Report on the 2010-2011 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, while other simply have exotic parentage.

In this report we present 1) a summary of the 2010-2011 trials.

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 13 locations. The PNUWWSN had 36 entries (& four checks, Table 4) and we obtained phenotypic data from xx 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.

RESULTS

The mean for each entry over all environments for all FHB traits are shown in tables 7 and 9. No entry had a lower average FHB Index than Truman, the most MR check, in the PNUWWSN or the NUWWSN. Based on analysis of all traits, the best and worst lines from each trial were identified and are show in Tables 8 and 10. Some entries in both tests still had good FHB resistance despite no entries with lower Index than Truman. In the NUWWSN, 15 of 60 entries were not significantly different than the most

resistant entry for 6 of 7 FHB traits while just 4 of 40 entries in the PNUWWSN were not different than the most resistant entry for 7 of 6 FHB traits (Table 8, 10).

In the NUWWSN, seven entries had molecular marker evidence the Asian allele for resistance at Fhb1 and 6 may have resistance at 5A from Ernie (Table 31). No entries had Fhb1 and 5A. None of the seven entries with Fhb1 were among the 10 most resistant, though three were among the top 15.

In the PNUWWSN, two entries had molecular marker evidence the Asian allele for resistance at Fhb1 and seven may have resistance at 5A from Ernie. One of the two entries in the PNUWWSN with Fhb1 was among the 14 most resistant lines in the PNUWWSN.

There is no test for GEI, but the ratio of GEI sum of squares (SS) to total SS and to genotype SS suggests GEI is important (Table 6). For FHB field traits and analyses involving all environments, the SS from GEI was on average 1.2 times greater than the SS due to genotypes. This ratio is lower than in 2009-2010 tests.

Most of FHB traits were highly correlated in the NUWWSN and PNUWWSN where the correlations among INC, SEV, IND, FDK, ISK, and DON generally exceeded 0.40 (Table 4): exceptions were in the NUWWSN for INC with IND and INC with DON. GHSEV was positively correlated to all other FHB traits.

The correlations of HD and HGT with FHB traits using means over all environments were not significant for the PNUWWSN (Table 4). The correlation of HD with FHB traits varied considerably by environment (Table 5). The correlation of HD with INC ranged from -0.48 to 0.74; HD with SEV ranged from -.74 to 0.48; HD with IND ranged from -0.45 to 0.44. The correlation of HD with FHB traits was consistently negative in MOCOL and consistently positive in NYITH.

Table 1. Cooperators in the 2010-11 P+NUWWSN

ENV CODE	LOCATION	NUWWSN	PNUWWSN	COOPERATORS	INSTITUTE	CODE
ILURB	Urbana, IL	yes	yes	Fred Kolb, Eric Brucker	University of Illinois	UIL
INBRO	Brookston, IN	yes	yes	Barton Fogleman, Jennifer Vonderwall	Syngenta, Agripro	SYN
INLAY	Lafayette, IN	yes	yes	Herb Ohm	Purdue University	PUR
KYLEX	Lexington, KY	yes	yes	David Van Sanford	Unversity of Kentucky	UKY
MDSAL	Salisbury, MD	yes	no	Jose Costa	University of Maryland	UMD
MIELA	East Lansing, MI	yes	yes	Janet Lewis, Lee Siler	Michigan State University	MSU
MOCOL	Columbia, MO	yes	yes	Anne McKendry, David Teague	University of Missouri	UMO
NEJAN	Jan, 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	Ridgetown, Ontario	yes	no	Lilly Tamburic, Mike Holtzworth	University of Guelph, Ridgetown	UGR
ROMAN	Calarasi, Romania	yes	no	Mariana Ittu	National Agricultural Research-Development Institute Fundulea	ROM
VABLA	Blacksburg, VA	yes	yes	Carl Griffey	Virginia Tech	VAT

Table 2. Traits assessed in 2010-11 P+NUWWSN

Code	Trait	Description	PNUWWSN Locations	NUWWSN Locations
INC	Disease incidence	% of heads with at least one infected spikelets	IL,IN,KY,MI,MO,VA	IL,IN,KY,MD,MI,MO,NE, NY,ON, VA
SEV	Disease severity from field tests	% of infected spikelets in an infected head.	IL,IN,KY,MI,MO,VA, RO	IL,IN,KY,MD,MI,MO,NE, NY,ON,VA,RO
IND	Disease index	IND = (SEVxINC)/100	IL,IN,KY,MI,MO,OH, VA,RO	IL,IN,KY,MD,MI,MO,NE, NY,OH,ON,VA
FDK	Fusarium damaged kernels	Either a visual assessment of the percent infected kernels, or a percent of scabby seed by weight	IL,IN,KY,MO,OH	IL,IN,KY,MO,NY,OH
ISK	Composite of head and kernel traits	ISK Index = .3 (Severity) + .3 (Incidence)+.4 (FDK)	IL,KY,MO,OH	IL,IN,KY,MO,NY,OH
DON	DON (vomitoxin)	PPM of vomitoxin in grain	IL,KY,OH	IL,KY,MD,NE,NY,OH
GH	Greenhouse severity	Same as SEV except from greenhouse	IL,MO	IL,MO
HD	Heading Date	Julian date when 50% of spikes have emerged from the boot	IN,MO,OH,VA,RO	IL,IN,KY,MD,MI,MO,NY, OH,ON,VA,RO
HGT	Plant Height	Height in inches from soil to top of spike of a typical plant	IN,RO	KY,MD
Mill Qual	Milling quality score	A relative composite score based on traits that affect milling		IN
Bake Qual	Baking quality score	A relative composite score based on traits that affect baking		IN
SE Qual	Softness equivalent score	A relative score based on softness equivalent		IN
TW	Test weight	Test weight in lbs/bu of clean grain		IN
WGP	Whole grain protein	Percent protein of whole grain		
WGH	Whole Grain Hardness			
FY	Flour protein	NIR estimate of flour protein percentage (based on 13% moisture)		IN
FY	Flour yield	The weight of the flour that passes through a 40 mesh screen after milling, adjusted for moisture and SE, expressed as percentage of milled grain.		IN
SE	Softness equivalent	Percentage of flour that passes through a 94 mesh screen		IN
LA	Lactic acid solvent retention capacity	A measure of gluten strength based on percentage of LA solvent retained by a flour sample after centrifugation		IN
SU	Sucrose solvent retention capacity	A measure of pentosan content, and thus water absorption, based on percentage of sucrose solvent retained by a flour sample after centrifugation		IN
ECD	Estimated cookie diameter	Diameter of a cookie in cm as estimated from sucrose SRC and softness equivalent		IN

Table 3. Entries in the 2010-11 P+NUWWSN

	NUWWSN	
1	ERNIE	
2	TRUMAN	
3	FREEDOM	
4	PIONEER2545	
5	NY99066-3025	NY87048W-7387/Mendon
6	OH751	10584-08-01 / Coker9663
7	NY99068-383	NY87048W-7387/P25W33
8	NY93246SP-6093	Harus/3/92145:91009(Geneva/U1273-5-18-8)/NY73116-4W
9	E6012	Caledonia / Pioneer Brand 25W33
10	E6032	Pioneer Brand 25W33 / Pioneer Brand 2552
11	E9022R	Pioneer Brand 2552/D8006
12	E9024R	Pioneer Brand 2552/Pioneer Brand 25R18
13	OH05-200-74	OH629/HOPEWELL
14	OH06-150-57	P.92201D5-2-29/OH708
15	OH06-180-57	KY90C-042-37-1/OH687
16	OH07-98-21	FOSTER / IL95-947
17	OH07-166-49	OH708 / OH684
18	03633A1--5	992059/INW0316//981358/97462
19	04704A1--1	INW0316/INW0304//9346/INW0301
20	04606A1--7	Truman/INW0316
21	05247A1--3	99840*2/03726//99794
22	05264A1--2	INW0304*2/03727/5/96169/3/Tadinia/BH1146//Geneva/4/INW0316
23	M05-1526	FFR502/P931765C-H21
24	M08*8005#	BRANSON/M99*3098
25	M08-8036#	COKER 9511/BRANSON
26	M08-8214	COOPER/PIO2552
27	M08-8349	M99-2418/PATTON
28	RCUOG1	Vienna x AC F1 19/4C
29	RCUOG2	RCL33xRCS 115
30	RCUOG3	Bezostaja x DH TF 203/2
31	RCUOG4	23/3 X Amigo
32	RCUOG5	TF174 x SD97060
33	IL06-14262	IL00-8530 /IL97-1828
34	IL06-14325	IL 00-8530 / IL97-1828
35	IL06-13721	IL00-8530 / IL97-3632
36	IL06-13708	IL00-8530 / IL97-3632
37	IL04-24668	IL98-13404 / IL97-3578
38	KY02C-1002-06	KY93C-0876-66-1//Tribute /KY92C-0168-95
39	KY03C-1237-32	25R18/92C-0017-17//KY96C-0767-1
40	KY02C-2216-05	Tribute/25W60
41	KY03C-1075-04	25R44/Tribute//KY96C-0769-3
42	KY-03C-2047-06	Roane/McCormick
43	MD03W485-10-9	USG3209/TRIBUTE//MD71-5(USG3342"S")
44	MD03W61-10-2	25R42/CHESAPEAKE
45	MD03W69-15	McCormick/25R42
46	MD03W61-09-7	25R42/CHESAPEAKE
47	MO080104	L910097/MO 92-599
48	MO081652	Pioneer 2552/MO 980829
49	MO080589	KY 90C-383-18-1/IL 94-1653
50	MO081777	Pioneer 2552/MO 980829
51	MO080789	MO 980525//MO 981020/IL95-4162
52	NE01481	
53	NE02558	
54	NE05548	
55	NE06469	
56	NE07444	
57	VA08W-176	KY96C-0079-5 / McCORMICK,F9
58	VA08W-294	SS 520/ VA99W-188 //TRIBUTE
59	VA09W-657	NEUSE/ VA99W-200 //McCORMICK,F10
60	VA09W-659	NEUSE/ VA99W-200 //McCORMICK,F10

	PNUWWSN	
1	ERNIE	
2	TRUMAN	
3	FREEDOM	
4	PIONEER2545	
5	E9020R	Pioneer Brand 2552/D8006
6	E9021R	Pioneer Brand 2552/D8006
7	E9009	D6234/E0029
8	M09-9804#	TRUMAN/COKER 9511
9	OH07-166-41	OH708 / OH684
10	OH07-254-11	OH728 / VA97W-361WS
11	OH07-263-3	OH748 / BRAVO
12	OH08-133-25	HONEY / COKER 9663
13	OH08-269-58	P.92226E2-5-3 / OH708
14	05251A1--5	INW0412*2/03705//981312
15	05269A1--1	INW0316*2//INW0304/9346/3/Arina/INW0301//M-6synthStb8/981004
16	06497A1--3	INW0412/B990081//0128
17	0711A1--1	92829/A941048/3/Gfd/X117//Roane/92145
18	0724B1--13	INW0731/OH904
19	M08-8352	M99-2418/PATTON
20	IL07-4348	P96169RE2-3-6-4 / IL01-34159
21	IL07-4415	P96169RE2-3-6-4 / IL01-34159
22	IL07-7525	IL97-1828 / IL99-12976
23	IL07-14547	IL01-5642 / IL01-3570
24	IL07-19334	IL01-36115 / IL79-008T-B-B
25	KY03C-2047-07	Roane/McCormick
26	KY04C-2023-18	VA97W-375WS/Truman
27	KY04C-2034-2	Truman/KY93C-1238-17-5
28	KY04C-2034-3	Truman/KY93C-1238-17-5
29	KY04C-2034-4	Truman/KY93C-1238-17-5
30	MO080241	MO 980521/MO 971215
31	MO090862	MO 980725/Sumai 3
32	MO090577	L910097/MO 92-599
33	MO090812	MO 980829//MO 980725/IL95-4162
34	MO091122	Ernie/Colorben 4
35	VA08W-632	OH 552/SS550//RC STRATEGY
36	VA09W-608	97397B1-4-5/McCORMICK// B980582
37	VA09W-635	COKER 9474/ McCormick "S" // ERNIE,F10
38	VA09W-636	ERNIE/ NC96-13374(SCAB RES) //McCORMICK
39	VA09W-644	ERNIE/ NC96-13374(SCAB RES) //McCORMICK
40	VA09W-654	VA98W-749/IL96-3073(SCAB RES) //9793A1-5

Table 4. Correlation of lines means averaged over all environments in 2010-11 NUWWSN (above diagonal) and PNUWWSN (below diagonal). Values in bold and large font are significant at p<0.05 level.

	INC	SEV	IND	FDK	ISK	DON	GH	HD	HGT
INC	**1**	**0.40**	0.11	**0.52**	**0.77**	0.04	**0.27**	**0.57**	**0.34**
SEV	**0.55**	**1**	**0.73**	**0.72**	**0.82**	**0.65**	**0.65**	-0.12	-0.04
IND	**0.75**	**0.93**	**1**	**0.45**	**0.90**	**0.88**	**0.46**	**-0.58**	**-0.51**
FDK	**0.65**	**0.86**	**0.87**	**1**	**0.88**	**0.51**	**0.55**	0.14	0.19
ISK	**0.80**	**0.92**	**0.94**	**0.94**	**1**	**0.67**	**0.50**	0.22	0.03
DON	**0.53**	**0.77**	**0.77**	**0.83**	**0.81**	**1**	**0.33**	**-0.50**	**-0.38**
GH	**0.37**	**0.59**	**0.57**	**0.59**	**0.57**	**0.54**	**1**	0.07	0.08
HD	-0.29	-0.12	-0.20	-0.20	-0.12	-0.12	-0.30	**1**	**0.85**
HGT	-0.21	-0.08	-0.08	-0.19	-0.22	-0.18	-0.12	**0.44**	**1**

Table 5. Correlation of heading date with FHB traits by environment for the 2010-11 P+NUWWSN. Values in bold and large font are significant at p<0.05 level.

NUWWSN	INC	SEV	IND	FDK	ISK	DON
ILURB	0.21	**0.28**	**0.29**	**0.46**	**0.42**	**0.43**
INBRO	0.06	0.24	0.18			
KYLEX	**0.49**	0.28	-0.09	-0.24	0.17	0.03
MDSAL	-0.13	-0.07	-0.12			
MIELA	0.10	0.07	0.00			
MOCOL	**-0.48**	**-0.47**	**-0.54**	-0.17	**-0.43**	
NYITH	0.23	**0.48**	**0.44**	**0.29**	**0.45**	**0.41**
OHWOO			0.17	**0.43**	**0.43**	**0.59**
ONRID	**0.74**	0.11	-0.07			
ROFUN		-0.14				
VABLA	**0.26**	**0.35**	**0.27**			

PNUWWSN	INC	SEV	IND	FDK	ISK	DON
KYLEX	**0.44**	-0.12	0.11	-0.29	0.15	-0.31
MOCOL	**-0.46**	**-0.42**	**-0.45**	-0.31	**-0.44**	
OHWOO			-0.09	0.14	0.14	0.15
ROFUN		**-0.74**				

Table 6. Sum of squares as a percentage of total sum of squares for the 2010-11 P+NUWWSN

	NUWWSN				PNUWWSN			
	Genotype	Environment	GxE	GxE/Genotype	Genotype	Environment	GxE	GxE/Genotype
INC	4.0	85.6	10.4	2.6	4.5	89.5	6.0	1.3
SEV	15.4	54.3	30.3	2.0	33.7	42.1	24.3	0.7
IND	9.5	69.8	20.7	2.2	15.0	67.5	17.5	1.2
FDK	12.0	73.8	14.2	1.2	17.1	62.4	20.5	1.2
ISK	6.9	85.5	7.6	1.1	7.6	85.2	7.2	1.0
DON	6.9	83.5	9.6	1.4	27.4	59.3	13.2	0.5
GH	66.1	13.2	20.7	0.3	46.6	22.7	30.7	0.7
HD	4.7	92.1	3.2	0.7	17.5	75.9	6.6	0.4
HGT	73.7	10.2	16.1	0.2	79.6	17.5	2.8	0.04

Table 7. Means over all environments of all entries in the 2010-11 NUWWSN

NAME	INC	SEV	IND	FDK	ISK	DON	GHSEV	#l	#h	HD	HGT
ERNIE	54.3	22.3 l	13.9	16.4	30.9	8.1	35.9 l	2	0	141 l	34.9
TRUMAN	36.6 l	16.5 l	6.7 l	8.7 l	22.5 l	4.4 l	6.4 l	7	0	147	38.6
FREEDOM	55.7	24.4	16.8	28.9	38.9 h	7.4	18.1 l	1	1	145	38.3
PIONEER2545	60.9 h	38.9 h	27.0 h	39.1 h	46.8 h	13.2 h	46.1 h	0	7	143	35.6
NY99066-3025	46.9	38.4 h	18.5	22.6	38.4	8.6	40.8 h	0	2	148	42.6
OH751	54.1	22.2 l	13.3	18.7	33.7	5.2 l	52.4 h	2	1	145	39.3
NY99068-383	47.3	16.1 l	7.5 l	15.3 l	28.3 l	6.0 l	14.5 l	6	0	149 h	40.0
NY93246SP-6093	54.5	28.7	16.5	22.5	38.1	7.9	19.9 l	1	0	149 h	40.7
E6012	58.5 h	30.6	19.4	21.4	38.5	8.0	30.6 l	1	1	144	35.1
E6032	57.7 h	31.1 h	20.3	25.9	41.4 h	12.4 h	26.3 l	1	4	145	32.9 l
E9022R	66.8 h	37.2 h	25.1 h	25.2	40.6 h	7.0	63.1 h	0	5	144	35.3
E9024R	56.4	29.0	17.3	24.6	38.5	8.6	32.0 l	1	0	144	33.3
OH05-200-74	47.8	19.3 l	11.5 l	26.0	36.6	6.7	8.5 l	3	0	145	36.8
OH06-150-57	51.0	29.8	18.4	26.5	38.8 h	7.8	68.9 h	0	2	142	34.2
OH06-180-57	49.3	31.1 h	16.6	27.1	38.1	7.6	71.6 h	0	2	144	35.8
OH07-98-21	45.3 l	30.0	14.4	22.3	35.5	5.7 l	51.3 h	2	1	144	37.2
OH07-166-49	53.7	34.6 h	19.7	23.7	38.8 h	7.8	69.7 h	0	3	144	34.4
03633A1--5	47.9	16.0 l	9.8 l	14.9 l	27.7 l	6.6	15.1 l	5	0	143	31.7 l
04704A1--1	63.8 h	39.9 h	29.2 h	26.4	43.7 h	8.7	30.1 l	1	4	143	30.8 l
04606A1--7	43.5 l	16.6 l	9.9 l	13.0 l	25.0 l	9.0	4.6 l	6	0	146	38.6
05247A1--3	48.0	18.4 l	10.3 l	21.3	31.8	6.3	19.8 l	3	0	143	31.3 l
05264A1--2	58.9 h	25.9	17.2	22.1	37.8	8.3	56.1 h	0	2	142	29.4 l
M05-1526	53.9	20.5 l	12.5 l	17.4	31.4	7.5	27.2 l	3	0	141 l	37.1
M08*8005#	43.7 l	20.0 l	10.4 l	18.3	29.3 l	4.9 l	65.3 h	5	1	141 l	33.9
M08-8036#	44.0 l	17.8 l	8.7 l	13.5 l	26.5 l	4.2 l	15.1 l	7	0	141 l	35.6
M08-8214	45.3 l	16.3 l	9.3 l	13.3 l	27.0 l	5.8 l	12.3 l	7	0	141 l	38.4
M08-8349	47.6	17.8 l	10.7 l	20.4	31.8	6.4	19.6 l	3	0	143	35.3
RCUOG1	45.5 l	27.4	14.3	26.2	36.2	5.0 l	54.7 h	2	1	147	43.9 h
RCUOG2	49.6	24.0	13.3	20.3	33.1	8.9	35.7 l	1	0	142	37.6
RCUOG3	39.7 l	23.2	10.0 l	17.8	27.9 l	6.2	18.3 l	4	0	145	45.7 h
RCUOG4	43.4 l	29.1	12.3 l	21.3	32.2	7.2	60.9 h	2	1	145	46.8 h
RCUOG5	43.7 l	24.5	10.3 l	24.6	33.9	6.5	37.2 l	3	0	145	46.7 h
IL06-14262	44.7 l	21.1 l	12.8 l	13.4 l	29.5 l	4.0 l	8.8 l	7	0	142	34.5
IL06-14325	53.0	28.8	15.5	17.3	33.7	5.8 l	31.5 l	2	0	142	35.5
IL06-13721	40.5 l	21.7 l	9.3 l	6.2 l	23.2 l	4.6 l	37.2 l	7	0	140 l	33.7
IL06-13708	48.3	18.6 l	9.5 l	12.5 l	25.8 l	4.4 l	36.5 l	6	0	143	38.1
IL04-24668	47.7	23.6	12.1 l	12.6 l	28.6 l	5.0 l	29.4 l	5	0	140 l	32.5 l
KY02C-1002-06	51.6	24.1	14.8	24.8	37.4	5.8 l	15.6 l	2	0	143	35.2
KY03C-1237-32	50.6	25.9	14.9	19.1	33.1	5.9 l	26.0 l	2	0	143	30.1 l
KY02C-2216-05	54.5	29.4	17.4	18.3	36.5	5.0 l	65.0 h	1	1	142	32.7 l
KY03C-1075-04	43.8 l	22.7	10.4 l	25.2	34.8	8.3	69.0 h	2	1	148 h	35.1
KY03C-2047-06	49.8	21.3 l	13.5	11.0 l	31.3	5.7 l	13.5 l	4	0	142	32.8 l
MD03W485-10-9	52.2	26.6	15.7	20.5	35.6	5.9 l	74.5 h	1	1	143	32.0 l
MD03W61-10-2	53.5	15.3 l	10.5 l	12.1 l	29.4 l	3.8 l	4.3 l	6	0	142	33.6
MD03W69-15	44.7 l	15.5 l	10.1 l	16.4	30.1 l	3.1 l	3.1 l	6	0	144	33.3
MD03W61-09-7	55.9	20.3 l	14.8	24.8	39.1 h	5.6 l	19.5 l	3	1	142	34.5
MO080104	43.0 l	15.3 l	7.5 l	13.2 l	24.6 l	4.3 l	13.9 l	7	0	142	35.7
MO081652	40.0 l	13.8 l	6.8 l	11.9 l	27.0 l	3.7 l	3.8 l	7	0	142 l	36.6
MO080589	36.4 l	14.3 l	7.8 l	12.5 l	23.8 l	6.0 l	15.7 l	7	0	144	37.1
MO081777	45.0 l	15.2 l	7.7 l	13.3 l	25.7 l	3.7 l	5.7 l	7	0	142	34.8
MO080789	37.6 l	18.4 l	6.8 l	10.7 l	25.8 l	4.6 l	11.3 l	7	0	142	39.0
NE01481	43.5 l	38.5 h	15.1	30.7 h	35.9	8.8	76.0 h	1	3	145	39.7
NE02558	51.1	29.9	15.4	29.5	36.6	8.0	56.4 h	0	1	145	37.3
NE05548	55.7	37.4 h	19.9	27.4	38.2	9.8	49.0 h	0	2	147	44.9 h
NE06469	49.0	28.6	16.7	32.3 h	38.7 h	9.8	52.6 h	0	3	141 l	37.2
NE07444	51.5	28.9	14.2	30.9 h	35.6	6.7	62.2 h	0	2	142	39.6
VA08W-176	48.1	27.2	13.4	21.1	35.4	5.8 l	64.4 h	1	1	144	34.5
VA08W-294	47.7	23.7	12.8 l	17.4	32.3	5.7 l	14.1 l	3	0	143	34.2
VA09W-657	49.7	23.3	13.0 l	15.1 l	31.5	5.2 l	17.0 l	4	0	143	37.0
VA09W-659	45.6 l	16.7 l	9.9 l	14.0 l	30.8	6.5	10.9 l	5	0	144	33.8
AVERAGE	49.2	24.4	13.7	20.0	33.2	6.6	33.6			144	36.4
MINUMUM	36.4	13.8	6.7	6.2	22.5	3.1	3.1			140	29.4
MAXIMUM	66.8	39.9	29.2	39.1	46.8	13.2	76.0			149	46.8
LSD(0.05)	9.7	8.8	6.3	9.2	8.1	3.0	35.6			2	3.6
n	10.0	11.0	11.0	6.0	5.0	6.0	2.0			11	3.0

l,h indicate means that are not significantly different from the lowest and highest means in that column ($p<0.05$)

Table 8. Best (top of table) and worst (bottom of table) entries in the 2010-11 NUWWSN

NAME	INC	SEV	IND	FDK	ISK	DON	GHSEV	#l	#h
TRUMAN	36.6 l	16.5 l	6.7 l	8.7 l	22.5 l	4.4 l	6.4 l	7	0
MO081652	40.0 l	13.8 l	6.8 l	11.9 l	27.0 l	3.7 l	3.8 l	7	0
MO080789	37.6 l	18.4 l	6.8 l	10.7 l	25.8 l	4.6 l	11.3 l	7	0
MO080104	43.0 l	15.3 l	7.5 l	13.2 l	24.6 l	4.3 l	13.9 l	7	0
MO081777	45.0 l	15.2 l	7.7 l	13.3 l	25.7 l	3.7 l	5.7 l	7	0
MO080589	36.4 l	14.3 l	7.8 l	12.5 l	23.8 l	6.0 l	15.7 l	7	0
M08-8036#	44.0 l	17.8 l	8.7 l	13.5 l	26.5 l	4.2 l	15.1 l	7	0
M08-8214	45.3 l	16.3 l	9.3 l	13.3 l	27.0 l	5.8 l	12.3 l	7	0
IL06-13721	40.5 l	21.7 l	9.3 l	6.2 l	23.2 l	4.6 l	37.2 l	7	0
IL06-14262	44.7 l	21.1 l	12.8 l	13.4 l	29.5 l	4.0 l	8.8 l	7	0
NY99068-383	47.3	16.1 l	7.5 l	15.3 l	28.3 l	6.0 l	14.5 l	6	0
IL06-13708	48.3	18.6 l	9.5 l	12.5 l	25.8 l	4.4 l	36.5 l	6	0
04606A1--7	43.5 l	16.6 l	9.9 l	13.0 l	25.0 l	9.0	4.6 l	6	0
MD03W69-15	44.7 l	15.5 l	10.1 l	16.4	30.1 l	3.1 l	3.1 l	6	0
MD03W61-10-2	53.5	15.3 l	10.5 l	12.1 l	29.4 l	3.8 l	4.3 l	6	0
03633A1--5	47.9	16.0 l	9.8 l	14.9 l	27.7 l	6.6	15.1 l	5	0
VA09W-659	45.6 l	16.7 l	9.9 l	14.0 l	30.8	6.5	10.9 l	5	0
M08*8005#	43.7 l	20.0 l	10.4 l	18.3	29.3 l	4.9 l	65.3 h	5	1
IL04-24668	47.7	23.6	12.1 l	12.6 l	28.6 l	5.0 l	29.4 l	5	0
E6032	57.7 h	31.1 h	20.3	25.9	41.4 h	12.4 h	26.3 l	1	4
04704A1--1	63.8 h	39.9 h	29.2 h	26.4	43.7 h	8.7	30.1 l	1	4
E9022R	66.8 h	37.2 h	25.1 h	25.2	40.6 h	7.0	63.1 h	0	5
PIONEER2545	60.9 h	38.9 h	27.0 h	39.1 h	46.8 h	13.2 h	46.1 h	0	7
AVERAGE	49.2	24.4	13.7	20.0	33.2	6.6	33.6		
MINUMUM	36.4	13.8	6.7	6.2	22.5	3.1	3.1		
MAXIMUM	66.8	39.9	29.2	39.1	46.8	13.2	76.0		
LSD(0.05)	9.7	8.8	6.3	9.2	8.1	3.0	35.6		

l,h indicate means that are not significantly different from the lowest and highest means in that column ($p<0.05$)

Table 9. Means over all environments of all entries in the 2010-11 PNUWWSN

NAME	INC	SEV	IND	FDK	ISK	DON	GHSEV	#l	#h	HD	HGT
ERNIE	45.0 h	25.2	15.1	20.7	35.2	9.3 l	20.9 l	2	1	141 l	33
TRUMAN	35.6 h	12.1 l	5.8 l	8.6 l	22.6 l	7.3 l	3.1 l	6	1	146 h	38 h
FREEDOM	54.0	30.0	20.7	30.4 h	40.9 h	9.2 l	20.0 l	2	2	143	37 h
PIONEER2545	57.6 h	44.0 h	29.3 h	38.7 h	47.6 h	5.6 l	66.5 h	1	6	142	36 h
E9020R	52.7	41.4 h	23.5 h	30.9 h	44.8 h	8.9 l	47.2 h	1	5	143	35
E9021R	57.8 h	39.3 h	23.9 h	26.6	42.9 h	7.9 l	44.9 h	1	5	142	38 h
E9009	53.7	38.8 h	23.0 h	23.2	41.7 h	5.4 l	13.6 l	2	3	144	33 l
M09-9804#	50.7	21.5 l	12.0 l	15.5 l	34.2	10.3	14.6 l	4	0	148 h	31 l
OH07-166-41	49.4	32.4	17.5	24.0	37.9	10.4	53.2 h	0	1	143	37 h
OH07-254-11	47.7	30.5	16.8	30.3 h	42.0 h	9.1 l	50.9 h	1	3	142	32 l
OH07-263-3	53.7	28.0	15.1	20.9	37.5	8.2 l	56.6 h	1	1	142	37 h
OH08-133-25	52.0	39.7 h	23.3 h	31.4 h	44.4 h	11.7	47.2 h	0	5	142	37 h
OH08-269-58	59.9 h	41.2 h	24.4 h	27.4	40.5 h	4.0 l	32.9 hl	2	5	143	36 h
05251A1--5	55.9 h	30.3	18.6	25.1	41.0 h	11.8	12.1 l	1	2	143	33
05269A1--1	64.4 h	36.6 h	25.3 h	36.2 h	47.3 h	10.4	54.2 h	0	6	142	30 l
06497A1--3	40.8 h	19.8 l	10.7 l	18.7 l	32.2 l	9.1 l	15.6 l	6	1	145	36
0711A1--1	49.9	24.5	14.8	21.7	37.3	22.0 h	41.7 h	0	2	142	31 l
0724B1--13	50.1	16.0 l	9.4 l	16.1 l	31.0 l	11.0	9.6 l	5	0	141 l	31 l
M08-8352	45.8 h	25.4	13.2 l	25.7	36.3	5.8 l	27.1 l	3	1	141 l	34
IL07-4348	49.2	14.7 l	10.2 l	13.6 l	30.3 l	15.5	7.2 l	5	0	143	32 l
IL07-4415	51.1	17.4 l	11.3 l	15.1 l	31.0 l	6.7 l	7.0 l	6	0	139 l	33
IL07-7525	50.2	21.0 l	11.6 l	17.7 l	33.7	11.7	36.3 hl	3	1	140 l	34
IL07-14547	41.9 h	18.1 l	9.1 l	15.7 l	28.5 l	12.8	28.7 hl	5	2	142	33 l
IL07-19334	38.0 h	14.9 l	6.7 l	12.3 l	25.6 l	13.7	30.0 hl	5	2	142	33
KY03C-2047-07	50.5	21.8 l	14.1 l	15.6 l	34.8	16.7 h	12.3 l	4	1	142	34
KY04C-2023-18	44.9 h	14.4 l	6.7 l	9.8 l	27.1 l	6.6 l	6.5 l	6	1	147 h	39 h
KY04C-2034-2	50.0	32.2	18.4	18.9 l	35.7	5.4 l	21.4 l	3	0	147 h	37 h
KY04C-2034-3	50.4	25.8	13.4 l	18.3 l	34.9	7.0 l	9.9 l	4	0	147 h	39 h
KY04C-2034-4	50.8	23.6	14.0 l	22.0	36.1	8.4 l	17.3 l	3	0	145	34
MO080241	37.5 h	15.6 l	7.1 l	14.7 l	25.3 l	22.1 h	17.6 l	5	2	141 l	39 h
MO090862	49.0	25.0	14.5	13.7 l	33.3	6.6 l	32.8 hl	3	1	139 l	36 h
MO090577	50.1	13.5 l	7.9 l	14.6 l	30.2 l	12.0	6.8 l	5	0	141 l	37 h
MO090812	43.6 h	20.4 l	10.0 l	17.1 l	32.4	6.0 l	6.5 l	5	1	148 h	38 h
MO091122	43.0 h	29.2	12.6 l	25.1	36.7	6.4 l	23.8 l	3	1	142	36 h
VA08W-632	56.5 h	29.6	18.2	28.3 h	41.6 h	10.1 l	11.9 l	2	3	141 l	35
VA09W-608	42.0 h	17.8 l	8.3 l	18.4 l	29.5 l	21.6 h	20.2 l	5	2	141 l	35
VA09W-635	53.2	26.6	17.1	28.3 h	40.7 h	7.1 l	18.5 l	2	2	142	34
VA09W-636	45.1 h	31.4	13.5 l	21.7	36.2	6.4 l	22.3 l	3	1	141 l	30 l
VA09W-644	45.5 h	20.5 l	9.6 l	16.2 l	31.5 l	15.3	35.2 hl	5	2	140 l	34
VA09W-654	49.8	19.0 l	10.8 l	14.0 l	30.9 l	12.4	40.8 hl	5	1	145	37 h
AVERAGE	49.2	25.7	14.7	21.1	35.6	10.2	26.1			143	35
MINUMUM	35.6	12.1	5.8	8.6	22.6	4.0	3.1			139	30
MAXIMUM	64.4	44.0	29.3	38.7	47.6	22.1	66.5			148	39
LSD(0.05)	10.4	10.6	8.4	11.0	9.7	6.3	38.5			3	3
n	6	7	7	5	4	3	2			5	2

l,h indicate means that are not significantly different from the lowest and highest means in that column ($p<0.05$)

Table 10. Best (top of table) and worst (bottom of table) entries in the 2010-11 PNUWWSN

ENTRY	NAME	INC		SEV		IND		FDK		ISK		DON		GHSEV		#l	#h
2	TRUMAN	35.6	h	12.1	l	5.8	l	8.6	l	22.6	l	7.3	l	3.1	l	6	1
26	KY04C-2023-18	44.9	h	14.4	l	6.7	l	9.8	l	27.1	l	6.6	l	6.5	l	6	1
16	06497A1--3	40.8	h	19.8	l	10.7	l	18.7	l	32.2	l	9.1	l	15.6	l	6	1
21	IL07-4415	51.1		17.4	l	11.3	l	15.1	l	31.0	l	6.7	l	7.0	l	6	0
24	IL07-19334	38.0	h	14.9	l	6.7	l	12.3	l	25.6	l	13.7		30.0	hl	5	2
30	MO080241	37.5	h	15.6	l	7.1	l	14.7	l	25.3	l	22.1	h	17.6	l	5	2
32	MO090577	50.1		13.5	l	7.9	l	14.6	l	30.2	l	12.0		6.8	l	5	0
36	VA09W-608	42.0	h	17.8	l	8.3	l	18.4	l	29.5	l	21.6	h	20.2	l	5	2
23	IL07-14547	41.9	h	18.1	l	9.1	l	15.7	l	28.5	l	12.8		28.7	hl	5	2
18	0724B1--13	50.1		16.0	l	9.4	l	16.1	l	31.0	l	11.0		9.6	l	5	0
39	VA09W-644	45.5	h	20.5	l	9.6	l	16.2	l	31.5	l	15.3		35.2	hl	5	2
33	MO090812	43.6	h	20.4	l	10.0	l	17.1	l	32.4		6.0	l	6.5	l	5	1
20	IL07-4348	49.2		14.7	l	10.2	l	13.6	l	30.3	l	15.5		7.2	l	5	0
40	VA09W-654	49.8		19.0	l	10.8	l	14.0	l	30.9	l	12.4		40.8	hl	5	1
12	OH08-133-25	52.0		39.7	h	23.3	h	31.4	h	44.4	h	11.7		47.2	h	0	5
5	E9020R	52.7		41.4	h	23.5	h	30.9	h	44.8	h	8.9	l	47.2	h	1	5
6	E9021R	57.8	h	39.3	h	23.9	h	26.6		42.9	h	7.9	l	44.9	h	1	5
13	OH08-269-58	59.9	h	41.2	h	24.4	h	27.4		40.5	h	4.0	l	32.9	hl	2	5
15	05269A1--1	64.4	h	36.6	h	25.3	h	36.2	h	47.3	h	10.4		54.2	h	0	6
4	PIONEER2545	57.6	h	44.0	h	29.3	h	38.7	h	47.6	h	5.6	l	66.5	h	1	6
101	MINUMUM	35.6		12.1		5.8		8.6		22.6		4.0		3.1			
103	LSD(0.05)	10.4		10.6		8.4		11.0		9.7		6.3		38.5			
100	AVERAGE	49.2		25.7		14.7		21.1		35.6		10.2		26.1			
102	MAXIMUM	64.4		44.0		29.3		38.7		47.6		22.1		66.5			

l,h indicate means that are not significantly different from the lowest and highest means in that column ($p<0.05$)

Table 11. Incidence (INC, %) for the 2010-11 NUWWSN

NAME	AVG		ILURB	INBRO	KYLEX	MDSAL	MIELA	MOCOL	NEJAN	NYITH	ONRID	VABLA
ERNIE	54.3		93.3	42.8	55.0	60.0	8.1	95.0	93.3	21.0	70.0	5.0
TRUMAN	36.6	l	93.3	4.5	67.5	20.0	4.5	37.5	53.3	10.0	70.0	5.0
FREEDOM	55.7		95.0	45.0	70.0	50.0	20.1	77.5	73.3	41.0	80.0	5.0
PIONEER2545	60.9	h	96.7	60.0	62.5	65.0	35.0	95.0	56.7	47.0	83.3	7.5
NY99066-3025	46.9		100.0	33.8	82.5	25.0	15.0	50.0	46.7	34.0	76.7	5.0
OH751	54.1		95.0	39.0	75.0	30.0	18.4	82.5	66.7	48.0	76.7	10.0
NY99068-383	47.3		91.7	16.5	75.0	25.0	2.7	85.0	76.7	22.0	73.3	5.0
NY93246SP-6093	54.5		93.3	30.0	95.0	25.0	18.4	85.0	76.7	32.0	80.0	10.0
E6012	58.5	h	100.0	26.3	77.5	60.0	17.3	87.5	90.0	41.0	80.0	5.0
E6032	57.7	h	100.0	33.8	77.5	50.0	29.2	92.5	46.7	50.0	90.0	7.5
E9022R	66.8	h	100.0	90.0	62.5	60.0	29.6	97.5	73.3	60.0	80.0	15.0
E9024R	56.4		98.3	26.3	70.0	50.0	19.0	92.5	83.3	30.0	90.0	5.0
OH05-200-74	47.8		95.0	12.0	77.5	20.0	13.9	97.5	36.7	38.0	80.0	7.5
OH06-150-57	51.0		91.7	33.8	57.5	42.5	23.2	85.0	66.7	41.0	63.3	5.0
OH06-180-57	49.3		98.3	45.0	40.0	30.0	19.6	75.0	50.0	50.0	80.0	5.0
OH07-98-21	45.3	l	91.7	16.5	60.0	30.0	9.5	70.0	66.7	34.0	70.0	5.0
OH07-166-49	53.7		100.0	48.8	67.5	40.0	9.3	85.0	60.0	41.0	80.0	5.0
03633A1--5	47.9		90.0	20.3	67.5	15.0	14.6	85.0	83.3	22.0	76.7	5.0
04704A1--1	63.8	h	100.0	60.0	80.0	65.0	15.5	92.5	66.7	63.0	90.0	5.0
04606A1--7	43.5	l	96.7	18.0	65.0	22.5	20.1	45.0	63.3	19.0	80.0	5.0
05247A1--3	48.0		91.7	16.5	55.0	45.0	18.9	92.5	53.3	19.0	83.3	5.0
05264A1--2	58.9	h	96.7	22.5	77.5	50.0	24.9	95.0	76.7	54.0	86.7	5.0
M05-1526	53.9		95.0	30.0	52.5	27.5	19.9	90.0	83.3	47.0	86.7	7.5
M08*8005#	43.7	l	91.7	7.5	50.0	35.0	8.5	80.0	73.3	19.0	66.7	5.0
M08-8036#	44.0	l	93.3	17.3	52.5	25.0	16.6	65.0	73.3	22.0	70.0	5.0
M08-8214	45.3	l	93.3	13.5	60.0	20.0	10.9	85.0	76.7	22.0	66.7	5.0
M08-8349	47.6		93.3	12.0	52.5	20.0	9.6	97.5	73.3	33.0	80.0	5.0
RCUOG1	45.5	l	95.0	8.3	72.5	32.5	25.6	60.0	46.7	33.0	76.7	5.0
RCUOG2	49.6		90.0	30.0	55.0	35.0	10.9	97.5	90.0	19.0	63.3	5.0
RCUOG3	39.7	l	75.0	5.3	50.0	12.5	9.4	50.0	86.7	33.0	70.0	5.0
RCUOG4	43.4	l	88.3	15.8	40.0	5.0	25.5	70.0	70.0	34.0	80.0	5.0
RCUOG5	43.7	l	90.0	16.5	65.0	40.0	12.8	70.0	50.0	31.0	56.7	5.0
IL06-14262	44.7	l	85.0	12.8	55.0	17.5	12.6	87.5	63.3	25.0	83.3	5.0
IL06-14325	53.0		88.3	18.0	70.0	55.0	17.5	97.3	73.3	32.0	73.3	5.0
IL06-13721	40.5	l	91.7	7.5	60.0	15.0	5.7	77.5	76.7	6.0	60.0	5.0
IL06-13708	48.3		85.0	30.0	67.5	27.5	9.3	62.5	93.3	26.0	76.7	5.0
IL04-24668	47.7		91.7	19.5	67.5	45.0	6.7	75.0	60.0	30.0	76.7	5.0
KY02C-1002-06	51.6		90.0	21.0	65.0	50.0	15.2	87.5	83.3	29.0	70.0	5.0
KY03C-1237-32	50.6		88.3	23.3	70.0	35.0	10.9	85.0	70.0	29.0	86.7	7.5
KY02C-2216-05	54.5		93.3	22.5	77.5	30.0	12.3	95.0	96.7	33.0	80.0	5.0
KY03C-1075-04	43.8	l	93.3	7.5	57.5	25.0	21.5	80.0	60.0	15.0	73.3	5.0
KY03C-2047-06	49.8		95.0	9.8	57.5	25.0	11.4	97.5	80.0	44.0	73.3	5.0
MD03W485-10-9	52.2		88.3	24.8	60.0	30.0	21.0	87.5	76.7	42.0	86.7	5.0
MD03W61-10-2	53.5		91.7	33.0	75.0	20.0	7.7	95.0	80.0	38.0	90.0	5.0
MD03W69-15	44.7	l	90.0	2.3	77.5	7.5	5.2	95.0	70.0	8.0	86.7	5.0
MD03W61-09-7	55.9		93.3	39.0	72.5	20.0	10.0	100.0	90.0	53.0	76.7	5.0
MO080104	43.0	l	93.3	9.0	42.5	20.0	6.3	82.5	73.3	15.0	83.3	5.0
MO081652	40.0	l	88.3	8.3	80.0	7.5	11.2	90.0	36.7	20.0	53.3	5.0
MO080589	36.4	l	96.7	9.0	50.0	25.0	7.1	50.0	33.3	11.0	76.7	5.0
MO081777	45.0	l	81.7	7.5	40.0	20.0	8.8	92.5	90.0	28.0	76.7	5.0
MO080789	37.6	l	91.7	6.0	40.0	10.0	7.3	80.0	43.3	33.0	60.0	5.0
NE01481	43.5	l	88.3	16.5	50.0	35.0	20.0	52.5	80.0	26.0	46.7	20.0
NE02558	51.1		96.7	52.5	47.5	30.0	16.2	70.0	90.0	31.0	70.0	7.5
NE05548	55.7		100.0	45.0	82.5	15.0	24.8	70.0	86.7	34.0	86.7	12.5
NE06469	49.0		95.0	48.8	50.0	30.0	14.3	97.5	50.0	23.0	76.7	5.0
NE07444	51.5		91.7	26.3	52.5	45.0	14.7	92.5	80.0	29.0	73.3	10.0
VA08W-176	48.1		98.3	15.0	50.0	35.0	19.8	90.0	60.0	45.0	63.3	5.0
VA08W-294	47.7		98.3	20.3	65.0	30.0	14.4	72.5	70.0	32.0	70.0	5.0
VA09W-657	49.7		95.0	28.5	65.0	35.0	15.2	95.0	53.3	32.0	73.3	5.0
VA09W-659	45.6	l	93.3	13.5	65.0	20.0	5.3	87.5	56.7	40.0	70.0	5.0
AVERAGE	49.2		93.1	24.6	63.0	31.5	14.8	81.8	69.3	32.0	75.5	6.0
MINUMUM	36.4		75.0	2.3	40.0	5.0	2.7	37.5	33.3	6.0	46.7	5.0
MAXIMUM	66.8		100.0	90.0	95.0	65.0	35.0	100.0	96.7	63.0	90.0	20.0
LSD(0.05)	9.7		.	.	.	.	.	.	.	.	.	.

l,h indicate means that are not significantly different from the lowest and highest means in that column ($p<0.05$)

Table 12. Severity (SEV, %) for the 2010-11 NUWWSN

NAME	AVG		ILURB	INBRO	KYLEX	MDSAL	MIELA	MOCOL	NEJAN	NYITH	ONRID	ROFUN	VABLA
ERNIE	22.3	l	40.5	21.0	48.2	25.0	8.8	16.0	18.7	13.0	25.0	23.2	5.5
TRUMAN	16.5	l	31.4	10.0	28.5	6.0	9.8	5.3	4.7	37.0	18.7	25.6	5.0
FREEDOM	24.4		54.3	27.0	50.1	12.5	17.9	17.0	7.7	19.0	44.0	16.3	2.5
PIONEER2545	38.9	h	73.3	55.0	49.0	35.0	39.9	35.1	5.3	29.0	69.3	27.0	10.5
NY99066-3025	38.4	h	74.5	50.0	43.1	13.5	48.8	7.7	3.0	59.0	34.7	83.0	5.0
OH751	22.2	l	43.7	33.0	37.3	12.5	12.8	12.7	5.0	17.0	29.0	19.5	22.0
NY99068-383	16.1	l	29.3	11.0	20.9	7.5	23.4	10.9	4.7	14.0	29.0	18.8	7.5
NY93246SP-6093	28.7		45.6	27.0	44.5	7.5	31.2	10.7	5.3	35.0	54.0	40.2	15.0
E6012	30.6		69.3	60.0	56.1	15.0	16.8	14.8	11.7	25.0	38.7	18.9	10.5
E6032	31.1	h	68.6	60.0	69.8	15.0	16.3	14.1	2.7	27.0	34.7	15.9	18.5
E9022R	37.2	h	60.5	90.0	48.0	15.0	29.6	22.3	4.3	38.0	38.7	38.6	24.0
E9024R	29.0		70.5	70.0	47.3	10.0	7.8	18.7	7.3	24.0	29.0	24.6	9.5
OH05-200-74	19.3	l	34.1	11.0	31.6	3.5	6.1	31.4	2.7	12.0	49.7	18.3	12.0
OH06-150-57	29.8		58.6	52.0	57.9	12.5	20.4	16.8	8.7	28.0	35.7	25.8	11.0
OH06-180-57	31.1	h	60.8	45.0	45.4	10.0	29.9	19.4	4.7	32.0	38.7	46.3	10.0
OH07-98-21	30.0		60.0	45.0	39.1	7.5	38.0	18.7	6.3	35.0	33.0	43.5	3.5
OH07-166-49	34.6	h	66.0	75.0	47.8	17.5	40.6	14.5	8.0	40.0	29.0	37.7	4.5
03633A1--5	16.0	l	35.9	10.0	33.5	2.0	5.0	19.6	7.7	9.0	34.7	14.8	4.0
04704A1--1	39.9	h	89.2	77.0	69.3	30.0	17.0	16.6	9.3	16.0	74.7	35.1	4.5
04606A1--7	16.6	l	36.5	23.0	24.4	3.5	7.4	6.4	12.0	16.0	38.7	12.0	2.5
05247A1--3	18.4	l	35.1	16.0	45.9	5.0	12.7	15.6	4.3	11.0	33.0	17.3	6.0
05264A1--2	25.9		46.2	25.0	59.6	20.0	5.9	10.3	13.7	21.0	50.0	22.9	10.0
M05-1526	20.5	l	38.7	12.0	31.3	5.0	6.3	21.3	9.7	14.0	44.0	31.0	12.0
M08*8005#	20.0	l	43.0	10.0	32.7	5.0	10.5	18.1	8.7	13.0	40.3	26.5	12.0
M08-8036#	17.8	l	30.1	21.0	46.7	5.0	11.8	14.1	7.7	11.0	21.0	24.9	3.0
M08-8214	16.3	l	28.4	19.0	35.4	6.0	3.9	10.1	18.7	15.0	25.0	16.2	1.5
M08-8349	17.8	l	42.7	21.0	28.4	5.0	13.4	12.4	11.3	15.0	34.7	10.2	2.0
RCUOG1	27.4		53.3	45.0	41.0	12.5	28.0	9.0	6.3	37.0	44.0	15.5	9.5
RCUOG2	24.0		52.1	37.0	52.5	15.0	12.3	16.7	17.0	10.0	25.0	24.9	1.5
RCUOG3	23.2		36.8	27.0	59.5	3.5	29.6	7.9	11.7	15.0	38.7	22.0	3.0
RCUOG4	29.1		42.5	70.0	48.0	2.0	28.9	15.2	6.7	36.0	34.7	33.6	2.0
RCUOG5	24.5		46.7	45.0	34.0	17.5	36.9	11.7	5.3	25.0	22.7	20.0	4.5
IL06-14262	21.1	l	40.6	20.0	42.3	3.5	8.7	19.5	9.7	17.0	44.3	21.1	5.0
IL06-14325	28.8		62.3	55.0	46.6	7.5	23.1	18.1	6.0	19.0	44.3	29.5	5.0
IL06-13721	21.7	l	25.6	25.0	43.3	5.0	7.7	19.8	13.7	10.0	22.7	62.0	4.5
IL06-13708	18.6	l	33.2	22.0	28.2	7.5	10.9	8.9	13.0	9.0	25.0	43.7	3.5
IL04-24668	23.6		42.0	28.0	40.5	40.0	15.1	18.2	4.3	12.0	25.0	31.5	2.5
KY02C-1002-06	24.1		60.8	31.0	50.3	10.0	7.0	33.8	5.0	14.0	25.0	20.8	7.0
KY03C-1237-32	25.9		36.5	21.0	61.9	42.5	20.7	24.3	5.3	13.0	38.7	12.0	8.5
KY02C-2216-05	29.4		50.8	50.0	55.1	17.5	24.2	30.1	8.3	18.0	34.7	27.1	8.0
KY03C-1075-04	22.7		37.1	30.0	57.2	12.5	12.7	11.0	3.7	32.0	25.0	25.5	2.5
KY03C-2047-06	21.3	l	40.5	20.0	43.8	7.5	14.0	31.6	14.0	10.0	30.7	17.0	5.5
MD03W485-10-9	26.6		52.4	20.0	46.2	10.0	19.8	40.0	10.7	15.0	40.3	32.3	6.0
MD03W61-10-2	15.3	l	23.8	11.0	32.6	5.0	13.2	16.9	10.7	8.0	29.0	16.4	1.5
MD03W69-15	15.5	l	21.5	10.0	42.8	2.0	1.9	17.4	6.3	18.0	33.0	13.3	4.5
MD03W61-09-7	20.3	l	38.1	13.0	59.4	5.0	6.9	33.4	7.7	9.0	33.0	14.7	3.5
MO080104	15.3	l	26.7	11.0	23.6	3.5	21.7	13.6	5.7	13.0	29.0	19.1	1.5
MO081652	13.8	l	25.2	22.0	27.5	1.5	8.0	13.8	3.3	13.0	16.3	18.5	3.0
MO080589	14.3	l	39.4	12.0	28.7	6.0	5.6	9.9	5.3	13.0	21.0	13.7	2.5
MO081777	15.2	l	31.6	20.0	29.4	3.5	9.7	11.9	8.0	10.0	29.0	10.3	3.5
MO080789	18.4	l	27.0	23.0	33.7	2.0	26.1	10.3	5.0	23.0	22.7	28.1	2.0
NE01481	38.5	h	68.2	80.0	46.1	15.0	42.8	11.5	13.3	34.0	33.3	52.5	27.0
NE02558	29.9		58.5	40.0	30.5	10.0	35.8	22.3	11.3	37.0	40.0	28.8	15.0
NE05548	37.4	h	74.9	100.0	37.5	7.5	28.6	11.7	7.0	35.0	29.0	51.4	29.0
NE06469	28.6		60.8	41.0	53.1	10.0	13.3	34.0	4.3	12.0	38.7	41.0	6.0
NE07444	28.9		38.1	70.0	37.3	27.5	17.3	24.8	8.3	15.0	34.7	29.9	15.0
VA08W-176	27.2		53.5	55.0	41.8	12.5	23.1	22.4	6.0	18.0	29.0	27.9	9.5
VA08W-294	23.7		47.4	35.0	42.4	7.5	17.8	26.3	7.3	15.0	29.0	25.0	8.5
VA09W-657	23.3		50.0	38.0	32.1	10.0	22.4	17.5	4.3	16.0	38.7	19.8	7.0
VA09W-659	16.7	l	39.2	10.0	36.3	5.0	7.0	20.5	5.3	15.0	21.0	15.1	9.5
AVERAGE	24.4		46.7	35.2	42.6	11.0	18.2	17.7	7.9	20.4	34.2	26.6	7.7
MINUMUM	13.8		21.5	10.0	20.9	1.5	1.9	5.3	2.7	8.0	16.3	10.2	1.5
MAXIMUM	39.9		89.2	100.0	69.8	42.5	48.8	40.0	18.7	59.0	74.7	83.0	29.0
LSD(0.05)	8.8		.	.	.	.	.	.	.	.	.	.	.

l,h indicate means that are not significantly different from the lowest and highest means in that column ($p<0.05$)

Table 13. Index (IND, %) for the 2010-11 NUWWSN

NAME	AVG		ILURB	INBRO	KYLEX	MDSAL	MIELA	MOCOL	NEJAN	NYITH	OHWOO	ONRID	VABLA
ERNIE	13.9		37.7	9.0	26.3	16.5	1.9	15.5	18.0	3.0	7.4	17.5	0.3
TRUMAN	6.7	l	28.1	0.5	19.4	1.6	1.0	2.0	2.7	4.0	0.8	13.1	0.3
FREEDOM	16.8		52.5	12.2	34.6	7.0	4.6	13.6	5.7	8.0	10.0	36.3	0.1
PIONEER2545	27.0	h	70.9	33.0	31.3	22.5	14.7	34.0	4.0	14.0	13.0	59.1	0.9
NY99066-3025	18.5		74.5	16.9	35.6	4.4	12.3	3.9	1.7	19.0	7.4	28.0	0.3
OH751	13.3		41.0	12.9	28.5	4.5	3.7	10.5	3.7	8.0	8.8	22.5	2.2
NY99068-383	7.5	l	26.7	1.8	15.6	1.8	-4.5	9.4	3.3	4.0	3.1	21.0	0.4
NY93246SP-6093	16.5		42.6	8.1	42.9	1.8	7.6	9.1	4.3	11.0	9.9	43.2	1.5
E6012	19.4		69.3	15.8	43.1	8.5	4.0	12.8	9.7	11.0	7.7	31.5	0.5
E6032	20.3		68.6	20.3	54.0	9.0	5.9	13.0	1.3	14.0	4.7	31.2	1.5
E9022R	25.1	h	60.5	81.0	29.8	9.0	9.9	21.6	3.3	23.0	3.4	30.9	3.5
E9024R	17.3		69.4	18.4	35.0	6.5	2.5	17.3	6.7	7.0	0.8	26.1	0.5
OH05-200-74	11.5	l	32.2	1.3	24.6	0.9	1.4	19.0	0.7	5.0	0.4	40.3	0.9
OH06-150-57	18.4		53.8	17.6	33.6	5.5	6.2	28.2	7.7	12.0	6.7	30.2	0.6
OH06-180-57	16.6		60.1	20.3	18.7	3.0	6.6	12.9	2.0	17.0	10.0	31.5	0.5
OH07-98-21	14.4		54.7	7.4	26.5	2.0	3.8	14.4	4.7	12.0	9.3	23.1	0.2
OH07-166-49	19.7		66.0	36.6	32.0	8.3	6.1	15.9	5.7	15.0	7.7	23.6	0.2
03633A1--5	9.8	l	32.3	2.0	22.7	0.3	2.1	12.4	6.3	2.0	0.0	27.0	0.2
04704A1--1	29.2	h	89.2	46.2	55.2	21.0	3.7	15.4	7.3	10.0	5.2	67.2	0.2
04606A1--7	9.9	l	35.6	4.1	15.7	1.1	2.7	2.9	7.7	4.0	4.4	30.9	0.1
05247A1--3	10.3	l	32.1	2.6	25.2	2.3	3.6	14.5	2.7	2.0	0.6	27.5	0.3
05264A1--2	17.2		44.5	5.6	46.2	11.0	3.5	9.7	10.7	11.0	3.7	43.3	0.5
M05-1526	12.5	l	37.1	3.6	16.5	1.4	2.5	19.2	8.3	6.0	2.8	38.5	1.2
M08*8005#	10.4	l	39.8	0.8	18.4	1.8	2.1	14.5	6.0	3.0	0.0	27.5	0.6
M08-8036#	8.7	l	28.3	3.6	27.0	1.3	3.5	8.9	5.3	2.0	1.4	14.7	0.2
M08-8214	9.3	l	26.5	2.6	20.2	1.6	2.0	8.5	17.3	4.0	2.2	16.8	0.1
M08-8349	10.7	l	39.8	2.5	14.1	1.0	2.6	12.1	11.0	5.0	1.3	28.3	0.1
RCUOG1	14.3		50.8	3.7	30.0	4.6	8.0	5.3	4.3	11.0	4.5	34.1	0.5
RCUOG2	13.3		47.1	11.1	28.9	5.8	2.8	16.4	16.3	2.0	0.0	16.1	0.1
RCUOG3	10.0	l	27.5	1.4	29.7	0.6	3.6	3.9	11.0	5.0	0.0	27.1	0.2
RCUOG4	12.3	l	37.2	11.0	19.1	0.1	9.3	11.0	5.7	13.0	1.0	28.3	0.1
RCUOG5	10.3	l	42.3	7.4	22.1	7.0	3.4	8.2	3.0	7.0	1.0	11.5	0.2
IL06-14262	12.8	l	34.5	2.6	26.9	0.8	2.6	16.6	6.3	4.0	8.2	37.7	0.3
IL06-14325	15.5		55.0	9.9	33.4	3.8	4.5	17.6	5.3	7.0	1.0	32.7	0.3
IL06-13721	9.3	l	23.6	1.9	27.7	0.8	1.6	16.5	11.0	2.0	2.9	13.8	0.2
IL06-13708	9.5	l	28.5	6.6	19.0	2.3	2.3	5.8	11.7	2.0	7.0	19.3	0.2
IL04-24668	12.1	l	38.1	5.5	27.1	16.5	2.1	15.5	3.0	4.0	2.4	18.9	0.1
KY02C-1002-06	14.8		54.7	6.5	32.7	4.0	2.6	31.6	4.3	4.0	4.4	17.5	0.4
KY03C-1237-32	14.9		32.1	4.9	42.6	16.8	2.8	20.7	4.7	4.0	0.4	33.7	0.8
KY02C-2216-05	17.4		47.0	11.3	42.9	5.3	3.5	28.6	8.0	7.0	9.4	27.7	0.4
KY03C-1075-04	10.4	l	34.7	2.3	34.9	4.3	0.6	8.9	2.0	4.0	4.2	18.6	0.1
KY03C-2047-06	13.5		38.0	2.0	26.0	2.0	2.8	30.7	12.3	5.0	7.4	22.2	0.3
MD03W485-10-9	15.7		46.4	5.0	28.1	3.5	5.4	34.8	7.7	6.0	0.9	34.6	0.3
MD03W61-10-2	10.5	l	21.8	3.6	23.9	1.0	2.4	16.1	10.0	3.0	7.2	26.1	0.1
MD03W69-15	10.1	l	19.3	0.2	33.3	0.2	1.8	16.6	4.7	1.0	4.7	28.6	0.2
MD03W61-09-7	14.8		35.4	5.1	43.6	1.0	2.0	33.4	7.0	5.0	4.9	25.3	0.2
MO080104	7.5	l	24.7	1.0	10.4	0.9	2.1	11.5	5.3	1.0	1.1	24.7	0.1
MO081652	6.8	l	22.2	1.8	22.0	0.1	2.3	12.4	1.3	3.0	0.0	9.3	0.2
MO080589	7.8	l	37.2	1.1	15.9	1.7	1.9	5.4	3.0	2.0	1.8	16.1	0.1
MO081777	7.7	l	25.6	1.5	11.8	0.9	2.0	10.9	7.3	2.0	0.0	22.5	0.2
MO080789	6.8	l	24.6	1.4	13.7	0.2	2.5	8.2	2.3	5.0	4.2	13.0	0.1
NE01481	15.1		60.3	13.2	23.2	5.5	9.4	6.0	11.7	7.0	0.7	23.6	5.9
NE02558	15.4		56.6	21.0	14.6	3.0	6.6	15.4	10.3	9.0	0.3	31.0	1.2
NE05548	19.9		74.9	45.0	30.6	1.3	8.1	8.6	6.0	13.0	2.7	25.4	3.7
NE06469	16.7		58.1	20.0	27.1	3.0	3.2	32.9	2.7	3.0	3.7	29.8	0.3
NE07444	14.2		34.9	18.4	19.7	13.5	3.2	23.3	6.7	5.0	2.7	26.9	2.2
VA08W-176	13.4		52.5	8.3	20.9	4.8	4.8	20.2	4.3	9.0	3.6	18.1	0.5
VA08W-294	12.8	l	46.6	7.1	28.0	2.5	3.8	18.8	5.7	5.0	2.4	20.3	0.4
VA09W-657	13.0	l	47.4	10.8	21.1	3.5	4.4	16.6	2.3	5.0	3.2	28.2	0.4
VA09W-659	9.9	l	36.5	1.4	23.3	1.0	1.7	18.1	3.3	5.0	3.9	14.7	0.5
AVERAGE	13.7		43.8	10.7	27.4	4.6	3.9	15.3	6.3	6.8	3.9	26.8	0.6
MINUMUM	6.7		19.3	0.2	10.4	0.1	-4.5	2.0	0.7	1.0	0.0	9.3	0.1
MAXIMUM	29.2		89.2	81.0	55.2	22.5	14.7	34.8	18.0	23.0	13.0	67.2	5.9
LSD(0.05)	6.3		.	.	.	.	.	.	.	.	.	.	.

l,h indicate means that are not significantly different from the lowest and highest means in that column ($p<0.05$)

Table 14. Fusarium Damaged Kernels (FDK, %) for the 2010-11 NUWWSN

NAME	AVG		ILURB	INLAF	KYLEX	MOCOL	NYITH	OHWOO
ERNIE	16.4		45.0	10.0	13.9	15.5	0.0	14.0
TRUMAN	8.7	l	28.3	5.0	6.7	4.0	0.0	8.0
FREEDOM	28.9		78.3	20.0	13.1	39.5	7.5	15.0
PIONEER2545	39.1	h	81.7	35.0	20.4	55.5	20.0	22.0
NY99066-3025	22.6		76.7	5.0	14.7	13.5	7.5	18.0
OH751	18.7		48.3	12.0	8.9	24.5	2.5	16.0
NY99068-383	15.3	l	63.3	4.0	7.6	6.5	2.5	8.0
NY93246SP-6093	22.5		70.0	4.0	13.5	21.0	2.5	24.0
E6012	21.4		61.7	12.0	12.5	21.0	7.5	14.0
E6032	25.9		75.0	20.0	13.9	26.5	10.0	10.0
E9022R	25.2		61.7	15.0	9.4	53.0	5.0	7.0
E9024R	24.6		75.0	7.0	13.9	30.5	5.0	16.0
OH05-200-74	26.0		73.3	12.0	10.1	40.5	0.0	20.0
OH06-150-57	26.5		68.3	12.0	14.0	43.0	10.0	12.0
OH06-180-57	27.1		66.7	17.0	12.3	45.5	5.0	16.0
OH07-98-21	22.3		55.0	10.0	12.1	32.0	2.5	22.0
OH07-166-49	23.7		60.0	15.0	11.9	37.5	10.0	8.0
03633A1--5	14.9	l	31.7	15.0	8.9	26.0	0.0	8.0
04704A1--1	26.4		81.7	15.0	16.2	28.0	7.5	10.0
04606A1--7	13.0	l	41.7	3.0	6.2	13.0	0.0	14.0
05247A1--3	21.3		60.0	5.0	7.4	38.0	2.5	15.0
05264A1--2	22.1		58.3	10.0	12.6	33.0	2.5	16.0
M05-1526	17.4		40.0	8.0	10.3	31.5	2.5	12.0
M08*8005#	18.3		56.7	4.0	10.0	16.5	2.5	20.0
M08-8036#	13.5	l	45.0	3.0	6.6	16.5	0.0	10.0
M08-8214	13.3	l	40.0	7.0	7.6	19.0	0.0	6.0
M08-8349	20.4		48.3	8.0	11.7	35.5	5.0	14.0
RCUOG1	26.2		65.0	12.0	12.0	37.5	2.5	28.0
RCUOG2	20.3		53.3	3.0	8.8	42.0	5.0	10.0
RCUOG3	17.8		56.7	4.0	7.0	18.5	2.5	18.0
RCUOG4	21.3		61.7	7.0	5.1	30.5	7.5	16.0
RCUOG5	24.6		66.7	5.0	9.2	40.5	2.5	24.0
IL06-14262	13.4	l	23.3	3.0	6.8	19.0	2.5	26.0
IL06-14325	17.3		48.3	10.0	8.7	26.0	5.0	6.0
IL06-13721	6.2	l	13.3	2.0	8.9	7.0	0.0	6.0
IL06-13708	12.5	l	23.3	3.0	7.0	21.5	2.5	18.0
IL04-24668	12.6	l	28.3	4.0	8.7	17.5	0.0	17.0
KY02C-1002-06	24.8		61.7	10.0	10.1	45.5	7.5	14.0
KY03C-1237-32	19.1		41.7	7.0	12.9	25.5	7.5	20.0
KY02C-2216-05	18.3		53.3	7.0	8.3	27.0	2.5	12.0
KY03C-1075-04	25.2		65.0	10.0	11.6	31.5	5.0	28.0
KY03C-2047-06	11.0	l	20.0	1.0	7.7	23.0	2.5	12.0
MD03W485-10-9	20.5		60.0	3.0	9.1	34.5	2.5	14.0
MD03W61-10-2	12.1	l	35.0	2.0	5.0	14.5	0.0	16.0
MD03W69-15	16.4		36.7	7.0	8.8	28.0	0.0	18.0
MD03W61-09-7	24.8		60.0	12.0	8.5	43.0	7.5	18.0
MO080104	13.2	l	26.7	7.0	6.7	19.0	0.0	20.0
MO081652	11.9	l	23.3	2.0	6.6	21.5	0.0	18.0
MO080589	12.5	l	33.3	5.0	6.5	13.5	0.0	17.0
MO081777	13.3	l	31.7	2.0	7.9	22.0	0.0	16.0
MO080789	10.7	l	26.7	2.0	6.3	13.0	0.0	16.0
NE01481	30.7	h	73.3	20.0	11.7	46.0	7.5	26.0
NE02558	29.5		70.0	15.0	12.0	42.5	7.5	30.0
NE05548	27.4		70.0	25.0	9.2	32.5	10.0	18.0
NE06469	32.3	h	66.7	35.0	12.4	42.0	10.0	28.0
NE07444	30.9	h	63.3	30.0	8.8	54.5	5.0	24.0
VA08W-176	21.1		56.7	4.0	8.9	42.5	2.5	12.0
VA08W-294	17.4		50.0	3.0	8.8	29.5	5.0	8.0
VA09W-657	15.1	l	40.0	4.0	6.9	29.0	2.5	8.0
VA09W-659	14.0	l	40.0	2.0	7.8	24.0	0.0	10.0
AVERAGE	20.0		52.3	9.4	9.9	28.8	3.9	15.8
MINUMUM	6.2		13.3	1.0	5.0	4.0	0.0	6.0
MAXIMUM	39.1		81.7	35.0	20.4	55.5	20.0	30.0
LSD(0.05)	9.2		.	.	.	.	.	.

l,h indicate means that are not significantly different from the lowest and highest means in that column (p<0.05)

Table 15. Incidence/Severity/FDK index (ISK, %) for the 2010-11 NUWWSN

NAME	AVG		ILURB	KYLEX	MOCOL	NYITH	OHWOO
ERNIE	30.9		58.1	36.5	39.5	10.1	10.0
TRUMAN	22.5	l	48.8	31.5	14.4	14.0	3.7
FREEDOM	38.9	h	76.2	41.3	44.2	21.1	12.0
PIONEER2545	46.8	h	83.7	41.6	61.2	30.7	16.6
NY99066-3025	38.4		83.0	43.6	22.7	31.0	11.6
OH751	33.7		60.9	37.2	38.4	20.4	11.7
NY99068-383	28.3	l	61.6	31.8	31.4	11.9	5.1
NY93246SP-6093	38.1		69.7	47.3	37.1	21.1	15.5
E6012	38.5		75.4	45.1	39.1	22.7	10.2
E6032	41.4	h	80.6	49.8	42.6	27.2	6.8
E9022R	40.6	h	72.8	36.9	57.1	31.5	4.8
E9024R	38.5		80.7	40.8	45.6	18.3	6.9
OH05-200-74	36.6		68.1	36.8	54.9	14.9	8.2
OH06-150-57	38.8	h	72.4	40.2	47.7	24.6	8.8
OH06-180-57	38.1		74.4	30.5	46.5	26.7	12.4
OH07-98-21	35.5		67.5	34.6	39.4	21.6	14.4
OH07-166-49	38.8	h	73.8	39.4	44.9	28.4	7.8
03633A1--5	27.7	l	50.5	33.9	41.8	9.2	3.2
04704A1--1	43.7	h	89.4	51.3	43.9	26.8	7.1
04606A1--7	25.0	l	56.6	29.3	20.6	10.5	8.2
05247A1--3	31.8		62.0	33.2	47.6	10.0	6.4
05264A1--2	37.8		66.2	46.2	44.8	23.4	8.6
M05-1526	31.4		56.1	29.3	46.0	19.2	6.5
M08*8005#	29.3	l	63.1	28.8	36.0	10.7	8.0
M08-8036#	26.5	l	55.0	32.4	30.3	10.0	4.8
M08-8214	27.0	l	52.5	31.7	36.1	11.0	3.7
M08-8349	31.8		60.2	28.9	47.2	16.4	6.4
RCUOG1	36.2		70.5	38.9	35.7	22.0	13.9
RCUOG2	33.1		64.0	35.8	51.1	10.8	4.0
RCUOG3	27.9	l	56.2	35.6	24.8	15.5	7.2
RCUOG4	32.2		63.9	28.4	37.8	24.0	7.0
RCUOG5	33.9		67.7	33.4	40.7	17.7	10.2
IL06-14262	29.5	l	47.0	31.9	39.7	13.7	15.3
IL06-14325	33.7		64.5	38.5	45.0	17.4	3.0
IL06-13721	23.2	l	40.5	34.5	32.0	4.7	4.1
IL06-13708	25.8	l	44.8	31.5	30.0	11.4	11.4
IL04-24668	28.6	l	51.4	35.9	35.0	12.7	8.2
KY02C-1002-06	37.4		69.9	38.7	54.6	15.8	8.2
KY03C-1237-32	33.1		54.1	44.7	43.0	15.5	8.2
KY02C-2216-05	36.5		64.6	43.1	48.3	16.2	10.4
KY03C-1075-04	34.8		65.1	39.0	39.9	16.1	13.7
KY03C-2047-06	31.3		48.7	33.5	47.9	17.1	9.2
MD03W485-10-9	35.6		66.2	35.5	52.1	18.1	6.1
MD03W61-10-2	29.4	l	48.7	34.3	39.4	13.7	10.7
MD03W69-15	30.1	l	48.1	39.6	44.9	7.7	10.0
MD03W61-09-7	39.1	h	63.4	43.0	57.2	21.7	10.1
MO080104	24.6	l	46.7	22.5	36.4	8.5	8.7
MO081652	27.0	l	43.4	34.9	39.7	10.0	7.2
MO080589	23.8	l	54.1	26.2	23.4	7.2	7.9
MO081777	25.7	l	46.7	24.0	40.1	11.3	6.4
MO080789	25.8	l	46.3	24.7	32.3	16.7	8.9
NE01481	35.9		76.3	33.5	37.6	21.1	10.8
NE02558	36.6		74.6	28.2	44.7	23.3	12.2
NE05548	38.2		80.5	39.7	37.5	24.7	8.8
NE06469	38.7	h	73.4	35.9	56.3	14.5	13.4
NE07444	35.6		64.3	30.5	57.0	15.3	11.2
VA08W-176	35.4		68.2	31.1	50.7	20.0	7.0
VA08W-294	32.3		63.8	35.7	41.4	16.0	4.6
VA09W-657	31.5		59.5	31.9	45.4	15.5	5.1
VA09W-659	30.8		55.8	33.5	42.0	16.6	6.3
AVERAGE	33.2		62.9	35.6	41.4	17.3	8.7
MINUMUM	22.5		40.5	22.5	14.4	4.7	3.0
MAXIMUM	46.8		89.4	51.3	61.2	31.5	16.6
LSD(0.05)	8.1		.	.	.	.	.

l,h indicate means that are not significantly different from the lowest and highest means in that column (p<0.05)

Table 16. Deoxynivalenol (DON, ppm) for the 2010-11 NUWWSN

NAME	AVG		ILURB	KYLEX	MDSAL	NEJAN	NYITH	OHWOO
ERNIE	8.1		14.8	26.7	2.9	0.7	1.1	2.2
TRUMAN	4.4	l	11.9	10.6	1.6	0.9	0.4	1.2
FREEDOM	7.4		13.4	22.4	2.7	0.9	1.8	2.9
PIONEER2545	13.2	h	31.7	29.6	4.9	2.4	7.6	3.3
NY99066-3025	8.6		20.4	16.2	3.3	0.8	4.9	6.1
OH751	5.2	l	8.4	15.7	3.1	0.5	1.7	2.0
NY99068-383	6.0	l	14.9	15.5	2.0	0.5	1.8	1.5
NY93246SP-6093	7.9		19.0	13.7	5.9	1.7	3.1	3.8
E6012	8.0		16.9	19.0	3.9	3.0	2.9	2.2
E6032	12.4	h	26.2	29.0	6.7	1.8	6.5	4.0
E9022R	7.0		16.5	14.2	2.6	0.6	6.8	1.4
E9024R	8.6		21.2	22.2	2.6	0.3	2.4	2.7
OH05-200-74	6.7		18.4	12.3	6.2	0.3	1.7	1.1
OH06-150-57	7.8		17.3	17.9	5.2	0.9	2.9	2.9
OH06-180-57	7.6		16.1	20.0	3.3	0.5	3.0	2.6
OH07-98-21	5.7	l	12.7	15.4	1.9	0.9	2.3	1.1
OH07-166-49	7.8		19.8	17.1	2.3	0.6	4.1	2.9
03633A1--5	6.6		19.1	14.6	3.6	0.6	1.4	0.4
04704A1--1	8.7		21.1	24.2	2.6	0.6	2.7	0.9
04606A1--7	9.0		25.0	22.5	3.4	0.7	0.7	1.4
05247A1--3	6.3		15.6	15.7	2.8	0.8	1.5	1.3
05264A1--2	8.3		17.1	25.4	4.0	0.6	1.5	1.2
M05-1526	7.5		13.8	26.1	1.5	0.3	1.7	1.5
M08*8005#	4.9	l	9.2	15.3	1.7	0.3	1.0	1.9
M08-8036#	4.2	l	7.9	17.3	0.9	0.4	0.4	.
M08-8214	5.8	l	13.0	19.6	0.8	0.3	0.8	0.5
M08-8349	6.4		12.7	21.5	0.9	0.3	1.9	1.3
RCUOG1	5.0	l	10.7	13.0	2.4	0.3	2.0	1.5
RCUOG2	8.9		18.2	29.9	1.3	0.7	1.6	1.9
RCUOG3	6.2		18.0	14.2	0.8	0.3	1.2	2.8
RCUOG4	7.2		18.1	16.4	2.4	0.9	2.2	3.4
RCUOG5	6.5		15.5	14.9	3.7	0.5	1.0	3.4
IL06-14262	4.0	l	8.6	12.9	0.3	0.3	1.1	0.7
IL06-14325	5.8	l	11.3	19.6	1.7	0.3	1.8	0.4
IL06-13721	4.6	l	6.8	17.7	1.7	0.3	0.4	1.0
IL06-13708	4.4	l	6.9	15.3	2.6	0.3	0.7	0.5
IL04-24668	5.0	l	10.8	14.6	2.1	0.3	1.6	0.6
KY02C-1002-06	5.8	l	11.1	19.2	1.1	0.3	2.0	0.9
KY03C-1237-32	5.9	l	11.7	18.2	1.7	0.3	2.0	1.7
KY02C-2216-05	5.0	l	8.8	17.9	0.6	0.5	1.4	0.7
KY03C-1075-04	8.3		17.6	21.8	3.0	0.6	1.2	5.5
KY03C-2047-06	5.7	l	9.5	18.7	3.0	0.3	1.8	0.9
MD03W485-10-9	5.9	l	12.1	17.5	2.0	0.5	1.8	1.7
MD03W61-10-2	3.8	l	9.0	10.7	1.0	0.6	0.7	0.7
MD03W69-15	3.1	l	8.6	8.7	0.7	0.3	0.2	0.3
MD03W61-09-7	5.6	l	11.2	18.1	1.1	0.3	2.0	1.0
MO080104	4.3	l	6.5	15.6	1.1	1.2	0.7	0.4
MO081652	3.7	l	5.1	14.7	0.7	0.5	0.9	0.3
MO080589	6.0	l	12.6	17.2	3.8	0.7	0.6	1.0
MO081777	3.7	l	6.5	13.5	0.9	0.3	0.6	0.4
MO080789	4.6	l	8.6	16.2	0.6	0.9	0.6	0.5
NE01481	8.8		21.9	18.6	3.5	1.1	3.6	4.0
NE02558	8.0		14.8	22.2	1.3	1.1	3.4	5.0
NE05548	9.8		19.1	22.6	4.9	1.1	5.7	5.5
NE06469	9.8		20.8	25.1	4.6	0.5	3.1	4.5
NE07444	6.7		16.9	18.0	1.3	0.3	1.8	1.9
VA08W-176	5.8	l	10.6	18.1	1.9	1.5	1.8	1.0
VA08W-294	5.7	l	12.7	17.0	1.7	0.8	1.2	1.0
VA09W-657	5.2	l	9.5	16.6	1.1	1.7	1.6	0.9
VA09W-659	6.5		11.4	20.5	3.8	0.5	1.5	1.2
AVERAGE	6.6		14.3	18.2	2.5	0.7	2.0	1.9
MINUMUM	3.1		5.1	8.7	0.3	0.3	0.2	0.3
MAXIMUM	13.2		31.7	29.9	6.7	3.0	7.6	6.1
LSD(0.05)	3.0		.	.	.	.	.	.

l,h indicate means that are not significantly different from the lowest and highest means in that column ($p<0.05$)

Table 17. Greenhouse type I severity (GH) for the 2010-11 NUWWSN

NAME	AVG		ILURB	MOCOL
ERNIE	35.9	l	52.5	19.2
TRUMAN	6.4	l	8.0	4.8
FREEDOM	18.1	l	14.4	21.8
PIONEER2545	46.1	h	36.1	.
NY99066-3025	40.8	h	67.3	14.2
OH751	52.4	h	66.5	38.3
NY99068-383	14.5	l	20.0	8.9
NY93246SP-6093	19.9	l	32.0	7.8
E6012	30.6	l	44.0	17.1
E6032	26.3	l	26.7	25.8
E9022R	63.1	h	84.3	41.8
E9024R	32.0	l	36.0	28.0
OH05-200-74	8.5	l	11.0	5.9
OH06-150-57	68.9	h	100.0	37.8
OH06-180-57	71.6	h	100.0	43.2
OH07-98-21	51.3	h	77.0	25.5
OH07-166-49	69.7	h	85.2	54.3
03633A1--5	15.1	l	14.4	15.9
04704A1--1	30.1	l	49.3	10.8
04606A1--7	4.6	l	2.5	6.6
05247A1--3	19.8	l	21.5	18.0
05264A1--2	56.1	h	67.7	44.4
M05-1526	27.2	l	21.0	33.3
M08*8005#	65.3	h	100.0	30.6
M08-8036#	15.1	l	22.8	7.4
M08-8214	12.3	l	13.7	10.9
M08-8349	19.6	l	29.8	9.4
RCUOG1	54.7	h	72.0	37.3
RCUOG2	35.7	l	53.2	18.1
RCUOG3	18.3	l	19.3	17.2
RCUOG4	60.9	h	77.5	44.2
RCUOG5	37.2	l	50.3	24.1
IL06-14262	8.8	l	8.0	9.7
IL06-14325	31.5	l	25.3	37.6
IL06-13721	37.2	l	62.0	12.5
IL06-13708	36.5	l	47.0	25.9
IL04-24668	29.4	l	51.0	7.8
KY02C-1002-06	15.6	l	8.5	22.7
KY03C-1237-32	26.0	l	41.4	10.5
KY02C-2216-05	65.0	h	100.0	30.0
KY03C-1075-04	69.0	h	89.0	49.0
KY03C-2047-06	13.5	l	3.3	23.6
MD03W485-10-9	74.5	h	100.0	49.0
MD03W61-10-2	4.3	l	3.4	5.2
MD03W69-15	3.1	l	1.5	4.7
MD03W61-09-7	19.5	l	21.5	17.5
MO080104	13.9	l	19.7	8.1
MO081652	3.8	l	3.0	4.6
MO080589	15.7	l	22.3	9.0
MO081777	5.7	l	1.4	10.0
MO080789	11.3	l	8.5	14.1
NE01481	76.0	h	86.7	65.3
NE02558	56.4	h	76.5	36.3
NE05548	49.0	h	60.4	37.6
NE06469	52.6	h	61.8	43.4
NE07444	62.2	h	98.0	26.4
VA08W-176	64.4	h	98.0	30.8
VA08W-294	14.1	l	14.8	13.4
VA09W-657	17.0	l	3.0	31.0
VA09W-659	10.9	l	2.8	19.0
AVERAGE	33.6		43.2	23.3
MINUMUM	3.1		1.4	4.6
MAXIMUM	76.0		100.0	65.3
LSD(0.05)	35.6		.	.

l,h indicate means that are not significantly different from the lowest and highest means in that column ($p<0.05$)

Table 18. Heading date (HD, Julian date) for the 2010-11 NUWWSN

NAME	AVG		ILURB	INBRO	KYLEX	MDSAL	MIELA	MOCOL	NYITH	OHWOO	ONRID	ROFUN	VABLA
ERNIE	141	l	136	139	131	122	152	137	150	148	154	139	142
TRUMAN	147		143	147	147	126	157	151	152	151	157	143	146
FREEDOM	145		139	141	135	125	157	145	153	150	158	144	144
PIONEER2545	143		138	140	133	124	155	142	152	151	157	139	143
NY99066-3025	148		144	146	144	129	157	151	153	151	159	142	146
OH751	145		139	141	138	124	156	151	152	148	158	140	144
NY99068-383	149	h	145	147	150	131	158	153	154	152	159	144	148
NY93246SP-6093	149	h	144	148	146	128	157	152	155	153	159	143	148
E6012	144		140	142	136	124	155	146	154	150	158	141	144
E6032	145		141	143	136	125	157	147	153	150	158	143	146
E9022R	144		141	143	132	124	156	143	153	149	157	142	144
E9024R	144		139	141	132	124	156	146	152	150	158	142	143
OH05-200-74	145		141	143	135	125	157	148	152	148	159	141	145
OH06-150-57	142		137	138	131	123	155	141	152	148	156	141	143
OH06-180-57	144		140	142	133	123	156	146	153	150	157	142	144
OH07-98-21	144		138	140	134	124	155	145	153	149	157	142	144
OH07-166-49	144		141	143	134	124	156	146	152	148	158	142	144
03633A1--5	143		138	140	133	125	156	144	152	148	157	139	144
04704A1--1	143		136	138	134	123	155	147	151	148	156	139	143
04606A1--7	146		142	144	142	125	156	151	152	150	157	141	145
05247A1--3	143		137	139	131	123	156	144	151	148	156	142	143
05264A1--2	142		135	137	133	124	154	139	151	148	155	140	143
M05-1526	141	l	134	136	132	124	152	143	151	146	154	139	144
M08*8005#	141	l	134	136	131	123	153	141	151	146	155	139	142
M08-8036#	141	l	133	135	131	122	154	144	151	146	155	138	143
M08-8214	141	l	134	136	131	122	153	140	148	146	155	139	142
M08-8349	143		136	138	133	123	155	144	151	148	155	142	144
RCUOG1	147		142	144	143	126	157	153	153	153	158	144	146
RCUOG2	142		136	138	133	123	155	143	151	148	155	140	143
RCUOG3	145		141	142	136	125	156	149	151	149	157	143	145
RCUOG4	145		141	143	133	124	157	148	151	149	159	143	145
RCUOG5	145		141	144	135	125	156	150	149	150	156	142	146
IL06-14262	142		138	140	133	124	153	142	151	147	156	139	143
IL06-14325	142		137	139	133	124	154	140	151	147	157	141	143
IL06-13721	140	l	132	135	131	122	152	145	148	144	153	137	142
IL06-13708	143		137	137	137	125	162	137	151	147	154	138	144
IL04-24668	140	l	133	134	131	123	153	139	150	146	154	139	143
KY02C-1002-06	143		138	140	134	124	155	142	152	149	157	142	144
KY03C-1237-32	143		136	138	135	124	154	141	152	150	156	144	144
KY02C-2216-05	142		137	138	133	124	154	139	150	149	156	143	143
KY03C-1075-04	148	h	145	147	140	128	157	152	153	154	159	146	146
KY03C-2047-06	142		136	137	132	124	154	141	151	147	156	141	143
MD03W485-10-9	143		137	139	131	123	156	140	151	150	156	143	144
MD03W61-10-2	142		136	137	132	123	155	142	151	147	157	140	144
MD03W69-15	144		138	140	135	125	155	142	152	150	157	142	143
MD03W61-09-7	142		136	138	133	124	154	140	152	148	156	141	143
MO080104	142		135	137	131	124	153	143	151	148	156	142	143
MO081652	142	l	136	138	130	123	154	139	152	147	155	141	142
MO080589	144		139	141	134	124	155	145	152	149	156	142	144
MO081777	142		136	138	132	123	154	142	151	148	155	142	143
MO080789	142		137	139	132	122	154	144	151	149	155	142	143
NE01481	145		141	141	140	125	155	142	152	151	157	142	144
NE02558	145		139	141	143	124	155	145	152	151	156	143	146
NE05548	147		143	144	144	126	156	149	152	151	157	143	147
NE06469	141	l	135	137	131	122	154	138	150	149	154	138	144
NE07444	142		136	136	131	123	154	141	151	149	156	139	143
VA08W-176	144		141	143	132	124	156	144	151	151	157	141	144
VA08W-294	143		140	141	133	123	156	143	152	149	156	139	144
VA09W-657	143		138	140	133	124	155	143	151	147	156	140	143
VA09W-659	144		138	140	133	124	156	146	151	149	157	142	143
AVERAGE	144		138	140	135	124	155	144	152	149	156	141	144
MINUMUM	140		132	134	130	122	152	137	148	144	153	137	142
MAXIMUM	149		145	148	150	131	162	153	155	154	159	146	148
LSD(0.05)	2		.	.	.	.	.	.	.	.	.	.	.

l,h indicate means that are not significantly different from the lowest and highest means in that column ($p<0.05$)

Table 19. Height (HGT, inches) for the 2010-11 NUWWSN

NAME	AVG		KYLEX	MDSAL	ROFUN
ERNIE	35		32	35	38
TRUMAN	39		39	40	37
FREEDOM	38		37	39	39
PIONEER2545	36		33	36	38
NY99066-3025	43		43	43	42
OH751	39		38	39	41
NY99068-383	40		39	42	39
NY93246SP-6093	41		37	43	42
E6012	35		33	36	36
E6032	33	l	30	35	34
E9022R	35		36	37	34
E9024R	33		35	35	30
OH05-200-74	37		35	40	36
OH06-150-57	34		33	36	34
OH06-180-57	36		35	37	36
OH07-98-21	37		33	40	39
OH07-166-49	34		31	38	35
03633A1--5	32	l	32	34	30
04704A1--1	31	l	30	32	30
04606A1--7	39		38	39	39
05247A1--3	31	l	30	33	32
05264A1--2	29	l	29	29	31
M05-1526	37		32	39	40
M08*8005#	34		33	35	34
M08-8036#	36		35	36	36
M08-8214	38		36	39	40
M08-8349	35		35	37	34
RCUOG1	44	h	43	49	40
RCUOG2	38		38	36	39
RCUOG3	46	h	43	50	44
RCUOG4	47	h	46	53	41
RCUOG5	47	h	46	56	38
IL06-14262	35		33	37	34
IL06-14325	36		32	39	36
IL06-13721	34		33	35	34
IL06-13708	38		36	40	38
IL04-24668	33	l	30	35	33
KY02C-1002-06	35		33	37	36
KY03C-1237-32	30	l	29	31	30
KY02C-2216-05	33	l	33	36	30
KY03C-1075-04	35		34	38	34
KY03C-2047-06	33	l	32	35	32
MD03W485-10-9	32	l	32	35	30
MD03W61-10-2	34		32	35	34
MD03W69-15	33		32	36	32
MD03W61-09-7	35		32	36	36
MO080104	36		34	39	35
MO081652	37		37	37	36
MO080589	37		36	41	34
MO081777	35		33	39	32
MO080789	39		39	39	39
NE01481	40		37	44	39
NE02558	37		38	40	34
NE05548	45	h	40	48	47
NE06469	37		39	37	36
NE07444	40		41	39	39
VA08W-176	35		34	36	34
VA08W-294	34		35	36	32
VA09W-657	37		34	36	41
VA09W-659	34		34	34	34
AVERAGE	36		35	38	36
MINUMUM	29		29	29	30
MAXIMUM	47		46	56	47
LSD(0.05)	4		.	.	.

l,h indicate means that are not significantly different from the lowest and highest means in that column ($p<0.05$)

Table 20. Other traits for the 2010-11 NUWWSN

	ROFUN FHB AUDPC	INLAY # Syptomatic Florets
ERNIE	212	0.86
TRUMAN	225	1.92
FREEDOM	166	0.75
PIONEER2545	244	3.42
NY99066-3025	695	3.17
OH751	171	1.42
NY99068-383	179	2.00
NY93246SP-6093	381	1.75
E6012	200	4.25
E6032	159	1.75
E9022R	367	2.33
E9024R	284	2.40
OH05-200-74	206	0.83
OH06-150-57	263	2.07
OH06-180-57	425	1.60
OH07-98-21	414	1.17
OH07-166-49	456	4.00
03633A1--5	148	1.20
04704A1--1	321	0.60
04606A1--7	133	2.33
05247A1--3	165	1.30
05264A1--2	239	0.83
M05-1526	283	1.14
M08*8005#	280	0.71
M08-8036#	223	1.29
M08-8214	154	1.14
M08-8349	104	1.08
RCUOG1	177	4.08
RCUOG2	267	3.07
RCUOG3	243	0.83
RCUOG4	316	1.50
RCUOG5	219	0.93
IL06-14262	203	0.90
IL06-14325	280	0.50
IL06-13721	667	1.00
IL06-13708	318	1.00
IL04-24668	338	3.50
KY02C-1002-06	200	3.42
KY03C-1237-32	123	1.00
KY02C-2216-05	279	1.08
KY03C-1075-04	255	2.25
KY03C-2047-06	156	0.86
MD03W485-10-9	281	1.75
MD03W61-10-2	144	0.75
MD03W69-15	124	0.60
MD03W61-09-7	155	0.67
MO080104	167	0.83
MO081652	164	0.71
MO080589	140	1.42
MO081777	121	1.00
MO080789	247	0.71
NE01481	499	2.90
NE02558	235	1.42
NE05548	466	2.88
NE06469	396	3.43
NE07444	290	1.50
VA08W-176	289	1.00
VA08W-294	239	0.93
VA09W-657	192	1.00
VA09W-659	168	0.42

l,h indicate means that are not significantly different from the lowest and highest means in that column ($p<0.05$)

Table 21. Incidence (INC, %) for the 2010-11 PNUWWSN

ENTRY	NAME	AVG		ILURB	INBRO	KYLEX	MIELA	MOCOL	VABLA
1	ERNIE	45.0	l	95.0	12.8	50.0	17.3	90.0	5.0
2	TRUMAN	35.6	l	93.3	11.3	50.0	-1.3	55.0	5.0
3	FREEDOM	54.0		100.0	56.3	77.5	15.2	70.0	5.0
4	PIONEER2545	57.6	h	100.0	60.0	47.5	33.0	100.0	5.0
5	E9020R	52.7		100.0	30.0	62.5	21.3	95.0	7.5
6	E9021R	57.8	h	100.0	53.3	70.0	18.6	100.0	5.0
7	E9009	53.7		98.3	33.8	82.5	12.8	90.0	5.0
8	M09-9804#	50.7		91.7	22.5	80.0	10.0	95.0	5.0
9	OH07-166-41	49.4		98.3	30.0	60.0	13.3	90.0	5.0
10	OH07-254-11	47.7		100.0	22.5	42.5	16.3	100.0	5.0
11	OH07-263-3	53.7		100.0	30.0	72.5	15.0	100.0	5.0
12	OH08-133-25	52.0		100.0	22.5	55.0	27.0	100.0	7.5
13	OH08-269-58	59.9	h	100.0	57.0	80.0	22.2	95.0	5.0
14	05251A1--5	55.9	h	100.0	41.3	75.0	14.2	100.0	5.0
15	05269A1--1	64.4	h	100.0	66.0	77.5	33.1	100.0	10.0
16	06497A1--3	40.8	l	100.0	12.8	40.0	7.1	80.0	5.0
17	0711A1--1	49.9		93.3	27.0	60.0	19.2	95.0	5.0
18	0724B1--13	50.1		93.3	28.5	55.0	19.0	100.0	5.0
19	M08-8352	45.8	l	98.3	21.8	35.4	16.6	95.0	7.5
20	IL07-4348	49.2		93.3	28.5	67.5	10.9	90.0	5.0
21	IL07-4415	51.1		96.7	25.5	62.5	16.6	100.0	5.0
22	IL07-7525	50.2		93.3	31.5	57.5	13.6	100.0	5.0
23	IL07-14547	41.9	l	88.3	15.0	40.0	20.4	80.0	7.5
24	IL07-19334	38.0	l	93.3	15.8	30.0	4.0	80.0	5.0
25	KY03C-2047-07	50.5		95.0	25.5	72.5	15.1	90.0	5.0
26	KY04C-2023-18	44.9	l	95.0	17.3	65.0	2.1	85.0	5.0
27	KY04C-2034-2	50.0		100.0	33.8	80.0	5.9	75.0	5.0
28	KY04C-2034-3	50.4		96.7	26.3	85.0	4.5	85.0	5.0
29	KY04C-2034-4	50.8		100.0	28.5	77.5	13.6	80.0	5.0
30	MO080241	37.5	l	86.7	20.3	25.0	18.1	70.0	5.0
31	MO090862	49.0		93.3	24.8	65.0	11.0	95.0	5.0
32	MO090577	50.1		93.3	27.8	62.5	16.9	95.0	5.0
33	MO090812	43.6	l	96.7	16.5	55.0	3.6	85.0	5.0
34	MO091122	43.0	l	96.7	13.5	45.0	13.0	85.0	5.0
35	VA08W-632	56.5	h	96.7	32.3	75.0	35.1	95.0	5.0
36	VA09W-608	42.0	l	91.7	18.8	35.0	11.7	90.0	5.0
37	VA09W-635	53.2		100.0	33.8	62.5	23.0	95.0	5.0
38	VA09W-636	45.1	l	98.3	17.3	45.0	10.3	95.0	5.0
39	VA09W-644	45.5	l	93.3	16.5	42.5	15.5	100.0	5.0
40	VA09W-654	49.8		96.7	34.5	75.0	7.9	80.0	5.0
100	AVERAGE	49.2		96.4	28.6	59.9	15.1	90.0	5.4
101	MINUMUM	35.6		86.7	11.3	25.0	-1.3	55.0	5.0
102	MAXIMUM	64.4		100.0	66.0	85.0	35.1	100.0	10.0
103	LSD(0.05)	10.4		.	.	.	.	.	.

l,h indicate means that are not significantly different from the lowest and highest means in that column (p<0.05)

Table 22. Severity (SEV, %) for the 2010-11 PNUWWSN

ENTRY	NAME	AVG		ILURB	INBRO	KYLEX	MIELA	MOCOL	ROFUN	VABLA
1	ERNIE	25.2		58.9	27.0	37.1	8.2	15.8	26.1	3.0
2	TRUMAN	12.1	l	27.5	10.0	17.2	7.5	7.3	12.9	2.5
3	FREEDOM	30.0		62.5	55.0	49.1	15.0	10.2	16.0	2.5
4	PIONEER2545	44.0	h	75.8	90.0	57.1	27.5	33.0	19.0	5.5
5	E9020R	41.4	h	78.8	80.0	47.7	19.0	24.0	31.1	9.5
6	E9021R	39.3	h	68.5	65.0	44.5	21.6	25.0	43.2	7.5
7	E9009	38.8	h	65.8	70.0	55.4	31.9	12.7	29.3	6.5
8	M09-9804#	21.5	l	43.2	17.0	34.3	13.3	10.0	27.0	6.0
9	OH07-166-41	32.4		53.6	52.0	39.4	44.8	17.0	12.2	7.5
10	OH07-254-11	30.5		59.2	40.0	46.6	22.4	23.3	16.8	5.0
11	OH07-263-3	28.0		43.8	45.0	40.4	18.8	13.1	30.2	5.0
12	OH08-133-25	39.7	h	83.0	65.0	50.9	17.1	19.9	36.5	5.5
13	OH08-269-58	41.2	h	61.1	70.0	49.6	34.4	19.0	45.6	9.0
14	05251A1--5	30.3		52.2	49.0	52.2	15.3	16.1	22.5	5.0
15	05269A1--1	36.6	h	53.2	74.0	55.7	11.8	26.0	22.5	13.0
16	06497A1--3	19.8	l	46.9	10.0	35.1	12.7	8.5	21.1	4.0
17	0711A1--1	24.5		49.7	25.0	47.3	10.9	12.7	18.7	7.5
18	0724B1--13	16.0	l	26.1	21.0	23.2	4.5	15.2	15.3	7.0
19	M08-8352	25.4		53.9	30.0	21.6	21.7	20.9	23.5	6.0
20	IL07-4348	14.7	l	34.2	14.0	24.6	2.4	13.4	11.4	3.0
21	IL07-4415	17.4	l	20.8	16.0	34.5	16.2	11.6	18.4	4.5
22	IL07-7525	21.0	l	43.1	15.0	28.2	4.4	16.3	34.2	6.0
23	IL07-14547	18.1	l	30.9	21.0	15.4	5.8	24.4	18.6	10.5
24	IL07-19334	14.9	l	27.2	10.0	18.6	16.7	12.2	14.2	5.5
25	KY03C-2047-07	21.8	l	39.3	16.0	42.3	8.5	22.6	16.9	7.0
26	KY04C-2023-18	14.4	l	25.2	7.0	21.3	19.7	7.0	14.9	6.0
27	KY04C-2034-2	32.2		58.0	60.0	43.6	29.0	9.8	19.3	6.0
28	KY04C-2034-3	25.8		40.8	35.0	35.7	30.4	9.4	23.9	5.5
29	KY04C-2034-4	23.6		55.3	30.0	29.7	12.1	7.6	21.9	8.5
30	MO080241	15.6	l	35.5	11.0	16.4	7.4	10.5	23.6	4.5
31	MO090862	25.0		46.8	33.0	46.4	9.5	11.9	22.6	4.5
32	MO090577	13.5	l	21.6	12.0	28.3	6.0	9.8	13.5	3.0
33	MO090812	20.4	l	33.1	17.0	42.4	13.9	12.1	18.8	5.5
34	MO091122	29.2		44.2	33.0	47.3	25.7	16.6	31.4	6.5
35	VA08W-632	29.6		48.0	35.0	46.1	27.1	21.6	27.1	2.5
36	VA09W-608	17.8	l	30.8	10.0	24.9	22.4	13.8	15.4	7.5
37	VA09W-635	26.6		51.1	29.0	54.6	6.5	17.3	21.4	6.0
38	VA09W-636	31.4		49.9	50.0	36.9	27.8	18.1	29.5	7.5
39	VA09W-644	20.5	l	30.1	18.0	34.9	11.7	18.4	27.3	3.0
40	VA09W-654	19.0	l	37.4	15.0	26.6	13.8	11.9	24.4	4.0
100	AVERAGE	25.7		46.7	34.6	37.6	16.9	15.7	23.0	5.9
101	MINUMUM	12.1		20.8	7.0	15.4	2.4	7.0	11.4	2.5
102	MAXIMUM	44.0		83.0	90.0	57.1	44.8	33.0	45.6	13.0
103	LSD(0.05)	10.6		.	.	.	.	.	.	.

l,h indicate means that are not significantly different from the lowest and highest means in that column (p<0.05)

Table 23. Index (IND, %) for the 2010-11 PNUWWSN

ENTRY	NAME	AVG		ILURB	INBRO	KYLEX	MIELA	MOCOL	OHWOO	VABLA
1	ERNIE	15.1		56.1	3.4	19.4	3.6	14.4	8.9	0.2
2	TRUMAN	5.8	l	25.8	1.1	8.8	-1.4	4.1	2.3	0.1
3	FREEDOM	20.7		62.5	30.9	38.1	1.5	7.0	4.6	0.1
4	PIONEER2545	29.3	h	75.8	54.0	27.0	8.0	33.0	7.2	0.3
5	E9020R	23.5	h	78.8	24.0	30.2	3.8	23.3	3.3	0.8
6	E9021R	23.9	h	68.5	34.6	32.2	3.9	25.0	2.7	0.4
7	E9009	23.0	h	65.0	23.6	45.7	6.2	11.2	9.0	0.3
8	M09-9804#	12.0	l	40.1	3.8	27.7	0.5	9.4	2.4	0.3
9	OH07-166-41	17.5		52.8	15.6	23.9	4.7	15.5	9.6	0.4
10	OH07-254-11	16.8		59.2	9.0	19.9	3.1	23.3	2.8	0.3
11	OH07-263-3	15.1		43.8	13.5	30.7	3.0	13.1	1.3	0.3
12	OH08-133-25	23.3	h	83.0	14.6	27.9	5.0	19.9	12.2	0.5
13	OH08-269-58	24.4	h	61.1	39.9	40.3	6.5	17.9	4.5	0.5
14	05251A1--5	18.6		52.2	20.2	38.5	1.4	16.1	1.3	0.3
15	05269A1--1	25.3	h	53.2	48.8	43.6	1.4	26.0	2.9	1.3
16	06497A1--3	10.7	l	46.9	1.3	15.1	1.0	7.3	2.9	0.2
17	0711A1--1	14.8		47.1	6.8	30.1	3.2	12.1	4.1	0.4
18	0724B1--13	9.4	l	24.4	6.0	12.7	3.6	15.2	3.6	0.4
19	M08-8352	13.2	l	52.8	6.5	8.2	3.2	19.8	1.6	0.6
20	IL07-4348	10.2	l	32.1	4.0	16.1	1.3	11.7	6.2	0.2
21	IL07-4415	11.3	l	20.0	4.1	23.4	3.7	11.6	16.1	0.2
22	IL07-7525	11.6	l	40.3	4.7	16.4	3.3	16.3	0.2	0.3
23	IL07-14547	9.1	l	27.5	3.2	6.2	3.7	21.3	0.8	1.0
24	IL07-19334	6.7	l	25.4	1.6	6.2	0.6	9.6	2.9	0.3
25	KY03C-2047-07	14.1	l	37.3	4.1	30.5	2.8	20.4	3.2	0.4
26	KY04C-2023-18	6.7	l	23.9	1.2	14.4	0.3	5.9	0.6	0.3
27	KY04C-2034-2	18.4		58.0	20.3	36.0	1.2	7.7	5.4	0.3
28	KY04C-2034-3	13.4	l	39.6	9.2	30.4	1.3	8.4	4.9	0.3
29	KY04C-2034-4	14.0	l	55.3	8.6	22.9	2.5	6.1	1.9	0.4
30	MO080241	7.1	l	30.7	2.2	4.2	3.6	7.2	1.8	0.2
31	MO090862	14.5		43.2	8.2	30.1	1.7	11.3	6.9	0.2
32	MO090577	7.9	l	20.3	3.3	17.6	3.5	9.2	1.2	0.2
33	MO090812	10.0	l	32.0	2.8	23.3	-0.2	10.5	1.3	0.3
34	MO091122	12.6	l	42.6	4.5	22.3	2.6	14.5	1.6	0.3
35	VA08W-632	18.2		46.0	11.3	34.8	9.1	20.6	5.2	0.1
36	VA09W-608	8.3	l	28.1	1.9	8.4	2.2	12.4	4.7	0.4
37	VA09W-635	17.1		51.1	9.8	33.6	3.3	16.6	5.0	0.3
38	VA09W-636	13.5	l	49.0	8.6	16.9	1.7	17.1	0.7	0.4
39	VA09W-644	9.6	l	28.0	3.0	15.1	1.7	18.4	0.8	0.2
40	VA09W-654	10.8	l	36.2	5.2	19.9	1.3	9.5	3.6	0.2
100	AVERAGE	14.7		45.4	12.0	23.7	2.8	14.5	4.1	0.3
101	MINUMUM	5.8		20.0	1.1	4.2	-1.4	4.1	0.2	0.1
102	MAXIMUM	29.3		83.0	54.0	45.7	9.1	33.0	16.1	1.3
103	LSD(0.05)	8.4		.	.	.	.	.	.	.

l,h indicate means that are not significantly different from the lowest and highest means in that column (p<0.05)

Table 24. Fusarium Damaged Kernels (FDK, %) for the 2010-11 PNUWWSN

ENTRY	NAME	AVG		ILURB	INLAF	KYLEX	MOCOL	OHWOO
1	ERNIE	20.7		40.0	12.0	12.9	26.5	12.0
2	TRUMAN	8.6	l	18.3	5.0	5.7	8.0	6.0
3	FREEDOM	30.4	h	71.7	20.0	14.8	33.5	12.0
4	PIONEER2545	38.7	h	76.7	27.0	19.6	56.0	14.0
5	E9020R	30.9	h	78.3	12.0	10.5	45.5	8.0
6	E9021R	26.6		56.7	10.0	14.8	44.5	7.0
7	E9009	23.2		58.3	3.0	13.9	24.0	17.0
8	M09-9804#	15.5	l	40.0	1.0	8.5	14.0	14.0
9	OH07-166-41	24.0		53.3	10.0	18.3	26.5	12.0
10	OH07-254-11	30.3	h	78.3	10.0	18.8	34.5	10.0
11	OH07-263-3	20.9		46.7	7.0	14.2	24.5	12.0
12	OH08-133-25	31.4	h	73.3	20.0	11.7	38.0	14.0
13	OH08-269-58	27.4		48.3	35.0	12.3	31.5	10.0
14	05251A1--5	25.1		50.0	12.0	10.9	37.5	15.0
15	05269A1--1	36.2	h	76.7	17.0	22.8	55.5	9.0
16	06497A1--3	18.7	l	35.0	5.0	8.7	25.0	20.0
17	0711A1--1	21.7		48.3	4.0	10.4	30.0	16.0
18	0724B1--13	16.1	l	18.3	5.0	10.8	31.5	15.0
19	M08-8352	25.7		53.3	10.0	12.9	40.5	12.0
20	IL07-4348	13.6	l	21.7	7.0	12.1	16.0	11.0
21	IL07-4415	15.1	l	21.7	10.0	8.4	15.5	20.0
22	IL07-7525	17.7	l	31.7	5.0	14.0	24.0	14.0
23	IL07-14547	15.7	l	16.7	3.0	9.9	33.0	16.0
24	IL07-19334	12.3	l	25.0	2.0	6.3	12.0	16.0
25	KY03C-2047-07	15.6	l	33.3	1.0	7.6	24.0	12.0
26	KY04C-2023-18	9.8	l	18.3	2.0	6.5	12.0	10.0
27	KY04C-2034-2	18.9	l	40.0	12.0	11.1	15.5	16.0
28	KY04C-2034-3	18.3	l	38.3	7.0	9.1	23.0	14.0
29	KY04C-2034-4	22.0		41.7	12.0	11.5	26.0	19.0
30	MO080241	14.7	l	31.7	4.0	7.4	16.5	14.0
31	MO090862	13.7	l	30.0	4.0	7.3	16.0	11.0
32	MO090577	14.6	l	28.3	4.0	4.2	28.5	8.0
33	MO090812	17.1	l	35.0	5.0	7.8	18.5	19.0
34	MO091122	25.1		61.7	10.0	12.5	31.5	10.0
35	VA08W-632	28.3	h	56.7	12.0	13.3	49.5	10.0
36	VA09W-608	18.4	l	38.3	12.0	5.9	28.0	8.0
37	VA09W-635	28.3	h	66.7	20.0	13.2	33.5	8.0
38	VA09W-636	21.7		46.7	4.0	12.0	40.0	6.0
39	VA09W-644	16.2	l	35.0	5.0	11.4	23.5	6.0
40	VA09W-654	14.0	l	31.7	7.0	4.6	20.5	6.0
100	AVERAGE	21.1		44.3	9.3	11.2	28.4	12.2
101	MINUMUM	8.6		16.7	1.0	4.2	8.0	6.0
102	MAXIMUM	38.7		78.3	35.0	22.8	56.0	20.0
103	LSD(0.05)	11.0		.	.	.	.	.

l,h indicate means that are not significantly different from the lowest and highest means in that column ($p<0.05$)

Table 25. Incidence/Severity/FDK index (ISK, %) for the 2010-11 PNUWWSN

ENTRY	NAME	AVG		ILURB	KYLEX	MOCOL	OHWOO
1	ERNIE	35.2		62.2	31.3	42.3	4.8
2	TRUMAN	22.6	l	43.6	22.5	21.9	2.4
3	FREEDOM	40.9	h	77.4	43.9	37.5	4.8
4	PIONEER2545	47.6	h	83.4	39.2	62.3	5.6
5	E9020R	44.8	h	85.0	37.3	53.9	3.2
6	E9021R	42.9	h	73.2	40.3	55.3	2.8
7	E9009	41.7	h	72.6	46.9	40.4	6.8
8	M09-9804#	34.2		56.5	37.7	37.1	5.6
9	OH07-166-41	37.9		66.9	37.1	42.7	4.8
10	OH07-254-11	42.0	h	79.1	34.2	50.8	4.0
11	OH07-263-3	37.5		61.8	39.5	43.7	4.8
12	OH08-133-25	44.4	h	84.3	36.5	51.2	5.6
13	OH08-269-58	40.5	h	67.6	43.8	46.8	4.0
14	05251A1--5	41.0	h	65.7	42.5	49.8	6.0
15	05269A1--1	47.3	h	76.6	49.1	60.0	3.6
16	06497A1--3	32.2	l	58.0	26.0	36.6	8.0
17	0711A1--1	37.3		62.3	36.4	44.3	6.4
18	0724B1--13	31.0	l	43.2	27.8	47.2	6.0
19	M08-8352	36.3		67.0	22.3	51.0	4.8
20	IL07-4348	30.3	l	46.9	32.5	37.4	4.4
21	IL07-4415	31.0	l	43.9	32.4	39.7	8.0
22	IL07-7525	33.7		53.6	31.3	44.5	5.6
23	IL07-14547	28.5	l	42.4	20.6	44.5	6.4
24	IL07-19334	25.6	l	46.2	17.1	32.5	6.4
25	KY03C-2047-07	34.8		53.6	37.5	43.4	4.8
26	KY04C-2023-18	27.1	l	43.4	28.5	32.4	4.0
27	KY04C-2034-2	35.7		63.4	41.5	31.6	6.4
28	KY04C-2034-3	34.9		56.6	39.8	37.5	5.6
29	KY04C-2034-4	36.1		63.2	36.7	36.7	7.6
30	MO080241	25.3	l	49.3	15.4	30.8	5.6
31	MO090862	33.3		54.1	36.3	38.5	4.4
32	MO090577	30.2	l	45.8	28.9	42.8	3.2
33	MO090812	32.4		53.0	32.3	36.5	7.6
34	MO091122	36.7		66.9	32.7	43.1	4.0
35	VA08W-632	41.6	h	66.1	41.6	54.8	4.0
36	VA09W-608	29.5	l	52.1	20.3	42.3	3.2
37	VA09W-635	40.7	h	72.0	40.4	47.1	3.2
38	VA09W-636	36.2		63.2	29.4	49.9	2.4
39	VA09W-644	31.5	l	51.0	27.8	44.9	2.4
40	VA09W-654	30.9	l	52.9	32.3	35.8	2.4
100	AVERAGE	35.6		60.7	33.7	43.0	4.9
101	MINUMUM	22.6		42.4	15.4	21.9	2.4
102	MAXIMUM	47.6		85.0	49.1	62.3	8.0
103	LSD(0.05)	9.7		.	.	.	.

l,h indicate means that are not significantly different from the lowest and highest means in that column ($p<0.05$)

Table 26. Deoxynivalenol (DON, ppm) for the 2010-11 PNUWWSN

ENTRY	NAME	AVG		ILURB	KYLEX	OHWOO
1	ERNIE	12.8		16.9	21.2	0.4
2	TRUMAN	6.7	l	12.7	6.9	0.6
3	FREEDOM	13.7		21.9	17.7	1.4
4	PIONEER2545	21.6	h	33.5	25.8	5.5
5	E9020R	12.0		19.5	15.2	1.3
6	E9021R	12.4		16.5	19.9	0.8
7	E9009	15.5		23.5	21.9	1.1
8	M09-9804#	6.6	l	11.5	7.8	0.3
9	OH07-166-41	11.0		15.9	15.9	1.3
10	OH07-254-11	22.1	h	32.0	32.6	1.7
11	OH07-263-3	11.7		15.7	18.8	0.6
12	OH08-133-25	15.3		21.1	21.1	3.7
13	OH08-269-58	10.3		15.1	15.3	0.6
14	05251A1--5	16.7	h	21.1	27.5	1.4
15	05269A1--1	22.0	h	31.0	33.6	1.3
16	06497A1--3	8.4	l	14.5	9.6	1.0
17	0711A1--1	7.3	l	11.2	10.1	0.7
18	0724B1--13	6.6	l	9.1	10.3	0.3
19	M08-8352	10.1	l	14.1	15.5	0.6
20	IL07-4348	5.8	l	8.8	8.5	0.2
21	IL07-4415	6.4	l	6.8	12.2	0.4
22	IL07-7525	9.1	l	11.0	15.9	0.3
23	IL07-14547	4.0	l	4.7	7.3	0.1
24	IL07-19334	6.0	l	7.4	10.2	0.4
25	KY03C-2047-07	8.2	l	11.3	12.8	0.4
26	KY04C-2023-18	7.1	l	12.9	7.9	0.4
27	KY04C-2034-2	10.4		18.4	12.1	0.8
28	KY04C-2034-3	9.3	l	16.7	10.3	0.9
29	KY04C-2034-4	7.9	l	12.2	11.1	0.5
30	MO080241	7.0	l	10.2	10.5	0.4
31	MO090862	6.4	l	7.9	10.1	1.1
32	MO090577	5.4	l	8.4	7.3	0.4
33	MO090812	8.9	l	15.8	10.3	0.5
34	MO091122	11.8		17.9	16.6	0.9
35	VA08W-632	9.2	l	12.8	13.9	1.0
36	VA09W-608	5.4	l	7.4	8.4	0.3
37	VA09W-635	11.7		15.4	18.9	0.9
38	VA09W-636	10.4		14.2	16.1	0.9
39	VA09W-644	9.1	l	11.0	15.6	0.6
40	VA09W-654	5.6	l	8.4	8.0	0.4
100	AVERAGE	10.2		14.9	14.8	0.9
101	MINUMUM	4.0		4.7	6.9	0.1
102	MAXIMUM	22.1		33.5	33.6	5.5
103	LSD(0.05)	6.3		.	.	.

l,h indicate means that are not significantly different from the lowest and highest means in that column ($p<0.05$)

Table 27. Greenhouse type I severity (GH) for the 2010-11 PNUWWSN

ENTRY	NAME	AVG		ILURB	MOCOL
1	ERNIE	20.9	l	27.5	14.3
2	TRUMAN	3.1	l	2.0	4.2
3	FREEDOM	20.0	l	33.0	6.9
4	PIONEER2545	66.5	h	100.0	33.0
5	E9020R	47.2	h	71.0	23.3
6	E9021R	44.9	h	64.7	25.0
7	E9009	13.6	l	15.8	11.4
8	M09-9804#	14.6	l	19.8	9.4
9	OH07-166-41	53.2	h	90.8	15.5
10	OH07-254-11	50.9	h	78.4	23.3
11	OH07-263-3	56.6	h	100.0	13.1
12	OH08-133-25	47.2	h	74.5	19.9
13	OH08-269-58	32.9	hl	47.7	18.0
14	05251A1--5	12.1	l	8.0	16.1
15	05269A1--1	54.2	h	82.5	25.9
16	06497A1--3	15.6	l	23.8	7.3
17	0711A1--1	41.7	h	71.2	12.1
18	0724B1--13	9.6	l	4.0	15.2
19	M08-8352	27.1	l	34.2	20.0
20	IL07-4348	7.2	l	2.8	11.5
21	IL07-4415	7.0	l	2.4	11.6
22	IL07-7525	36.3	hl	56.3	16.3
23	IL07-14547	28.7	hl	36.0	21.3
24	IL07-19334	30.0	hl	50.0	9.9
25	KY03C-2047-07	12.3	l	4.0	20.5
26	KY04C-2023-18	6.5	l	7.0	5.9
27	KY04C-2034-2	21.4	l	35.0	7.8
28	KY04C-2034-3	9.9	l	11.3	8.4
29	KY04C-2034-4	17.3	l	28.5	6.1
30	MO080241	17.6	l	27.8	7.3
31	MO090862	32.8	hl	54.2	11.3
32	MO090577	6.8	l	4.4	9.2
33	MO090812	6.5	l	2.3	10.7
34	MO091122	23.8	l	33.2	14.3
35	VA08W-632	11.9	l	3.0	20.7
36	VA09W-608	20.2	l	28.0	12.4
37	VA09W-635	18.5	l	20.2	16.7
38	VA09W-636	22.3	l	27.2	17.3
39	VA09W-644	35.2	hl	52.0	18.4
40	VA09W-654	40.8	hl	72.2	9.5
100	AVERAGE	26.1		37.7	14.5
101	MINUMUM	3.1		2.0	4.2
102	MAXIMUM	66.5		100.0	33.0
103	LSD(0.05)	38.5		.	.

l,h indicate means that are not significantly different from the lowest and highest means in that column ($p<0.05$)

Table 28. Heading date (HD, Julian date) for the 2010-11 PNUWWSN

ENTRY	NAME	AVG		KYLEX	MOCOL	OHWOO	ROFUN	VABLA
1	ERNIE	141	l	132	146	148	139	142
2	TRUMAN	146	h	146	145	152	141	146
3	FREEDOM	143		135	145	151	142	145
4	PIONEER2545	142		133	143	151	139	143
5	E9020R	143		135	145	152	141	145
6	E9021R	142		133	144	151	140	143
7	E9009	144		136	145	151	142	144
8	M09-9804#	148	h	146	151	154	142	146
9	OH07-166-41	143		135	144	152	142	144
10	OH07-254-11	142		133	143	151	141	143
11	OH07-263-3	142		133	144	149	141	143
12	OH08-133-25	142		135	142	152	139	143
13	OH08-269-58	143		134	143	152	142	144
14	05251A1--5	143		135	144	151	140	144
15	05269A1--1	142		135	142	151	141	143
16	06497A1--3	145		136	149	153	141	145
17	0711A1--1	142		132	147	148	139	143
18	0724B1--13	141	l	132	142	149	139	143
19	M08-8352	141	l	128	144	151	140	143
20	IL07-4348	143		135	144	151	139	144
21	IL07-4415	139	l	131	139	147	137	142
22	IL07-7525	140	l	132	142	148	137	142
23	IL07-14547	142		133	144	150	138	143
24	IL07-19334	142		132	144	151	139	143
25	KY03C-2047-07	142		136	145	149	138	143
26	KY04C-2023-18	147	h	146	149	154	142	145
27	KY04C-2034-2	147	h	143	151	153	141	146
28	KY04C-2034-3	147	h	145	151	153	141	146
29	KY04C-2034-4	145		143	147	152	140	145
30	MO080241	141	l	131	145	147	140	143
31	MO090862	139	l	130	140	147	137	143
32	MO090577	141	l	131	143	149	138	143
33	MO090812	148	h	146	153	154	142	146
34	MO091122	142		132	146	149	140	144
35	VA08W-632	141	l	133	144	150	138	143
36	VA09W-608	141	l	132	144	150	138	143
37	VA09W-635	142		133	145	150	138	144
38	VA09W-636	141	l	132	143	148	139	143
39	VA09W-644	140	l	133	141	147	139	143
40	VA09W-654	145		143	146	152	141	145
100	AVERAGE	143		135	145	151	140	144
101	MINUMUM	139		128	139	147	137	142
102	MAXIMUM	148		146	153	154	142	146
103	LSD(0.05)	3		.	.	.	.	.

l,h indicate means that are not significantly different from the lowest and highest means in that column ($p<0.05$)

Table 29. Height (HGT, inches) for the 2010-11 PNUWWSN

ENTRY	NAME	AVG		KYLEX	ROFUN
1	ERNIE	33		33	34
2	TRUMAN	38	h	39	38
3	FREEDOM	37	h	34	39
4	PIONEER2545	36	h	35	37
5	E9020R	35		35	36
6	E9021R	38	h	37	39
7	E9009	33	l	31	34
8	M09-9804#	31	l	31	32
9	OH07-166-41	37	h	35	39
10	OH07-254-11	32	l	30	34
11	OH07-263-3	37	h	35	40
12	OH08-133-25	37	h	32	42
13	OH08-269-58	36	h	34	38
14	05251A1--5	33		32	34
15	05269A1--1	30	l	27	32
16	06497A1--3	36		35	37
17	0711A1--1	31	l	31	32
18	0724B1--13	31	l	30	33
19	M08-8352	34		33	36
20	IL07-4348	32	l	31	34
21	IL07-4415	33		32	35
22	IL07-7525	34		33	36
23	IL07-14547	33	l	32	33
24	IL07-19334	33		31	36
25	KY03C-2047-07	34		33	36
26	KY04C-2023-18	39	h	39	39
27	KY04C-2034-2	37	h	36	38
28	KY04C-2034-3	39	h	38	39
29	KY04C-2034-4	34		35	32
30	MO080241	39	h	38	40
31	MO090862	36	h	34	38
32	MO090577	37	h	33	41
33	MO090812	38	h	37	39
34	MO091122	36	h	34	38
35	VA08W-632	35		33	36
36	VA09W-608	35		32	37
37	VA09W-635	34		32	36
38	VA09W-636	30	l	29	32
39	VA09W-644	34		32	37
40	VA09W-654	37	h	36	39
100	AVERAGE	35		33	36
101	MINUMUM	30		27	32
102	MAXIMUM	39		39	42
103	LSD(0.05)	3		.	.

l,h indicate means that are not significantly different from the lowest and highest means in that column ($p<0.05$)

Table 30. Other traits for the 2010-11 PNUWWSN

ENTRY	NAME	ROFUN AUDPC	INLAF # SYMPTOMATIC SPIKELETS
1	ERNIE	226	4.2
2	TRUMAN	125	1.3
3	FREEDOM	171	2.0
4	PIONEER2545	223	2.5
5	E9020R	318	0.9
6	E9021R	340	1.2
7	E9009	270	1.9
8	M09-9804#	238	1.0
9	OH07-166-41	128	0.8
10	OH07-254-11	158	3.4
11	OH07-263-3	265	0.9
12	OH08-133-25	288	2.7
13	OH08-269-58	418	0.0
14	05251A1--5	228	1.4
15	05269A1--1	212	0.8
16	06497A1--3	219	0.6
17	0711A1--1	182	2.5
18	0724B1--13	137	0.7
19	M08-8352	226	0.8
20	IL07-4348	133	0.6
21	IL07-4415	211	1.1
22	IL07-7525	361	3.1
23	IL07-14547	178	2.0
24	IL07-19334	160	1.7
25	KY03C-2047-07	157	0.4
26	KY04C-2023-18	152	.
27	KY04C-2034-2	226	0.7
28	KY04C-2034-3	228	1.8
29	KY04C-2034-4	204	1.2
30	MO080241	208	0.6
31	MO090862	226	1.3
32	MO090577	129	0.5
33	MO090812	166	3.7
34	MO091122	301	0.7
35	VA08W-632	289	0.8
36	VA09W-608	152	0.7
37	VA09W-635	209	0.9
38	VA09W-636	249	0.8
39	VA09W-644	242	1.1
40	VA09W-654	239	0.6

l,h indicate means that are not significantly different from the lowest and highest means in that column ($p<0.05$)

Table 31. Presence or absence of alleles based on marker assays performed by the USDA Small Gains Genotyping lab, Raleigh NC, for entries in the 2010-11 NUWWSN. Data provided by Gina Brown-Guedira.

Entry	Sample Name	Fhb1	5AS from Ernie	5AS from Ning7840	2DL from Wuhan1	1RS	H13	H9	H25	H26	Bdv2/3	Bx7 oe	Glu-A1	Glu-D1
1	ERNIE	no	mix	no		non 1RS	no	no	no	no	no	no	het	2+12
2	TRUMAN	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax1 or null	2+12
3	FREEDOM	no	no	no	no	1RS:1BL	no	no	no	no	no	no	het	2+12
4	PIONEER2545	no	no	no	no	1RS:1AL	no	no	no	no	no	no	Ax2*	het
5	NY99066-3025	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax1 or null	2+12
6	OH751	no	no	no	no	non 1RS	no		no	no	no	no	Ax1 or null	2+12
7	NY99068-383	yes	no	no	no	non 1RS	no	no	no	no	no	no	Ax2*	2+12
8	NY93246SP-6093	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax1 or null	2+12
9	E6012	no	yes	no	no	non 1RS	no	no	no	no	no	no		2+12
10	E6032	no	yes	no	no	non 1RS	no	no	no	no	no	no	Ax2*	2+12
11	E9022R	no	no	no	no	non 1RS	no	no	no	no	no	yes	Ax2*	5+10
12	E9024R	no	no	no	no	1RS:1BL	no		no	no	no	no	Ax2*	2+12
13	OH05-200-74	no	no	no	no	1RS:1AL			no	no	no	no	Ax1 or null	2+12
14	OH06-150-57	no	no	no	no	non 1RS	no	no	no	no	no	no	het	2+12
15	OH06-180-57	no	no	no	no	1RS:1BL		no	no	no	no	no	Ax1 or null	2+12
16	OH07-98-21	no	no	no	no	1RS:1BL	no	no	no	no	no	no	Ax2*	5+10
17	OH07-166-49	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax2*	2+12
18	03633A1--5	yes	no	no	no	1RS:1BL	no	no	no	no	yes	yes	Ax1 or null	5+10
19	04704A1--1	no	no	no	no	non 1RS	no	no	no	no	yes	yes	Ax1 or null	5+10
20	04606A1--7	no	no	no	no	1RS:1BL	no	no	no	no	yes	yes	Ax1 or null	5+10
21	05247A1--3	no	yes	no	no	1RS:1BL	no	no	no	no	yes	yes	Ax2*	2+12
22	05264A1--2	no	no	no	no	non 1RS	no	no	no	no	yes	no	Ax1 or null	2+12
23	M05-1526	no	yes	no	no	1RS:1BL	no	no	no	no	no	het	Ax1 or null	2+12
24	M08_8005	no	no	no	no	non 1RS		no	no	no	no	no	Ax2*	5+10
25	M08-8036	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax2*	2+12
26	M08-8214	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax1 or null	2+12
27	M08-8349	no	yes	no	no	1RS:1BL	no	no	no	no	no	yes	het	2+12
28	RCUOG1	no	no	no	no	1RS:1BL	no	no	no	no	no	no	Ax1 or null	5+10
29	RCUOG2	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax2*	het
30	RCUOG3	yes	no	no	no	non 1RS		no	no	no	no	no	het	2+12
31	RCUOG4	no	no	no	no	1RS:1AL	no	no	no	no	no	no	het	het
32	RCUOG5	no	no	no	no	1RS:1AL	no	no	no	no	no	no	het	5+10
33	IL06-14262	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax2*	5+10
34	IL06-14325	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax2*	5+10
35	IL06-13721	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax2*	5+10
36	IL06-13708	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax2*	5+10
37	IL04-24668	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax2*	5+10
38	KY02C-1002-06	no	no	no	no	1RS:1AL	no	no	no	no	no	yes	Ax1 or null	5+10
39	KY03C-1237-32	het	no	no	no	non 1RS	no	no	no	no	no	het	Ax2*	2+12
40	KY02C-2216-05	no	no	no	no	1RS:1AL	no		no	no	no	no	Ax2*	5+10
41	KY03C-1075-04	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax2*	2+12
42	KY-03C-2047-06	no	no	no	no	1RS:1AL	no		no	no	no	no	Ax2*	2+12
43	MD03W485-10-9	no	no	no	no	1RS:1BL	no	no	no	no	no	no	Ax1 or null	5+10
44	MD03W61-10-2	yes	no	no	no	1RS:1BL	no	no	no	no	no	no	Ax1 or null	2+12
45	MD03W69-15	yes	no	no	no	1RS:1BL	no	no	no	no	no	no	Ax1 or null	2+12
46	MD03W61-09-7	yes	no	no	no	1RS:1BL	no	no	no	no	no	no	Ax1 or null	5+10
47	MO080104	no	no	no	no	non 1RS	no	no	no	no	no	no	het	5+10
48	MO081652	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax2*	5+10
49	MO080589	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax1 or null	2+12
50	MO081777	no	no	no	no	non 1RS	no	no	no	no	no	no	het	het
51	MO080789	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax1 or null	2+12
52	NE01481	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax2*	5+10
53	NE02558	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax2*	5+10
54	NE05548	no	no	no	no	non 1RS	no	no	no	no	no	no	het	het
55	NE06469	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax2*	5+10
56	NE07444	no	no	no	no	non 1RS	no	yes	no	no	no	no	Ax1 or null	5+10
57	VA08W-176	no	no	no	no	1RS:1AL	no		no	no	no	no	Ax2*	2+12
58	VA08W-294	no	no	no	no	1RS:1AL	no		no	no	no	no	Ax2*	2+12
59	VA09W-657	no	no	no	no	1RS:1AL	no	no	no	no	no		Ax2*	het
60	VA09W-659	no	yes	no	no	1RS:1AL	no	no	no	no	no	het	het	2+12

Table 31. (continued)

Entry No.	Sample Name	Rht-B1b	Rht-D1b	Rht8	Ppd-D1a	vrn-A1* allele	Lr34/Yr18	Lr37/Yr17	Sr36	Sr24/Lr24	Sr2	Lr9	Lr19/Sr25	Qyr.uga-2AS*
1	ERNIE	yes	no	no	het	vrn-A1b	no	het	no	no	no	no	no	no
2	TRUMAN	yes	no	no	no	vrn-A1b	no	no	no	no	no	no	no	?
3	FREEDOM	yes	no	no	no	vrn-A1b	no	no	yes		no	no	no	?
4	PIONEER2545	no	yes	no	yes	vrn-A1b	no	no	no	no	no	no	no	?
5	NY99066-3025	no	yes	no	no	vrn-A1b	no	no	no	no	no	no	no	no
6	OH751	no	no	no	no	vrn-A1b	no	no	yes	no	no	yes	no	no
7	NY99068-383	no	yes	no	no	vrn-A1b	no	no	no	no	no	no	no	no
8	NY93246SP-6093	no	yes	no	no	vrn-A1b	no	no	no	no	no	no	no	no
9	E6012	no	het	no	yes	vrn-A1b	no	no	no	no	no	no	no	?
10	E6032	no	yes	no	yes	vrn-A1b	no	no	no	no	no	no	no	?
11	E9022R	no	yes	no	yes	vrn-A1b	no	no	no	no	no	no	no	no
12	E9024R	yes	no	no	yes	vrn-A1b	yes	no	no	no	no	no	no	?
13	OH05-200-74	yes	no	no	no	vrn-A1b	no	no	no	no	no	no	no	?
14	OH06-150-57	yes	no	yes	yes	vrn-A1b	no	yes	no	no	no	no	no	no
15	OH06-180-57	no	no	yes	yes	vrn-A1b	no	no	no	no	no	no	no	?
16	OH07-98-21	yes	no	no	no	vrn-A1b	no	no	no	no	no	no	no	no
17	OH07-166-49	yes	no	yes	yes	vrn-A1b	no	no	no	no	no	no	no	no
18	03633A1--5	yes	no	no	no	vrn-A1b	no	yes	yes	no	no	no	no	no
19	04704A1--1	yes	no	no	no	vrn-A1b	no	no	yes	no	no	no	no	no
20	04606A1--7	yes	no	no	no	vrn-A1b	no	no	no	no	no	no	no	?
21	05247A1--3	yes	no	no	yes	vrn-A1b	no	yes	no	no	no	no	no	no
22	05264A1--2	yes	no	no	no	vrn-A1b	no	yes	yes	no	no	no	no	no
23	M05-1526	yes	no	no	no	vrn-A1b	no	no	no	no	no	no	no	no
24	M08_8005	yes	no	no	yes	vrn-A1b	no	no	no	no	no	no	no	no
25	M08-8036	no	no	no	yes	vrn-A1b	no	no	het	no	no	yes	no	no
26	M08-8214	no	no	no	yes	vrn-A1b	no	no	no	no	no	no	no	no
27	M08-8349	yes	no	no	no	vrn-A1b	no	no	no	no	no	no	no	no
28	RCUOG1	het	het	no	no	vrn-A1b	no	no	no	yes	no	no	no	?
29	RCUOG2	het	het	no	het	vrn-A1b	yes	no	no	yes	no	yes	no	?
30	RCUOG3	no	no	yes	no	vrn-A1b	het	het	no	no	no	no	no	no
31	RCUOG4	no	het	mix	no	vrn-A1b	no	no	no	yes	no	no	no	no
32	RCUOG5	yes	no	no		vrn-A1b	no	no	no	yes	no	no	no	no
33	IL06-14262	yes	no	no		vrn-A1b	no	no	no	no	no	no	no	no
34	IL06-14325	yes	no	no	no	vrn-A1b	no	no	no	no	no	no	no	no
35	IL06-13721	yes	no	no	no	vrn-A1b	no	no	no	no	no	no	no	no
36	IL06-13708	yes	no	no	no	vrn-A1b	no	no	no	no	no	no	no	no
37	IL04-24668	yes	no	no	yes	vrn-A1b	no	no	no	no	no	no	no	no
38	KY02C-1002-06	yes	no	no	no	vrn-A1b	no	no	yes	no	no	no	no	?
39	KY03C-1237-32	yes	no	no	yes	vrn-A1b	no	no	no	no	no	no	no	?
40	KY02C-2216-05	no	yes	no	no	vrn-A1b	no	no	no	yes	no	yes	no	no
41	KY03C-1075-04	no	yes	no	no	vrn-A1b	no	no	no	no	no	no	no	no
42	KY-03C-2047-06	no	yes	no	yes	vrn-A1b	no	no	no	no	no	no	no	no
43	MD03W485-10-9	no	yes	no	yes	vrn-A1b	no	no	na	no	no	no	no	no
44	MD03W61-10-2	no	yes	no	yes	vrn-A1b	no	no	no	no	no	no	no	?
45	MD03W69-15	no	yes	no	yes	vrn-A1b	no	no	no	no	no	no	no	?
46	MD03W61-09-7	no	yes	no	yes	vrn-A1b	no	no	no	no	no	no	no	?
47	MO080104	no	no	no	yes	vrn-A1b	no	no	no	no	no	no	no	no
48	MO081652	no	no	no	yes	vrn-A1b	no	no	no	no	no	no	no	no
49	MO080589	yes	no	no	no	vrn-A1b	no	no	no	no	no	no	no	?
50	MO081777	no	no	no	het	vrn-A1b	no	no	no	no	no	no	no	?
51	MO080789	yes	no	no	no	vrn-A1b	no	no	no	no	no	no	no	?
52	NE01481	yes	no	no	no	vrn-A1b	no	no	no	no	no	no	no	?
53	NE02558	yes	no	no	no	vrn-A1a	yes	no	no	no	yes	no	no	no
54	NE05548	yes	no	no	no	vrn-A1b	no	no	no	yes	no	no	no	?
55	NE06469	yes	no	no	yes	vrn-A1b	no	no	no	yes	no	no	no	?
56	NE07444	yes	no	no	yes	vrn-A1b	no	no	no	yes	no	no	no	?
57	VA08W-176	no	yes	no	no	vrn-A1b	no	no	no	yes	no	no	no	no
58	VA08W-294	no	yes	no	no	vrn-A1b	no	no	no	no	no	yes	no	no
59	VA09W-657	no	yes	no	het	Both	no	no	no	no	no	no	no	no
60	VA09W-659	no	het	no	no	vrn-A1b	no	no	no	no	no	no	no	no

***vrn-A1a = short vernalizing allele**

***APR Yr from P26R61; only called yes if both flanking markers are present**

Table 32. Presence or absence of alleles based on marker assays performed by the USDA Small Gains Genotyping lab, Raleigh NC, for entries in the 2010-11 PNUWWSN. Data provided by Gina Brown-Guedira.

Name	Fhb1	5AS from Ernie	5AS from Ning7840	2D from Wuhan1 W14	1RS	H13	H9	H25	H26	Bdv2/3	Bx7 OE	Glu-A1	Glu-D1
ERNIE	no	**yes**	no		non 1RS	no	no	no	no	no	no	Ax1 or null	2+12
TRUMAN	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax1 or null	2+12
FREEDOM	no	**yes**	no	no	**1RS:1BL**	no	no	no	no	no	no	het	2+12
PIONEER2545	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax2*	2+12
E9020R	no	no	no	no	non 1RS	no	no	no	no	no	**yes**	Ax2*	5+10
E9021R	no	no	no	no	non 1RS	no	no	no	no	no	**yes**	Ax2*	5+10
E9009	no	no	no	no	**1RS:1BL**	no	no	no	no	no	no	Ax1 or null	2+12
M09-9804_	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax1 or null	5+10
OH07-166-41	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax2*	2+12
OH07-254-11	no	no	no	no	**1RS:1BL**	no	no	no	no	no	no	Ax1 or null	2+12
OH07-263-3	no	no	no	no	**1RS:1BL**	no	no	no	no	no	no	Ax2*	het
OH08-133-25	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax2*	2+12
OH08-269-58	no	no	no	no	non 1RS	no	**yes**	no	no	no	no	Ax2*	2+12
05251A1--5	no	**yes**	no		non 1RS		no	no	no	**yes**	no	Ax1 or null	het
05269A1--1	no	no	no	no	**1RS:1BL**	no	no	no	no	**yes**	**yes**	Ax1 or null	2+12
06497A1--3	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax2*	2+12
0711A1--1	**het**	**yes**	no	no	**1RS:1BL**	no	no	no	no	no	no	Ax2*	het
0724B1--13	**het**	no	no	no	**1RS:1BL**	**yes**	no	no	no	no	no	Ax1 or null	5+10
M08-8352	no	**yes**	no	no	**1RS:1BL**	no	no	no	no	no	**yes**	Ax2*	2+12
IL07-4348	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax1 or null	5+10
IL07-4415	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax1 or null	5+10
IL07-7525	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax2*	5+10
IL07-14547	no	no	no		non 1RS	no	no	no	no	no	no	Ax2*	5+10
IL07-19334	no	no	no	no	non 1RS	no	no	no	no	no	no	het	het
KY-03C-2047-07	no	no	no	no	**1RS:1AL**	no	no	no	no	no	no	Ax2*	het
KY04C-2023-18	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax1 or null	2+12
KY04C-2034-2	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax2*	2+12
KY04C-2034-3	no	no	no	no	non 1RS	no	no	no	no	no	no	het	2+12
KY04C-2034-4	no	no	no	no	non 1RS	no	no	no	no	no	no	het	2+12
MO080241	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax1 or null	het
MO090862	no	no	no	no	non 1RS	no	no	no	no		no	Ax1 or null	het
MO090577	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax2*	5+10
MO090812	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax2*	2+12
MO091122	no	**yes**	no	no	non 1RS	no	no	no	no	no	no	het	2+12
VA08W-632	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax1 or null	2+12
VA09W-608	no	no	no	no	non 1RS	no	no	no	no	no	no	Ax1 or null	het
VA09W-635	no	no	no	no	**1RS:1AL**	no		no	no	no	no	Ax2*	5+10
VA09W-636	no	no	no	no	**1RS:1AL**	no		no	no	no	no	het	2+12
VA09W-644	no	**yes**	no	no	**1RS:1AL**	no		no	no	no	no	Ax2*	2+12
VA09W-654	no	no	no	no	non 1RS	no		no	no	no	no	Ax1 or null	5+10

Table 32. (Continued)

Name	Rht-B1b	Rht-D1b	Rht8	Ppd-D1a	vrn-A1* allele	Lr34/Yr18	Lr37/Yr17	Sr36	Sr24/Lr24	Sr2	Lr9	Lr19/Sr25	Qyr.uga-2AS*
ERNIE	**yes**	no	no	no	vrn-A1b	**het**	no	**het**	no	no	no	no	no
TRUMAN	**yes**	no	no	no	vrn-A1b	no	no	no	no	no	no	no	**?**
FREEDOM	**yes**	no	no	no	vrn-A1b	no	no	**het**	no	no	no	no	**?**
PIONEER2545	no	**yes**	no	**yes**	vrn-A1b	no	no	no	no	no	no	no	**?**
E9020R	no	**yes**	no	**yes**	vrn-A1b	no	no	no	no	no	no	no	no
E9021R	no	**yes**	no	**yes**	vrn-A1b	no	no	no	no	no	no	no	no
E9009	no	**yes**	no	**yes**	vrn-A1b	no	no	no	no	no	no	no	no
M09-9804_	**yes**	no	no	no	**Both Alleles**	no	no	**yes**	no	no	no	no	no
OH07-166-41	**yes**	no	**yes**	**yes**	vrn-A1b	no	no	no	no	no	no	no	no
OH07-254-11	**yes**	no	no	**yes**	vrn-A1b	no	no	yes	no	no	no	no	**?**
OH07-263-3	no	no	no	no	vrn-A1b	no	no	no	no	no	no	no	no
OH08-133-25	no	no	no	no	vrn-A1b	no	no	**yes**	no	no	no	no	**?**
OH08-269-58	**yes**	no	**yes**	**yes**	vrn-A1b	no	no	no	no	no	no	no	no
05251A1--5	**yes**	no	no	no	vrn-A1b	no	**yes**	no	no	no	no	no	no
05269A1--1	**yes**	no	no	**yes**	vrn-A1b	no	no	**het**	no	no	no	no	no
06497A1--3	**yes**	no	no	no	vrn-A1b	no	no	no	no	no	no	no	**?**
0711A1--1	**yes**	no	no	**het**	vrn-A1b	**yes**	no	no	no	no	no	no	**?**
0724B1--13	**yes**	no	no	no	vrn-A1b	no	no	**yes**	no	no	no	no	no
M08-8352	**yes**	no	no	no	vrn-A1b	no	no		no	no	no	no	no
IL07-4348	**yes**	no	no	no	vrn-A1b	no	**yes**	no	no	no	no	no	no
IL07-4415	**yes**	no	no	no	vrn-A1b	no	**yes**	no	no	no	no	no	no
IL07-7525	**yes**	no	no	no	vrn-A1b	no	no	no	no	no	no	no	no
IL07-14547	**yes**	no	no	no	vrn-A1b	no	no	no	no	no	no	no	no
IL07-19334	**yes**	no	no	**het**	vrn-A1b	no	no	no	no	no	no	no	no
KY-03C-2047-07	no	het	no	**het**	vrn-A1b	no	no	no	no	no	no	no	no
KY04C-2023-18	**yes**	no	no	no	vrn-A1b	no	no	no	no	no	no	no	**?**
KY04C-2034-2	**yes**	no	**het**	no	vrn-A1b	no	no	no	no	no	no	no	no
KY04C-2034-3	**yes**	no	no	no	vrn-A1b	no	no	no	no	no	no	no	**?**
KY04C-2034-4	**yes**	no	**yes**	no	vrn-A1b	no	no	no	no	no	no	no	**?**
MO080241	**yes**	no	no	**het**	vrn-A1b	no	no	no	no	no	no	no	**?**
MO090862	**yes**	no	no	no	**vrn-A1a**	no	no	no	no	no	no	no	**?**
MO090577	no	no	no	**yes**	vrn-A1b	no	no	no	no	no	no	no	no
MO090812	**yes**	no	no	no	vrn-A1b	no	no	no	no	no	no	no	**?**
MO091122	**yes**	no	no	**het**	vrn-A1b	no	no	**het**	no	no	no	no	no
VA08W-632	no	**yes**	no	no	**vrn-A1a**	no	no	no	no	no	**yes**	no	no
VA09W-608	**yes**	no	no	**het**	vrn-A1b	**het**	no	**yes**	no	no	**yes**	no	no
VA09W-635	no	no	no	no	**vrn-A1a**	no	no	**yes**	no	no	no	no	no
VA09W-636	no	**yes**	no	no	vrn-A1b	no	no	no	**yes**	no	**yes**	no	no
VA09W-644	no	**yes**	no	no	vrn-A1b	no	no	**het**	no	no	no	no	no
VA09W-654	no	no	no	no	**vrn-A1a**	no	no	no	no	no	no	no	no

*vrn-A1a = short vernalizing allele

*APR Yr from P26R61; only called yes if both flanking markers are present

2011 Crop
Micro Milling and Baking Evaluation
Set 2011 M04

2011 Northern Uniform Winter Wheat Scab Nursery
Herb Ohm, Purdue University
Entries #: 1110241 – 1110300

A total of 60 samples were grown in Lafayette, Indiana and submitted by Herb Ohm of Purdue University for milling and baking quality evaluations. The standard quality data were compared to the average for the cultivar checks given for this nursery, and quality scores for all entries are adjusted to the check average. A table of observed and historical quality scores is given below.

Within this nursery, there were visible signs of Fusarium Head Blight and weathered grain before cleaning. Pre-harvest sprouting was present within the check Pioneer 2545 and alpha-amylase activity with increased damaged starch must be considered probable. Our flour analyses, when compared to the historical data of the given checks, conclude that flour protein and lactic acid SRC were within the expected target range for soft wheat characteristics. Sucrose SRC absorption and milling yield were below the range we observe for these cultivars while softness equivalence exceeded the expected range.

The adjusted average values of the provided checks are predicted to have increased milling and baking scores but decreased softness equivalent scores when compared to the historical average. The observed scores for the checks correlated to the historical scores for milling, baking, and softness equivalence at a level of r>0.6, r>0.8, and r>0.7, respectively. The baking and softness equivalent relative ranking and correlation indicates that the results of the following quality scores are likely predictive of future results. However, milling values are not as highly correlated with past performance as expected. Milling quality should be monitored, as it may not be as predictive of future breeding performance as in previous trials.

2011 Northern Uniform Winter Wheat Scab Nursery

		From Advanced Milling Database Scoring						Predicted from Measured Data					
Entry Number	ENTRY	Milling Quality Score		Baking Quality Score		Softness Equivalent Score		Milling Quality Score		Baking Quality Score		Softness Equivalent Score	
141	ERNIE	51.65	D	43.38	E	57.14	D	56.53	D	58.50	D	50.92	D
142	TRUMAN	55.59	D	50.83	D	65.04	C	56.35	D	70.47	B	68.52	C
143	FREEDOM	52.71	D	55.62	D	62.87	C	59.60	D	69.83	C	65.52	C
144	PIONEER 2545	49.74	E	51.44	D	68.10	C	50.22	D	61.93	C	61.02	C
	Average	52.42		50.32		63.29		55.67		65.18		61.50	
	Adjustment Bias for Trial	-3.25		-14.87		1.79							
	Diagnostics - Correlations	0.6		0.8		0.7							

Additional Information on Analysis

Thank you for the submission of this trial. Our evaluation is different from previous years. The detailed changes in evaluations can be viewed on our website at: http://www.ars.usda.gov/Research/docs.htm?docid=21964. Please review the data analysis and the descriptions of the summary. Let us know if this is helpful or still requires improvement.

Of the characteristics of quality we measure at the Soft Wheat Quality Laboratory, milling yield is the most reproducible and perhaps most important because it is genetically and environmentally associated with good soft wheat flour quality. The average milling yield of the checks was 67.9%. Sample NE05548 had the highest milling yield of the combined samples at 71.6%, followed by M08-8349, NE02558, and NE07444. On the other hand, samples NY99066-3025, MO080104, and MD03W61-10-2 had the lowest milling yield values.
The next most heritable trait in the quality evaluations is softness equivalent. The average softness equivalence of the checks was 56.7%, similar to that of the nursery's average of 57.0%. Out of the 60 samples, MO080589 had the greatest softness equivalence at 64.4%. However, 7 entries expressed hard wheat characteristics scoring below 50% for softness equivalence and are likely unacceptable for most soft wheat applications. This includes NE01481, NE07444, and even the highest milling entry, NE05548.

Sucrose SRC is a measure of arabinoxylan content, which can strongly affect water absorption in baked products and probably is the best predictor of cookie quality. Sucrose SRC typically increases in wheat samples with lower flour yield and lower softness equivalent. The cross hydration of gliadins by sucrose also causes sucrose SRC values to be correlated to flour protein and lactic acid SRC. Soft wheat flours for cookies typically have a target of 95% or less. As a whole, the nursery's average was below this target range with a value of 88.2%, but still 5 points higher than that of the checks average of 82.3%. Only 5 samples were above the 95% target and this includes KY02C-2216-05 and MD03W485-10-9. Not only did the sample NY99068-383 have the lowest absorption value at 78.8%, it also had the largest cookie diameter at 18.7cm.

Lactic acid SRC is a good measure of gluten strength. The lactic acid SRC also correlates to flour protein concentration, but the effect is dependent on genotypes and growing conditions. The average lactic acid SRC for the nursery was 85.4% and is borderline "weak" for gluten strength (lactic acid below 85%). Amongst the checks, Freedom had the lowest lactic acid SRC with a value of 71.9%. There were 3 test lines below this mark and they were 05247A1—3, 05264A1—2, and 04606A1—7. The strongest gluten was detected in test line NE01481 with a value of 100.9%. Based on the analysis, there are 4 strong gluten genotypes with good milling yield. The strong gluten lines with the best combinations of quality include E6032, IL06-14262, IL04-24668, and KY03C-1075-04.

To select the best lines for milling and baking quality, we sequentially sorted for flour yield and selected all lines with better flour yield than the nursery average. We then repeated the operation for softness equivalent and sucrose SRC, selecting the lines that were better than average in each case. Next, we discarded the weakest gluten lines to present a more accurate evaluation of the cookies. After the sort, 3 test lines fit these criteria. The test lines with the most balanced milling and baking qualities consist of IL06-14262, E6032, and IL04-24668.

Table 33. Quality data on the entries from the 2010-11 NUWWSN using grain from West Lafayette provided by Herb Ohm. Quality analyses were conducted by the USDA Soft Wheat Quality Lab in Wooster Ohio

ENTRY	Mill Qual		Bkae Qual		SE Qual		TW (lb/bu)	WGP (%)	WGH (0-100)	FY (%)		SE (%)		FP (%)		LA (%)		SU (%)		ECD (cm)	
ERNIE	53.27	D	43.6	E	52.7	D	59.8	10.7	30.9	68.1		52.9	q	7.8		75.9		82.8		18.1	
TRUMAN	53.09	D	55.6	D	70.3	B	58.2	10.2	20.4	68.1		59.1	+	7.8		74.6		81.6		18.5	
FREEDOM	56.34	D	55.0	D	67.3	C	56.0	10.8	23.6	68.7		58.1		7.7		71.9		81.2		18.4	
PIONEER2545	46.97	E	47.1	E	62.8	C	57.3	10.7	38.1	66.8	q	56.5		8.2		77.1		83.5		18.2	
NY99066-3025	36.51	F	42.1	E	66.1	C	58.5	12.5	31.6	64.7	q	57.6		9.2	q	73.5		86.1	q	18.2	
OH751	61.81	C	54.5	D	69.3	C	58.6	11.3	22.9	69.8	+	58.8	+	8.6	q	84.7	s	81.3		18.5	
NY99068-383	58.78	D	63.6	C	75.5	B	59.4	10.8	27.1	69.2	+	61.0	+	8.3		78.0		78.8	+	18.7	+
NY93246SP-6093	49.27	E	49.6	E	75.0	B	58.6	10.7	29.1	67.3		60.8	+	8.2		87.1	s	85.6	q	18.3	
E6012	62.38	C	55.7	D	72.2	B	58.7	10.4	29.9	69.9	+	59.8	+	7.8		82.7	s	82.1		18.5	
E6032	62.61	C	46.0	E	72.6	B	58.3	10.3	20.9	70.0	+	59.9	+	7.7		90.1	s	87.1	q	18.2	
E9022R	56.17	D	33.3	F	69.2	C	59.5	11.3	26.0	68.7		58.7	+	8.4	q	100.4	s	91.9	q	17.9	q
E9024R	65.07	C	54.2	D	77.5	B	59.7	10.3	26.0	70.5	+	61.7	+	7.8		78.6		84.3		18.4	
OH05-200-74	49.02	E	41.1	E	64.3	C	58.1	10.5	30.1	67.3		57.0		7.5		81.4		87.4	q	18.1	
OH06-150-57	61.06	C	43.7	E	64.8	C	59.8	9.8	27.0	69.7	+	57.2		7.7		81.1		86.1	q	18.1	
OH06-180-57	49.50	E	41.6	E	58.0	D	58.5	10.7	31.4	67.4		54.8		8.1		75.1		85.0		18.1	
OH07-98-21	58.73	D	58.2	D	81.5	A	60.2	9.7	27.4	69.2	+	63.1	+	7.4		85.4	s	83.7		18.5	
OH07-166-49	56.37	D	44.5	E	67.9	C	59.1	9.7	26.2	68.7		58.3		7.2	+	82.3	s	86.9	q	18.2	
03633A1--5	47.01	E	45.1	E	72.4	B	58.3	11.7	26.6	66.9	q	59.9	+	8.7	q	77.4		86.8	q	18.2	
04704A1--1	61.07	C	52.1	D	69.0	C	57.9	9.9	25.4	69.7	+	58.7		7.5		72.9		83.3		18.4	
04606A1--7	52.64	D	39.6	F	66.3	C	59.7	10.5	25.6	68.0		57.7		7.7		69.3		88.5	q	18.0	
05247A1--3	58.68	D	38.7	F	61.4	C	61.2	12.3	26.3	69.2	+	56.0		9.4	q	71.6		86.4	q	18.1	
05264A1--2	49.89	E	37.2	F	39.9	F	57.2	11.0	29.2	67.4		48.4	q	8.4	q	70.0		82.0		17.9	q
M05-1526	54.48	D	43.0	E	58.5	D	59.4	10.7	28.5	68.4		55.0		8.3		74.3		84.3		18.1	
M08*8005#	59.25	D	47.2	E	71.7	B	59.7	9.8	22.9	69.3	+	59.6	+	7.3	+	81.7		86.6	q	18.2	
M08-8036#	59.96	D	32.4	F	60.3	C	60.3	11.2	29.3	69.5	+	55.6		8.7	q	91.2	s	89.7	q	17.9	q
M08-8214	47.65	E	31.5	F	56.9	D	59.7	11.0	31.1	67.0		54.4	q	8.3		91.8	s	89.5	q	17.8	q
M08-8349	67.98	C	32.9	F	59.7	D	58.2	10.4	24.1	71.1	+	55.4		7.8		72.5		89.9	q	17.9	q
RCUOG1	46.44	E	23.1	F	51.8	D	59.4	10.7	32.7	66.7	q	52.6	q	8.1		73.9		92.3	q	17.6	q
RCUOG2	44.16	E	40.2	E	67.5	C	60.7	11.5	33.3	66.3	q	58.2		8.8	q	98.4	s	87.8	q	18.1	
RCUOG3	54.77	D	20.8	F	38.6	F	60.2	11.6	32.9	68.4		47.9	q	9.5	q	94.6	s	88.9	q	17.6	q
RCUOG4	49.08	E	12.8	F	38.0	F	60.0	11.7	33.1	67.3		47.7	q	9.4	q	89.9	s	92.7	q	17.3	q
RCUOG5	53.90	D	54.8	D	76.5	B	58.1	10.8	28.6	68.2		61.3	+	8.3		86.2	s	83.4		18.5	
IL06-14262	61.94	C	61.5	C	77.0	B	59.2	9.8	23.4	69.9	+	61.5	+	7.9		96.6	s	80.5		18.6	
IL06-14325	50.65	D	27.8	F	62.1	C	59.5	10.3	28.9	67.6		56.2		7.9		90.3	s	93.0	q	17.7	q
IL06-13721	64.72	C	24.3	F	61.2	C	62.0	9.9	32.2	70.4	+	55.9		7.9		81.1		94.5	q	17.6	q
IL03-13708	59.09	D	34.8	F	65.9	C	59.6	10.2	26.9	69.3	+	57.6		7.8		89.9	s	90.6	q	17.9	q
IL04-24668	59.67	D	48.3	E	78.2	B	60.4	9.9	25.4	69.4	+	61.9	+	7.8		90.1	s	87.4	q	18.3	
KY02C-1002-06	57.57	D	31.2	F	58.0	D	60.0	10.8	28.8	69.0	+	54.8		8.2		93.4	s	90.0	q	17.8	q
KY03C-1237-32	54.53	D	50.7	D	76.0	B	60.4	9.2	27.1	68.4		61.1	+	7.0	+	87.5	s	86.2	q	18.3	
KY02C-2216-05	53.42	D	13.8	F	64.5	C	61.4	9.5	25.0	68.1		57.1		7.3	+	89.7	s	101.0	q	17.3	q
KY03C-1075-04	60.72	C	36.7	F	80.8	A	59.1	9.6	32.0	69.6	+	62.8	+	7.5		95.2	s	94.0	q	18.0	
KY-03C-2047-06	52.17	D	30.3	F	65.8	C	62.3	9.8	28.6	67.9		57.5		7.2	+	87.1	s	93.2	q	17.8	q
MD03W485-10-9	56.66	D	26.2	F	78.7	B	60.5	11.1	34.6	68.8		62.1	+	8.6	q	88.0	s	97.8	q	17.8	q
MD03W61-10-2	43.79	E	22.6	F	71.3	B	60.8	11.2	35.1	66.2	q	59.5	+	8.4	q	87.4	s	97.7	q	17.6	q
MD03W69-15	57.36	D	36.6	F	78.1	B	60.4	11.1	26.6	68.9	+	61.9	+	8.8	q	88.2	s	92.4	q	18.0	
MD02W61-09-7	52.86	D	35.3	F	60.3	C	59.8	11.6	36.1	68.0		55.6		9.2	q	92.3	s	87.9	q	18.0	
MO080104	42.97	E	39.3	F	79.2	B	60.2	9.4	24.8	66.0	q	62.3	+	7.2	+	96.9	s	92.5	q	18.0	
MO081652	44.49	E	36.2	F	84.0	A	60.1	9.4	28.1	66.3	q	64.0	+	7.2	+	100.8	s	95.3	q	18.0	
MO080589	47.69	E	43.9	E	85.1	A	59.8	8.9	23.6	67.0		64.4	+	6.8	+	98.4	s	92.2	q	18.2	
MO081777	56.14	D	47.4	E	68.4	C	58.9	9.1	21.6	68.7		58.5		7.1	+	75.4		85.7	q	18.2	
MO080789	50.11	D	41.9	E	61.9	C	59.6	9.8	30.1	67.5		56.2		7.8		84.8	s	86.2	q	18.1	
NE01481	56.69	D	10.5	F	21.0	F	59.4	11.5	32.1	68.8		41.7	q	8.7	q	100.9	s	89.7	q	17.2	q
NE02558	65.26	C	24.4	F	49.2	E	59.4	10.0	19.4	70.5	+	51.7	q	7.2	+	84.7	s	91.7	q	17.6	q
NE05548	70.61	B	21.4	F	27.7	F	59.2	12.2	37.8	71.6	+	44.1	q	10.0	q	95.1	s	85.3		17.6	q
NE06469	61.36	C	12.7	F	39.5	F	58.9	10.5	32.7	69.7	+	48.2	q	8.2		93.2	s	94.1	q	17.3	q
NE07444	65.10	C	28.6	F	25.2	F	58.7	11.5	31.4	70.5	+	43.2	q	9.6	q	95.0	s	81.3		17.7	q
VA08W-176	56.45	D	48.0	E	77.0	B	60.6	10.2	23.1	68.8		61.5	+	7.7		81.2		87.3	q	18.3	
VA08W-294	45.36	E	23.7	F	67.3	C	60.4	10.6	22.3	66.5	q	58.1		7.7		94.8	s	96.5	q	17.6	q
VA09W-657	58.59	D	29.5	F	64.5	C	60.8	10.2	24.8	69.2	+	57.1		7.8		85.2	s	92.9	q	17.8	q
VA09W-659	57.17	D	37.4	F	63.8	C	61.7	10.4	26.6	68.9		56.8		7.6		82.0		88.9	q	18.0	
Average	55.12		38.4		64.1		59.5	10.5	28.1	68.5		56.9		8.1		85.3		88.2		18.0	

2010 Crop
Advanced Milling and Baking Evaluation
Set 2010 M02

2010 Northern Uniform Winter Wheat Scab Nursery
Herb Ohm, Purdue University
Entries #: 1010073 – 1010131

A total of 59 samples were grown in Lafayette, Indiana and graciously provided by Herb Ohm of Purdue University for milling and baking quality evaluations. The standard quality data was compared to the average for the cultivar checks given for this nursery, and quality scores for all entries are adjusted to this average. Of the 565 cultivars in the SWQL database of Allis-milled cultivars, the following table compares 3 checks from this trial, Ernie, Truman, and Freedom with their "historical data" from the Micro Milling databases.

This nursery had a significant number of samples that contained FHB infected, as well as, weather damaged seed. Pre-harvest sprouting was noticeably present, especially within the sample 99691A2-5-4-16-1. Grain moisture was 13.9%. Flour analysis average for this nursery demonstrates that flour yield and sucrose SRC was below the expected target range for soft wheat characteristics, while softness equivalence was above the target range. Based on milling analysis a total of 7 samples are likely hard wheat genotypes, with a softness equivalence of less than 50%. A combination of low sucrose SRC and flour protein typically produces a larger cookie diameter and higher baking scores, which is evident with test lines E3024 and IL06-7550 as they rank 1 and 2 for baking quality. In general, the 3 checks have lower than expected quality scores based from their historical data. Therefore, we expect the results of the evaluations to be generally predictive of future performance of breeding lines in this trial.

The evaluation scores sheet in the MS Excel file includes the average field ratings for Fusarium resistance from cooperators. The values were distributed by Clay Sneller. We have used the average Fusarium index (index) and the average Fusarium damaged kernel (FDK) scores as indicators of resistance. Larger values for the index and FDK scores indicate greater susceptibility to Fusarium.

2010 Northern Uniform Winter Wheat Scab Nursery

			From Advanced Milling Database Scoring				Predicted from Measured Data					
Lab Number	Entry Number	ENTRY	Milling Quality Score	Baking Quality Score	Softness Equivalent Score		Milling Quality Score		Baking Quality Score		Softness Equivalent Score	
1010073	189	ERNIE	63.0	61.1	65.6		60.3	C	68.4	C	63.6	C
1010074	190	TRUMAN	64.8	69.2	65.7		56.8	D	62.3	C	68.5	C
1010075	191	FREEDOM	64.9	70.8	60.3		55.3	D	70.5	B	60.8	C
		Average	64.22	67.07	63.85		57.46		67.05		64.29	

		Adjustment Bias for Trial	6.75	0.02	-0.44							

Changes in 2010 Evaluations

We have changes for group evaluations this year. Our goal is to provide more consistent and complete information on milling and baking performance of new wheat lines and cultivars. Through a generous grant funded by the state of Ohio, the Soft Wheat Quality Laboratory has access to a new diode array NIR instrument that measures whole grain spectra. As a result we will now provide whole grain protein with the quality information. We also are using this instrument to develop prediction models for milling yield and softness equivalent (break flour yield). Analysis of the first two years of data, in collaboration with Mary Guttieri and Clay Sneller of Ohio State University, is promising. Prediction equations for milling yield and softness equivalent using the NIR instrument have R^2 values of over 75%. Our intent is to launch the use of NIR analysis for non-destructive milling yield selection within the next 18 months.

We are using multiple checks for adjusting the quality scores in the group. Previously, a single check was used for the scoring. This caused problems for a number of the evaluations due to 1) genotype x environment interactions and 2) interactions between cultivars for cookie diameters using the old sugar-snap cookie method and the revised AACC sugar-snap cookie method. Using the average of multiple checks should make the adjustments more robust. We transitioned to a new database of check cultivar performance that uses advanced milling data and cookie bakes using the revised AACC sugar-snap cookie method. The scoring system is still indirectly based on Allis mill ratings of cultivars.

The scores given in above table under the heading 'advanced milling database scoring' derive from the average milling and baking scores given in 5 or more millings from trials with sound grain. We transitioned to the advanced milling so that we could have more of the data based the revised AACC sugar snap cookie data and have a broader range of check cultivars from which to choose. The advanced milling database used for this adjustment will be posted on the SWQL web-site during September.

Lactic acid SRC values of gluten strength will be reported on an 'as is' basis. We have previously corrected the lactic acid SRC values to a 9% flour protein value using the formula of 7% point increase for every 1 % point increase in flour protein. After looking at many trials across many regions, we felt that this adjustment was creating more problems than it was solving. In recent years we have had many low protein trials that have resulted in very large adjustments of lactic acid that are not realistic expectations of the genetic potential of the cultivars. We also see that some genotypes can be much more responsive than model due to the presence of 5+10 allele at the *GluD1* locus with the absence of the rye translocation on the short arm of the chromosome 1B. We can provide the lactic acid values on a protein corrected basis if requested by a researcher.

Please give us feedback on the changes in the evaluations. We are open to your suggestions for continuous improvement.

Specific Information on Cultivars

The Northern Uniform Winter Wheat Scab Nursery routinely screens hard wheat cultivars. Our testing protocols are not appropriate for hard wheat testing. The lactic acid values may give some indication of relative gluten strength but other evaluations should not be used for comparisons to soft wheat lines. GS-0-

EM0681, GS-0-EM0614, GS-1-EM0362, WESLEY, WESLEYFHB1, NE06607, NE06469, and NW07505 had milling profiles similar to Wesley and other hard wheat genotypes. These lines will not be discussed further.

Flour yield is generally most heritable quality trait we evaluate. The average flour yield for this location was low due to the poor condition of the seed. Yet the relative rankings of the genotypes should be fairly predictive of future performance. Lines with flour yields significantly below Truman may have unacceptably low flour yield. Truman had a flour yield 68%; lines with flour yield of 66.5% are likely to have poor milling yield if released as a cultivar.

Sequentially selecting for flour yield, softness equivalent and sucrose SRC should identify the best quality genotypes in this study. Among the lines with better than average ratings for both Fusarium index and FDK, the best quality lines were: 03M1539#031, IL06-7550, IL06-14262, and MO071522.