143.5	134	143	153	147	156	131		28.5		35.0	22.0
26	10641B1-9-11-7	143.7	l	150	144	139	132.5	142	152	147	155	132		30.5		36.5	24.5
27	B08-91993	143.9	l	150	143	140.5	132.5	142	153	147	156	131		30.5		36.0	25.0
28	B09*900256	145.3		149	145	142.5	133.5	147	153	147	158	133		26.5	l	32.5	20.5
29	M09L-9547	143.7	l	146	144	140	133.5	142	152	147	156	133		29.9		34.5	25.2
30	M10-1100#	145.8		150	146	142.5	135	143	154	148	159	135		27.6	l	32.0	23.2
31	M11-1027#	144.7		148	144	143	133.5	143	154	148	156	133		29.8		35.5	24.0
32	M11-2298	144.3		147	145	141	133	143	151	147	159	133		29.8		35.0	24.5
33	GL133	143.3	l	146	144	140.5	132.5	141	152	147	155	132		26.8	l	31.5	22.0
34	GL164	144.6		147	144	143	133.5	143	155	147	156	133		27.9		32.5	23.2
35	UGRCC2-78	144.7		146	144	142.5	134.5	143	154	148	156	134		30.2		35.0	25.3
36	UGRCC5-116	145.4		148	145	141.5	135.5	143	154	149	159	134		31.1		36.5	25.7
37	IL09-24328	143.1	l	146	143	143	132	141	151	146	155	131		30.3		35.5	25.0
38	IL09-3264	143.3	l	147	143	142.5	132	141	153	146	155	130		27.9		33.5	22.3
39	IL10-19464	143.3	l	145	143	140.5	132.5	142	153	146	157	131		27.9		33.5	22.2
40	IL10-6855	144.0	l	149	142	144.5	131.5	144	152	146	156	131		28.8		33.5	24.0
41	KY05C-1020-4-6-5	146.4		150	146	139	138.5	148	154	150	158	134		27.0	l	33.0	21.0
42	KY05C-1105-43-6-1	144.7		149	144	143.5	134	142	152	147	158	133		28.7		34.0	23.3
43	KY06C-3003-43-13-3	146.6		149	147	142	137.5	149	154	149	158	134		29.4		35.0	23.7
44	KY204604	147.2		152	148	140.5	139	145	155	150	161	134		28.7		33.5	23.8
45	MD08-22-22-13-4	145.6		150	145	142	136	142	153	149	160	133		26.9	l	31.5	22.2
46	MD08-22-22-13-10	145.9		148	148	141	136	145	153	149	159	134		27.8		33.0	22.5
47	MD09W272-8-4-13-3	146.5		156	148	140.5	136	147	152	148	157	134		28.3		35.0	21.5
48	MDC07026-12-28	144.5		150	145	141	134.5	142	154	148	156	130		26.9	l	31.5	22.3
49	MO120194	143.5	l	146	143	141	133.5	142	151	147	158	130		28.4		32.5	24.2
50	MO120452	147.3	h	152	147	142	140	148	154	149	160	134		34.0	h	39.0	29.0
51	MO120794	146.4		152	146	142.5	137	148	152	148	158	134		32.9	h	39.0	26.8
52	MO121183	143.7	l	145	143	141	133.5	143	153	147	155	133		27.3	l	33.5	21.0
53	NE06545	144.3		146	144	141.5	135	143	151	148	157	133		30.6		34.5	26.7
54	NE08499	144.6		145	144	142	137	143	153	147	158	132		31.4		37.0	25.7
55	NE10478	142.8	l	144	142	140	133	143	151	147	155	130		26.0	l	31.5	20.5
56	NI12702W	147.4	h	150	148	141	141.5	147	156	150	158	135		31.4		36.0	26.8
57	VA10W-140	145.8		152	147	141	135	143	152	149	160	133		27.9		33.0	22.8
58	VA11W-106†	145.6		150	147	142	135.5	143	154	148	158	133		27.4	l	33.0	21.8
59	VA11W-301	145.7		153	147	140	136.5	143	153	149	156	134		26.2	l	31.5	20.8
60	VA12FHB-53	145.7		152	149	142.5	135	143	153	148	156	133		26.9	l	33.5	20.2
100	AVERAGE	145.3		149.5	145.5	141.5	135.2	144.2	153.2	148.1	157.3	133.1		29.2		34.6	23.7
101	MINUMUM	142.8		144	142	139	131.5	141	151	146	155	130		25.7		31.0	20.2
102	MAXIMUM	148.7		156	150	144.5	142	150	156	151	161	136		34.0		39.0	29.0
103	LSD(0.05)	1.3		.	.	.	.	.	.	.	.	.		2.0		.	.

Table 18. Summary of other traits collected on the 2013-2014 NUWWSN

ENTRY	NAME	VABLA YR 0-9	VABLA PM 0-9	VABLA LR 0-9	ILCHA WINTER KILL 0-9	ILCHA BACTERIAL LEAF STREAK 0-9
1	TRUMAN	0.0	2.5	9.0	2.0	3.0
2	ERNIE	9.0	2.0	7.0	4.0	5.0
3	FREEDOM	7.5	1.5	4.0	6.0	4.5
4	PIONEER2545	9.0	1.7	7.0	5.5	4.5
5	NY01016-AN	9.0	3.0	1.0	6.5	4.5
6	NY01066-278	0.0	3.5	8.0	7.0	3.5
7	NY99059-249	0.0	3.0	7.0	6.0	4.0
8	NY99069-249	4.5	2.0	8.0	6.5	5.5
9	NY99069-352	7.5	4.0	6.0	3.0	4.5
10	KWS023	0.0	3.0	3.0	5.5	5.0
11	KWS024	0.0	4.0	2.0	5.0	5.0
12	KWS025	7.5	1.5	4.0	3.5	4.5
13	KWS028	9.0	2.0	6.0	2.0	4.0
14	L29230	0.0	5.0	8.0	5.5	4.0
15	LCS321	0.0	5.0	6.0	6.0	3.0
16	E6012	0.0	3.5	8.0	5.0	5.0
17	F0036R	0.0	3.0	8.0	5.5	4.5
18	F0039	7.5	3.0	7.0	8.0	3.5
19	F1014	0.0	4.0	4.0	5.5	4.0
20	OH07-263-3	9.0	3.0	6.0	4.5	4.0
21	OH08-206-69	0.0	1.5	1.0	7.0	4.5
22	OH08-269-58	9.0	2.0	7.0	4.5	3.5
23	0570A1-2-32-5-1-4	0.0	2.5	1.0	6.5	2.5
24	0762A1-2-8	0.0	3.5	1.0	4.5	4.5
25	08334A1-31	0.0	2.5	5.0	3.0	4.0
26	10641B1-9-11-7	9.0	1.5	1.0	5.0	3.5
27	B08-91993	0.0	1.5	3.0	6.5	2.0
28	B09*900256	0.0	2.0	5.0	4.5	3.5
29	M09L-9547	6.0	1.5	2.0	3.0	3.5
30	M10-1100#	0.0	1.5	4.0	5.0	4.5
31	M11-1027#	0.0	3.5	6.0	2.5	3.0
32	M11-2298	0.0	2.0	1.0	4.0	2.5
33	GL133	6.0	3.0	3.0	3.5	3.5
34	GL164	7.5	2.0	2.0	3.0	3.0
35	UGRCC2-78	4.5	3.0	6.0	3.0	4.5
36	UGRCC5-116	0.0	1.5	2.0	2.0	3.0
37	IL09-24328	0.0	3.5	7.0	2.0	3.5
38	IL09-3264	3.0	1.5	1.0	3.5	1.5
39	IL10-19464	0.0	2.0	6.0	2.5	4.0
40	IL10-6855	0.0	2.5	2.0	7.0	3.5
41	KY05C-1020-4-6-5	0.0	4.0	3.0	6.0	2.5
42	KY05C-1105-43-6-1	7.5	2.5	2.0	5.0	4.5
43	KY06C-3003-43-13-3	0.0	5.0	3.0	2.5	3.5
44	KY204604	6.0	2.7	3.0	5.0	6.0
45	MD08-22-22-13-4	3.0	7.5	.	5.0	4.5
46	MD08-22-22-13-10	3.0	8.0	2.0	5.0	4.0
47	MD09W272-8-4-13-3	0.0	2.0	1.0	8.5	3.5
48	MDC07026-12-28	0.0	1.0	2.0	6.5	6.0
49	MO120194	0.0	2.5	6.0	2.5	5.5
50	MO120452	1.5	3.5	8.0	2.5	5.0
51	MO120794	0.0	1.0	6.0	2.5	5.0
52	MO121183	4.5	3.5	4.0	2.5	6.5
53	NE06545	0.0	4.5	2.0	1.5	4.0
54	NE08499	0.0	2.0	2.0	1.5	3.5
55	NE10478	0.0	4.0	1.0	1.5	5.0
56	NI12702W	0.0	5.0	1.0	1.5	6.5
57	VA10W-140	9.0	2.5	1.0	7.0	7.0
58	VA11W-106†	0.0	2.0	3.0	4.0	6.0
59	VA11W-301	7.5	1.5	1.0	6.0	7.0
60	VA12FHB-53	6.0	1.5	3.0	8.0	6.5
100	AVERAGE	2.9	2.8	4.1	4.5	4.3
	MINIMUM	0.0	1.0	1.0	1.5	1.5
	MAXIMUM	9.0	8.0	9.0	8.5	7.0

Table 19. Summary of incidence (INC, %) from 2013-2014 PNUWWSN.

ENTRY	NAME	AVG		ILCHA	ILURB	INTHO	INWLA	KYLEX	MIELA	MOCOL	OHWOO	ONRID	VABLA
1	TRUMAN	56.5	l	45.0	86.7	35.0	35.0	65.0	75.0	80.0	100.0	13.3	30.0
2	ERNIE	67.8		60.0	95.0	90.0	30.0	75.0	80.0	80.0	100.0	28.3	40.0
3	FREEDOM	76.6	h	82.5	91.7	85.0	45.0	70.0	90.0	100.0	100.0	16.7	85.0
4	PIONEER2545	82.4	h	92.5	100.0	85.0	65.0	72.5	81.1	100.0	100.0	50.0	77.5
5	KWS014	74.7	h	69.6	86.7	85.0	25.0	95.0	90.0	100.0	100.0	18.3	77.5
6	KWS029	69.4		49.6	95.0	90.0	35.0	75.0	85.0	90.0	100.0	16.7	57.5
7	KWS030	70.7		40.0	96.7	85.0	30.0	75.0	90.0	90.0	100.0	40.0	60.0
8	KWS031	63.1	l	50.0	93.3	75.0	25.0	75.0	95.0	65.0	100.0	20.0	32.5
9	KWS032	66.5		75.0	86.7	75.0	25.0	67.5	90.0	70.0	98.3	25.0	52.5
10	KWS033	76.6	h	92.5	96.7	85.0	20.0	100.0	100.0	100.0	90.0	26.7	55.0
11	KWS034	72.2	h	62.5	88.3	80.0	25.0	90.0	90.0	100.0	100.0	16.7	70.0
12	OH07-264-35	69.3		77.5	96.7	85.0	15.0	82.5	75.0	100.0	96.7	20.0	45.0
13	OH08-235-33	64.1		45.0	90.0	75.0	15.0	65.0	95.0	75.0	96.7	21.7	62.5
14	OH09-281-10	75.1	h	75.0	100.0	80.0	20.0	92.5	100.0	95.0	98.3	40.0	50.0
15	OH10-194-16	65.7		40.0	85.0	80.0	10.0	80.0	100.0	75.0	100.0	20.0	67.5
16	OH10-219-65	69.8		57.5	86.7	80.0	20.0	62.5	95.0	100.0	100.0	21.7	75.0
17	OH10-222-78	64.7		35.0	95.0	75.0	15.0	70.0	90.0	85.0	100.0	21.7	60.0
18	OH10-305-39	57.9	l	32.5	83.3	80.0	5.0	45.0	80.0	85.0	91.7	11.7	65.0
19	05251A1-1-77-8-2	63.7	l	55.0	91.7	50.0	25.0	75.0	90.0	80.0	88.3	26.7	55.0
20	0566A1-3-1-52	68.6		60.0	91.7	80.0	25.0	82.5	76.4	95.0	95.0	28.3	52.5
21	082A1-3-1	67.5		40.0	86.7	75.0	20.0	67.5	90.0	95.0	100.0	33.3	67.5
22	1042A1-1-2	67.5		57.5	78.3	85.0	15.0	75.0	90.0	100.0	98.3	23.3	52.5
23	10512RA1-8	65.7		85.0	90.0	85.0	10.0	72.5	70.0	50.0	100.0	20.0	75.0
24	10565C1-1	69.6		82.5	93.3	70.0	30.0	75.0	42.5	100.0	100.0	25.0	77.5
25	B09-2949	78.9	h	95.0	100.0	80.0	35.0	75.0	89.8	95.0	96.7	40.0	82.5
26	M10-1615	60.5	l	25.0	70.0	85.0	25.0	70.0	76.4	95.0	96.7	26.7	35.0
27	M10-1659	61.0	l	22.5	76.7	80.0	15.0	60.0	100.0	85.0	100.0	13.3	57.5
28	M12-2019#	64.6		30.0	90.0	60.0	20.0	72.5	95.0	100.0	98.3	30.0	50.0
29	M12-3189	61.3	l	50.0	90.0	85.0	10.0	60.0	70.0	80.0	100.0	18.3	50.0
30	M12-3326L	69.2		7.5	96.7	75.0	15.0	80.0	100.0	100.0	100.0	43.3	75.0
31	DH4-12	58.7	l	20.0	90.0	80.0	15.0	75.0	100.0	45.0	86.7	18.3	57.5
32	GL119	66.8		65.0	90.0	80.0	5.0	77.5	67.7	100.0	90.0	30.0	62.5
33	GL39	73.2	h	70.0	100.0	85.0	10.0	77.5	89.8	100.0	100.0	25.0	75.0
34	OACSnow	71.7	h	77.5	100.0	85.0	20.0	72.5	95.0	95.0	98.3	18.3	55.0
35	UGRCDH5-15	71.8	h	87.5	91.7	70.0	45.0	75.0	100.0	95.0	96.7	21.7	35.0
36	UGRCDH5-28	63.9		62.5	88.3	75.0	20.0	72.5	81.1	100.0	100.0	15.0	25.0
37	IL10-17672	62.6	l	55.0	81.7	55.0	25.0	70.0	95.0	80.0	93.3	18.3	52.5
38	IL10-17707	54.9	l	35.0	53.3	65.0	30.0	37.5	90.0	100.0	80.0	18.3	40.0
39	IL10-21934	55.5	l	22.5	70.0	75.0	15.0	55.0	90.0	65.0	80.0	20.0	62.5
40	IL10-21937	58.3	l	17.5	75.0	85.0	30.0	42.5	80.0	75.0	95.0	23.3	60.0
41	IL10-29145	57.7	l	25.0	76.7	80.0	35.0	45.0	70.0	85.0	95.0	28.3	37.5
42	KY03C-1237-32	63.8		60.0	96.7	85.0	20.0	57.5	90.0	90.0	93.3	28.3	17.5
43	KY06C-1003-140-3-3	61.5	l	65.0	80.0	65.0	15.0	60.0	80.0	85.0	96.7	23.3	45.0
44	KY06C-1061-3-18-1	71.6	h	75.0	100.0	80.0	15.0	67.5	95.0	95.0	100.0	18.3	70.0
45	KY06C-1065-4-13-3	67.1		82.5	90.0	85.0	10.0	95.0	75.0	90.0	95.0	8.3	40.0
46	KY06C-1116-10-2-1	65.2		32.5	85.0	90.0	25.0	57.5	90.0	90.0	90.0	20.0	72.5
47	KY06C-2020-11-12-1	60.2	l	30.0	83.3	85.0	15.0	60.0	85.0	80.0	93.3	20.0	50.0
48	MO100172	62.0	l	37.5	70.0	85.0	20.0	60.0	76.4	100.0	95.0	33.3	42.5
49	MO120150	53.0	l	7.5	78.3	90.0	5.0	45.0	75.0	90.0	88.3	18.3	32.5
50	MO120487	58.4	l	22.5	83.3	80.0	5.0	62.5	85.0	75.0	100.0	13.3	57.5
51	MO120846	56.8	l	12.5	93.3	65.0	10.0	67.5	75.0	85.0	100.0	15.0	45.0
52	MO121280	57.4	l	25.0	86.7	80.0	5.0	70.0	85.0	70.0	100.0	15.0	37.5
53	MO121539	67.4		45.0	93.3	90.0	10.0	80.0	90.0	95.0	100.0	23.3	47.5
54	MO121983	61.6	l	47.5	63.3	90.0	5.0	62.5	95.0	70.0	96.7	23.3	62.5
55	VA11MAS-9409-8-2-798	78.3	h	100.0	93.3	65.0	50.0	80.0	85.0	95.0	95.0	40.0	80.0
56	VA12FHB-34†	59.6	l	40.0	95.0	80.0	20.0	70.0	85.0	75.0	95.0	13.3	22.5
57	VA12FHB-4	66.4		82.5	91.7	80.0	30.0	57.5	85.0	90.0	83.3	26.7	37.5
58	VA12FHB-55	71.3		75.0	86.7	85.0	25.0	72.5	100.0	70.0	100.0	36.7	62.5
59	VA12FHB-77†	66.7		42.5	95.0	90.0	20.0	75.0	85.0	60.0	100.0	21.7	77.5
60	VA12FHB-8	72.1	h	85.0	100.0	75.0	40.0	77.5	85.0	75.0	100.0	23.3	60.0
100	AVERAGE	65.9		53.3	88.2	78.6	21.7	70.0	86.2	86.4	96.4	23.6	55.3
101	MINUMUM	53.0		7.5	53.3	35.0	5.0	37.5	42.5	45.0	80.0	8.3	17.5
102	MAXIMUM	82.4		100.0	100.0	90.0	65.0	100.0	100.0	100.0	100.0	50.0	85.0
103	LSD(0.05)	10.8		.	.	.	.	.	.	.	.	.	.

Table 20. Summary of severity (SEV, %) data from the 2013-2014 PNUWWSN

ENTRY	NAME	AVG		ILCHA	ILURB	INTHO	KYLEX	MIELA	MOCOL	OHWOO	ONRID	VABLA
1	TRUMAN	24.3	l	22.5	19.2	30.0	28.3	35.3	11.4	42.3	11.7	17.6
2	ERNIE	35.4		35.0	41.4	65.0	27.2	43.1	19.0	38.0	33.3	16.6
3	FREEDOM	42.0		42.5	39.3	45.0	37.5	56.2	38.4	56.0	33.3	30.1
4	PIONEER2545	58.9	h	55.0	78.8	75.0	40.1	44.1	44.6	82.7	71.7	38.1
5	KWS014	51.1	h	56.5	38.4	75.0	42.7	34.4	53.9	51.3	53.3	54.6
6	KWS029	34.7		26.5	33.7	70.0	35.2	29.3	24.3	48.2	13.3	31.7
7	KWS030	40.0		20.0	37.5	70.0	30.8	34.6	28.4	56.3	40.0	42.3
8	KWS031	42.6		45.0	61.8	75.0	51.5	51.7	11.9	50.3	20.0	16.1
9	KWS032	42.0		45.0	58.7	45.0	39.9	62.7	9.4	41.1	30.0	46.4
10	KWS033	43.5		45.0	48.1	30.0	47.7	53.3	54.1	53.6	26.7	33.4
11	KWS034	45.6		40.0	50.0	65.0	28.8	52.4	51.7	52.1	10.0	60.2
12	OH07-264-35	46.9		40.0	71.9	60.0	40.3	42.0	55.0	44.8	40.0	27.8
13	OH08-235-33	41.7		45.0	64.8	60.0	28.7	43.4	30.3	43.7	25.0	34.6
14	OH09-281-10	33.4		25.0	44.2	60.0	30.2	38.8	21.8	23.4	43.3	13.5
15	OH10-194-16	35.0		17.5	27.7	70.0	38.4	48.7	20.8	38.8	23.3	29.8
16	OH10-219-65	38.2		30.0	35.6	50.0	43.3	34.2	51.4	36.5	26.7	36.4
17	OH10-222-78	40.4		20.0	44.0	40.0	44.3	70.6	11.4	69.9	31.7	31.5
18	OH10-305-39	24.4	l	10.0	18.9	30.0	21.0	37.0	18.8	29.0	16.7	38.6
19	05251A1-1-77-8-2	21.5	l	20.0	25.7	30.0	31.6	26.8	13.1	18.0	16.7	11.2
20	0566A1-3-1-52	34.8		22.5	28.9	65.0	31.0	38.9	30.7	45.8	31.7	18.6
21	082A1-3-1	32.0	l	25.0	15.7	70.0	31.5	42.6	20.7	36.7	26.7	19.4
22	1042A1-1-2	33.5		25.0	28.1	30.0	46.9	28.3	47.3	25.7	30.0	40.0
23	10512RA1-8	23.8	l	30.0	15.7	35.0	34.1	26.0	7.3	28.8	20.0	17.0
24	10565C1-1	36.3		20.0	31.2	50.0	29.6	33.1	40.3	59.7	30.0	32.4
25	B09-2949	39.5		30.0	40.8	55.0	37.5	40.3	38.0	51.0	36.7	26.3
26	M10-1615	28.5	l	12.5	15.6	60.0	16.7	36.0	32.7	34.3	25.0	23.9
27	M10-1659	26.5	l	12.5	16.2	70.0	27.1	33.4	22.9	26.2	13.3	17.2
28	M12-2019#	30.0	l	15.0	31.1	45.0	28.4	26.7	41.2	32.7	23.3	26.6
29	M12-3189	27.2	l	22.5	29.9	55.0	22.8	27.5	22.6	28.9	16.7	19.0
30	M12-3326L	31.9	l	7.5	31.0	45.0	29.9	34.8	46.3	28.6	36.7	26.9
31	DH4-12	24.9	l	15.0	18.1	60.0	27.8	41.9	6.9	22.1	15.0	16.9
32	GL119	49.0	h	40.0	50.1	80.0	37.8	22.4	63.8	62.8	58.3	25.8
33	GL39	53.9	h	45.0	75.7	75.0	33.9	18.2	77.3	76.1	45.0	38.8
34	OACSnow	37.7		42.5	58.6	55.0	36.1	27.5	12.4	39.0	26.7	41.6
35	UGRCDH5-15	42.6		40.0	49.4	75.0	45.0	45.5	30.2	56.5	21.7	19.8
36	UGRCDH5-28	38.4		30.0	57.0	45.0	27.2	25.2	42.1	59.3	20.0	39.8
37	IL10-17672	29.8	l	27.5	20.1	60.0	22.2	24.7	20.7	34.4	26.7	32.3
38	IL10-17707	24.2	l	12.5	12.3	35.0	20.2	48.5	33.6	17.4	13.3	24.8
39	IL10-21934	25.6	l	12.5	17.8	65.0	18.5	41.1	17.3	13.8	21.7	22.3
40	IL10-21937	26.9	l	12.5	14.0	65.0	23.4	40.3	28.6	23.2	20.0	15.1
41	IL10-29145	24.4	l	15.0	18.8	45.0	21.9	26.9	18.8	37.7	23.3	12.5
42	KY03C-1237-32	26.7	l	15.0	29.1	45.0	25.4	29.8	28.1	34.9	23.3	9.3
43	KY06C-1003-140-3-3	34.5		30.0	28.1	65.0	34.1	37.5	22.8	35.4	25.0	32.6
44	KY06C-1061-3-18-1	46.9		40.0	68.3	75.0	35.5	34.5	35.4	70.3	21.7	41.0
45	KY06C-1065-4-13-3	30.7	l	50.0	27.9	40.0	31.4	33.9	20.1	39.4	13.3	20.7
46	KY06C-1116-10-2-1	32.8		10.0	23.0	65.0	43.3	48.0	27.9	26.9	28.3	22.8
47	KY06C-2020-11-12-1	29.8	l	15.0	26.3	90.0	28.6	41.7	15.8	26.0	13.3	11.3
48	MO100172	29.8	l	22.5	25.6	75.0	26.1	18.6	27.1	26.9	31.7	14.4
49	MO120150	23.8	l	5.0	25.0	70.0	21.7	39.5	15.3	11.8	11.7	14.5
50	MO120487	26.2	l	16.5	35.2	40.0	26.3	30.2	14.1	37.7	15.0	21.1
51	MO120846	28.5	l	7.5	38.2	45.0	38.8	42.8	10.3	39.3	11.7	23.1
52	MO121280	26.6	l	7.5	22.4	45.0	20.6	38.2	10.7	44.5	18.3	32.1
53	MO121539	29.5	l	16.5	23.0	65.0	28.7	29.7	21.5	44.5	23.3	12.9
54	MO121983	32.9		12.5	18.1	80.0	19.5	62.5	15.0	34.9	36.7	16.6
55	VA11MAS-9409-8-2-798	38.5		70.0	28.0	27.5	39.5	34.0	24.0	46.2	53.3	23.7
56	VA12FHB-34†	34.6		30.0	38.2	69.5	35.9	36.5	32.0	38.6	13.3	17.4
57	VA12FHB-4	31.4	l	35.0	19.0	70.0	25.5	34.6	20.5	25.7	33.3	18.7
58	VA12FHB-55	31.8	l	32.5	16.1	45.0	38.1	60.8	13.3	26.0	33.3	20.7
59	VA12FHB-77†	38.0		30.0	46.9	50.0	31.4	37.9	9.1	53.7	60.0	23.2
60	VA12FHB-8	44.1		45.0	71.8	60.0	46.8	47.8	17.9	42.3	28.3	37.3
100	AVERAGE	34.7		27.4	35.4	56.8	32.2	38.4	27.5	40.4	27.4	26.3
101	MINUMUM	21.5		5.0	12.3	27.5	16.7	18.2	6.9	11.8	10.0	9.3
102	MAXIMUM	58.9		70.0	78.8	90.0	51.5	70.6	77.3	82.7	71.7	60.2
103	LSD(0.05)	10.9		.	.	.	.	.	.	.	.	.

Table 21. Summary of index (IND, %) data from the 2013-2014 PNUWWSN.

ENTRY	NAME	AVG		ILCHA	ILURB	INTHO	KYLEX	MIELA	MOCOL	OHWOO	ONRID	VABLA
1	TRUMAN	15.7	l	10.1	16.7	10.5	19.9	25.6	9.2	42.3	1.9	5.3
2	ERNIE	27.1		21.0	39.3	58.5	20.8	34.7	15.2	38.0	9.5	6.6
3	FREEDOM	34.7		35.1	37.1	38.5	26.3	50.0	38.4	56.0	5.3	25.6
4	PIONEER2545	50.8	h	50.9	78.8	63.5	29.4	40.8	44.6	82.7	36.8	29.4
5	KWS014	40.7	h	39.3	33.8	63.5	40.8	31.0	53.9	51.3	10.2	42.3
6	KWS029	27.7		13.1	32.0	63.0	26.4	24.9	21.9	48.2	2.3	17.4
7	KWS030	31.7		8.0	36.7	59.5	24.6	31.3	25.6	56.3	18.3	25.1
8	KWS031	32.1		22.5	57.7	54.0	38.9	49.3	7.7	50.3	4.0	4.9
9	KWS032	31.2		33.8	51.8	33.0	26.4	55.1	6.4	40.7	9.5	24.5
10	KWS033	38.6		41.6	47.2	25.0	47.7	53.3	54.1	51.7	7.2	19.3
11	KWS034	38.3		25.0	44.1	52.5	26.8	48.3	51.7	52.1	1.7	42.4
12	OH07-264-35	37.2		31.0	69.6	51.5	32.7	31.8	55.0	43.6	7.8	12.0
13	OH08-235-33	30.6		20.3	58.8	44.5	18.8	41.7	22.7	42.0	5.6	20.6
14	OH09-281-10	27.3		18.8	44.2	48.0	28.2	38.8	20.6	23.1	17.7	6.6
15	OH10-194-16	27.4		7.0	24.9	56.0	30.8	48.7	15.6	38.8	4.7	20.0
16	OH10-219-65	29.8		17.3	30.9	40.0	26.6	32.5	51.4	36.5	5.8	27.0
17	OH10-222-78	30.8		7.0	41.9	27.0	31.0	63.6	9.7	69.9	7.2	20.1
18	OH10-305-39	17.3	l	3.3	15.6	24.0	9.5	30.3	15.9	27.6	1.8	27.8
19	05251A1-1-77-8-2	15.1	l	11.0	23.4	16.0	24.0	23.6	10.5	16.3	4.7	6.4
20	0566A1-3-1-52	27.3		13.5	26.6	52.0	26.1	33.9	29.2	44.9	9.5	9.9
21	082A1-3-1	24.0	l	10.0	13.8	52.5	21.6	39.1	19.7	36.7	9.0	13.6
22	1042A1-1-2	25.1	l	14.4	22.3	25.5	36.4	25.5	47.3	25.3	8.0	21.1
23	10512RA1-8	18.1	l	25.5	14.1	30.0	24.9	18.3	3.6	28.8	4.5	13.0
24	10565C1-1	27.7		16.5	29.2	35.0	22.2	14.2	40.3	59.7	7.8	24.3
25	B09-2949	33.7		28.5	40.8	42.5	28.2	41.3	36.3	49.8	14.7	21.6
26	M10-1615	20.8	l	3.1	10.6	51.0	11.7	31.3	31.2	33.2	6.8	8.4
27	M10-1659	20.0	l	2.8	12.7	56.0	17.3	33.4	19.9	26.2	1.7	10.0
28	M12-2019#	22.1	l	4.5	28.0	26.5	20.7	24.9	41.2	32.3	7.1	13.8
29	M12-3189	19.9	l	11.3	26.9	47.5	13.4	19.3	18.9	28.9	3.2	9.8
30	M12-3326L	26.1		0.6	30.0	33.0	24.1	34.8	46.3	28.6	17.7	19.7
31	DH4-12	18.3	l	3.0	16.3	47.0	20.3	41.9	3.1	21.1	2.8	9.4
32	GL119	37.3		26.0	45.2	64.0	29.3	16.8	63.8	57.4	18.3	14.7
33	GL39	46.2	h	31.5	75.7	63.5	26.5	19.3	77.3	76.1	16.8	29.5
34	OACSnow	29.8		32.9	58.6	46.5	26.1	26.2	11.8	38.8	5.5	21.4
35	UGRCDH5-15	34.1		35.0	45.6	49.5	33.9	45.5	28.8	56.0	5.4	7.3
36	UGRCDH5-28	29.0		18.8	51.4	33.0	19.6	23.8	42.1	59.3	3.2	10.0
37	IL10-17672	19.5	l	15.1	16.4	33.0	15.5	23.3	16.5	32.9	6.0	16.9
38	IL10-17707	16.8	l	4.4	6.6	23.0	7.6	44.8	33.6	14.3	2.5	14.4
39	IL10-21934	16.8	l	2.8	12.4	48.5	10.5	36.0	11.3	11.3	4.3	14.1
40	IL10-21937	18.6	l	2.2	10.4	54.5	10.9	32.2	21.4	21.9	4.7	9.1
41	IL10-29145	16.6	l	3.8	15.2	35.5	10.1	18.8	16.0	37.1	7.0	6.2
42	KY03C-1237-32	19.5	l	9.0	28.1	38.5	14.8	26.8	15.3	33.8	7.3	1.9
43	KY06C-1003-140-3-3	22.9	l	19.5	21.5	42.0	20.4	29.8	19.4	34.7	5.8	12.6
44	KY06C-1061-3-18-1	38.7		30.0	68.3	59.5	24.5	32.6	33.6	70.3	3.9	25.6
45	KY06C-1065-4-13-3	24.5	l	41.3	25.1	34.0	29.7	24.8	18.1	38.8	1.2	7.8
46	KY06C-1116-10-2-1	24.8	l	3.3	19.8	58.5	24.8	43.3	25.1	25.3	6.1	16.6
47	KY06C-2020-11-12-1	22.8	l	4.5	23.0	76.5	17.7	37.3	12.6	24.7	2.7	6.4
48	MO100172	21.3	l	8.4	18.6	63.0	15.9	15.6	27.1	26.1	10.5	6.2
49	MO120150	17.1	l	0.4	19.7	63.0	8.9	29.7	13.8	11.0	2.2	5.1
50	MO120487	19.1	l	3.7	29.0	31.0	16.2	25.5	10.6	37.7	2.9	15.7
51	MO120846	20.4	l	0.9	35.6	29.0	26.3	30.6	8.8	39.3	2.2	10.9
52	MO121280	18.8	l	1.9	19.6	34.5	14.3	32.3	7.5	44.5	2.8	11.5
53	MO121539	23.9	l	7.4	21.6	58.5	23.0	26.8	20.4	44.5	6.0	6.9
54	MO121983	25.0	l	5.9	11.8	72.0	12.3	58.8	10.5	34.5	8.7	10.4
55	VA11MAS-9409-8-2-798	31.3		70.0	26.0	17.8	31.8	28.6	22.8	44.7	21.3	18.9
56	VA12FHB-34†	25.2	l	12.0	36.4	55.6	25.1	30.7	24.0	37.2	2.0	4.2
57	VA12FHB-4	23.3	l	28.9	17.5	56.0	17.1	32.2	18.5	22.9	9.3	7.6
58	VA12FHB-55	24.9	l	24.4	14.1	38.5	27.7	60.8	9.3	26.0	11.3	11.9
59	VA12FHB-77†	27.3		12.8	44.6	45.0	23.1	32.3	5.5	53.7	11.2	17.6
60	VA12FHB-8	36.0		38.3	71.8	45.0	37.1	40.7	13.4	42.3	6.7	28.3
100	AVERAGE	26.6		17.4	32.4	44.9	23.3	34.0	25.1	39.7	7.5	15.5
101	MINUMUM	15.1		0.4	6.6	10.5	7.6	14.2	3.1	11.0	1.2	1.9
102	MAXIMUM	50.8		70.0	78.8	76.5	47.7	63.6	77.3	82.7	36.8	42.4
103	LSD(0.05)	10.7		.	.	.	.	.	.	.	.	.

Table 22. Summary of Fusarium Damaged Kernel (FDK, %) data from the 2013-2014 PNUWWSN.

ENTRY	NAME	AVG		ILURB	INTHO	INWLA	KYLEX	MIELA	OHWOO	VABLA
1	TRUMAN	34.8		47.5	94.2	15.0	16.5	30.7	35	5.0
2	ERNIE	37.0		45.0	100.0	7.5	33.1	28.2	30	15.5
3	FREEDOM	56.6	h	75.0	100.0	22.5	37.9	65.8	80	15.0
4	PIONEER2545	54.3	h	82.5	91.2	35.0	39.8	25.5	85	21.0
5	KWS014	34.0		42.5	57.8	20.0	24.9	26.0	55	12.0
6	KWS029	41.9		55.0	100.0	3.0	22.7	36.4	60	16.5
7	KWS030	39.8		42.5	57.6	25.0	33.7	32.4	70	17.7
8	KWS031	42.2		45.0	100.0	12.5	26.8	27.8	75	8.3
9	KWS032	38.5		40.0	60.9	12.5	38.7	51.2	50	16.0
10	KWS033	40.4		57.5	96.0	20.0	30.1	32.6	30	16.4
11	KWS034	38.0		72.5	60.1	20.0	25.6	30.5	45	12.5
12	OH07-264-35	46.6	h	65.0	100.0	20.0	32.9	43.6	50	14.6
13	OH08-235-33	39.8		65.0	100.0	10.5	25.5	17.9	50	10.0
14	OH09-281-10	31.5	l	52.5	68.2	8.0	31.6	22.2	28	10.3
15	OH10-194-16	29.0	l	42.5	66.1	5.5	19.3	19.0	45	5.5
16	OH10-219-65	40.0		42.5	100.0	15.5	23.2	26.0	60	12.5
17	OH10-222-78	36.7		47.5	88.7	5.0	20.6	25.4	60	10.0
18	OH10-305-39	28.1	l	40.0	80.9	5.5	8.4	29.5	25	7.5
19	05251A1-1-77-8-2	31.4	l	40.0	76.2	3.0	26.9	35.0	30	8.5
20	0566A1-3-1-52	39.9		47.5	100.0	7.5	29.4	48.9	30	15.9
21	082A1-3-1	34.7		37.5	80.9	3.0	25.7	34.1	55	6.5
22	1042A1-1-2	40.5		65.0	91.7	12.5	29.6	30.1	40	14.5
23	10512RA1-8	42.8	h	70.0	85.7	8.0	22.2	34.4	55	24.0
24	10565C1-1	44.1	h	72.5	66.4	20.0	23.7	51.4	65	9.5
25	B09-2949	40.1		55.0	93.3	10.0	24.3	25.0	60	13.0
26	M10-1615	21.2	l	15.0	24.4	10.0	20.6	32.0	40	6.5
27	M10-1659	32.9		32.5	76.9	5.5	15.0	57.4	35	8.0
28	M12-2019#	39.2		72.5	65.3	15.5	25.7	35.3	50	10.0
29	M12-3189	29.5	l	30.0	51.7	5.5	18.0	37.1	55	9.0
30	M12-3326L	29.4	l	25.0	83.6	8.0	25.2	23.4	35	5.5
31	DH4-12	33.5		40.0	66.7	7.5	22.1	39.1	50	9.1
32	GL119	39.1		42.5	62.5	8.0	31.0	56.0	55	18.7
33	GL39	42.0		67.5	81.5	7.5	27.6	32.0	70	8.0
34	OACSnow	39.2		77.5	50.8	15.0	25.5	24.3	65	16.0
35	UGRCDH5-15	38.4		67.5	59.6	12.5	29.3	24.5	65	10.7
36	UGRCDH5-28	34.8		62.5	36.7	5.5	26.6	23.8	70	18.5
37	IL10-17672	20.1	l	12.5	29.8	10.0	19.0	36.5	30	3.0
38	IL10-17707	23.2	l	10.0	63.3	5.5	21.1	38.3	20	4.5
39	IL10-21934	18.0	l	20.0	19.4	3.0	18.3	32.1	30	3.5
40	IL10-21937	21.3	l	17.5	59.0	1.0	17.6	17.7	35	1.5
41	IL10-29145	21.7	l	10.0	55.7	3.0	20.0	24.5	30	8.5
42	KY03C-1237-32	23.6	l	72.5	16.0	10.5	18.4	9.3	35	3.5
43	KY06C-1003-140-3-3	31.4	l	35.0	59.7	10.5	22.4	44.0	35	13.2
44	KY06C-1061-3-18-1	45.5	h	85.0	45.0	35.0	22.4	31.2	80	20.0
45	KY06C-1065-4-13-3	39.8		70.0	40.9	30.0	37.9	28.9	50	21.0
46	KY06C-1116-10-2-1	27.1	l	37.5	65.5	5.5	17.3	31.5	25	7.5
47	KY06C-2020-11-12-1	22.6	l	35.0	60.3	5.5	12.5	22.6	15	7.5
48	MO100172	25.1	l	25.0	59.8	12.5	21.2	20.7	25	11.5
49	MO120150	18.7	l	20.0	38.7	3.0	18.3	18.7	25	6.9
50	MO120487	31.8	l	32.5	100.0	5.5	19.9	23.8	35	6.0
51	MO120846	36.3		37.5	100.0	5.5	23.0	39.9	40	8.5
52	MO121280	27.8	l	37.5	20.9	3.0	23.7	60.7	45	3.5
53	MO121539	40.7		47.5	100.0	3.0	24.4	44.8	50	15.4
54	MO121983	23.8	l	15.0	64.1	5.5	18.2	30.1	25	8.4
55	VA11MAS-9409-8-2-798	40.4		65.0	83.9	12.5	37.9	27.8	30	25.5
56	VA12FHB-34	39.4		60.0	78.5	17.5	26.0	43.9	40	10.1
57	VA12FHB-4	26.0	l	22.5	65.5	5.5	20.3	28.1	35	5.0
58	VA12FHB-55	34.6		67.5	55.3	3.0	24.4	52.2	30	10.0
59	VA12FHB-77	36.8		77.5	47.7	27.5	27.4	28.3	30	19.5
60	VA12FHB-8	39.3		65.0	66.5	27.5	27.8	39.0	40	9.5
100	AVERAGE	34.6		47.6	69.5	11.3	24.7	33.2	45	11.2
101	MINUMUM	18.0		10.0	16.0	1.0	8.4	9.3	15	1.5
102	MAXIMUM	56.6		85.0	100.0	35.0	39.8	65.8	85	25.5
103	LSD(0.05)	13.9		.	.	.	.	.	.	.

Table 23. Summary of INC/SEV/FDK (ISK, %) data from the 2013-2014 PNUWWSN

ENTRY	NAME	AVG		ILURB	INTHO	KYLEX	MIELA	OHWOO	VABLA
1	TRUMAN	43.7	l	52.1	57.2	34.6	45.4	56.7	16.3
2	ERNIE	52.2		57.9	86.5	43.9	48.2	53.4	23.2
3	FREEDOM	64.9	h	73.8	79.0	47.4	70.2	78.8	40.5
4	PIONEER2545	66.7	h	86.6	84.5	49.7	47.8	88.8	43.1
5	KWS014	55.8		52.9	71.1	51.3	47.7	67.4	44.4
6	KWS029	56.7		59.4	88.0	42.1	48.8	68.5	33.4
7	KWS030	55.5		55.0	69.6	45.2	50.3	74.9	37.7
8	KWS031	57.8	h	65.2	85.0	48.7	55.1	75.1	17.9
9	KWS032	55.3		59.5	60.4	47.7	66.3	61.8	36.1
10	KWS033	56.7		63.9	72.9	56.3	59.0	55.1	33.1
11	KWS034	57.7	h	70.0	67.5	45.9	54.9	63.6	44.1
12	OH07-264-35	58.9	h	76.9	83.5	50.0	52.5	62.5	27.7
13	OH08-235-33	56.3		75.3	80.5	38.3	48.7	62.1	33.1
14	OH09-281-10	50.5		62.8	69.3	49.4	50.5	47.7	23.1
15	OH10-194-16	52.2		55.6	71.4	43.2	52.2	59.6	31.4
16	OH10-219-65	53.8		50.3	79.0	41.0	49.1	65.0	38.4
17	OH10-222-78	56.1		59.5	70.0	42.5	58.3	75.0	31.5
18	OH10-305-39	43.6	l	45.8	65.3	23.2	46.9	46.2	34.1
19	05251A1-1-77-8-2	44.4	l	52.8	54.5	42.7	49.0	43.9	23.3
20	0566A1-3-1-52	53.4		54.9	83.5	45.8	54.1	54.2	27.7
21	082A1-3-1	51.6		48.8	75.9	40.0	53.4	63.0	28.7
22	1042A1-1-2	52.1		58.5	71.2	48.4	47.5	53.2	33.6
23	10512RA1-8	51.7		58.8	70.3	40.8	42.5	60.6	37.2
24	10565C1-1	54.1		67.3	62.5	40.9	43.2	73.9	36.8
25	B09-2949	56.7		64.0	77.8	43.5	49.0	68.3	37.8
26	M10-1615	40.0	l	30.6	53.3	34.2	46.5	55.3	20.3
27	M10-1659	48.7		43.6	75.8	32.1	63.0	51.9	25.6
28	M12-2019#	50.5		67.8	57.6	40.5	50.6	59.3	27.0
29	M12-3189	45.4	l	48.5	62.7	32.1	44.1	60.7	24.3
30	M12-3326L	49.2		47.5	69.5	43.1	49.8	52.6	32.8
31	DH4-12	48.9		48.3	68.7	39.7	58.2	52.6	25.9
32	GL119	55.3		60.8	73.0	47.0	49.4	67.8	34.0
33	GL39	61.7	h	81.9	80.6	44.5	45.2	80.8	37.3
34	OACSnow	55.5		78.7	62.3	42.8	46.5	67.2	35.4
35	UGRCDH5-15	54.7		67.1	67.4	47.7	53.5	72.0	20.7
36	UGRCDH5-28	51.4		73.1	50.7	40.5	41.4	75.8	26.8
37	IL10-17672	41.0	l	36.9	46.4	35.3	50.5	50.3	26.6
38	IL10-17707	36.5	l	22.8	55.3	25.7	56.9	37.2	21.2
39	IL10-21934	38.5	l	33.1	49.7	29.4	52.2	40.1	26.8
40	IL10-21937	40.6	l	32.7	68.6	26.8	43.2	49.5	23.1
41	IL10-29145	37.9	l	30.4	59.8	28.1	38.9	51.8	18.4
42	KY03C-1237-32	41.0	l	66.6	45.4	32.2	39.7	52.5	9.5
43	KY06C-1003-140-3-3	47.0		47.1	62.9	37.2	52.8	53.6	28.5
44	KY06C-1061-3-18-1	60.5	h	82.6	64.5	39.9	51.3	83.1	41.3
45	KY06C-1065-4-13-3	50.2		63.3	53.8	53.1	44.2	60.3	26.6
46	KY06C-1116-10-2-1	47.9		46.7	72.7	37.2	54.0	45.1	31.6
47	KY06C-2020-11-12-1	43.4	l	42.1	76.6	31.6	47.0	41.8	21.4
48	MO100172	41.5	l	37.8	71.9	34.3	36.8	46.6	21.7
49	MO120150	38.2	l	39.8	63.5	27.3	41.8	40.0	16.8
50	MO120487	47.4		48.4	76.0	34.6	44.1	55.3	26.0
51	MO120846	50.1		53.9	73.0	41.1	51.3	57.8	23.8
52	MO121280	45.9	l	48.1	45.8	36.6	61.2	61.4	22.3
53	MO121539	53.8		52.2	86.5	42.4	53.8	63.4	24.3
54	MO121983	46.3		33.2	76.7	31.9	59.3	49.5	27.1
55	VA11MAS-9409-8-2-798	53.1		63.9	61.3	51.0	46.8	54.4	41.3
56	VA12FHB-34	51.5		64.4	76.3	42.2	54.0	56.1	16.0
57	VA12FHB-4	43.4	l	43.8	71.2	33.0	47.1	46.7	18.9
58	VA12FHB-55	51.4		56.6	61.1	42.9	69.1	49.8	29.0
59	VA12FHB-77	53.8		74.7	61.1	42.9	48.2	58.1	38.0
60	VA12FHB-8	56.7		77.9	67.1	48.4	55.4	58.7	33.0
100	AVERAGE	50.6		56.2	68.4	40.5	50.6	59.0	29.0
101	MINUMUM	36.5		22.8	45.4	23.2	36.8	37.2	9.5
102	MAXIMUM	66.7		86.6	88.0	56.3	70.2	88.8	44.4
103	LSD(0.05)	9.5		.	.	.	.	.	.

Table 24. Summary of deoxynivalenol (DON, ppm) data from the 2013-2014 PNUWWSN.

ENTRY	NAME	AVG		ILURB	INWLA	KYLEX	MIELA	OHWOO	VABLA
1	TRUMAN	9.8		12.3	0.7	12.9	3.6	28.5	0.7
2	ERNIE	8.6	l	9.0	1.0	13.9	7.3	19.7	0.9
3	FREEDOM	14.5	h	11.3	2.4	18.8	13.7	32.4	8.4
4	PIONEER2545	17.0	h	17.2	3.8	15.6	20.7	37.0	7.5
5	KWS014	13.8	h	16.7	6.8	19.8	4.6	30.3	4.6
6	KWS029	9.1		11.1	0.6	15.1	3.2	22.5	1.9
7	KWS030	12.1		10.0	2.4	16.0	9.9	32.1	2.0
8	KWS031	9.8		7.9	1.2	12.3	4.1	33.1	0.4
9	KWS032	12.0		17.0	2.7	11.6	12.1	23.5	5.0
10	KWS033	15.7	h	24.5	7.7	31.6	10.0	16.1	4.3
11	KWS034	17.6	h	26.6	7.5	22.5	10.0	35.5	3.7
12	OH07-264-35	9.0		9.3	1.7	13.7	5.3	22.5	1.3
13	OH08-235-33	9.8		14.6	1.0	12.6	4.7	23.8	2.3
14	OH09-281-10	7.6	l	7.8	1.1	13.1	6.1	17.3	0.5
15	OH10-194-16	9.3		11.5	1.7	12.8	4.8	23.9	0.9
16	OH10-219-65	7.8	l	7.3	1.1	6.8	10.8	19.5	1.1
17	OH10-222-78	9.3		10.9	1.3	8.8	6.3	26.5	1.9
18	OH10-305-39	6.8	l	6.7	0.5	7.4	2.2	23.0	1.1
19	05251A1-1-77-8-2	7.3	l	9.4	0.5	6.5	3.6	22.7	1.0
20	0566A1-3-1-52	6.8	l	6.2	0.8	8.2	3.6	21.2	0.7
21	082A1-3-1	11.0		8.8	1.2	11.1	4.1	37.9	2.7
22	1042A1-1-2	8.3	l	11.4	1.0	7.6	5.3	22.2	2.1
23	10512RA1-8	14.0	h	17.5	2.1	22.7	4.4	32.4	5.0
24	10565C1-1	17.4	h	26.8	5.6	26.7	8.7	33.9	2.8
25	B09-2949	8.4	l	10.7	0.7	5.8	5.4	25.9	1.8
26	M10-1615	7.8	l	5.1	0.7	12.0	2.3	25.3	1.5
27	M10-1659	6.2	l	5.3	0.3	6.3	6.0	18.9	0.2
28	M12-2019#	8.3	l	14.4	1.5	10.4	1.8	20.4	1.3
29	M12-3189	8.4	l	7.1	0.4	10.5	2.8	28.3	1.5
30	M12-3326L	7.6	l	8.3	0.5	12.7	2.6	20.0	1.3
31	DH4-12	9.0		7.4	0.8	10.8	3.0	30.7	1.4
32	GL119	10.2		11.0	0.4	12.5	3.3	31.8	2.3
33	GL39	10.2		15.2	1.6	16.1	3.6	22.9	2.1
34	OACSnow	13.1		19.1	2.8	14.1	5.8	33.3	3.3
35	UGRCDH5-15	14.0	h	18.1	1.5	27.8	9.4	26.1	1.3
36	UGRCDH5-28	11.0		13.1	0.9	16.1	3.5	30.4	1.8
37	IL10-17672	6.0	l	8.0	1.0	11.8	1.7	12.8	0.6
38	IL10-17707	4.7	l	3.1	0.2	7.3	2.9	14.5	0.1
39	IL10-21934	7.1	l	5.1	0.5	12.1	2.3	22.6	0.3
40	IL10-21937	6.4	l	4.8	0.6	7.0	5.1	19.7	1.1
41	IL10-29145	4.7	l	3.2	0.4	8.1	2.4	12.9	1.3
42	KY03C-1237-32	7.8	l	13.6	0.8	9.6	4.0	18.0	0.7
43	KY06C-1003-140-3-3	7.5	l	6.0	1.0	10.7	3.9	22.7	0.9
44	KY06C-1061-3-18-1	15.1	h	18.4	2.5	15.4	13.9	37.8	2.8
45	KY06C-1065-4-13-3	10.0		13.5	2.3	9.1	7.4	23.7	3.9
46	KY06C-1116-10-2-1	5.6	l	3.6	0.5	6.6	5.3	15.3	2.0
47	KY06C-2020-11-12-1	6.0	l	7.4	0.6	7.0	4.0	16.2	0.7
48	MO100172	6.2	l	5.0	1.5	7.4	7.1	14.6	1.3
49	MO120150	5.2	l	5.1	0.5	10.6	2.3	12.3	0.2
50	MO120487	8.7	l	12.2	0.7	10.7	3.5	21.1	3.9
51	MO120846	7.9	l	10.4	0.8	9.1	6.6	19.1	1.3
52	MO121280	8.5	l	8.9	0.8	14.6	4.1	22.4	0.5
53	MO121539	8.4	l	13.0	0.6	11.3	3.1	21.7	0.6
54	MO121983	5.1	l	5.4	0.5	9.4	1.8	13.2	0.4
55	VA11MAS-9409-8-2-798	7.8	l	10.0	4.1	9.2	6.2	13.4	4.2
56	VA12FHB-34	9.8		10.6	1.7	25.1	5.2	15.3	1.2
57	VA12FHB-4	6.4	l	7.2	1.0	13.1	2.7	13.4	1.3
58	VA12FHB-55	7.8	l	13.0	0.9	10.9	1.0	17.6	3.2
59	VA12FHB-77	8.6	l	10.8	1.3	14.7	5.6	15.2	4.0
60	VA12FHB-8	9.9		10.9	3.4	11.7	7.2	23.7	2.7
100	AVERAGE	9.3		10.9	1.6	12.8	5.5	23.2	2.0
101	MINUMUM	4.7		3.1	0.2	5.8	1.0	12.3	0.1
102	MAXIMUM	17.6		26.8	7.7	31.6	20.7	37.9	8.4
103	LSD(0.05)	4.2		.	.	.	.	.	.

Table 25. Summary of greenhouse severity (GHSEV, %) data from the 2013-2014 PNUWWSN.

ENTRY	NAME	GHSEV
1	TRUMAN	12.1
2	ERNIE	23.1
3	FREEDOM	17.0
4	PIONEER2545	51.9
5	KWS014	30.8
6	KWS029	23.8
7	KWS030	21.6
8	KWS031	26.2
9	KWS032	34.3
10	KWS033	29.4
11	KWS034	45.1
12	OH07-264-35	30.6
13	OH08-235-33	45.4
14	OH09-281-10	24.3
15	OH10-194-16	24.8
16	OH10-219-65	36.4
17	OH10-222-78	18.1
18	OH10-305-39	23.4
19	05251A1-1-77-8-2	19.8
20	0566A1-3-1-52	13.2
21	082A1-3-1	9.6
22	1042A1-1-2	27.3
23	10512RA1-8	27.6
24	10565C1-1	20.5
25	B09-2949	22.8
26	M10-1615	16.7
27	M10-1659	14.4
28	M12-2019#	13.2
29	M12-3189	9.7
30	M12-3326L	14.5
31	DH4-12	36.4
32	GL119	15.2
33	GL39	33.1
34	OACSnow	21.7
35	UGRCDH5-15	15.8
36	UGRCDH5-28	19.1
37	IL10-17672	19.4
38	IL10-17707	11.8
39	IL10-21934	20.8
40	IL10-21937	30.3
41	IL10-29145	14.6
42	KY03C-1237-32	32.5
43	KY06C-1003-140-3-3	11.1
44	KY06C-1061-3-18-1	40.3
45	KY06C-1065-4-13-3	13.3
46	KY06C-1116-10-2-1	15.7
47	KY06C-2020-11-12-1	17.3
48	MO100172	16.2
49	MO120150	20.0
50	MO120487	12.8
51	MO120846	22.8
52	MO121280	9.4
53	MO121539	16.1
54	MO121983	16.5
55	VA11MAS-9409-8-2-798	48.5
56	VA12FHB-34†	26.7
57	VA12FHB-4	20.6
58	VA12FHB-55	10.0
59	VA12FHB-77†	46.3
60	VA12FHB-8	23.6
100	AVERAGE	23.1
101	MINUMUM	9.4
102	MAXIMUM	51.9
103	LSD(0.05)	.

Table 26. Summary of other traits collected on the 2013-2014 PNUWWSN

ENTRY	NAME	VABLA YR 0-9	VABLA PM 0-9	VABLA LR 0-9	ILCHA WINTER KILL 0-9	ILCHA BACTERIAL LEAF STREAK 0-9
1	TRUMAN	0.0	3.5	9.0	1.7	3.5
2	ERNIE	9.0	2.0	8.0	3.0	5.0
3	FREEDOM	7.5	1.5	6.0	6.0	5.0
4	PIONEER2545	7.5	3.0	9.0	2.3	4.5
5	KWS014	7.5	2.5	3.0	5.7	3.0
6	KWS029	0.0	1.5	4.0	4.7	4.0
7	KWS030	0.0	1.0	3.0	4.5	4.5
8	KWS031	0.0	2.5	7.0	5.5	4.5
9	KWS032	3.0	1.5	7.0	5.5	7.0
10	KWS033	9.0	3.5	1.0	6.0	5.0
11	KWS034	4.5	2.0	2.0	8.0	3.0
12	OH07-264-35	0.0	1.5	6.0	4.0	6.0
13	OH08-235-33	6.0	1.0	8.0	7.0	5.5
14	OH09-281-10	0.0	2.0	6.0	4.5	6.0
15	OH10-194-16	0.0	1.0	4.0	3.0	4.5
16	OH10-219-65	7.5	2.0	6.0	3.0	5.0
17	OH10-222-78	0.0	1.5	2.0	5.5	3.5
18	OH10-305-39	0.0	2.0	3.0	5.0	7.5
19	05251A1-1-77-8-2	7.5	3.5	2.0	5.0	2.0
20	0566A1-3-1-52	0.0	2.0	2.0	5.0	4.0
21	082A1-3-1	9.0	2.0	4.0	4.5	6.0
22	1042A1-1-2	0.0	3.5	1.0	3.0	2.5
23	10512RA1-8	9.0	4.0	2.0	6.5	4.5
24	10565C1-1	9.0	1.0	4.0	6.5	4.5
25	B09-2949	6.0	1.5	3.0	8.0	5.5
26	M10-1615	0.0	3.5	3.0	3.5	4.0
27	M10-1659	7.5	2.0	1.0	2.0	2.0
28	M12-2019#	0.0	2.0	6.0	6.0	3.5
29	M12-3189	6.0	2.0	5.0	3.0	3.5
30	M12-3326L	0.0	4.0	3.0	4.5	5.0
31	DH4-12	7.5	4.0	4.0	2.0	3.0
32	GL119	3.0	3.5	7.0	3.0	3.5
33	GL39	0.0	4.0	4.0	5.0	2.5
34	OACSnow	7.5	3.5	6.0	4.0	5.0
35	UGRCDH5-15	6.0	2.5	3.0	5.0	3.5
36	UGRCDH5-28	4.5	5.0	5.0	3.0	4.5
37	IL10-17672	0.0	1.5	1.0	7.0	3.0
38	IL10-17707	0.0	1.0	1.0	7.0	3.5
39	IL10-21934	0.0	4.5	2.0	2.0	3.0
40	IL10-21937	0.0	2.0	3.0	2.5	3.0
41	IL10-29145	0.0	2.5	3.0	4.5	3.5
42	KY03C-1237-32	0.0	1.0	6.0	4.0	3.0
43	KY06C-1003-140-3-3	0.0	3.0	6.0	3.5	4.5
44	KY06C-1061-3-18-1	3.0	5.0	7.0	3.5	4.0
45	KY06C-1065-4-13-3	3.0	7.5	7.0	7.5	5.0
46	KY06C-1116-10-2-1	9.0	2.5	1.0	3.5	3.5
47	KY06C-2020-11-12-1	9.0	2.0	3.0	4.0	3.5
48	MO100172	9.0	2.5	9.0	6.5	6.0
49	MO120150	1.5	2.0	6.0	3.5	3.0
50	MO120487	0.0	6.0	5.0	5.0	3.0
51	MO120846	0.0	2.0	4.0	4.0	3.5
52	MO121280	0.0	3.0	7.0	3.5	5.0
53	MO121539	0.0	3.5	2.0	2.5	4.5
54	MO121983	7.5	5.5	3.0	2.0	4.5
55	VA11MAS-9409-8-2-798	7.5	1.0	1.0	8.5	6.0
56	VA12FHB-34†	0.0	3.0	2.0	7.5	4.0
57	VA12FHB-4	9.0	1.0	1.0	6.0	5.0
58	VA12FHB-55	9.0	1.5	1.0	8.0	5.5
59	VA12FHB-77†	9.0	3.0	1.0	6.0	4.5
60	VA12FHB-8	7.5	1.0	1.0	4.5	5.0
100	AVERAGE	3.8	2.6	4.0	4.7	4.3

Table 27. Summary of heading date (HD, Julian days) and height (HGT, inches) data from the 2013-2014 PNUWWN

ENTRY	NAME	HD AVG		ILCHA	ILURB	INWLA	KYLEX	MOCOL	OHWOO	ONRID	VABLA		HGT AVG		KYLEX	MIELA
1	TRUMAN	148		155	148	144	142	149	149	159	135		33.4	h	38.5	28.3
2	ERNIE	143		149	143	139	135	142	147	157	131		27.3		32.0	22.5
3	FREEDOM	147		155	148	144	137	148	148	158	135		29.4	h	36.0	22.8
4	PIONEER2545	144		148	146	142	136	145	148	156	134		21.8	l	32.0	11.5
5	KWS014	148	h	153	149	145	143	149	152	160	136		31.2	h	36.5	25.8
6	KWS029	145		148	146	142	137	145	149	158	134		31.8	h	38.5	25.0
7	KWS030	144		146	145	142	135	145	149	159	134		25.0	l	28.5	21.5
8	KWS031	145		152	145	142	136	147	149	159	132		32.4	h	37.5	27.3
9	KWS032	145		151	144	142	135	147	148	156	134		27.0		32.5	21.5
10	KWS033	149	h	154	149	146	143	151	149	161	136		28.0		33.5	22.5
11	KWS034	149	h	156	150	147	141	151	151	161	137		28.8	h	34.0	23.5
12	OH07-264-35	143		147	143	140	135	142	148	158	134		30.9	h	35.5	26.3
13	OH08-235-33	145		153	148	140	136	145	148	157	133		31.3	h	37.5	25.0
14	OH09-281-10	145		151	146	141	135	148	147	156	133		27.3		32.0	22.5
15	OH10-194-16	145		150	145	144	137	145	148	156	134		30.4	h	35.0	25.8
16	OH10-219-65	143		150	144	141	133	143	147	156	132		29.8	h	33.5	26.0
17	OH10-222-78	145		151	146	144	137	147	149	156	134		31.5	h	35.5	27.5
18	OH10-305-39	145		152	147	142	137	147	148	155	134		31.3	h	38.0	24.5
19	05251A1-1-77-8-2	144		152	144	140	135	143	147	155	133		27.3		33.0	21.5
20	0566A1-3-1-52	143		151	143	139	134	142	148	155	133		24.4	l	29.5	19.3
21	082A1-3-1	142	l	147	142	138	132	142	147	154	131		26.8		31.0	22.5
22	1042A1-1-2	145		152	145	141	137	149	147	158	134		27.5		32.5	22.5
23	10512RA1-8	146		154	148	142	137	147	148	156	134		31.4	h	35.0	27.8
24	10565C1-1	146		154	147	142	139	149	148	158	133		28.5	h	33.5	23.5
25	B09-2949	144		151	146	139	134	143	148	156	132		21.3	l	33.0	9.5
26	M10-1615	142	l	146	142	140	133	145	147	155	131		28.3	h	33.0	23.5
27	M10-1659	142	l	145	144	139	134	143	147	156	130		29.8	h	36.0	23.5
28	M12-2019#	142	l	146	144	140	132	141	147	155	133		29.4	h	35.0	23.8
29	M12-3189	145		149	146	142	135	147	148	158	134		30.0	h	35.0	25.0
30	M12-3326L	142	l	145	143	140	133	143	147	156	132		29.3	h	33.0	25.5
31	DH4-12	144		148	143	141	135	145	148	156	133		29.0	h	34.5	23.5
32	GL119	143		148	144	140	134	146	148	156	132		30.4	h	34.0	26.8
33	GL39	144		149	145	141	134	143	148	157	133		25.5	l	36.0	15.0
34	OACSnow	146		152	147	144	137	147	147	158	134		30.3	h	35.0	25.5
35	UGRCDH5-15	146		153	147	142	139	147	149	158	134		29.9	h	35.0	24.8
36	UGRCDH5-28	146		149	147	144	137	148	149	160	135		24.5	l	36.0	13.0
37	IL10-17672	143		150	143	141	134	142	148	156	132		29.8	h	33.5	26.0
38	IL10-17707	141	l	148	142	139	132	141	147	154	129		27.3		33.0	21.5
39	IL10-21934	142	l	145	143	141	132	145	147	155	131		30.8	h	36.0	25.5
40	IL10-21937	142	l	146	142	139	133	142	147	155	130		30.3	h	36.0	24.5
41	IL10-29145	142	l	146	142	139	132	142	147	154	132		28.8	h	34.5	23.0
42	KY03C-1237-32	144		151	147	142	133	148	147	156	132		25.4	l	30.5	20.3
43	KY06C-1003-140-3-3	143		149	143	142	134	143	148	155	132		28.5	h	32.5	24.5
44	KY06C-1061-3-18-1	145		151	147	143	137	145	149	156	133		29.0	h	33.5	24.5
45	KY06C-1065-4-13-3	147		153	149	144	138	150	149	158	136		27.3		32.0	22.5
46	KY06C-1116-10-2-1	144		148	144	141	137	145	147	158	133		23.8	l	27.0	20.5
47	KY06C-2020-11-12-1	144		151	145	142	135	143	148	156	133		28.3	h	32.5	24.0
48	MO100172	142	l	150	142	139	131	142	146	154	129		27.9		32.5	23.3
49	MO120150	143	l	145	143	141	134	143	147	156	132		29.8	h	33.0	26.5
50	MO120487	146		149	147	145	139	147	149	160	134		30.3	h	34.5	26.0
51	MO120846	145		149	146	144	136	148	148	156	133		30.7	h	35.5	25.8
52	MO121280	144		149	146	141	137	145	148	156	131		31.0	h	36.5	25.5
53	MO121539	143		147	144	140	134	143	148	156	132		28.9	h	33.5	24.3
54	MO121983	143	l	146	142	140	133	145	147	157	132		31.4	h	34.5	28.3
55	VA11MAS-9409-8-2-798	146		156	149	142	135	147	148	156	133		26.7		30.0	23.3
56	VA12FHB-34†	144		152	146	141	134	148	147	156	132		30.3	h	37.0	23.5
57	VA12FHB-4	144		152	145	140	134	143	147	156	133		26.7		31.0	22.3
58	VA12FHB-55	145		152	148	140	136	143	148	156	133		26.9		31.5	22.3
59	VA12FHB-77†	146		152	149	144	137	147	149	156	133		28.4	h	31.0	25.8
60	VA12FHB-8	145		151	146	142	137	145	148	157	133		27.0		30.5	23.5
100	AVERAGE	144		150	145	141	135	145	148	157	133		28.6		33.8	23.4
101	MINUMUM	141		145	142	138	131	141	146	154	129		21.3		27.0	9.5
102	MAXIMUM	149		156	150	147	143	151	152	161	137		33.4		38.5	28.3
103	LSD(0.05)	1		.	.	.	.	.	.	.	.		5.2		.	.

Table 28. Presence or absence of FHB QTL in the 2013-2014 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.

Entry	Cultivar/Designation	Fhb1	Fhb_Massey 3BL	Fhb_2DL-Wuhan1/W14	Fhb_5A
1	Truman	no	no	no	no
2	Ernie	no	**Fhb Massey 3BL**	no	**Fhb_5A Ernie het**
3	Freedom	no	**Fhb Massey 3BL**	no	no
4	Pioneer2545	no	no	no	no
5	NY01016-AN	no	no	no	no
6	NY01066-278	no	no	no	no
7	NY99059-249	no	no	no	**Fhb_5A Ernie**
8	NY99069-249	no	no	no	**Fhb_5A Ernie het**
9	NY99069-352	no	no	no	**Fhb_5A Ernie**
10	KWS023	no	**Fhb Massey 3BL**	no	no
11	KWS024	no	no	no	no
12	KWS025	no	no	no	**Fhb_5A Ernie het**
13	KWS028	no	no	no	no
14	L29230	no	**Fhb Massey 3BL**	no	no
15	LCS321	no	no	no	no
16	E6012	no	no	no	**Fhb_5A Ernie**
17	F0036R	no	no	no	no
18	F0039	no	no	no	no
19	F1014	**Fhb1**	no	no	no
20	OH07-263-3	no	no	no	no
21	OH08-206-69	no	no	no	no
22	OH08-269-58	no	**Fhb Massey 3BL het**	no	**Fhb_5A Ernie het**
23	0570A1-2-32-5-1-4	no	no	no	**Fhb_5A Ernie**
24	0762A1-2-8	**Fhb1**	no	no	no
25	08334A1-31	no	no	no	**Fhb_5A Ernie het**
26	10641B1-9-11-7	**Fhb1**	no	no	**Fhb_5A Ernie**
27	B08-91993	no	**Fhb Massey 3BL**	no	no
28	B09*900256	no	no	no	**Fhb_5A Ernie**
29	M09L-9547	no	no	no	no
30	M10-1100#	no	no	no	no
31	M11-1027#	no	no	no	no
32	M11-2298	no	no	no	no
33	GL133	no	no	no	**Fhb_5A Ernie**
34	GL164	no	no	no	no
35	UGRCC2-78	no	no	no	no
36	UGRCC5-116	no	no	no	**Fhb_5A Ernie het**
37	IL09-24328	no	no	no	no
38	IL09-3264	no	no	no	no
39	IL10-19464	no	no	no	no
40	IL10-6855	no	no	no	**Fhb_5A Ernie**
41	KY05C-1020-4-6-5	**Fhb1**	no	no	no
42	KY05C-1105-43-6-1	no	no	no	no
43	KY06C-3003-43-13-3	no	no	no	no
44	KY204604	no	no	no	no
45	MD08-22-22-13-4	**Fhb1**	no	**Fhb_2DL-Wuhan1/W14**	**Fhb_5A Ning7840**
46	MD08-22-22-13-10	**Fhb1**	no	**Fhb_2DL-Wuhan1/W14**	**Fhb_5A Ning7840**
47	MD09W272-8-4-13-3	**Fhb1**	no	no	no
48	MDC07026-12-28	**Fhb1 het**	no	**Fhb_2DL-Wuhan1/W14**	**Fhb_5A Ning7840 het**
49	MO120194	no	no	no	no
50	MO120452	no	no	no	no
51	MO120794	no	no	no	no
52	MO121183	no	no	no	no
53	NE06545	no	no	no	no
54	NE08499	no	no	no	no
55	NE10478	no	no	no	no
56	NI12702W	no	no	no	no
57	VA10W-140	no	no	no	no
58	VA11W-106	no	no	no	no
59	VA11W-301	no	no	no	no
60	VA12FHB-53	**Fhb1 het**	no	no	no

Table 29. Presence or absence of FHB QTL in the 2013-2014 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.

Entry	Cultivar/Designation	Fhb1	Fhb_Massey 3BL	Fhb_2DL-Wuhan1/W14	Fhb_5A
1	Truman	no	no	no	no
2	Ernie	no	**Fhb Massey 3BL het**	no	**Fhb_5A Ernie**
3	Freedom	no	**Fhb Massey 3BL**	no	no
4	Pioneer2545	no	no	no	no
5	KWS014	no	no	no	no
6	KWS029	no	no	no	no
7	KWS030	no	no	no	no
8	KWS031	no	**Fhb Massey 3BL**	no	no
9	KWS032	no	no	no	**Fhb_5A Ernie**
10	KWS033	no	no	no	no
11	KWS034	no	no	no	no
12	OH07-264-35	no	**Fhb Massey 3BL**	no	no
13	OH08-235-33	no	no	no	no
14	OH09-281-10	no	no	no	no
15	OH10-194-16	no	**Fhb Massey 3BL**	no	no
16	OH10-219-65	no	no	no	no
17	OH10-222-78	no	no	no	no
18	OH10-305-39	no	no	no	no
19	05251A1-1-77-8-2	no	no	no	**Fhb_5A Ernie**
20	0566A1-3-1-52	no	no	no	no
21	082A1-3-1	**Fhb1**	no	no	no
22	1042A1-1-2	no	no	no	**Fhb_5A Ernie**
23	10512RA1-8	**Fhb1**	no	no	**Fhb_5A Ernie**
24	10565C1-1	**Fhb1 het**	**Fhb Massey 3BL het**	no	no
25	B09-2949	no	no	no	no
26	M10-1615	no	no	no	no
27	M10-1659	no	no	no	no
28	M12-2019#	no	**Fhb Massey 3BL**	no	no
29	M12-3189	no	no	no	**Fhb_5A Ernie het**
30	M12-3326L	no	no	no	no
31	DH4-12	**Fhb1 het**	no	no	no
32	GL119	no	no	no	**Fhb_5A Ernie**
33	GL39	no	no	no	**Fhb_5A Ernie**
34	OACSnow	no	no	no	no
35	UGRCDH5-15	no	no	no	no
36	UGRCDH5-28	no	no	no	no
37	IL10-17672	no	no	no	no
38	IL10-17707	no	no	no	no
39	IL10-21934	no	no	no	no
40	IL10-21937	no	no	no	no
41	IL10-29145	no	no	no	no
42	KY03C-1237-32	**Fhb1 het**	no	no	no
43	KY06C-1003-140-3-3	no	no	no	no
44	KY06C-1061-3-18-1	no	no	no	no
45	KY06C-1065-4-13-3	**Fhb1 het**	no	no	no
46	KY06C-1116-10-2-1	no	no	no	no
47	KY06C-2020-11-12-1	no	no	no	no
48	MO100172	no	no	no	no
49	MO120150	no	no	no	no
50	MO120487	no	no	no	no
51	MO120846	no	no	no	no
52	MO121280	no	no	no	no
53	MO121539	no	no	no	no
54	MO121983	no	no	no	no
55	VA11MAS-9409-8-2-798	**Fhb1**	no	no	no
56	VA12FHB-34†	no	no	no	no
57	VA12FHB-4	**Fhb1 het**	no	no	no
58	VA12FHB-55	**Fhb1**	no	no	no
59	VA12FHB-77	no	no	no	no
60	VA12FHB-8	no	no	no	no

Table 30. Quality parameters for the 2013-2014 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 in RED is the check used for this evaluation					*For highlighted entries, please see the notes in lir				
Entry Number	Entry	Test Weight (LB/BU)	NIR Kernel Protein (at 12%)	SKCS Kernel Hardness	SKCS Kernel Diameter (mm)	SKCS Kernel Weight (mg)	Flour Yield (%)	Softness Equivalent (%)	Flour Protein (at 14%)	Lactic Acid SRC (%)	Sodium Carbonate SRC (%)
1	TRUMAN	57.2	9.9	4.8	2.3	35.5	67.7	58.3	7.7	111.6	68.2
2	ERNIE	56.9	11.1	1.5	2.8	42.0	65.8	55.7	8.6	115.8	67.3
3	FREEDOM	55.5	9.6	18.5	2.4	37.0	64.4	55.1	7.9	97.8	67.8
4	PIONEER 2545	56.1	10.0	17.3	2.3	36.4	64.3	58.0	8.5	107.7	70.2
5	NY01016-AN	60.1	11.2	6.0	2.7	42.2	69.4	57.9	8.6	133.6	66.4
6	NY01066-278	58.9	10.5	8.0	2.5	37.5	69.0	62.0	8.0	106.9	64.3
7	NY99059-249	60.4	9.7	9.1	2.3	34.6	70.5	59.8	7.8	111.8	64.7
8	NY99069-249	60.1	10.1	5.4	2.5	36.9	67.9	59.7	7.8	112.8	66.5
9	NY99069-352	57.9	10.6	10.4	2.4	35.1	67.8	59.6	8.1	112.7	66.8
10	KWS023	60.2	11.0	6.6	2.4	37.8	69.4	57.5	8.3	121.2	65.2
11	KWS024	62.9	10.8	30.5	2.5	37.4	65.7	55.1	8.4	119.7	74.6
12	KWS025	59.7	10.7	1.4	2.5	39.8	70.3	55.9	8.0	124.5	64.6
13	KWS028	60.4	11.0	4.4	2.3	36.0	68.6	58.1	8.3	118.3	65.7
14	L29230	60.9	11.1	7.9	2.5	35.7	68.4	60.6	8.6	127.5	64.5
15	LCS321	62.3	10.9	1.3	2.6	40.3	68.6	57.5	8.3	123.4	67.8
16	E6012	58.2	10.8	2.7	2.5	36.6	68.5	59.8	8.2	127.4	67.4
17	F0036R	59.0	10.7	-3.8	2.4	36.5	67.7	65.3	7.8	101.5	70.7
18	F0039	58.5	9.6	2.7	2.6	40.3	69.8	60.7	7.7	108.9	65.6
19	F1014	58.7	10.9	28.4	2.4	33.8	67.8	53.7	8.3	84.5	67.6
20	OH07-263-3	61.8	10.2	3.5	2.5	40.5	69.0	57.6	8.0	104.2	65.2
21	OH08-206-69	61.2	12.6	9.7	3.0	44.9	70.8	50.5	9.7	115.1	61.6
22	OH08-269-58	59.7	10.8	-9.6	2.6	39.4	65.2	65.0	7.7	120.6	73.0
23	0570A1-2-32-5-1-4	61.2	10.5	5.9	2.8	44.0	67.7	58.9	8.2	118.1	67.5
24	0762A1-2-8	58.9	10.7	6.0	2.8	41.0	66.3	56.0	8.4	104.0	67.6
25	08334A1-31	57.8	10.7	-1.2	2.5	38.6	66.4	63.5	7.9	125.9	68.3
26	10641B1-9-11-7	62.1	12.7	37.3	2.9	40.2	69.9	42.3	10.3	129.4	73.6
27	B08-91993	62.5	10.8	3.1	2.5	42.5	66.1	58.8	8.2	114.8	74.3
28	B09*900256	60.9	10.3	21.2	2.3	34.3	65.6	57.8	8.1	131.4	70.6
29	M09L-9547	Missing Entry									
30	M10-1100#	58.1	9.8	-1.9	2.3	38.3	68.9	62.0	7.3	108.0	64.9
31	M11-1027#	60.9	10.7	8.8	2.2	33.2	65.7	61.7	8.2	133.1	72.9
32	M11-2298	60.4	11.2	9.2	2.5	34.7	67.3	56.5	8.5	124.2	63.1
33	GL133	58.8	10.4	9.6	2.5	35.8	66.8	58.9	8.6	114.0	66.8
34	GL164	59.7	10.2	18.6	2.3	32.6	64.2	56.9	7.9	104.4	67.5
35	UGRCC2-78	58.7	9.7	3.1	2.4	38.1	67.4	66.0	7.9	108.6	68.8
36	UGRCC5-116	59.1	10.3	6.4	2.3	33.3	68.0	60.7	7.5	83.7	67.1
37	IL09-24328	60.7	10.3	-0.4	2.3	35.0	68.2	59.2	8.0	135.2	66.3
38	IL09-3264	60.2	12.1	1.5	2.6	39.7	68.2	57.4	8.9	135.0	65.2
39	IL10-19464	61.6	10.9	-2.5	2.6	40.1	68.5	58.3	8.6	127.7	66.2
40	IL10-6855	61.8	11.6	-0.5	2.8	40.6	67.8	58.8	8.6	139.3	67.4
41	KY05C-1020-4-6-5	62.9	11.5	20.4	2.5	36.5	66.9	55.1	8.8	121.9	66.7
42	KY05C-1105-43-6-1	61.6	11.1	15.6	2.4	34.1	66.1	58.5	8.1	135.5	69.1
43	KY06C-3003-43-13-3	59.3	10.8	12.9	2.1	32.6	64.7	60.9	8.5	124.3	70.0
44	KY204604	58.7	11.1	17.0	2.4	34.6	66.1	60.0	8.6	133.8	70.5
45	MD08-22-22-13-4	61.5	11.9	26.6	2.3	29.4	66.2	53.7	9.2	115.1	69.1
46	MD08-22-22-13-10	62.2	11.8	32.6	2.3	29.8	66.0	51.6	9.3	109.6	69.5
47	MD09W272-8-4-13-3	61.6	13.2	14.3	2.4	36.0	64.0	56.2	10.1	122.3	71.0
48	MDC07026-12-28	60.8	12.9	24.0	2.2	29.4	65.7	53.2	10.1	145.3	68.6
49	MO120194	60.1	11.3	-4.3	2.3	37.5	67.3	61.3	8.5	124.9	71.0
50	MO120452	60.1	10.0	6.9	2.3	36.1	66.5	58.9	7.3	109.8	67.7
51	MO120794	58.8	10.4	4.6	2.2	33.7	66.7	59.0	7.8	111.1	66.7
52	MO121183	59.3	10.4	2.3	2.2	34.0	64.8	61.5	8.0	126.8	71.6
53	NE06545	58.5	10.7	41.1	2.5	35.5	68.7	54.2	8.5	153.6	79.1
54	NE08499	60.2	9.9	43.1	2.5	35.1	68.1	52.9	7.9	127.3	74.3
55	NE10478	59.9	10.7	66.9	2.6	34.1	69.7	36.4	8.9	150.7	85.7
56	NI12702W	62.3	11.8	76.6	2.6	35.0	68.7	32.4	9.7	141.7	99.2
57	VA10W-140	61.5	10.9	11.6	2.5	37.9	68.5	56.3	8.3	128.1	70.2
58	VA11W-106†	60.9	9.8	5.5	2.4	36.7	66.2	61.5	7.5	118.6	73.6
59	VA11W-301	59.4	10.0	1.0	2.4	38.6	67.4	58.9	7.1	95.9	70.2
60	VA12FHB-53	60.0	10.9	11.6	2.4	33.1	65.3	58.8	8.0	107.8	69.4
	Mean	60.0	10.8	12.2	2.5	36.7	67.3	57.3	8.3	119.5	69.3
	Std Dev	1.6	0.8	16.0	0.2	3.3	1.7	5.7	0.7	14.2	5.6

Table 31. Quality parameters for the 2013-2014 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 in RED is the check used for this evaluation					*For highlighted entries, please see the notes in line				
Entry Number	Entry	Test Weight (LB/BU)	NIR Kernel Protein (at 12%)	SKCS Kernel Hardness	SKCS Kernel Diameter (mm)	SKCS Kernel Weight (mg)	Flour Yield (%)	Softness Equivalent (%)	Flour Protein (at 14%)	Lactic Acid SRC (%)	Sodium Carbonate SRC (%)
1	TRUMAN	56.5	9.6	-0.2	2.2	34.0	66.0	61.5	7.4	110.9	70.3
2	ERNIE	58.4	10.4	-6.5	3.0	43.3	66.3	56.6	7.8	119.8	69.0
3	FREEDOM	55.0	8.8	14.6	2.3	35.7	65.4	58.3	7.2	102.1	69.0
4	PIONEER 2545	55.7	10.0	9.2	2.3	33.9	63.9	61.0	8.1	113.5	73.0
5	KWS014	59.0	10.1	6.0	2.4	36.9	67.5	62.4	7.6	124.3	69.0
6	KWS029	59.3	10.0	0.0	2.2	35.8	65.0	64.4	7.3	129.8	73.1
7	KWS030	61.2	9.8	26.3	2.6	38.1	64.7	58.7	7.6	117.5	74.3
8	KWS031	61.2	10.2	2.5	2.4	38.2	68.5	61.7	7.4	130.9	67.2
9	KWS032	58.7	9.6	12.6	2.5	36.3	64.9	62.5	7.4	124.1	76.7
10	KWS033	62.2	10.2	16.4	2.5	41.4	67.3	52.9	7.8	104.1	68.6
11	KWS034	59.6	9.5	8.9	2.5	39.0	67.1	59.7	7.1	122.9	68.7
12	OH07-264-35	59.1	9.8	4.3	2.5	37.1	67.9	60.8	7.1	112.9	64.9
13	OH08-235-33	59.6	11.0	1.6	2.8	42.7	67.6	61.4	8.4	121.2	68.3
14	OH09-281-10	60.1	10.5	17.0	2.7	37.6	67.9	56.1	7.7	114.3	65.6
15	OH10-194-16	62.0	10.1	7.6	2.3	35.4	67.3	60.9	7.7	123.1	67.3
16	OH10-219-65	60.3	10.8	5.1	2.3	35.0	65.5	60.2	8.0	119.5	70.6
17	OH10-222-78	57.4	10.5	-5.2	2.2	36.3	68.0	62.3	7.9	115.5	64.7
18	OH10-305-39	61.1	9.5	10.5	2.8	45.0	66.7	56.2	8.1	117.5	71.9
19	05251A1-1-77-8-	59.9	10.2	7.4	2.4	34.3	65.5	62.0	7.4	115.6	72.2
20	0566A1-3-1-52	58.7	10.7	6.4	2.6	36.7	64.7	61.9	7.5	121.5	70.4
21	082A1-3-1	59.3	11.4	10.7	2.9	39.9	66.5	54.5	8.0	88.0	68.7
22	1042A1-1-2	58.2	10.6	6.3	2.5	34.6	65.2	63.8	7.6	115.9	77.1
23	10512RA1-8	58.5	10.1	8.1	2.8	39.8	64.9	58.3	7.8	120.6	76.2
24	10565C1-1	61.2	11.2	11.3	2.6	36.7	65.9	59.5	8.2	107.6	71.0
25	B09-2949	62.2	10.6	9.2	2.7	39.3	66.0	57.3	7.7	141.2	69.3
26	M10-1615	61.0	10.1	4.8	2.5	39.8	68.0	56.2	7.7	112.6	67.4
27	M10-1659	61.3	11.9	7.2	2.8	38.7	67.3	53.4	8.8	127.2	64.0
28	M12-2019#	60.7	11.0	12.4	2.5	36.9	65.7	52.6	8.6	90.5	66.2
29	M12-3189	61.2	10.9	12.3	2.8	35.3	68.7	53.7	8.3	120.1	64.1
30	M12-3326L	56.4	9.1	-2.7	2.3	35.0	67.7	63.9	7.6	122.6	72.0
31	DH4-12	55.2	8.6	12.6	2.2	35.0	62.8	62.3	7.3	115.8	76.1
32	GL119	58.2	9.7	2.0	2.5	35.1	67.7	58.1	7.7	111.0	70.4
33	GL39	57.5	10.1	7.0	2.7	41.2	68.7	54.7	8.1	109.6	66.3
34	OACSnow	55.5	8.3	10.1	2.4	37.7	67.1	60.8	7.2	96.1	71.3
35	UGRCDH5-15	59.2	10.3	17.3	2.6	38.1	65.8	54.2	7.9	85.5	66.8
36	UGRCDH5-28	61.3	10.6	16.7	2.4	35.6	66.5	55.6	7.9	86.1	67.2
37	IL10-17672	60.1	9.9	-3.8	2.3	35.0	66.7	61.6	7.7	137.7	68.3
38	IL10-17707	62.1	10.4	9.9	2.4	34.5	66.0	58.2	7.5	133.7	68.9
39	IL10-21934	62.1	10.4	-0.2	2.6	39.0	67.3	55.4	7.7	123.2	64.9
40	IL10-21937	61.2	10.4	6.2	2.4	35.5	65.8	54.7	8.0	131.7	65.6
41	IL10-29145	60.8	10.6	1.5	2.6	40.8	67.7	58.3	8.1	137.9	66.2
42	KY03C-1237-32	60.7	11.2	8.8	2.8	41.8	67.1	54.8	8.5	143.8	68.7
43	KY06C-1003-140	60.9	10.6	13.1	2.6	39.8	67.3	55.0	7.9	106.4	69.7
44	KY06C-1061-3-1	60.4	11.1	6.2	2.5	41.9	65.9	58.5	8.5	132.3	76.4
45	KY06C-1065-4-1	59.0	10.7	42.5	2.4	33.9	68.8	49.2	8.4	141.4	76.7
46	KY06C-1116-10-	60.8	11.5	1.8	2.5	37.5	66.9	58.6	8.4	138.9	67.0
47	KY06C-2020-11-	61.2	10.6	-2.0	2.5	35.1	67.2	59.8	8.0	127.4	66.0
48	MO100172	59.7	9.9	5.9	2.2	36.8	65.7	59.8	7.9	147.2	71.3
49	MO120150	62.4	11.1	13.0	2.5	36.2	65.4	58.7	8.0	132.2	71.8
50	MO120487	59.9	10.2	4.8	2.1	32.8	66.6	60.0	7.9	112.9	68.5
51	MO120846	60.2	10.7	7.4	2.2	33.6	66.8	58.8	8.0	121.3	68.3
52	MO121280	59.9	10.3	4.9	2.5	39.7	63.7	58.2	7.6	117.7	71.4
53	MO121539	60.1	11.7	0.8	2.4	37.0	66.4	55.4	8.7	130.4	66.6
54	MO121983	61.4	11.3	4.5	2.6	37.7	67.2	57.4	8.0	119.9	65.8
55	VA11MAS-9409-	59.2	11.9	23.7	2.3	32.4	67.2	54.0	9.6	116.7	64.4
56	VA12FHB-34†	60.8	11.7	4.2	2.4	37.2	66.9	59.3	9.1	154.5	72.6
57	VA12FHB-4	60.0	12.0	-2.7	2.6	39.2	65.0	57.9	8.7	109.0	70.1
58	VA12FHB-55	59.6	11.7	2.9	2.6	40.8	67.5	56.1	8.4	107.5	69.9
59	VA12FHB-77†	61.1	12.7	11.8	2.5	35.0	67.9	55.4	10.0	121.6	67.5
60	VA12FHB-8	59.9	11.1	9.6	2.5	34.4	66.7	57.6	8.2	110.5	69.0
	Average	59.8	10.5	7.7	2.5	37.3	66.5	58.2	8.0	119.5	69.4
	Mean	1.8	0.8	7.9	0.2	2.8	1.3	3.2	0.6	14.4	3.4

Note: Entry #45 has much higher SKCS kernel hardness than typical SRW wheat, lower softness equivalent and higher sodium carbonate SRC.