Report on the 2009-2010 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 eash 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 allmust 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 2009-201 trials and 2) an analysis of all lines tested in the P+NUWWSN from 1998-2010 to test for trends in FHB resistance over time.

MATERIAL AND METHODS

Current Year: 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 47 entries (& four checks, Table 4) and we obtained phenotypic data from eight 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 "I") or the highest entry mean (such values are designated with an "h") for each trait.

For each trait, test environments were clustered to determine if there was a subset(s) of environments that had less GEI than the entire set. A matrix of GEI values were obtained and subjected to Ward's minimum variance clustering (eg clustering environments that produce low GEI variance) and to principal component analysis. Clusters of environments and outliers were determined based on visual inspection the resulting dendogram and graphs.

1998-2010 analysis: Since 1998, 722 lines have been assessed for FHB in the NUWWSN and PNUWWSN. We obtained best-linear unbiased predictors (BLUPs) of each line for all seven FHB traits using three data types:

Y = phenotypes within each trial/year/location combination

Y' = Y minus the mean of MR checks (Freedom, Ernie) for that trial/year/location

Y" = Y'/standard deviation of all lines in that trial/year/location

Each line was classified by the year it was first tested (1stYR). Three different regressions were conducted to assess trends over time.

- 1) Regression of BLUPs (Y, Y' and Y") on 1stYR using data from all 722 lines.
- 2) Obtain mean BLUP (Y, Y' and Y") for each trait for each level of 1stYR and regression those means on 1stYR: eg mean BLUP of lines first tested in 1998, mean BLUP of all lines first tested in 1999 ... mean BLUP of lines first tested in 2010.
- 3) Obtain mean BLUP (Y, Y' and Y") for each trait for rolling 2-year periods of 1stYR and regress those means on period. There were 12 periods: mean of period 1 is mean BLUP of lines first tested in 1998 or 1999, mean for period 2 is mean BLUP of lines first tested in 1999 or 2000 mean of period 12 is mean BLUP of lines first tested in 2009 or 2010.

RESULTS

Current tests: The mean for each entry over all environments for all FHB traits are shown in tables 8 and 10. In the NUWWSN, 12 entries had a lower index value than Truman (the most MR check) while only one entry in the PNUWWSN has a lower index than Truman. Based on analysis of all traits, the best and worst lines from each trial were identified and are show in Tables 9 and 11.

In the NUWWSN, seven entries had molecular marker evidence the Asian allele for resistance at Fhb1, four may have resistance at 3Bc from Ernie, and six may have resistance at 5A. No entries had Fhb1 and 5A. In the PNUWWSN, three entries had molecular marker evidence the Asian allele for resistance at Fhb1, two may have resistance at 3Bc from Ernie, and five may have resistance at 5A from Ernie and one has the Asian allele at 5A. Five of the seven entries in the NUWWSN with Fhb1 were among the most resistant lines in the NUWWSN, though the four very best entries had no evidence of FHB QTL (Table 9). One entry in the PNUWWSN has Fhb1 and 5A and it was in the most resistant class along with 10 other entries that had no evidence of FHB QTL (Table 11).

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 5). For each FHB trait and each trial, there was evidence of clusters of environments with reduced GEI and outlier environments. For FHB field traits and analyses involving all environments, the SS from GEI was on average 1.68 times greater than the SS due to genotypes. This ratio was reduced to 0.95 when analyses only involved environments within clusters. This indicates that genotype effects are estimated more accurately within clusters than by means over all environments.

Most of FHB traits were highly correlated in the NUWWSN where the correlations among INC, SEV, IND, FDK, ISK, and DON all exceeded 0.62 (Table 6). GHSEV was not highly correlated to any other FHB traits in the NUWWSN. The correlations among FHB traits were generally lower in the PNUWWSN than the NUWWSN and the correlations of GHSEV with other FHB traits were greater than in the NUWWSN. The correlations of HD and HGT with FHB traits were modest overall and variable within test environments (Table 7). In most locations, all or nearly all correlations of HD and HGT with FHB traits were not significant. In the NUWWSN, the KYLEX and MDSAL locations were considered outlier environments for many traits (Table 7). In KYLEX there was generally a positive correlation of HD and HGT with FHB traits while in MDSAL the correlations were negative. The magnitude of these correlations and their change in sign between the two locations may explain why they were considered outliers.

1998-2010 Analysis: No regression using data from the 722 individual lines was significant while the regressions using 1stYR means or rolling means for Y. Y', or Y" produced significant results for some traits. Generally the regression for a given trait using Y, Y', or Y" gave similar results. Regression using rolling means for Y' generally produced the greatest R² values and will be discussed.

Using data from all 12 periods, the regression of Y' on period was significant for severity and index only (Table 34). Graphing of trends over time showed that periods 1, 2 and 3 (1998+1999, 1999+2000, 2000+2001) appeared to be outliers for several traits (see Figures 1a-g). When those three periods were removed, the regression was significant for severity, index and DON (Table 34 and Figs 1a, 1b, and 1c). The slopes of these regressions are modest.

All traits showed a modest decrease with increasing period. A modest response would be expected in a uniform trial where lines are from many programs that use varying selection intensities and parentage, and lines are entered in the trials for various purposes: greater gains would be expected within a program solely focused on improving FHB resistance.

Index showed the greatest response over time (Table 34). Index is easy to assess in the field and is often used in early generation selection among head rows and unreplicated plots. Index is a function of incidence (Type I resistance) and severity (Type II resistance). The analyses indicate that progress in reducing index likely comes from progress in improving type II resistance and not from improving type I resistance as incidence showed no response over time (Fig. 1d). Assessing type I resistance is laborious and few programs can effectively exert much selection pressure on type I resistance. The same is likely true for Fusarium damaged kernels (FDK) and DON where fewer lines can be phenotyped for these traits than for index and thus less selection pressure can be exerted. There were significant correlations among the BLUPs for all seven FHB traits. It is likely that selection for low index likely accounts for most decrease in FDK and DON.

Most resistance in the 722 lines comes from native sources. The first axis of the principal component analyses accounted for 68% of the total variation and all traits had a negative correlation to this axis (thus lower PC1 scores indicate greater resistance). Of the 20 lines with the lowest scores for this axis, 14 had no marker or pedigree evidence of FHB1 or resistance from Asian sources.

The BLUPs for all traits for Y' will be made available upon request and will be distributed to all cooperators along with Excel versions of all tables.

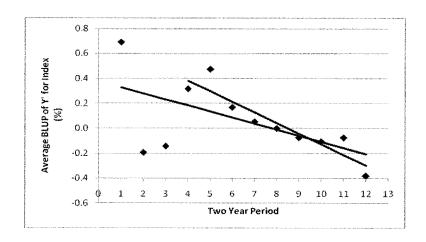


Figure 1a. Regression of average BLUPs of Y' for IND for rolling two year periods on period

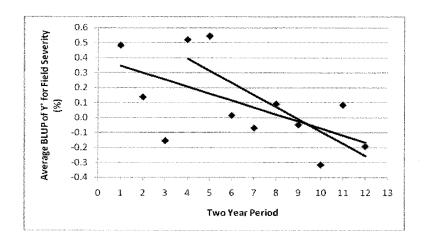


Figure 1b. Regression of average BLUPs of Y' for SEV for rolling two year periods on period

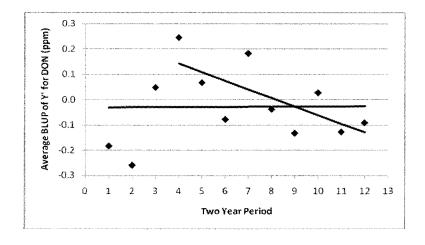


Figure 1c. Regression of average BLUPs of Y' for DON for rolling two year periods on period

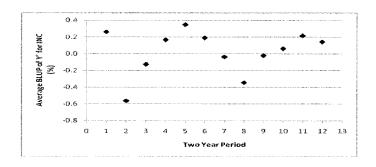


Figure 1d. Average BLUPs of Y' for INC for rolling two year periods versus period

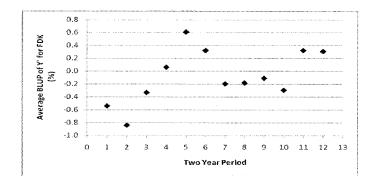


Figure 1e. Average BLUPs of Y' for FDK for rolling two year periods versus period

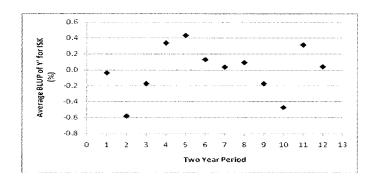


Figure 1f. Average BLUPs of Y' for ISK for rolling two year periods versus period

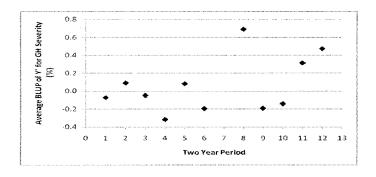


Figure 1g. Average BLUPs of Y' for GHSEV for rolling two year periods versus period

Table 1. Cooperators in the 2009-2010 NUWWSN and PNUWWSN

ENV CODE	LOCATION	NUWWSN	PNUWWSN	COOPERATORS	INSTITUTE	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, Nikki Mundell	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
NEMEA	Mead, NE	yes	no	Stephen Baenziger, S Wegulo	University of Nebraska	UNE
NYITH	Ithaca, NY	yes	no	Mark Sorrells, Gary Bergstrom	Cornell University	COR
OHWOO	Wooster, Ohio	yes	yes	Clay Sneller, Pierce Paul	The Ohio State University	OSU
ONRID	Ridgetown, Ontario	yes	no	Lilly Tamburic, Mike Holtzworth	University of Guelph, Ridgetown	UGR
ROMAN	Calarasi, Romania	yes	no	Mariana Ittu	National Agricultural Research-Development	ROM
VABLA	Blacksburg, VA	yes	yes	Carl Griffey, Shuyu Liu	Virginia Tech	VAT

Table 2. Traits assessed in the 2009-2010 P+NUWWSN.

Code	Trait	Description	PNUWWSN Locations	NUWWSN Locations
SEV	Disease severity from field	% of infected spikelets in an	IL,IN,IN,KY,MI,MO,VA	IL,IN,IN,KY,MD,MI,MO,NE,NY,
	tests	infected head.		OH, ON, VA
INC	Disease incidence	% of heads with at least one	IL,IN,IN,KY,MI,MO,VA	IL,IN,IN,KY,MD,MI,MO,NE,NY,
		infected spikelets		OH, ON, VA
IND	Disease index	IND = (SEVxINC)/100	IL,IN,IN,KY,MI,MO,OH,VA	IL,IN,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,IN,KY,MO	IL,IN,IN,KY,MD, MO,NE,RO
ISK	Composite of head and kernel traits	ISK Index = .3 (Severity) + .3 (Incidence)+.4 (FDK)	IL,IN,IN,KY,MO	IL,IN,IN,KY,MD,MO,NE
DON	DON (vomitoxin)	PPM of vomitoxin in grain	IL,KY,OH,VA	KY,MD,NE,OH,VA
GHSEV	Greenhouse severity	Same as SEV except from greenhouse	IL	IL,MO
	Milling quality score	A relative composite score based on traits that affect milling		IN
	Baking quality score	A relative composite score based on traits that affect baking		IN
	Softness equivalent score	A relative score based on softness equivalent		IN
	Test weight	Test weight in lbs/bu of clean grain		IN
	Whole grain protein	Percent protein of whole grain		
	Flour protein	NIR estimate of flour protein percentage (based on 13% moisture)		IN
	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
	Softness equivalent	Percentage of flour that passes through a 94 mesh screen		IN
	Lactic acid solvent retention capacity	A measure of gluten strength based on percentage of LA solvent retained by a flour sample after centrifugation		IN
	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

Table 3. Entries in the 2009-2010 NUSWWSN

ENTRY	SOURCE	NAME	PEDIGREE
1	UMO	ERNIE	, regional
2	UMO	TRUMAN	
3	OSU	FREEDOM	
4	PIO	PIONEER2545	
5	COR	NY99045-3110	Geneva/P2737W
6	osu	OH07-176-56	OH708 / P.92145E8-7-7-1-9
7	COR	NY94052-9340	P2737W/Harus
8	COR	NY99068-3251	NY87048W-7387/P25W33
9	COR	NY88046-7088	MD286-21/Harus
10	MSU	E5011B	Caledonia / NY88024-117
11	MSU	E5024	D6234 / Pioneer Brand 25W33
12	MSU	E3024	980775,(Caledonia, Geneva / Geneva)//NY85020-395
13	MSU	E6012	Caledonia / Pioneer Brand 25W33
14	MSU	E8052	P2552 / D8006
15	OSU	OH04-264-58	OH645/HOPEWELL
16	OSU	OH05-101-1	HOPEWELL/PIONEER25R26
17	OSU	OH05-164-76	PIONEER25R18/OH686
18	osu	OH05-200-74	OH629/HOPEWELL
19	PUR	99691A2-5-4-16-1	NC97BGTD8/Patterson//92212/3/9560
20	PUR	01946A1-16-48-5	981477/981128//INW0304/981250
21	PUR	057RA1-8-5	Truman/96169/49819/3INW9811//Fdm/201R
22	PUR	059A1-2-4-3	Truman/INW0316/4/9819/3/Freedom//Ernie/INW9824
23	SUN	TABOO	L930605/ASHLAND
24	SUN	MONDO	ROANE/IL95-3245
25	SUN	PROBE	MENDON/GR915
26	SUN	RUMOR	HOPEWELL/HONEY
27	SYN	03M1539#019	GIBSON/92226E2-5-3
28	SYN	03M1539#031	GIBSON/92226E2-5-3
29	SYN	W1104	HOPEWELL/M94-1107
30	SYN	ML06-2097	BENTON/M98-1569
31	UGR	GS-0-EM0681	Radiant/FE9
32	UGR	GS-0-EM0614	Radiant/BR32
33	UGR	GS-1-EM0362	GS-0-EM0672/Radiant = FE9/2*Radiant
34	UGR	ACF213003B	Harding/TF174
35	UGR	ACF126103	Movokrimka/Arina
36	UiL	IL02-18228	Pio25R26/IL9634-24437//IL95-4162
37	UIL	1L04-24668	IL98-13404/ IL97-3578
38	UIL	IL06-7550	L97-3632/
39	UIL	IL06-14262	L00-8530/ L97-1828
40	UKY	KY02C-3006-46	25R18/VA97W-375WS
41	UKY	KY02C-3004-02	25R18/Tribute 25R18/VA01W-476
42	UKY UKY	KY04C-2151 KY03C-1192-34	25K16/VA01W-476 KY93C-0876-66//KY96C-0059-21
43 44		KY02C-3008-01	25R18/92C-0010-17
45	UKY UMD	MD03W91-09-8	25R42/TRIBUTE
46	UMD	MD03W61-09-1	25R42/CHESAPEAKE
47	UMD	MD03W01-09-1	SISSON/MCCORMICK
48	UMO	MO071522	003013/980525
49	UMO	MO080104	L910097/MO-92-599
50	UMO	MO080864	981020//P92201D5-2/980725
51	UMO	MO081652	PL-2552/980829
52	UNE	WESLEY	
53	UNE	WESLEYFHB1	
54	UNE	NE06607	NE98466=(KS89H50-4/NE90518(=BRL//SXL/BENN))/WESLEY
55	UNE	NE06469	Pedigree lost
56	UNE	NW07505	Trego/Thunderbolt F3
57	VAT	VA06W-612	FREEDOM/ NEUSE"S" (NC96-13374)// VA98W-688[ROANE"S" (91-
			54-219) //FFR555W/GORE],F9
58	VAT	VA07W-594	FREEDOM/ NEUSE"S" (NC96-13374) // RC-STRATEGY,F9
59	VAT	VA07W-601	OH 552/ SISSON"S" (SS550)// RC-STRATEGY,F9
60	VAT	VA08W-734	COKER 9474(FHB-RES)/ IL97-2945 (FHB-RES) //TRIBUTE,F7

Table 4. Entries in the 2009-2010 PNUWWSN

1	ENTRY	SOURCE	NAME	PEDIGREE
3	1	UMO	ERNIE	
4	2	UMO	TRUMAN	
6 MSU E8007 D6206 / Pioneer Brand 2552 7 OSU OH06-159-6 P.92145E87-7-1-9-1/OH728 8 OSU OH06-159-6 P.92145E87-7-1-9-1/OH728 9 OSU OH06-180-57 P.92145E87-7-1-9-1/OH672 10 OSU OH06-197-81 P.92145E87-7-1-9-1/OH701 11 OSU OH06-190-29 OH707/OH687 12 OSU OH06-190-29 OH707/OH687 13 PUR 0320741-7-5 IRW030472/RSI5/3/981281/INW0316/99794 14 PUR 0359A1-1-9-5 IRW030472/RSI5/3/981281/INW0316/99794 15 PUR 0559A1-1-9-5 Truman/INW0316/4/9819/3/Freedom//Ernie/INW9824 17 PUR 0557A1-9-9-3 99751/2754/97462/INW0412 18 PUR 0537A1-7-8 II.W0411/2754/INW0412/98134 19 SUN SE98-1094-C20 IRV7944135 20 SUN SE00-10303-35 PION25W60/TW96286 21 SUN SE00-10303-35 PION25W60/TW96286 25 SUN M0678005#	3	OSU	FREEDOM	
6	4	PIO	PIONEER-2545	
To OSU OH06-158-50 P.92145E8-7.7-1.9-1/OH728	5	MSU	E5017	D6206 / Pioneer Brand 2552
8	6	MSU	E8007	VA96W-403-WS / W14
9 OSU OH06-180-57 KY90C-042-37-1/OH687 10 OSU OH06-197-61 P.92145E8-7-7-19-1/OH701 11 OSU OH06-190-29 OH707/OH687 12 OSU OH06-190-29 OH707/OH687 13 PUR 03615A1-5-7 Emickiny 278-818-819-819-819-819-819-819-819-819-81	7	OSU	OH06-158-50	P.92145E8-7-7-1-9-1/OH728
10	8	OSU	OH06-159-6	P.92145E8-7-7-1-9-1/OH728
11	9	OSU	OH06-180-57	KY90C-042-37-1/OH687
13	10	OSU	OH06-197-61	P.92145E8-7-7-1-9-1/OH701
13	11	OSU	OH06-228-73	OH708/OH707
14	12	OSU	OH06-190-29	OH707/OH687
15	13	PUR	03207A1-7-5	INW0304*2/RSI5/3/981281//INW0316/99794
16	14	PUR	03615A1-5-7	Ernie/INW0316//981358/97462
16	15	PUR	059A1-1-9-5	Truman/INW0316/4/9819/3/Freedom//Ernie/INW9824
17	1 1			Truman/INW0316/4/9819/3/Freedom//Ernie/INW9824
18			0527A1-9-9-3	
19	1 1		0537A1-7-8	INW0411/2754//INW0412/98134
20				
21 SUN SE98-1094-C20 FREEDOM/SE2549 LIBRA/N95L 189			SE-MO98-274-8	IL-87-2834-1/960314
22				
23	1 1		1	
24	1 1		1	PION25W60/CALEDONIA
25 SUN MISC-HDS-148 Unknown 26 SYN M08*8005# BRANSON/M99*3098 27 SYN MH07-7474 M97-1048/ELKHART 28 UIL IL06-13072 IL00-8109/IL97-3632 29 UIL IL06-13721 IL00-8530/IL97-3632 30 UIL IL06-25634 N-1538/IL98-4632//IL97-3632 31 UIL IL06-27969 IL96-6472/ P961341A3-2-2 33 UIL IL06-14325 IL00-8530/ IL97-1828 34 UKY KY03C-1237-23 25R18/92C-0017-17I/KY96C-0767-1 36 UKY KY01C-1070-02 KY91C-170-3/KY91C-117-27I/KY91C-170-3/Roane 37 UKY KY03C-1136-18 CG 554W/Z5R37/I/CG 554W/Tribute 39 UKY KY03C-1092-13 Allegiance/25W33//Allegiance/25R44 40 UMO MO080103 L910097/MO-92-599 42 UMO MO080373 980703/980525,-Truman-'S'/Truman 43 UMO MO081772 Truman/Seu-Seun-6 45 UMO MO081772 Truman/				
26	1 1			
27				
28	1 1		1	1
29				
30				1
31				
32				1
33				l i
34 UKY KY02C-3007-55 25R18/ALLEGIANCE 35 UKY KY03C-1237-23 25R18/92C-0017-17//KY96C-0767-1 36 UKY KY01C-1070-02 KY91C-170-3/KY91C-170-3/Roane 37 UKY KY01C-1531-17 KY91C-117-27//KY91C-170-3/Roane 38 UKY KY03C-1136-18 CG 554W/25R37//CG 554W/Tribute 39 UKY KY03C-1092-13 Allegiance/25W33//Allegiance/25R44 40 UMO MO070933 980429/P86958RC4-2-1-10 41 UMO MO080103 L910097/MO-92-599 42 UMO MO081378 03013/981020 43 UMO MO081377 Truman/Seu-Seun-6 45 UMO MO081772 Truman/Seu-Seun-6 45 UMO MO081777 PL-2552/980829 46 VAT VA08W-622 FREEDOM / NEUSE"S" (NC96-13374)// VA98W-688[Roane"S" (91-54-219)// FFR555W/GORE],F9 47 VAT VA08W-630 OH 552(P71761A4-31-5-33/MD55-286-21: FHB-RES)/SS550 (VA96W-247= CK9803/FREEDOM)//RC STRATEGY [VA98W-586=92-51-39 (IN71761A4-31-5-48//71-54-147/ MCN1813)/ Roane"S" (91-54-219)],F9 48 VAT VA08W-653 COKER 9474(FHB-RES)/ NEUSE"S" (NC96-13374),F8 49 VAT VA07W-600 OH 552/SS550//RC-STRATEGY,F9 50 VAT VA08W-740 B961092(SCAB RES)/ VA00W-566 [(CHILL"S"/YMI6)/PION2548//			1	
35 UKY KY03C-1237-23 25R18/92C-0017-17//KY96C-0767-1 36 UKY KY01C-1070-02 KY91C-170-3/KY91C-170-3/Roane 37 UKY KY01C-1531-17 Tribute/2552//Tribute/SS 520 38 UKY KY03C-1136-18 CG 554W/25R37//CG 554W/Tribute 39 UKY KY03C-1092-13 Allegiance/25W33//Allegiance/25R44 40 UMO MO070933 980429/P86958RC4-2-1-10 41 UMO MO080103 L910097/MO-92-599 42 UMO MO081378 003013/981020 43 UMO MO081378 003013/981020 44 UMO MO081772 Truman/Seu-Seun-6 45 UMO MO081777 PL-2552/980829 46 VAT VA08W-622 FREEDOM / NEUSE"S" (NC96-13374)// VA98W-688[Roane"S" (91-54-219)// FFR555W/GORE],F9 47 VAT VA08W-630 OH 552(P71761A4-31-5-33/MD55-286-21: FHB-RES)/SS550 (VA96W-247= CK9803/FREEDOM)//RC STRATEGY [VA98W-586=92-51-39 (IN71761A4-31-5-48//71-54-147/ MCN1813)/ Roane"S" (91-54-219)],F9 48 VAT VA08W-653 COKER 9474(FHB-RES)/ NEUSE"S" (NC96-13374),F8 49 VAT VA07W-607 IL89-6489(PIONEER 9021L// ROLAND/IL77-2656: FHB-RES)/ Sisson"S" (VA97W-375= CK9803/FREEDOM)// ERNIE.F8 51 VAT VA08W-740 B961092(SCAB RES)/ VA00W-566 [(CHILL"S"/YMI6)/PION2548//				
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PION2684] //McCORMICK"S" (VA98W-590),F7	51	VAT	VA08W-740	
· · · · · · · · · · · · · · · · · · ·				PION2684] //McCORMICK"S" (VA98W-590),F7

Table 5. Statistics and percentage of total sum of squares attributed to genotype, environment, and GxE interation effects from ANOVAs for the 2009-2010 P+NUWWSN. ANOVA were conducted for all environments and then for each cluster of environments.

		# Environments			% SS	% SS	% SS	SS GEI /
NUWWSN		(#clusters/#outliers)	R2	CV	Geno	Env	GEI	SS Geno
SEV	ALL	13 (2/2)	0.67	40	20.0	47.4	32.6	1.63
	CLUSTER 1	8	0.71	36	19.9	50.1	30.0	1.51
	CLUSTER 2	3	0.75	31	52.1	23.1	24.7	0.47
INC	ALL	12 (1/3)	0.91	20	3.0	87.2	9.8	3.26
	CLUSTER 1	9	0.95	14	2.9	91.7	5.5	1.92
IND	ALL	12 (1/4)	0.77	47	11.7	65.3	23.0	1.97
	CLUSTER 1	8	0.86	37	11.2	75.1	13.7	1.22
FDK	ALL	8 (1/2)	0.64	46	18.7	45.3	36.0	1.93
	CLUSTER 1	6	0.69	43	20.5	48.6	30.9	1.51
ISK	ALL	7 (1/2)	0.77	32	15.7	61.0	23.4	1.49
	CLUSTER 1	5	0.86	23	19.1	67.7	13.2	0.69
DON	ALL	7 (2/1)	0.85	51	9.7	75.1	15.2	1.57
	CLUSTER 1	3	0.84	80	33.2	31.0	35.8	1.08
	CLUSTER 2	3	0.83	81	49.7	33.5	16.8	0.34
GHSEV	ALL	2	0.78	61	69.2	9.2	21.6	0.31
HD	ALL	8	0.99	1	4.2	94.4	1.4	0.33
HGT	ALL	3	0.85	6	34.1	50.9	15.0	0.44

					% SS	% SS	% SS	SS GEI /
PNUWWSN	_		R2	CV	Geno	Env	GEI	SS Geno
SEV	ALL	7 (1/2)	0.65	41	20.5	45.0	34.6	1.69
	CLUSTER 1	5	0.81	35	4.5	92.3	3.2	0.72
INC	ALL	7 (2/1)	0.92	21	4.7	86.8	8.5	1.80
	CLUSTER 1	4	0.97	9	2.1	97.9	2.5	1.15
	CLUSTER 2	2	0.84	58	95.9	4.1	18.7	0.19
IND	ALL	8 (1/2)	0.72	52	14.8	57.7	27.5	1.86
	CLUSTER 1	6	0.86	43	15.9	70.1	14.0	0.88
FDK	ALL	5 (1/1)	0.75	45	28.5	46.4	25.1	0.88
	CLUSTER 1	4	0.71	51	31.9	39.5	28.5	0.89
ISK	ALL	5 (1/2)	0.82	23	19.0	68.2	12.8	0.67
	CLUSTER 1	3	0.93	23	24.4	68.5	7.2	0.29
DON	ALL	4(1/1)	0.81	46	14.2	66.2	19.6	1.38
	CLUSTER 1	3	0.77	47	16.8	60.9	22.4	1.33
GHSEV*								_
HD		5	0.97	1	3.9	94.6	1.6	0.40
HGT*								

^{*} one environment for GHSEV and HGT in the PNUWWSN

Table 6. Correlation among genotype means for the 2009-2010 NUWWSN (above the diagonal) and PNUWWSN (below the diagonal)

	INC	SEV	IND	FDK	ISK	DON	GHSEV	HD	HGT
INC	1	0.75	0.85	0.77	0.86	0.63			
SEV	0.39	1	0.95	0.75	0.86	0.74	0.39	0.39	
IND		0.93	1	0.77	0.89	0.72	0.28	0.34	
FDK	0.44	0.59	0.53	1	0.97	0.66	0.28		
ISK	0.88	0.87	0.91	0.63	1	0.7	0.26		
DON	0.38	0.73	0.56		0.62	1			
GHSEV	0.51	0.61	0.54	0.32	0.56		1		
HD	0.61							1	0.37
HGT	0.51	0.28						0.91	1

= non-significant correlation at p=0.05

Table 7. Correlation of heading date (HD) and height (HGT) with FHB traits by location for the 2009-2010 P+NUWWSN

NUWWSN		ILURB	KYLEX	MDSAL	MIELA	MOCOL	OHWOO	ONRID	VABLA
HD with	INC	NS	0.56	NS	NS	NS	NS	NS	NS
H	SEV	NS	0.31	NS	0.53	NS	NS	NS	NS
11	IND	NS	0.25	-0.3	0.34	NS	NS	NS	NS
11	FDK	NS	NS	-0.31		NS			NS
11	ISK	NS	0.64	-0.36		NS			NS
l "	DON	NS	NS	-0.6			NS		NS
HGT with	INC		0.46	NS					
"	SEV		0.35	NS					
11	IND		0.29	-0.27					
11	FDK		0.37	NS					
"	ISK		0.36	-0.25					
"	DON		NS	-0.52					

PNUWWSN		ILURB	KYLEX	MIELA	MOCOL	OHWOO
HD with	INC	NS	0.38	0.63	-0.47	
"	SEV	NS	NS	NS	NS	
"	IND	NS	NS	NS	NS	NS
"	FDK	NS	NS		NS	
"	ISK	NS	0.38		NS	
"	DON	0.27	NS			NS
HGT with	INC		0.34			
	SEV		0.28			
**	IND		NS			
11	FDK		NS			
11	ISK		NS			
11	DON		NS			

NS = non-significant at p=0.05.

data not collect on both traits
location was an outlier for that trait

Table 8. Mean of FHB traits for the 2009-2010 NUWWSN. "I" and "h" indicate means that are not significantly different from the lowest and highest mean in each column, respectively.

ENTRY	NAME		SEV	IND	FDK	ISK	DON	GHSEV		#h
1	ERNIE	53.7	24.7 1	17.4	25.5	30.1	7.3	10.7	4	0
2 3	TRUMAN FREEDOM	50.0 I 60.6	29.4 34.0	16.7 26.8	18.0 I 36.3	27.8 I 41.5	5.3 l 7.1 l	5.2 l 7.9 l	5	0
4	PIONEER-2545	71.1 h	48.7 h	36.8 h		55.6 h	12.9 h	26.3	1	6
5	NY99045-3110	56.8	35.1	24.1	31.7	37.5	10.0	8.5 1	2	0
6	OH07-176-56	54.9	34.6	21.7	38.4	35.5	5.7	49.0 h	1	1
7	NY94052-9340	57.9	42.6	27.1	29.7	40.9	8.4	7.5 1	2	Ó
8	NY99068-3251	49.4	37.0	19.4	26.5	34.1 I	7.6	18.2 I	4	0
9	NY88046-7088	64.9 h	53.3 h	35.5 h			7.2	17.5 l	1	5
10	E5011B	64.7 h	46.6 h	31.7 h	46.5 h	49.6 h	10.0	12.9 1	1	5 5
11	E5024	64.3 h	35.9	23.3	33.8	40.8	12.1	10.9 I	1	1
12	E3024	64.4 h	56.0 h	38.0 h	40.2	52.2 h	9.0	31.4	0	4
13	E6012	60.5	42.1	27.8	34.1	41.3	10.8	10.5 1	1	0
14	E8052	65.5 h	40.4	30.3 h		45.3	11.4	21.2	1	2
15	OH04-264-58	63.4 h	37.2	27.3	43.1 h	44.3	5.7 1	24.1	2	
16	OH05-101-1	55.7	29.0	16.7	39.8	39.7	5.6 1	35.2	1	0
17	OH05-164-76	61.3	27.1	19.0	27.8	34.2 1	5.3	9.8 [4	0
18	OH05-200-74	59.4	26.1	17.6	34.7	36.7	6.2 1	7.4	2	0
19	99691A2-5-4-16-1	56.5	35.0 26.6	21.8	30.3	35.4 32.8 I	7.8 7.1	43.7 h	1 3	1 0
20	01946A1-16-48-5 057RA1-8-5	57.4 56.9	26.6 36.3	19.4 22.7	27.5 I 33.5 I	32.8 I 38.5	7.1 10.2	10.5 l 6.3 l	2	0
22	059A1-2-4-3	57.1	30.3 32.9	21.8	41.0	38.3	10.2	6.4 1	1	0
23	TABOO	60.4	47.0 h	25.9	39.6	41.8	5.7 1	52.5 h	1	-5
24	MONDO	50.3	28.8	15.3 I	23.8	28.6	7.2	17.9 [5	2 0
25	PROBE	64.7 h	44.5	28.5	45.4 h		7.1 I	60.3 h	1	3
26	RUMOR	60.6	36.4	25.1	34.2	39.7	6.4 1	17.6 1	2	0
27	03M1539#019	56.9	31.1	20.1	38.0	33.6	9.2	67.8 h	1	1
28	03M1539#031	56.8	36.3	22.0	27.6	36.6	7.9	56.0 h	1	1
29	W1104	59.0	37.9	23.1	41.8	39.5	13.7 h	15.2	1	1
30	ML06-2097	59.4	38.0	23.5	43.0 h	41.6	8.4	28.9 1	1	1
31	GS-0-EM0681	58.6	35.0	21.5	46.6 h	44.0	10.8	18.3	1	1
32	GS-0-EM0614	53.8	35.0	21.4	40.0	37.6	5.8 1	42.7 h	1	1
33	GS-1-EM0362	57.8	49.6 h			50.7 h		54.3 h	0	5 2
34	ACF213003B	61.9 h	39.8	27.3	45.1 h	44.7	9.2	12.0	1	2
35	ACF126103	60.9	39.9	26.7	39.9	44.9	9.3	35.1	0	0
36	IL02-18228	46.6 I 53.8	19.0 I	12.3 I	23.7	24.9 I 31.7 I	3.4	25.7 l 26.0 l	7	0
37 38	IL04-24668 IL06-7550	55.5	31.6 23.6 I	19.7 17.5	22.2 I 28.9 I	32.4	5.0 I 7.4	9.3	4	0
39	IL06-14262	49.2 I	23.0 I	17.3 10.9 I		29.0	4.5 1	6.4	7	0
40	KY02C-3006-46	53.9	18.2	13.5	20.4	27.9	4.3 1	3.9 1	6	0
41	KY02C-3004-02	50.5 I	16.3 I	11.5 I	19.3	26.4	3.4	5.7 1	7	0
42	KY04C-2151	51.8	22.5	17.0	23.0	31.4	4.1	5.3 1	6	Ö
43	KY03C-1192-34	62.0 h	36.5	25.9	35.9	41.9	7.8	50.1 h	ő	2
44	KY02C-3008-01	62.5 h		17.3	30.0 1	35.5	6.1 1	4.7 1	4	1
45	MD03W91-09-8	55.1	24.6	15.6 I	20.5 1	30.3 1	5.7 1	41.5 h	5	1
46	MD03W61-09-1	52.8 I	16.6	11.7	25.3	29.6	3.8 1	13.2	7	0
47	MD02W135-08-9	52.3 l	30.9	18.0	20.9 1	32.2 1	6.6 1	59.4 h	4	1
48	MO071522	50.7 I	30.9	18.9	29.0	31.8	5.1 1	7.4 1	5	0
49	MO080104	43.6 1	16.4	8.1 1	22.2	21.2	3.1	8.1	7	0
50	MO080864	45.8	22.1	14.0 I	18.7		5.8 1	4.4	7	0
51	MO081652	50.9 1	14.5	9.0 1	18.9 1	23.2 1	3.9 1	6.6	7	0
52	WESLEY	70.3 h	46.1 h	33.6 h	53.9 h		10.5	6.3	1	5
53	WESLEYFHB1	68.2 h	43.2	30.9 h			8.8	38.8	0	4 1
54	NE06607 NE06469	52.5 l 63.7 h	35.0 35.6	20.1 23.0	45.7 h 55.3 h		6.4 I 7.9	12.4 l 26.3 l	1	3
55 56	NE06469 NW07505	63.2 h						37.1	0	ა _6
57	VA06W-612	59.5	31.7	19.9	37.2	34.6	6.1 I	27.3	2	-0
58	VA00V-012 VA07W-594	53.5	27.3	14.9 I	1		4.8	26.7 1	5	0
59	VA07W-594 VA07W-601	53.8	25.2	17.1	41.1	36.9	4.5	13.3	2	0
60	VA08W-734	43.8 1	16.1 I	10.4 I	21.0	22.3	4.0 1	9.1	7	Ö
100	AVERAGE	57.2	33.1	21.6	34.3	38.1	7.4	22.2		
101	MINUMUM	43.6	14.5	14.5	18.0	21.2	3.1	3.9		
102	MAXIMUM	71.1	56.0	56.0	58.3	61.3	16.4	67.8		
103	LSD(0.05)	9.5	10.4	8.1	15.5	13.2	4.1	27.4		
I	N	12	13	12	8	7	7	2	L	

Table 9. Best (top of the table) and worst (bottom of the table) entries in the 2009-2010 NUWWSN

		Putative				·				Γ	
ENTRY	NAME	QTL	INC	SEV	IND	FDK	ISK	DON	GHSEV	#1 #	ŧh
49	MO080104		43.6	16.4 I	8.1 I	22.2	21.2	3.1 1	8.1		0
51	MO081652		50.9 I	14.5 I	9.0	18.9 I	23.2 1	3.9 1	6.6 1	7	0
60	VA08W-734		43.8	16.1 I	10.4 l	21.0	22.3	4.0 I	9.11	7	0
39	IL06-14262		49.2 1	22.4	10.9 I	20.4	29.0 1	4.5	6.4 1	7	0
41	KY02C-3004-02	Fhb1?	50.5 1	16.3 I	11.5 I	19.3 l	26.4	3.4 1	5.7 1	7	0
46	MD03W61-09-1	Fhb1	52.8 1	16.6 I	11.7 I	25.3	29.6	3.8 I	13.2		0
36	IL02-18228		46.6 I	19.0 I	12.3 I	23.7 1	24.9 1	3.4 I	25.7 1	7	0
50	MO080864	5Aernie	45.8 1	22.1	14.0 I	18.7	23.6 1	5.8 1	4.4 1	7	0
40	KY02C-3006-46	Fhb1	53.9	18.2	13.5 I	20.1	27.9	4.3 I	3.9 I		0
42	KY04C-2151	Fhb1, 2DL	51.8 I	22.5	17.0	23.0	31.4	4.1 I	5.3 I	6	0
58	VA07W-594		53.5	27.3	14.9 I	32.5	33.7	4.8 I	26.7 1	5	0
24	MONDO	5Aernie	50.3 1	28.8	15.3 I	23.8 1	28.6	7.2	17.9 I	5	0
45	MD03W91-09-8		55.1	24.6	15.6 I	20.5	30.3	5.7	41.5 h	5	1
2	TRUMAN		50.0	29.4	16.7	18.0 l	27.8 1	5.3 I	5.2 l		0
48	MO071522		50.7	30.9	18.9	29.0 l	31.8	5.1 I	7.4 I		0
44	KY02C-3008-01		62.5 h	22.7	17.3	30.0	35.5	6.1 I	4.7 1	4	1
1 1	ERNIE	5Aernie	53.7	24.7	17.4	25.5	30.1	7.3	10.7 I		0
38	IL06-7550		55.5	23.6	17.5	28.9	32.4	7.4	9.3 I	ı	0
47	MD02W135-08-9		52.3	30.9	18.0	20.9	32.2 1	6.6 I	59.4 h	4	1
17		Fhb1, 3Bc?		27.1	19.0	27.8 1	34.2	5.3 I	9.8 I	1	0
8	NY99068-3251		49.4	37.0	19.4	26.5 I	34.1	7.6	18.2 I	4	0
53	WESLEYFHB1	Fhb1	68.2 h	43.2	30.9 h	45.4 h	48.8 h	8.8	38.8	0	4
12		5Aernie	64.4 h	56.0 h		l .	52.2 h	9.0	31.4	1	
33	GS-1-EM0362		57.8	49.6 h	31.4 h	45.2 h	50.7 h	11.9	54.3 h	0	<u>4</u>
10	E5011B		64.7 h	46.6 h	31.7 h	46.5 h	49.6 h	10.0	12.9	1	5
52	WESLEY		70.3 h	46.1 h	33.6 h	53.9 h	58.1 h	10.5	6.3 I	1	5
9	NY88046-7088		64.9 h	53.3 h			54.5 h	7.2	17.5	1	5 5 5 6
56	NW07505		63.2 h	48.8 h	31.8 h	56.2 h	60.8 h	16.4 h	37.1	0	6
4	PIONEER-2545		71.1 h	48.7 h	36.8 h	58.3 h	55.6 h	12.9 h	26.3	1	6
100	AVERAGE		57.2	33.1	19.9	34.3	38.1	7.4	22.2		
101	MINUMUM		43.6	14.5	14.5	18.0	21.2	3.1	3.9		
102	MAXIMUM		71.1	56.0	56.0	58.3	61.3	16.4	67.8		
103	LSD(0.05)		9.5	10.4	8.1	15.5	13.2	4.1	27.4		
	N		12	13	12	8	7	7	2		

Table 10. Mean of FHB traits for the 2009-2010 PNUWWSN. "I" and "h" indicate means that are not significantly different from the lowest and highest mean in each column, respectively.

ENTRY	NAME	INC	SEV	IND	FDK	ISK	DON	GHSEV	#1	#h
1	ERNIE	49.1 I	21.9 I	17.6 I	18.3 I	29.2 1	12.7 h	17.5	5	1
2	TRUMAN	43.2	18.2 I	10.8	10.8 I	24.3 1	4.4	14.4	6	0
3	FREEDOM	62.2 h	32.9	24.5	42.8 h	49.1	6.9	5.0	1	2
4	PIONEER2545	71.0 h	51.7 h		52.9 h	61.6 h	12.0	80.3	0	5
5	E5017	74.8 h	33.3	29.9	37.1	50.4	18.3 h	7.7	0	2
6	E8007	41.2	15.1 I	9.1 1	13.1 I	23.2	8.6	3.0	6	0
7	OH06-158-50	59.3	43.9 h	28.6	34.6	47.1	9.7 I	100.0	1	1
8	OH06-159-6	52.7 I	25.7	17.7 I	44.7 h	43.1	11.3	37.3	2	1
9	OH06-180-57	60.8	39.7 h	27.3	34.5	46.6	9.5 I	91.8	1	1
10	OH06-197-61	49.7 I	26.2	15.5 I	38.3	39.0	5.8 I	19.3	3	0
11	OH06-228-73	62.6 h	38.6 h	29.1	43.2 h	49.8	10.8	88.5	Ō	3
12	OH06-190-29	62.1	35.6	25.1	43.6 h	47.7	9.5 1	64.8	1	1
13	03207A1-7-5	54.1	25.9	20.2	34.3	38.0	9.6 1	33.8		Ö
14	03615A1-5-7	52.0 1	20.1 I	16.0 I	22.7	31.5 I	5.2 I	5.0	6	0
15	059A1-1-9-5	53.8	30.1	21.6	30.6	37.6	9.4	21.0		0
16	059A1-1-9-6	56.8	40.4 h	32.7 h	37.2	46.0	11.9	28.6	Ö	2
17	0527A1-9-9-3	53.4 I	22.2	17.2 I	28.6 1	33.9	11.6	3.0	-	0
18	0537A1-7-8	53.7	26.0	16.8 I	20.7 1	34.1	8.5 1	35.8	3	0
19	SE99-1015-7	59.3	27.7	24.8	41.8	43.2	13.0 h	74.4	5	1
20	SE-MO98-274-8	57.9	39.8 h	34.1 h	34.5	45.2 45.9	14.2 h	34.8	-	3
21	SE98-1094-C20	57.9 57.2	32.9	26.1	39.7	45.9	12.0	12.7	0	0
22		i I	34.8	25.6		49.1	12.0	26.0		1
	SE00-4040-10	58.4			52.0 h	l				1
23	SE00-10303-35	66.7 h	49.3 h	32.8 h	59.3 h	59.6 h	13.1 h	59.5	0	
24	SE00-10286-7	64.4 h	37.6	30.4 h	38.7	46.4	17.1 h	53.0	0	3
25	MISC-HDS-148	74.8 h	41.0 h	37.9 h	60.1 h	62.2 h	13.3 h	58.8	0	6
26	M08*8005#	51.5 I	22.3 1	17.9 I	17.1	30.1	11.6	41.6	5	0
27	MH07-7474	49.9 I	29.3	21.5	31.0	37.4	7.7 1	27.2	2	0
28	IL06-13072	52.4	28.2	18.0 I	17.9	33.7	7.9 1	53.6	4	0
29	IL06-13708	49.9	22.8 I	13.7 I	23.7	32.5	5.4	18.0	6	0
30	IL06-13721	46.8	15.6 I	10.4 I	12.1 I	25.1 I	9.3 I	14.0	6	0
31	IL06-25634	57.1	22.2 I	18.8 I	17.0 I	32.1 I	11.3	6.3	4	0
32	IL06-27969	47.1 I	24.2 I	14.7	11.7	28.1 I	5.3	55.3	6	0
33	IL06-14325	47.9 l	22.5 I	14.1	19.7 I	31.5 I	6.5 I	61.3	6	0
34	KY02C-3007-55	52.7	19.7 I	11.9	20.0	31.8 I	6.5 I	3.8	6	0
35	KY03C-1237-23	66.9 h	30.7	26.3	33.2	44.1	11.3	54.2		1
36	KY01C-1070-02	62.7 h	31.9	25.7	39.0	46.5	9.7 I	69.2	1	1
37	KY01C-1531-17	60.3	37.6	24.8	39.3	46.4	8.8 1	100.0	1	0
38	KY03C-1136-18	71.5 h	43.5 h	39.0 h	60.0 h	61.8 h	11.8	86.0	0	5
39	KY03C-1092-13	60.5	33.8	27.4	46.1 h		11.1	21.6		1
40	MO070933	53.0 I	28.3	19.3 I	18.6 I	34.2	11.4	6.3		0
41	MO080103	40.8 I	12.2	8.0 1	14.6 I	21.7	4.0	5.6		0
42	MO080373	44.4	21.1 l	14.9 I	11.0 I	26.0	6.2	7.4		0
43	MO081378	47.8 I	34.5	23.5	22.3	37.5	7.6 1	5.4		0
44	MO081772	48.8 I	30.1	20.9	15.5 I	34.0	4.7	9.5	3	0
45	MO081777	45.5 I	16.8 I	11.1	12.7 1	25.3	4.5	9.8	6	0
46	VA08W-622	58.8	23.6	17.2 I	35.5	40.7	6.9 1	42.2	3	0
47	VA08W-630	61.2	34.1	26.6	40.8	45.9	7.7	43.8	1	0
48	VA08W-653	61.8	33.9	27.4	40.2	47.0	9.7 1	7.6	1	0
49	VA07W-600	60.4	27.3	20.3	33.4	41.1	7.0	24.7		0
50	VA07W-607	49.4	26.7	17.3 I	25.6	33.8	5.8 1	16.0		0
51	VA08W-740	50.1 I	26.6	19.0	38.0	37.9	12.9 h	22.4		1
100	AVERAGE	55.9	29.6	22.0	31.6	39.9	9.5	35.1		
101	MINUMUM	40.8	12.2	8.0	10.8	21.7	4.0	3.0		
102	MAXIMUM	74.8	51.7	41.5	60.1	62.2	18.3	100.0		
103	LSD(0.05)	12.7	13.2	11.5	18.0	11.8	6.2			
 	N	7	7	8	5	5	4	1		\dashv
L		'					•	<u> </u>		

Table 11. Best (top of the table) and worst (bottom of the table) entries in the 2009-2010 PNUWWSN

ENTRY	NAME	Putative QTL	INC	SEV	IND	FDK	ISK	DON	GHSEV	#1	#h
41	MO080103		40.8 I	12.2 I	8.0 1	14.6 I	21.7	4.0 1	5.6	6	0
6	E8007	Fhb1, 5Aning	41.2 I	15.1 I	9.1	13.1 I	23.2	8.6 1	3.0	6	0
30	IL06-13721	_	46.8 I	15.6 I	10.4	12.1 I	25.1 l	9.3 1	14.0	6	0
2	TRUMAN		43.2 I	18.2 I	10.8 I	10.8 I	24.3 1	4.4	14.4	6	0
45	MO081777		45.5 I	16.8 I	11.1	12.7 I	25.3 I	4.5 1	9.8	6	0
34	KY02C-3007-55		52.7 I	19.7 I	11.9	20.0 1	31.8	6.5 I	3.8	6	0
29	IL06-13708		49.9	22.8 I	13.7 I	23.7 1	32.5 l	5.4 1	18.0	6	0
33	IL06-14325		47.9 I	22.5 I	14.1	19.7 I	31.5 I	6.5 1	61.3	6	0
32	IL06-27969		47.1 l	24.2 1	14.7	11.7	28.1 I	5.3 1	55.3	6	0
42	MO080373		44.4	21.1	14.9	11.0 1	26.0 1	6.2 1	7.4	6	0
14	03615A1-5-7		52.0 I	20.1 I	16.0	22.7 1	31.5 I	5.2 1	5.0	6	0
1	ERNIE	5Aernie	49.1 I	21.9 I	17.6	18.3 I	29.2	12.7 h	17.5	5	1
26	M08*8005#		51.5 I	22.3 1	17.9	17.1	30.1 I	11.6	41.6	5	0
	14100 0000#		0 1.0		1 17.0 1	.,	00.1	1)	-
20	Wice Coocii		01.0	EE.O	17.0	.,,	00.1				
17	0527A1-9-9-3		53.4	22.2	17.2	28.6	33.9	11.6	3.0		0
17 50						28.6 l 25.6 l	33.9 33.8		3.0 16.0	4	0 0
17	0527A1-9-9-3	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	53.4	22.2 I 26.7	17.2 l	28.6 I	33.9	11.6	3.0	4	
17 50	0527A1-9-9-3 VA07W-607		53.4 49.4	22.2 I 26.7 28.2 22.2 I	17.2 17.3 18.0 18.8	28.6 l 25.6 l	33.9 33.8	11.6 5.8 I	3.0 16.0	4 4 4	0 0 0
17 50 28	0527A1-9-9-3 VA07W-607 IL06-13072		53.4 49.4 52.4	22.2 I 26.7 28.2 22.2 I	17.2 17.3 18.0 18.8	28.6 I 25.6 I 17.9 I 17.0 I	33.9 33.8 33.7	11.6 5.8 I 7.9 I	3.0 16.0 53.6	4 4 4	0
17 50 28 31	0527A1-9-9-3 VA07W-607 IL06-13072 IL06-25634		53.4 49.4 52.4 57.1	22.2 I 26.7 28.2 22.2 I 43.5 h	17.2 l 17.3 l 18.0 l 18.8 l 39.0 h	28.6 I 25.6 I 17.9 I 17.0 I 60.0 h	33.9 33.8 33.7 32.1 I 61.8 h	11.6 5.8 I 7.9 I 11.3	3.0 16.0 53.6 6.3	4 4 4 4 0	0 0 0
17 50 28 31 38	0527A1-9-9-3 VA07W-607 IL06-13072 IL06-25634 KY03C-1136-18		53.4 49.4 52.4 57.1 71.5	22.2 I 26.7 28.2 22.2 I 43.5 h	17.2 l 17.3 l 18.0 l 18.8 l 39.0 h 41.5 h	28.6 I 25.6 I 17.9 I 17.0 I 60.0 h 52.9 h	33.9 33.8 33.7 32.1 I 61.8 h 61.6 h	11.6 5.8 I 7.9 I 11.3	3.0 16.0 53.6 6.3 86.0	4 4 4 4 0 0	0 0 0 5
17 50 28 31 38 4	0527A1-9-9-3 VA07W-607 IL06-13072 IL06-25634 KY03C-1136-18 PIONEER2545 SE00-10303-35 MISC-HDS-148		53.4 49.4 52.4 57.1 71.5 71.0 71	22.2 I 26.7 28.2 22.2 I 1 43.5 h 1 51.7 h 1 49.3 h	17.2 17.3 18.0 18.8 39.0 h 41.5 h 32.8 h	28.6 25.6 17.9 17.0 60.0 h 52.9 h 59.3 h	33.9 33.8 33.7 32.1 I 61.8 h 61.6 h	11.6 5.8 I 7.9 I 11.3 11.8 12.0	3.0 16.0 53.6 6.3 86.0 80.3 59.5 58.8	4 4 4 4 0 0	0 0 0 5 5
17 50 28 31 38 4 23 25	0527A1-9-9-3 VA07W-607 IL06-13072 IL06-25634 KY03C-1136-18 PIONEER2545 SE00-10303-35 MISC-HDS-148 AVERAGE		53.4 49.4 52.4 57.1 71.5 71.0 66.7 66.7	22.2 I 26.7 28.2 22.2 I 1 43.5 h 1 51.7 h 1 49.3 h 1 41.0 h 29.6	17.2 17.3 18.0 18.8 39.0 h 41.5 h 32.8 h 37.9 h	28.6 I 25.6 I 17.9 I 17.0 I 60.0 h 52.9 h 59.3 h 60.1 h 31.6	33.9 33.8 33.7 32.1 I 61.8 h 61.6 h 59.6 h 62.2 h	11.6 5.8 7.9 11.3 11.8 12.0 13.1 h 13.3 h	3.0 16.0 53.6 6.3 86.0 80.3 59.5 58.8 35.1	4 4 4 4 0 0	0 0 0 5 5 6
17 50 28 31 38 4 23 25	0527A1-9-9-3 VA07W-607 IL06-13072 IL06-25634 KY03C-1136-18 PIONEER2545 SE00-10303-35 MISC-HDS-148		53.4 49.4 52.4 57.1 71.5 71.0 66.7 74.8 66.7 74.8 74	22.2 I 26.7 28.2 22.2 I 1 43.5 h 1 51.7 h 1 49.3 h 1 41.0 h	17.2 17.3 18.0 18.8 39.0 h 41.5 h 32.8 h 37.9 h	28.6 I 25.6 I 17.9 I 17.0 I 60.0 h 52.9 h 59.3 h 60.1 h	33.9 33.8 33.7 32.1 I 61.8 h 61.6 h 59.6 h 62.2 h	11.6 5.8 7.9 11.3 11.8 12.0 13.1 h 13.3 h	3.0 16.0 53.6 6.3 86.0 80.3 59.5 58.8	4 4 4 4 0 0	0 0 0 5 5 6
17 50 28 31 38 4 23 25	0527A1-9-9-3 VA07W-607 IL06-13072 IL06-25634 KY03C-1136-18 PIONEER2545 SE00-10303-35 MISC-HDS-148 AVERAGE		53.4 49.4 52.4 57.1 71.5 71.0 66.7 74.8 55.9	22.2 I 26.7 28.2 22.2 I 1 43.5 h 1 51.7 h 1 49.3 h 1 41.0 h 29.6	17.2 17.3 18.0 18.8 39.0 h 41.5 h 32.8 h 37.9 h	28.6 I 25.6 I 17.9 I 17.0 I 60.0 h 52.9 h 59.3 h 60.1 h 31.6	33.9 33.8 33.7 32.1 I 61.8 h 61.6 h 59.6 h 62.2 h	11.6 5.8 7.9 11.3 11.8 12.0 13.1 h 13.3 h	3.0 16.0 53.6 6.3 86.0 80.3 59.5 58.8 35.1	4 4 4 4 0 0 0 0	0 0 0 5 5 6
17 50 28 31 38 4 23 25 100 101	0527A1-9-9-3 VA07W-607 IL06-13072 IL06-25634 KY03C-1136-18 PIONEER2545 SE00-10303-35 MISC-HDS-148 AVERAGE MINUMUM		53.4 49.4 52.4 57.1 71.5 71.0 66.7 74.8 55.9 40.8	22.2 I 26.7 28.2 22.2 I 1 43.5 h 1 51.7 h 1 49.3 h 1 41.0 h 29.6 12.2	17.2 17.3 18.0 18.8 39.0 h 41.5 h 32.8 h 37.9 h 22.0 8.0	28.6 I 25.6 I 17.9 I 17.0 I 60.0 h 52.9 h 59.3 h 60.1 h 31.6 10.8	33.9 33.8 33.7 32.1 I 61.8 h 61.6 h 59.6 h 62.2 h 39.9 21.7	11.6 5.8 I 7.9 I 11.3 11.8 12.0 13.1 h 13.3 h 9.5 4.0	3.0 16.0 53.6 6.3 86.0 80.3 59.5 58.8 35.1 3.0	4 4 4 4 0 0 0 0	0 0 0 5 5 6

Table 12. Summary of incidence (INC, %) data from 2009-2010 NUWWSN.

<u></u>		ALL	CLUST	FR 1			· · · · · · · · · · · · · · · · · · ·						OUT	OUT	OUT
ENTRY	NAME		AVG		B INBRO	INLAY	MIELA	MOCOL	NYITH	OHWOO	ONRID	VABLA	KYLEX	MDSAL	NEMEA
1	ERNIE	53.7	50.8		00 9								75		
2	TRUMAN	50.0 1	48.3		90 1.					88.3			90 90		
3 4	FREEDOM PIONEER-2545	60.6 71.1 h	60.0 73.5		00 25. 00 57.				36.3 50.0	100.0 100.0			90		67
5	NY99045-3110	56.8	56.1		92 3				26.3	98.3			95		47
6	OH07-176-56	54.9	55.4		97 15	0 5,0	81.8		27.5	93.3			100		
7	NY94052-9340	57.9	53.9		95 1.				26.3	96.7			100		
8 9	NY99068-3251	49.4 l 64.9 h	44.7 63.8	ı	60 3. 98 25.				17.5 26.3	90.0 96.7	50.0 76.7		100 100		70 70
10	NY88046-7088 E5011B	64.9 ft	66.3	h 1	00 37				35.0	95.0			100		
11	E5024	64.3 h	62.3		97 17				33.8	100.0			90		
12	E3024	64.4 h	60.9		98 12				46.3	95.0			100		70
13	E6012	60.5	61.3		00 20				36.3	100.0			85		
14	E8052 OH04-264-58	65.5 h 63.4 h	68.4 63.7		00 22 00 27				52.5 22.5	100.0 100.0			95 95		
16	OH05-101-1	55.7	57.4	'	90 12				16.3	100.0			50		
17	OH05-164-76	61.3	55.7		95 1			100.0	12.5	98.3			90		
18	OH05-200-74	59.4	60.3		00 10				37.5	96.7	76.7		95		
19 20	99691A2-5-4-16-1 01946A1-16-48-5	56.5 57.4	52.9 56.9		87 .17. 97 13.				11.3 30.0	100.0 100.0			80 80		
21	057RA1-8-5	56.9	53.7	1	00 3				15.0	98.3			90		
22	059A1-2-4-3	57.1	54.2		00 5				25.0	100.0			85		
23	TABOO	60.4	58.2		98 35				37.5	96.7	63.3		90		
24	MONDO	50.3 [53.4		97 2				18.8	96.7			45		
25 26	PROBE RUMOR	64.7 h	63.2 59.9		00 15 00 7				40.0 31.3	96.7 96.7	70.0 76.7		85 95		
27	03M1539#019	56.9	58.4		00 15				21.3		73.3				
28	03M1539#031	56.8	55.0		98 12		85.8	100.0		98.3	70.0	5.0	80		87
29	W1104	59.0	59.2		98 15					100.0			1		
30	ML06-2097 GS-0-EM0681	59.4	60.6 59.5	1	00 <u>25</u> 98 5				40.0 42.5	100.0 91.7	66.7 86.7		90 100		
32	GS-0-EM0614	58.6 53.8	56.5	1	90 J				32.5				75		
33	GS-1-EM0362	57.8	54.3		00 7					98.3			100		
34	ACF213003B	61.9 h	61.2		98 20					100.0					
35	ACF126103	60.9	60.6	1	00 10				27.5	98.3					
36 37	IL02-18228 IL04-24668	46.6 I 53.8	40.1 51.7	l	50 2 85 13					86.7 90.0	46.7 83.3				
38	IL06-7550	55.5	53.1		93 7								1		
39	IL06-14262	49.2	50.2		87 8		77,9			96.7			70		
40	KY02C-3006-46	53.9	55.2		98 1.					96.7	76.7				
41	KY02C-3004-02 KY04C-2151	50.5 l 51.8 l	50.9 43.7	1	77 1. 45 2				8.8 5.0	95.0 95.0			80 90		
43	KY03C-1192-34	62.0 h	65.9	•	00 40								1		
44	KY02C-3008-01	62.5 h	60.4		98 11					95.0			85		67
45	MD03W91-09-8	55.1	57.7		00 11					98.3			1		
46 47	MD03W61-09-1	52.8 I 52.3 I	56.5 57.3		00 4 00 3					100.0 98.3					
48	MD02W135-08-9 MO071522	52.3 I 50.7 I	50.3		98 7				16.3		43.3 56.7				
49	MO080104	43.6	46.5	}	70 7					90.0			1		
50	MO080864	45.8 I	50.8		85 3								1		
51	MO081652	50.9 1	49.5	<u> </u>	70 0										
52 53	WESLEY WESLEYFHB1	70.3 h 68.2 h			00 45 00 15					100.0 100.0					
54	NE06607	52.5	57.1		00 20										27
55	NE06469	63.7 h	62.0	1	00 22	5 40.0	85.3	95.0	25.0	100.0	70.0	20.0	85	55	67
56	NW07505	63.2 h	67.4	h 1	00 67										
57	VA06W-612 VA07W-594	59.5 53.5	60.8 56.5		98 15 90 12										
58 59	VA07W-594 VA07W-601	53.5	57.5		90 12 97 20										
60	VA08W-734	43.8	42.8	1	87 2				6.3	86.7	40.0	5.0	90	20	30
100	AVERAGE	57.2	57.1		94 14										
101	MINUMUM	43.6	40.1		45 0										
102 103	MAXIMUM LSD(0.05)	71.1 9.5	7.4 8.3	1	00 67	5 95.0	94.5	100.0	52.5	100.0	60.7	30.0	100	. 65	93
103	LGD(0.00)	1 9.5	1 0.5	•		•	•	···	<u> </u>	·		·	·	-:	<u> </u>

Table 13. Summary of severity (SEV, %) data from 2009-2010 NUWWSN.

		ALL	CLUS	TER 1	1								CLUSTE	R 2			OUT	OUT
ENTRY	NAME	AVG	AVG		NBRO		MOCOL	NEMEA		OHWOO		VABLA	AVG	ILURB		KYLEX	MDSAL	ROFUN
1 1	ERNIE	24.7	22.1		3.5	40.0	47.7	16.0	7.5		16.3	10	22.8	39.8	5.0	23.5	20.0	56.5
2	TRUMAN	29.4	16.1	I	1.0	24.6	32.0		10.3		22.7	10	40.5	52.7	4.2	64.6	60.0	71.6
3	FREEDOM	34.0	30.1		12.5	41.8	55.3		27.3		33.0	10	43.5	55.9	2.5	72.2	45.0	26.1
4	PIONEER-2545	48.7 h	40.2	h	40.0	58.9	51.4	12.0			49.7	15	62.8 h		26.7	80.3	40.0	83.7
5	NY99045-3110 OH07-176-56	35.1 34.6	25.1 26.1		1.5 7.5	57.3 44.5	42.8 45.0		23.8 41.0		38.7 29.0	10 10	44.2 44.0	49.4 56.2	15.0 15.8	68.1 59.9	70.0 10.0	52.3 100.0
7	NY94052-9340	42.6	33.1		2.5	44.5	37.3		33.5		33.0	20	53.1	38.7	50.8	69.7	70.0	59.8
8	NY99068-3251	37.0	23.2		11.0	39.0	30.7	36.0	14.8		20.3	7.5	45.5	27.6	38.8	70.2	75.0	84.4
9	NY88046-7088	53.3 h	36.9	h	20.0	58.8	48.9		44.3		44.3	17.5	72.0 h		55.8	83.6	90.0	91.2
10	E5011B	46.6 h	37.7	h	22.5	54.4	47.6				49.7	22.5	49.4	73.5	10.0	64.7	75.0	81.3
11	E5024	35.9	22.2		10.0	40.8	31.7	13.0	15.8		18.7	15	64.8 h		71.7	67.8	50.0	44.7
12	E3024	56.0 h	41.4	h	22.5	55.8	53.1	31.0	41.8	42.3	65.0	20	68.9 h	66.5	55.8	84.4	90.0	100.0
13	E6012	42.1	25.6		3.5	31.8	41.3		22.3		26.7	15	69.2 h		55.8	75.2	60.0	74.7
14	E8052	40.4	26.8		3.5	40.4	33.8	29.0	27.0		29.0	10	65,2 h		34.2	83.0	40.0	74.7
15	OH04-264-58	37.2	30.8		5.0	46.1	46.8		35.5		33.0	12.5	51.2	62.4	18.3	72.8	15.0	68.9
16	OH05-101-1	29.0	22.0		10.0	22.5	49.6		23.0		16.3	10	32.6 I	40.2	5.0	52.5	25.0	78.0
17	OH05-164-76	27.1	22.0	į,	1.5	28.6	65.0	6.0	10.0		22.7	22.5	36.6	27.2	26.7	55.9	15.0	51.4
18	OH05-200-74 99691A2-5-4-16-1	26.1 35.0	18.3 33.8	h	2.0 5.0	29.5 22.2	37.9 47.4	11.0 30.0	16.0 48.6		18.7 54.0	10 17.5	36.1 34.7	35.1 39.2	24.2 28.3	49.0 36.6	55.0 30.0	29.0 50.8
20	01946A1-16-48-5	26.6	24.6	**	6.0	32.0	40.9		23.5		33.0	12.5	30.6 I	40.5	6.7	44.6		26.8
21	057RA1-8-5	36.3	22.3		3.5	38.1	46.3		21.3		18.7	12.3	59.2 h		44.2	72.1	35.0	81.5
22	059A1-2-4-3	32.9	22.3		2.0	43.1	45.8		17.5		26.7	10	52.1	63.4	31.7	61.1	15.0	78.0
23	TABOO	47.0 h	37.4	h	35.0	53.6	42.7	9.0	57.4		55.3	17.5	61.9 h		80.8	42.0	30.0	96.2
24	MONDO	28.8	20.9		2.5	32.1	39.5	14.0	26.5	17.9	25.0	10	40.4	34.3	43.3	43.5	35.0	51.1
25	PROBE	44.5	34.1	h	17.5	41.8	54.7	21.0	46.3	29.4	44.3	17.5	57.0 h	74.1	51.7	45.1	45.0	90.0
26	RUMOR	36.4	28.1		2.0	41.8	49.7	27.0	32.5		33.0	10	57.5 h		60.0	55.6	25.0	50.5
27	03M1539#019	31.1	27.4		15.0	50.1	40.9				44.3	12.5	28.7 I	49.1	7.5	29.5	0.0	99.4
28	03M1539#031	36.3	25.7		10.0	40.9	37.7	27.0			32.3	10	54.7	57.8	69.2	37.2	35.0	67.6
29	W1104	37.9	28.0		12.5	39.5	44.4	7.0	39.0		33.0	20	49.4	50.8	35.8	61.5	30.0	90.7
30	ML06-2097 GS-0-EM0681	38.0 35.0	31.4 22.5		17.5 1.0	50.4 51.8	54.7 40.0	7.0 7.0	33.5 21.8		33.0 25.0	17.5 10	43.9 38.1	53.8 42.4	37.5 15.0	40.3 56.8	30.0 70.0	81.3 90.4
32	GS-0-EM0614	35.0	23.9		5.0	50.8	35.6		33.5		20.3	10	44.4	76.0	10.0	47.3	40.0	90.4
33	GS-1-EM0362	49.6 h	29.8		5.0	55,5	46.8	10.0	42.5		26.0	12.5	78.8 h		60.8	88.0	70.0	100.0
34	ACF213003B	39.8	28.6		17.5	44.9	43.5	12.0	26.0		29.0	12.5	60.3 h		33.3	75.0	40.0	67.9
35	ACF126103	39.9	26.4		10.0	48.3	40.8	9.0	31.8		26.7	12.5	62.4 h		52.5	68.4	60.0	61.1
36	!L02-18228	19.0 J	20.0	1	1.5	14.7	38.2	49.0	11.8	23.1	11.7	10	12.0 I	15.2	4.2	16.5	5.0	46.5
37	IL04-24668	31.6	30.3		10.5	30.6	29.4		51.3		33.0	15	33.0 1	34.0	11.7	53.4	30.0	39.5
38	IL06-7550	23.6	19.9	1	5.0	24.8	40.5	13.0	22.0		25.0	10	36.6	41.0	9.2	59.6	5.0	32.5
39	IL06-14262	22.4	18.4		25.5	18.8	39.5		16.0		14.0	12.5	31.5 I	18.1	44.2	32.3	15.0	33.8
40	KY02C-3006-46	18.2	18.9	ŀ	1.0	23.0	41.7	27.0	13.5		22.7	7.5	18.9	22.9	5.0	28.7	10.0	18.4
41	KY02C-3004-02	16.3 22.5	14.0 17.6	I	3.0	16.8	41.0 48.0	8.0 18.0	4.5 29.0		16.3	10 5	24.1 I 18.0 I	17.1 20.5	15.0 5.0	40.2 28.5	2.5 85.0	25.5
42 43	KY04C-2151 KY03C-1192-34	36.5	30.8	1	1.5 25.0	10.5 43.8	48.0	6.0	29.0 34.3		14.0 38.7	10	49.7	20.5 67.1	42.5	28.5 39.5	10.0	12.2 68.7
44	KY02C-3008-01	22.7	20.5		9.5	30.4	34.3	20.0	16.0		29.0	10	30.4	37.8	8.3	45.0	17.5	22.2
45	MD03W91-09-8	24.6	19.1	1	16.0	29.5	40.8	6.0	16.0		20.3	10	34.8	44.9	27.5	31.9	15.0	48.1
46	MD03W61-09-1	16.6	15.1	i	10.0	18.7	29.7	8.0	3.0		29.0	10	23.2 1	27.9	9.2	32.4	10.0	15.8
47	MD02W135-08-9	30.9	27.3		3.5	37.5	53.9	43.0	33.8		18.7	7.5	32.5	50.9	9.2	37.3	35.0	50.5
48	MO071522	30.9	19.6	T	1.0	24.8	34.5	6.0	19.3		30.7	15	46.9	45.5	26.7	68.4	45.0	59.0
49	MO080104	16.4 I	14.2	1	3.0	8.9	39.1	4.0	24.5		11.7	10	13.2	21.0	3.3	15.3	10.0	49.9
50	MO080864	22.1 I	18.6	1	3.0	37.5	47.7	3.0	11.5		25.0	10	29.9 1	43.0	10.8	35.8	25.0	24.3
51	MO081652	14.5 I	12.6		0.5	8.4	32.8	10.0	11.3		16.3	10	15.2	23.2	4.2	18.3	5.0	37.4
52	WESLEY	46.1 h	33.8		37.5	46.6	50.6	6.0	36.8		25.0	22.5	64.1 h		41.7	70.1	60.0	77.1
53 54	WESLEYFHB1	43.2 35.0	29.2 22.8		11.0 6.0	40.7 44.2	44.4 45.5	10.0 6.0	40.0 24.5		28.3 22.7	15 15	63.2 h 48.4	77.0 65.6	59.2 37.5	53.5 42.0	50.0 50.0	88.0 77.9
55	NE06607 NE06469	35.6	22.8		11.0	37.4	45.5 29.0	9.0	24.5 30.5		26.7	10	46.4	76.3	18.3	38.0	60.0	88.5
56	NW07505	48.8 h	37.0	h	40.0	70.0	41.0	6.0	51.8		50.0	10	63.3 h		47.5	72.0	55.0	93.8
57	VA06W-612	31.7	24.6		11.0	40.0	37.9	6.0	32.8		25.0	15	34.0 1	52.4	15.8	33.7	30.0	82.9
58	VA07W-594	27.3	19.2	I	6.0	36.5	34.8		16.3		25.0	10	38.6	39.9	36.7	39.1	10.0	75.6
59	VA07W-601	25.2	24.9	•	11.5	36.6	61.2		11.8		22.7	12.5	22.6 1	42.9	5.0	20.0	15.0	45.3
60	VA08W-734	16.1 I	14.1	I	1.5	43.2	21.7	5.0	8.5		14.0	10	20.5 1	24.9	5.0	31.6	10.0	25.7
100	AVERAGE	33.1	27.0	h	10.0	37.9	42.6	16.4	26.7		28.7	12.5	43.4	50.7	28.1	51.4	36.5	62.4
101	MINUMUM	14.5	12.6		0.5	8.4	21.7	3.0	3.0		11.7	5	12.0	15.2	2.5	15.3	0.0	12.2
102	MAXIMUM	56.0	44.5		40.0	70.0	65.0	62.0	57.4	49.3	65.0	22.5	78.8	87.5	80.8	88.0	90.0	100.0
103	LSD(0.05)	10.4	8.9	<u> </u>		.		ě			<u>. </u>		22.3	·			l	

Table 14. Summary of index (IND, %) data from 2009-2010 NUWWSN.

		ALL	CLUST	ER 1								OUT	OUT	OUT	OUT
ENTRY	NAME		AVG	INBRO		MIELA	MOCOL	NYITH	OHWOO	ONRID	VABLA	ILURB	KYLEX		NEMEA
1	ERNIE	17.4	16.5	0.3		37.6	48.5		35.7	8.8	0.5	39.8			10.0
2	TRUMAN	16.7	9.9	0.0		12.9	33.7		14.8	15.2	0.5	47.5		8.0	8.0
3	FREEDOM	26.8	18.7	3.1		34.1	56.2		20.8	24.2	0.8	55.9		15.0	36.0
5	PIONEER-2545 NY99045-3110	36.8 h 24.1	32.8 19.0	h 23.0		55.2 46.3	52.3 45.9		49.3 21.8	40.8 26.0	1.3	81.3 45.5		17.0 24.5	9.0 3.0
6	OH07-176-56	21.7	17.8	1.1		37.0	45.7		23.9	21.4	0.9	54.0		1.0	3.0
7	NY94052-9340	27.1	17.6	0.0		39.4	37.9		26.3	22.0	2.8	37.1	69.7	20.0	58.0
8	NY99068-3251	19.4	12.4	0.4		22.7	31.8		25.3	10.8	0.8	18.7			30.0
9	NY88046-7088	35.5 h	26.2	5.0		47.6	49.7		31.8	34.4	4	75.1	83.6	31.5	26.0
10	E5011B	31.7 h	25.1	8.4	4.5	48.0	47.6	19.4	31.3	38.6	3	73.5	64.7	31.5	10.0
11	E5024	23.3	17.8	1.8		38.3	31.7		32.4	16.3	2	53.0		10.0	13.0
12	E3024	38.0 h	28.4			46.4	54.9		40.5	48.1	4	65.7	84.4	49.5	29.0
13	E6012	27.8	20.1	0.7		27.9	42.0		42.1	17.7	2.5	76.6		15.0	18.0
14	E8052 OH04-264-58	30.3 h 27.3	21.9 21.6	0.8 1.4		39.6 42.0	33.8 46.8		41.8 40.8	23.2 23.1	1.3	78.5 62.4	78.8 69.1	7.0 4.5	24.0
16	OH05-101-1	16.7	14.2			22.9	49.6		24.9	8.2	0.8	36.2		9.0	19.0 15.0
17	OH05-164-76	19.0	17.1	0.0		26.7			19.3	16.3	4.5	25.5		10.0	5.0
18	OH05-200-74	17.6	14.2	0.0		25.9	38.6		20.8	14.2	0.8	35.1	46.5	7.5	8.0
19	99691A2-5-4-16-1	21.8	20.1	0.9		19.8	49.0		45.8	36.2	2.4	34.2		10.0	27.0
20	01946A1-16-48-5	19.4	16.8	0.8		29.0	40.9		30.8	24.2	1.3	39.0		7.0	17.0
21	057RA1-8-5	22.7	15.7	0.1		33.5	46.3	3.2	25.8	11.0	1,	61.3		7.0	14.0
22	059A1-2-4-3	21.8	16.3	0.1		38.3	45.8		22.6	17.4	0.8	63.4	52.0	5.5	10.0
23	TABOO	25.9	23.9	12.3		43.5	44.1	21.5	27.5	35.9	1.8	62.2		13.8	6.0
24	MONDO	15.3	14.6	0.1		27.3	43.1	5.0	17.4	17.5	1.3	33.5		4.0	9.0
25	PROBE	28.5	24.5	2.6		40.9	55.6		28.4	30.5	5.3	74.1	38.4	13.5	20.0
26	RUMOR 03M1539#019	25.1 20.1	21.0 20.1	0.2 2.3		40.0 47.4	49.7 40.9	10.2 4.4	27.8 30.0	25.3 33.3	1.3	56.9 49.1	52.8 26.5	2.5 0.0	<u>21.0</u> 4.0
28	03M1539#031	22.0	18.2	1.3		37.2	37.7		33.5	23.2	0.5	56.7	29.8	8.5	24.0
29	W1104	23.1	19.5	1.9		36.0	45.1	10.7	28.3	27.5	1	49.9		4.5	5.0
30	ML06-2097	23.5	22.8	4.4		43.9	54.7		37.3	22.0	2.5	53.8		5.5	5.0
31	GS-0-EM0681	21.5	18.0	0.1		46.2			22.3	21.8	1.5	41.8		11.5	4.0
32	GS-0-EM0614	21.4	16.7	0.6	3.3	37.7	38.8	10.9	27.4	13.4	1.3	76.0	35.5	7.0	5.0
33	GS-1-EM0362	31.4 h	21.2	0.4		46.1	48.4		39.7	14.9	1.8	87.5		24.0	8.0
34	ACF213003B	27.3	21.2	3.5		38.7	44.2		43.3	18.8	1	71.7	67.5	9.0	9.0
35	ACF126103	26.7	20.6	1.0		42.6	42.2		31.6	20.2	1.5	66.3		18.0	6.0
36	IL02-18228	12.3	9.8	0.0		11.1	38.8		20.8	5.4	1.3	7.8	11.5	4.5	46.0
38	IL04-24668 IL06-7550	19.7 17.5	14.3 13.6	1 1.4 1 0.4		23.1 21.6	31.5 44.2		19.9 18.9	27.5 18.2	1.5 0.8	28.4 38.4	42.8 47.7	5.0 2.5	45.0 12.0
39	IL06-14262	10.9	!	2.2		16,1	40.2		13.7	7.0	1.3	15.8		1.5	5.0
40	KY02C-3006-46	13.5	12.5	1 0.0		19.8	43.9		14.3	17.7	0.7	22.5		2.0	21.0
41	KY02C-3004-02	11.5	10.6	0.0		13.1	42.4		12.1	10.7	0.8	13.2		0.3	8.0
42	KY04C-2151	17.0	10.5	0.0		10.7	48.0	1.5	14.4	8.9	0.5	9.5	25.7	72.5	12.0
43	KY03C-1192-34	25.9	25.5	10.0	19.1	41.8	48.9	11.6	40.3	30.9	1	67.1	35.5	1.0	3.0
44	KY02C-3008-01	17.3	13.7	1.1		29.4	34.9	3.6	14.1	22.5	1	37.2		7.8	15.0
45	MD03W91-09-8	15.6 I	13.9	1.8		30.1	41.5		13.8	11.3	1.5	44.9		1.5	3.0
46	MD03W61-09-1	11.7 I	11.0	0.5		17.2	31.2		12.3	21.1	1.3	27.9		1.0	6.0
47	MD02W135-08-9 MO071522	18.0 18.9	16.3 13.1	0.1		36.0 14.9	53.9 37.6		20.1 24.8	8.2 19.6	1.2 2.3	50.9 44.9	20.5 68.4	5,5 6.0	9.0 3.0
48	MO071522 MO080104	8.1 I	8.7	I 0.1		9.2	37.6 39.1	3.1	24.8 11.2	5.4	∠.3 1	16.2		0.8	3.0
50	MQ080864	14.0 I	13.2	1 0.2		26.9	47.7	2.7	10.5	16.0	1	37.5	16.1	8.5	1.0
51	MO081652	9.0 1	8.5	1 0.0		8.4	32.8		11.5	12.1	1.5	15.6	16.4	0.5	7.0
52	WESLEY	33.6 h	28.5			40.8	50.6		45.2	20.7	3			21.5	3.0
53	WESLEYFHB1	30.9 h	28.3			40.1	45.1		44.3	22.5	3			8.0	8.0
54	NE06607	20.1	16.6	1.2		40.2			16.5	14.0	2.3			11.0	2.0
55	NE06469	23.0	16.2	2.5		32.6			28.0	19.3	2			32.0	6.0
56	NW07505	31.8 h	28.8			61.7	42.4		26.8	36.7	1			23.5	3.0
57	VA06W-612	19.9	18.4	1.7		39.3	39.9		28.7	20.0	1.3			9.0	4.0
58 59	VA07W-594 VA07W-601	14.9 I 17.1	13.7 17.6	ı 0.8 2.3		28.2 35.2			17.3 21.1	16.1 13.5	1.8 1.7	35.9 41.7		1.5 2.5	3.0 10.0
60	VA07VV-601 VA08W-734	10.4	8.7			31.0			7.7		0.5	21.8			3.0
100	AVERAGE	21.6	17.7	2.6		33.0	43.5		26.2	20.2	1.6	49.0		11.1	12.7
101	MINUMUM	14.5	8.5	0.0		8.4			7.7		0.5				1.0
102	MAXIMUM	56.0	32.8	27.0		61.7	65.0		49.3		5.3			72.5	58.0
103	LSD(0.05)	8.1	6.5												

Table 15. Summary of fusarium damaged kernel (FDK, %) data from 2009-2010 NUWWSN.

		ALL	CLUST	ER 1						OUT	OUT
ENTRY	NAME		AVG		INBRO			MDSAL		MOCOL	ROFUN
1	ERNIE	25.5	18.9	1 40.0	3.6		10.5	18.5	39	40	
2 3	TRUMAN FREEDOM	18.0 I 36.3	15.2 28.4	1 26.7 1 48.3			12.7 17.3	12.0 16.8	33 54	10 75	42.2 45
4	PIONEER-2545	58.3 h	48.4	h 83.3			26.2	21.8	36	80	96.4
5	NY99045-3110	31.7 I	28.8	41.7	19.8		17.9	17.3	46	20	60.7
6	OH07-176-56	38.4	24.3	36.7			15.2	18.3	48	75	86.9
7	NY94052-9340	29.7 1	24.2	32.5	10.0		22.3	13.5	65	50	42.6
8 9	NY99068-3251 NY88046-7088	26.5 I 42.8 h	21.0 42.4	I 25.0 h 81.7	10.8 22.8		13.6 15.2	16.5 30.8	55 49	20 10	66.1 78.2
10	E5011B	46.5 h	35.6	h 73.3	12.7		9.1	16.5	57	75	83.3
11	E5024	33.8	25.9	1 43.3	17.7		10.1	11.0	66	50	64.7
12	E3024	40.2	31.4	55.0			29.2	17.0	54	60	73.5
13	E6012	34.1	30.8	55.0	13.3		18.5	16.8	41	10	78.2
14 15	E8052 OH04-264-58	41.3 43.1 h	37.9 40.0	h 66.7 h 75.0	19.5 25.3		11.9 12.0	5.3 19.3	54 46	40 40	63.2 64.3
16	OH05-101-1	39.8	35.2	50.0			12.0	23.5	48	50	57.9
17	OH05-164-76	27.8 1	19.4	1 40.0	5.7		9.1	9.3	35	60	45.6
18	OH05-200-74	34.7	24.1	i 41.7			9.7	22.5	42	75	58.1
19	99691A2-5-4-16-1	30.3	22.8	1 60.0			12.2	23.8	30	50	55.7
20	01946A1-16-48-5	27.5 1	20.6	1 45.0		15.0	10.9	6.3	22	50	46.5
21 22	057RA1-8-5 059A1-2-4-3	33.5 I 41.0	26.1 26.7	I 66.7	9.5 13.3		15.3 16.1	32.8 10.5	17 4 5	40 75	71.3 93
23	TABOO	39.6	23.4	1 66.7	14.9		10.1	5.3	34	80	96.4
24	MONDO	23.8 1	19.8	36.7	11.6		10.5	14.3	28	20	51.8
25	PROBE	45.4 h	32.4	73.3			17.9	14.5	38	80	88.9
26	RUMOR	34.2	31.8	53.3	29.0		23.1	16.5	44	20	62.8
27 28	03M1539#019 03M1539#031	38.0 27.6 I	29.8 22.9	48.3 I 40.0	25.3 5.3		16.3 15.8	22.8 7.3	51 62	25 25	100 58.4
26 29	W1104	41.8	28.7	66.7	8.3		17.9	7.3 14.0	45	75	87.4
30	ML06-2097	43.0 h	33.8	70.0	18.9		10.7	22.5	53	75	66.3
31	GS-0-EM0681	46.6 h	45.0	h 86.7	27.8	17.5	30.4	45.5	62	60	43.2
32	GS-0-EM0614	40.0	37.3	h 63.3	31.5		16.6	31.5	51	20	76.1
33	GS-1-EM0362	45.2 h	43.2	h 85.0	24.5		52.9	13.5	68	75	27.6
34 35	ACF213003B ACF126103	45.1 h 39.9	38.2 31.5	h 75.0 65.0	22.1 23.3	32.5 27.5	17.6 13.1	20.8 24.8	61 35	40 60	92 70.9
36	IL02-18228	23.7	17.5	I 13.3	5.0		6.1	34.8	45	10	74.3
37	IL04-24668	22.2	21.0	1 32.5	5.6		11.0	41.8	32	20	31.4
38	IL06-7550	28.9	23.8	1 38.3	4.2		13.2	28.5	56	50	38.5
39	IL06-14262	20.4	20.5	1 25.0	10.5		12.5	12.8	52	20	20.1
40 41	KY02C-3006-46 KY02C-3004-02	20.1 I 19.3 I	20.2 20.2	I 30.0 I 16.7	4.8 8.1	27.5 20.0	11.1 5.0	8.0 26.5	40 45	20 10	19.5 23.2
42	KY04C-2151	23.0	21.9	1 27.5	13.1	20.0	6.5	7.3	57	20	32.9
43	KY03C-1192-34	35.9	33.6	50.0	38.3		13.1	20.0	55	60	25.4
44	KY02C-3008-01	30.0 1	28.6	66.7	5.1	30.0	8.1	23.5	38		58.3
45	MD03W91-09-8	20.5	23.0	1 38.3			5.9	26.3	47	10	15.8
46 47	MD03W61-09-1	25.3 1	28.2	1 46.7			6.3	21.8	39	10	23.7
47 48	MD02W135-08-9 MO071522	20.9 I 29.0 I	24.9 22.9	I 35.0			10.0 8.5	9.5 32.5	53 47	10 20	8.3 74.8
49	MO080104	22.2	16.8	1 23.3			6.8	25.8	37	20	56.3
50	MO080864	18.7 I	14.1	1 13.3	6.5		10.7	17.8	34	25	40.4
51	MO081652	18.9 1	17.7	1 25.0	0.0	4.0	6.5	23.5	47	5	40
52	WESLEY	53.9 h	48.6	h 96.3			18.7	26.3	47	95	44.2
53 54	WESLEYFHB1 NE06607	45.4 h 45.7 h	41.3 41.7	h 73.3 h 82.5	34.9 32.6	65.0 50.0	10.5 5.9	37.0 40.0	27 39	40 40	75.4 75.7
54 55	NE06469	55.3 h		h 80.0	32.6 26.1	50.0	11.4	58.5	60	60	96.1
56	NW07505	56.2 h	49.9	h 91.7	52.5	42.5	14.1	57.5	41	50	100
57	VA06W-612	37.2	24.6	1 30.0	9.7	25.0	11.9	27.0	44	50	100
58	VA07W-594	32.5 1	27.8	1 43.3			11.7	29.8	64	75	18
59 60	VA07W-601 VA08W-734	41.1 21.0 I	34.4 14.3	43.3 I 26.7	40.2 8.1	22.5 2.0	11.2 4.1	26.0 15.8	63 29	75 20	47.7 62
100	AVERAGE	34.3	28.9	51.1	17.2		13.7	21.9	45.9	42.3	59.1
100	MINUMUM	18.0	14.1	13.3			4.1	5.3	17	5	
102	MAXIMUM	58.3	49.9	96.3			52.9	58.5	68	95	100
103	LSD(0.05)	15.5	14.3								

		ALL	CLUS	TER 1					OUT	OUT
ENTRY	NAME		AVG					MOCOL	MDSAL	NEMEA
1 2	ERNIE TRUMAN	30.1 l 27.8 l	31.9	58.0 53.5	5.2 3.0	2.9 3.9	33.8 51.5	59.8 42.1	10.8	40 36
3	FREEDOM	41.5	45.4	66.1	20.8	8.5	55.6	76.1		56
4	PIONEER-2545	55.6 h	66.4	h 87.7	55.4	50.5	61.5		18.9	38
5	NY99045-3110	37.5	39.7	59.0	9.3			48.8		34
6 7	OH07-176-56 NY94052-9340	35.5 40.9	42.3 39.4	60.5 53.1	16.7 5.1	7.2 18.3				36 69
8	NY99068-3251	34.1	33.0	36.3	8.7	17.4		46.2		54
9	NY88046-7088	54.5 h	53.9	85.1	22.6	52.2				49
10	E5011B	49.6 h	53.3	81.4	23.1	34.5	53.0	74.3	40.8	40
11	E5024	40.8	43.9	62.9	15.3		51.4	59.5	8.3	58
12 13	E3024 E6012	52.2 h 41.3	50.8 46.4	71.4 75.0	21.2 12.4	25.3 43.2		68.9 45.9		
14	E8052	45.3	53.3	80.2	15.6	56.3	58.1	45.9 56.1		41 48
15	OH04-264-58	44.3	51.8	78.7	19.9	45.5	55.1	60.0		46
16	OH05-101-1	39.7	42.8	59.1	18.5	35.5	35.8	64.9	18.9	45
17	OH05-164-76	34.2 1	39.3	52.7	3.2	19.5	47.4	73.5		40
18	OH05-200-74 99691A2-5-4-16-1	36.7 35.4	41.3 37.2	57.2 61.7	6.9 9.2	24.3 12.0	47.1 39.9	70.9 63.2		38
20	01946A1-16-48-5	32.8 1	37.5	59.2	9.2 15.5	8.6				47 37
21	057RA1-8-5	38.5	43.6	75.1	5.9	22.3	54.7			38
22	059A1-2-4-3	38.3	44.2	73.0	7.4	16.4	50.3	73.7		46
23	TABOO	41.8	49.8	75.1	27.0	29.4	43.9	73.8		35
24 25	MONDO PROBE	28.6 I 46.0	32.4 51.9	1 53.9 81.6	6.2 14.0	23.7 39.8	30.8 46.2	47.4 77.9		34 49
26	RUMOR	39.7	45.0	68.4	14.5	34.8	54.4	52.9		51
27	03M1539#019	33.6 1	38.6	64.1	19.1	15.0				42
28	03M1539#031	36.6	38.5	62.9	8.9	28.1	41.5			59
29	W1104	39.5	46.9	71.4	11.6	23.2		72.8		38
30	ML06-2097 GS-0-EM0681	41.6 44.0	47.9 45.6	74.2 76.9	20.3 12.9	25.3 13.8	43.3 59.2	76.4 65.0		41 43
32	GS-0-EM0614	37.6	42.0	78.1	17.8	24.8		46.2		37
33	GS-1-EM0362	50.7 h	56.1	90.2	13.6	26.0	77.6	73.0	23.3	51
34	ACF213003B	44.7	49.7	81.3	20.1	32.0	56.5	58.5		51
35 36	ACF126103	44.9	49.4	75.9	15.3 3.2	36.5	54.2	65.3		35 58
37	IL02-18228 IL04-24668	24.9 I 31.7 I	20.7 30.8	I 24.9 I 48.7	3.2 9.3	2.1 6.8	28.4 44.4	45.0 44.8		52
38	IL06-7550	32.4 1	34.5	55.7	5.4	4.7	47.2	59.6		51
39	IL06-14262	29.0 1	31.9	l 41.5	14.4	18.8	35.7	49.3	1.2	42
40	KY02C-3006-46	27.9	29.9	1 48.4	2.5	18.5	31.0	49.0		45
41 42	KY02C-3004-02 KY04C-2151	26.4 l 31.4 l	29.0 27.6	1 34.8 1 30.7	4.6 6.5	22.3 10.4	38.0 38.1	45.3 52.4	0.6 37.6	39 44
43	KY03C-1192-34	41.9	50.6	70.1	34.8	36.3	44.1	67.9	1.4	39
44	KY02C-3008-01	35.5	37.7	67.5	8.4	26.5	42.2	43.8	1	41
45	MD03W91-09-8	30.3	34.9	58.8	10.2	22.5	37.4		2.5	35
46	MD03W61-09-1	29.6	34.0	57.1 50.3	9.4	33.3	28.7	41.4		36
47	MD02W135-08-9 MO071522	32.2 l 31.8 l	35.4 35.1	59.3 57.8	4.7 6.2	31.0 11.7	31.7 53.9	50.2 45.9		45 33
49	MO080104	21.2	23.5	1 36.6	3.8	5.1	22.3	49.7		30
50	MO080864	23.6 1	27.1	1 43.7	4.4	4.8	28.5	54.3		19
51	MO081652	23.2	23.8	1 38.0	0.3	3.5	35.1	41.9	0.4	43
52	WESLEY	58.1 h	67.7		36.1	68.0	58.5	83.2		35.
53 54	WESLEYFHB1 NE06607	48.8 h 41.7	56.8 47.2	82.4 82.7	21.8 20.8	72.3 37.3	48.7 35.9	58.8 59.1	20.9 30.9	37 25
55	NE06469	61.3 h	49.1	84.9	20.5	37.5	41.5	61.2		47
56	NW07505	60.8 h	59.7	h 87.8	53.3	46.3	49.7	61.3	98.5	29
57	VA06W-612	34.6	37.7	57.2	11.7	20.7	38.9	59.9		36
58	VA07W-594	33.7 I 36.9	38.4 40.8	56.3 59.2	9.8 25.5	17.0 15.8	38.9 25.5	69.9		41 50
59 60	VA07W-601 VA08W-734	22.3 I	26.4	59.2 i 44.1	25.5 4.3	3.5	25.5 38.1	77.8 42.0		22
100	AVERAGE	38.1	41.5	63.7	14.2	24.8	46.0	59.0	17.0	42.1
101	MINUMUM	21.2	20.7	24.9	0.3	2.1	22.3	41.4	0.0	19
102	MAXIMUM	61.3	67.7	92.7	55.4	72.3	77.6	83.2	136.8	69
103	LSD(0.05)	13.2	11.9							

Table 17. Summary of deoxynivalenol (DON, ppm) data from 2009-2010 NUWWSN.

		ALL	CLUST	ER 1			CLUST	ER 2			OUT
ENTRY	NAME		AVG		MDSAL	OHWOO	AVG	NEMEA	NYITH	VABLA	KYLEX
1	ERNIE	7.3	9.6	12.2	1.4	15.2	0.61	1	0.5	0.3	20.2
2	TRUMAN	5.3	5.7		4.2	5.3		2	0.7	0)
3	FREEDOM	7.1	7.0	10.1	3.8	7.2	0.81	1	1.5	0	25.8
4	PIONEER-2545	12.9 h	13.2	13.8	6.3	19.5	3.6 h	2		0.3	40.1
5	NY99045-3110	10.0	10.3	14.1	10.0	6.8	1.9 lh		2.1	0.6	33.8
6	OH07-176-56	5.7	5.9		0.6	7.6	0.91	1	1.7	0	19.3
7	NY94052-9340	8.4 7.6	11.0 8.4	18.6 12.8	8.1	6.4	1.6 1	3 2	1.2 0.5	0.5	21.0 25.3
8	NY99068-3251 NY88046-7088	7.0	9.8	12.6	9.1 8.9	3.4 6.9	0.9 I 1.2 I	1	2.1	0.1 0.4	17.9
10	E5011B	10.0	12.2	16.3	8.2	12.1	2.3 h		4.5	0.4	26.3
11	E5024	12.1	16.4	23.6	7.5	18.2	1.0 1	1	1.8	0.2	32.2
12	E3024	9.0	11.7	12.5	11.2	11.5	2.9 h	2	5.9	0.8	19.5
13	E6012	10.8	15.1	17.6	9.5	18.2	2.1 h	3	3		24.4
14	E8052	11.4	15.8	26.1	5.9	15.4	3.1 h	3	6	0.2	23.0
15	OH04-264-58	5.7 1	7.7	8.5	1.2	13.4	0.81	1	1.2	0.3	14.0
16	OH05-101-1	5.6 1	7.2	8.8	1.0	11.9	0.7 1	1	1	0.1	15.5
17	OH05-164-76	5.3 1	4.5		1.6	6.6	0.5 1	1	0.5	0.1	22.3
18	OH05-200-74	6.2 1	6.7	1 11.4	2.7	5.9	0.7	1	1.1	0.1	21.1
19	99691A2-5-4-16-1	7.8	6.7		1.4	8.2	0.8	1	1.2	0.3	
20	01946A1-16-48-5	7.1	7.8	11.2	3.0	9.1	0.7 [1	1	0.1	24.6
21	057RA1-8-5	10.2	9.6	15.2	2.8	10.9	0.7 [1	1.1	0	40.7
22	059A1-2-4-3 TABOO	10.1 5.7 I	10.4 6.3	16.4 I 8.0	1.3 1.5	13.4 9.5	1.8 I 1.3 I	3 1	2.2 2.8	0.2 0.1	34.3 16.8
24	MONDO	7.2	7.0	9.8	2.9	9.5 8.4	ı	1	2.0 1.7	0.1	26.5
25	PROBE	7.1	7.8	10.7	1.5	11.1	1.2 [1	2.4	0.1	22.6
26	RUMOR	6.4	6.3	1 8.5	1.7	8.6	1.0 i	1	1.9	0.1	22.9
27	03M1539#019	9.2	7.8	10.5	1.5	11.5	1.1	1	1.8	0.5	37.6
28	03M1539#031	7.9	7.1	9.7	2.4	9.2	1.2	2		0	
29	W1104	13.7 h	10.2	16.4	2.8	11.5	2.1 h	3	3	0.2	59.2
30	ML06-2097	8.4	7.7	8.5	2.8	11.9	1.3	2	1.8	0.1	31.4
31	GS-0-EM0681	10.8	8.9	16.7	9.3	0.6		9.4		4.9	24.8
32	GS-0-EM0614	5.8 1	5.9		2.9	5.8	1.3	2	1.6	0.2	18.8
33	GS-1-EM0362	11.9	11.9	18.7	4.5	12.5	2.5 h	5	1.7		40.2
34	ACF213003B	9.2	9.5	12.7	6.6	9.2	2.6 h	5			
35	ACF126103	9.3	10.0	12.8	4.0	13.2		2		0.3	
36	IL02-18228	3.4	2.4 4.0		0.9 0.9	2.7 5.1	0.4 l 0.6 l	1	0.3 0.8	0 0.1	15.4 21.4
37 38	IL04-24668 IL06-7550	5.0 1 7.4	6.7		2.4	7.2	1.2	3			27.9
39	IL06-14262	4.5 1	3.8		0.8	4.6	1.1	2			16.9
40	KY02C-3006-46	4.3 1	4.1		0.7	6.6	0.6 1	1	0.7	0	16.0
41	KY02C-3004-02	3.4 1	2.5		1.2	3.5	0.5 1	1	0.6	Ō	14.4
42	KY04C-2151	4.1	3.9		0.7	7.3		1	0.8	0	15.3
43	KY03C-1192-34	7.8	9.0	12.1	1.2	13.8	1.3	1	2.7	0.3	23.8
44	KY02C-3008-01	6.1 1	5.3		1.0	7		0		0	
45	MD03W91-09-8	5.7	6.7			7.1		1	2.9		15.9
46	MD03W61-09-1	3.8	4.3		0.3	5.4		1	0.5	0	
47	MD02W135-08-9	6.6	5.0			5.9		1	1.3		28.9
48	MO071522	5.1	5.7		1.4	4.8		1	0.5		
49	MO080104	3.1 l 5.8 l	3.0 4.6		1.0 3.5	2.5 1.5	0.2	0 2	0.5 0.7	0.1 0.3	
50 51	MO080864 MO081652	3.9 1	2.8			1.5		1	0.7		
52	WESLEY	10.5	12.4	16.3		17.8		2			26.4
53	WESLEYFHB1	8.8	9.3	12.2		13.2		3	5.8		
54	NE06607	6.4 1	7.3	12.5	2.5	6.9		3	2		18.0
55	NE06469	7.9	10.5	13.9		9.6		2	2.4		
56	NW07505	16.4 h	24.2	h 30.4	19.7	22.6	2.6 h	3	4.1	0.7	34.7
57	VA06W-612	6.1 I	6.0			8.1		1	2.6		21.2
58	VA07W-594	4.8 1	4.7		2.0	5.6		2			16.6
59	VA07W-601	4.5 1	5.0		0.6	5.7		2			
60	VA08W-734	4.0 1	3.8			1.6		1			
100	AVERAGE	7.4	7.9	11.2		9		1.7	1.9		
101	MINUMUM	3.1	2.4	2.9		1.5		0 5			
102 103	MAXIMUM LSD(0.05)	16.4 4.1	24.2 4.5	30.4	19.7	22.6	3.6 1.7	5	0.0	0.0	JJ.2
103	LSD(0.05)	[4.1	1 4.5		·	•	1.7	•	<u>. </u>	<u>.:</u>	·

Table 18. Summary of greenhouse severity from SPI (GHSEV, %) data from 2009-2010 NUWWSN.

ENTRY	NAME	AVG	ILURB	MOCOL
1	ERNIE	10.7 I	8	13.4
2	TRUMAN	5.2 1	4.8	5.6
3	FREEDOM	7.9 [5	10.8
4	PIONEER-2545	26.3 I	28.7	23.9
5	NY99045-3110	8.5 [12.8	4.2
6	OH07-176-56	49.0 h	77.8	20.3
7	NY94052-9340	7.5	8.6	6.4
8	NY99068-3251	18.2 1	24.2	12.2
9	NY88046-7088	17.5 I	21.8	13.2
10	E5011B	12.9 I	6.8	19
11	E5024	10.9 I	13	8.8
12	E3024	31.4	51.5	11.3
13	E6012	10.5 I	10	11
14	E8052	21.2 [30	12.5
15	OH04-264-58	24.1 1	30.4	17.9
16	OH05-101-1	35.2	53.8	16.5
17	OH05-164-76	9.8 1	4	15.5
18	OH05-200-74	7.4 1	8.3	6.6
19	99691A2-5-4-16-1	43.7 h	62.4	25
20	01946A1-16-48-5	10.5 l	13.5	7.5
21	057RA1-8-5	6.3	7.5	5.2
22	059A1-2-4-3	6.4 [5.5	7.4
23	TABOO	52.5 h	60	45.1
24	MONDO	17.9	18	17.9
25	PROBE	60.3 h	76.4	44.2
26	RUMOR	17.6	26.3	8.9
27	03M1539#019	67.8 h	100	35.6
28	03M1539#031	56.0 h		41.4
29	W1104	15.2 [19.7	10.7
30	ML06-2097	28.9 [39	18.8
31	GS-0-EM0681	18.3 [23.2	13.3
32	GS-0-EM0614	42.7 h	59.8	25.5
33	GS-1-EM0362	54.3 h	87.7	20.9
34	ACF213003B	12.0 [10.8	13.1
35	ACF126103	35.1	50	20.2
36	IL02-18228	25.7 I	39.6	11.7
37	IL04-24668	26.0 1	26.8	25.3
38	IL06-7550	9.3 1	5.3	13.3
39	IL06-14262	6.4 1	6.7	6
40	KY02C-3006-46	3.9 1	3.6	
41	KY02C-3004-02	5.7	3.8	7.5 3.8
42	KY04C-2151	5.3	6.7	
43	KY03C-1192-34	50.1 h	64.8	35.5
44	KY02C-3008-01 MD03W91-09-8	4.7 l	4.4 65.2	<u> </u>
45 46	MD03W61-09-1	41.5 h 13.2 l	11.3	
46	MD02W135-08-9	59.4 h		
48	MO071522	7.4	11.2	
49	MO080104	8.1 [3.8	
50	MO080864	4.4	3.3	
51	MO081652	6.61	3.3	10.3
52	WESLEY	6.3 1	6.6	····
53	WESLEYFHB1	38.8	50.2	
54	NE06607	12.4 [8	
55	NE06469	26.3 1	28	
56	NW07505	37.1	39.5	
57	VA06W-612	27.3 1	37.2	
58	VA07W-594	26.7 1	44	
59	VA07W-601	13.3	19.7	6.9
60	VA08W-734	9.1	5.8	
100	AVERAGE	22.2	28.6	
101	MINUMUM	3.9	3	
102	MAXIMUM	67.8	100	
103	LSD(0.05)	27.4		<u>. </u>

Table 19. Summary of heading date (HD, julian days) data from 2009-2010 NUWWSN.

ENTRY	NAME	AVG								ROFUN
1	ERNIE	135	127	127	120	152	140	139	146	131
2	TRUMAN	140	134	135	124	156	147	142	150	135
3	FREEDOM	138	132	130	122	155	143	141	149	135
4	PIONEER-2545	137	130	129	121	153	143	141	147	133
5	NY99045-3110	142 h	137	137	126	156	146	145	152	136
6	OH07-176-56	138	132	130	121	153	144	141	147	133
7	NY94052-9340	142 h	138	139	125	157	147	145	149	136
8	NY99068-3251	142 h	140	138	126	157	147	145	151	136
9	NY88046-7088	141 h	137	136	126	156	146	144	150	136
10	E5011B	140	136	133	125	155	145	143	149	136
11	E5024	139	133	131	124	153	144	143	147	134
12	E3024	143 h	139	137	126	158	147	144	152	138
13	E6012	138	131	131	124	152	144	142	146	134
14	E8052	138	132	130	122	152	144	141	146	133
15	OH04-264-58	138	132	132	122	154	144	141	149	134
16	OH05-101-1	136	127	128	120	151	143	140	146	131
17	OH05-164-76	137	131	129	121	152	144	139	146	133
18	OH05-200-74	138	131	130	122	153	144	141	147	134
19	99691A2-5-4-16-1	133 1	126	124	118	149	137	135	146	130
20	01946A1-16-48-5	137	128	130	120	153	144	139	146	134
21	057RA1-8-5	138	131	134	121	154	145	140	147	132
22	057KA1-8-5 059A1-2-4-3	137	128	130	121	154	145	140	148	132
23	TABOO	137	131	128	121	153	143	140	146	132
			1				143	140	146	132
24	MONDO	137	129	128 128	121 120	153	144	139	147	132
25	PROBE	136	130			151				
26	RUMOR	138	132	130	122	152	143	141	146	134
27	03M1539#019	137	130	128	121	152	142	140	146	133
28	03M1539#031	136	129	127	121	152	143	140	146	133
29	W1104	138	130	130	121	153	144	141	146	135
30	ML06-2097	138	133	131	122	154	144	141	148	135
31	GS-0-EM0681	143 h	139	139	128	157	148	151	134	
32	GS-0-EM0614	139	133	131	123	155	145	142	149	135
33	GS-1-EM0362	140	135	135	125	153	147	144	147	133
34	ACF213003B	139	133	131	124	155	145	142	146	134
35	ACF126103	138	133	131	122	154	144	141	146	131
36	IL02-18228	135	127	125	120	149	142	135	146	132
37	IL04-24668	134	127	125	120	151	138	137	146	131
38	IL06-7550	136	128	130	121	152	144	138	146	132
39	IL06-14262	137	128	129	120	152	144	140	146	133
40	KY02C-3006-46	137	131	129	120	153	143	141	146	134
41	KY02C-3004-02	139	133	131	122	154	144	142	147	135
42	KY04C-2151	134 1	127	125	118	149	137	137	146	130
43	KY03C-1192-34	137	128	129	120	151	145	141	146	134
44	KY02C-3008-01	138	133	131	121	152	143	141	148	134
45	MD03W91-09-8	136	128	128	120	151	143	140	148	133
46	MD03W61-09-1	136	129	129	120	151	145	140	146	132
47	MD02W135-08-9	137	129	129	120	152	144	141	146	133
48	MO071522	140	135	136	125	156	146	142	150	133
49	MO080104	136	128	127	120	151	139	140	148	133
50	MO080864	139	133	132	124	157	145	142	150	132
51	MO081652	135	127	127	120	149	141	138	147	132
52	WESLEY	138	133	131	124	154	144	141	146	132
53	WESLEYFHB1	135	126	125	119	150	141	138	146	133
54	NE06607	138	133	130	123	153	145	141	147	135
55	NE06469	136	127	129	120	152	145	140	147	131
56	NW07505	137	128	129	120	154	144	140	147	133
57	VA06W-612	137	129	128	120	152	144	140	146	134
58	VA00VV-012 VA07W-594	138	129	130	120	155	145	141	149	133
59	VA07VV-594 VA07W-601	136	128	126	121	155	143	141	149	133
		140	133	133	125	154	142	141	151	134
60	VA08W-734							141	147	133
100	AVERAGE	138	131	130	122	153	144 137			
101	MINUMUM	133	126	124	118	149	137	135	134	130
102	MAXIMUM	143	140	139	128	158	148	151	152	138
103	LSD(0.05)	11	L:	•	•		<u>. </u>		•	

1 ERNIE 33 I 30 31 39.4 2 TRUMAN 37 36 35 39.4 3 FREEDOM 37 35 34 41.4 4 PIONEER-2545 34 34 34 33 35.5 5 NY99045-3110 38 34 35 45.3 6 OH07-176-56 35 32 33 41.4 7 NY94052-9340 40 h 38 37 45.3 8 NY99068-3251 37 34 35 43.3 9 NY88046-7088 40 h 37 38 45.3 10 E5011B 32 I 30 30 35.5 11 E5024 32 I 32 31 33.7 12 E3024 35 35 33 37.8 13 E6012 33 I 33 32 33.5 14 E8052 33 I 31 31 31 35.5 15 OH04-264-58 32 I 30 31 34.3 16 OH05-101-1 35 30 34 41.4 17 OH05-164-76 33 I 31 31 33 35.5 18 OH05-200-74 36 32 35 41.4 19 99691A2-5-4-16-1 36 32 35 41.4 20 01946A1-16-48-5 31 I 27 32 33.9 21 057RA1-8-5 30 I 28 30 33.1 22 059A1-2-4-3 31 I 28 31 34.3 23 TABOO 37 32 34 44.9 24 MONDO 38 34 36 43.3 25 PROBE 32 I 30 32 35.5 26 RUMOR 35 34 32 39.4 27 03M1539#013 35 32 34 39.4 28 03M1539#013 35 32 34 39.4 29 W1104 33 I 33 32 33.9 30 ML06-2097 35 31 34 39.4 31 GS-0-EM0681 38 40 35 39.4 31 GS-0-EM0681 38 40 35 39.4 31 GS-0-EM0681 38 40 35 39.4 31 KY902C-3004-02 32 I 30 33 31 31 31 31 33 35.5 38 IL06-7550 34 31 31 31 31 33 38.2 39 IL06-14262 36 33 I 31 31 31 33 35.5 38 IL06-7550 34 31 31 31 31 33 35.5 39 IL06-14262 36 33 I 31 31 31 31 33 34.3 41 KY902C-3004-02 32 I 30 33 33.1 44 KY02C-3004-02 32 I 30 33 34.4 45 MD03W91-09-8 33 I 30 33 35.5	ENTRY	NAME	AVG	KYLEX	MDSAL	ROFUN
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34 ACF213003B 36 32 33 43.3 35 ACF126103 37 33 32 47.3 36 IL02-18228 37 35 34 41.4 37 IL04-24668 33 I 31 32 35.5 38 IL06-7550 34 31 33 38.2 39 IL06-14262 36 33 35 41 40 KY02C-3006-46 33 I 31 31 37.4 41 KY02C-3004-02 32 I 30 33 33.1 42 KY04C-2151 31 I 25 31 38.2 43 KY03C-1192-34 35 32 35 39.4 44 KY02C-3008-01 37 33 34 44.1 45 MD03W91-09-8 33 I 30 33 35.5 46 MD03W91-09-8 33 I 30 33 35.5 47 MD02W135-08-9 34 I 29 32 40.2 48 MO071522 32 I 32 32 32 33.5 49 MO080104 35 31 34 41.4 50 MO080864 38 36 36 42.2 51 MO081652 36 30 33 44.9 52 WESLEY 32 I 30 31 35.5 53 WESLEYFHB1 34 30 34 37.4 54 NE06607 35 33 35 37.8 55 NE06469 37 33 37 42.2 56 NW07505 37 32 36 42.6 57 VA06W-612 32 I 29 31 35.5 58 VA07W-594 32 I 30 32 32 34.3 59 VA07W-594 32 I 30 32 34.3 59 VA07W-601 32 I 28 31 35.5 60 VA08W-734 36 30 34 45.3 100 AVERAGE 35 32 33 39.1 101 MINUMUM 30 25 30 33.1	1					
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36 IL02-18228 37 35 34 41.4 37 IL04-24668 33 I 31 32 35.5 38 IL06-7550 34 31 33 38.2 39 IL06-14262 36 33 35 41 40 KY02C-3006-46 33 I 31 31 37.4 41 KY02C-3004-02 32 I 30 33 33.1 42 KY04C-2151 31 I 25 31 38.2 43 KY03C-1192-34 35 32 35 39.4 44 KY02C-3008-01 37 33 34 44.1 45 MD03W91-09-8 33 I 30 33 35.5 46 MD03W61-09-1 34 I 31 33 37 47 MD02W135-08-9 34 I 29 32 40.2 48 MO71522 32 I 32 </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>						
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40 KY02C-3006-46 33 I 31 31 37.4 41 KY02C-3004-02 32 I 30 33 33.1 42 KY04C-2151 31 I 25 31 38.2 43 KY03C-1192-34 35 32 35 39.4 44 KY02C-3008-01 37 33 34 44.1 45 MD03W91-09-8 33 I 30 33 35.5 46 MD03W61-09-1 34 I 31 33 37 47 MD02W135-08-9 34 I 29 32 40.2 48 MO071522 32 I 32 32 33.5 49 MO080104 35 31 34 41.4 50 MO080664 38 36 36 42.2 51 MO081652 36 30 33 44.9 52 WESLEYFHB1 34 30 34 37.4 54 NE06607 35 <t< td=""><td>38</td><td>IL06-7550</td><td></td><td></td><td></td><td>38.2</td></t<>	38	IL06-7550				38.2
41 KY02C-3004-02 32 30 33 33.1 42 KY04C-2151 31 25 31 38.2 43 KY03C-1192-34 35 32 35 39.4 44 KY02C-3008-01 37 33 34 44.1 45 MD03W91-09-8 33 30 33 35.5 46 MD03W61-09-1 34 31 33 37 47 MD02W135-08-9 34 29 32 40.2 48 MO071522 32 32 32 33.5 49 MO080104 35 31 34 41.4 50 MO080664 38 36 36 42.2 51 MO081652 36 30 33 34.9 52 WESLEY 32 30 31 35.5 53 WESLEYFHB1 34 30 34 37.4 54 NE06607 35 33 35 37.4 55 NE06469 <t< td=""><td>39</td><td>IL06-14262</td><td>36</td><td>33</td><td>35</td><td>41</td></t<>	39	IL06-14262	36	33	35	41
42 KY04C-2151 31 I 25 31 38.2 43 KY03C-1192-34 35 32 35 39.4 44 KY02C-3008-01 37 33 34 44.1 45 MD03W91-09-8 33 I 30 33 35.5 46 MD03W61-09-1 34 I 31 33 37 47 MD02W135-08-9 34 I 29 32 40.2 48 MO071522 32 I 32 32 33.5 49 MO080104 35 31 34 41.4 50 MO080664 38 36 36 42.2 51 MO081652 36 30 33 44.9 52 WESLEY 32 I 30 31 35.5 53 WESLEYFHB1 34 30 34 37.4 54 NE06607 35 33 35 37.4 55 NE06469 37 33	40	KY02C-3006-46	33 I	31	31	37.4
43 KY03C-1192-34 35 32 35 39.4 44 KY02C-3008-01 37 33 34 44.1 45 MD03W91-09-8 33 I 30 33 35.5 46 MD03W61-09-1 34 I 31 33 37 47 MD02W135-08-9 34 I 29 32 40.2 48 MO071522 32 I 32 32 33.5 49 MO080104 35 31 34 41.4 50 MO080664 38 36 36 42.2 51 MO081652 36 30 33 44.9 52 WESLEY 32 I 30 31 35.5 53 WESLEYFHB1 34 30 34 37.4 54 NE06607 35 33 35 37.8 55 NE06469 37 33 37 42.2 56 NW07505 37 32 <t< td=""><td>41</td><td>KY02C-3004-02</td><td>32 </td><td>30</td><td>33</td><td>33.1</td></t<>	41	KY02C-3004-02	32	30	33	33.1
44 KY02C-3008-01 37 33 34 44.1 45 MD03W91-09-8 33 I 30 33 35.5 46 MD03W61-09-1 34 I 31 33 37 47 MD02W135-08-9 34 I 29 32 40.2 48 MO071522 32 I 32 32 33.5 49 MO080104 35 31 34 41.4 50 MO080664 38 36 36 42.2 51 MO081652 36 30 33 44.9 52 WESLEY 32 I 30 31 35.5 53 WESLEYFHB1 34 30 34 37.4 54 NE06607 35 33 35 37.8 55 NE06469 37 33 37 42.2 56 NW07505 37 32 36 42.6 57 VA06W-612 32 I 29	42		31 I	25	31	38.2
45 MD03W91-09-8 33 I 30 33 35.5 46 MD03W61-09-1 34 I 31 33 37 47 MD02W135-08-9 34 I 29 32 40.2 48 MO071522 32 I 32 32 33.5 49 MO080104 35 31 34 41.4 50 MO080664 38 36 36 42.2 51 MO081652 36 30 33 44.9 52 WESLEY 32 I 30 31 35.5 53 WESLEYFHB1 34 30 34 37.4 34 37.4 54 NE06607 35 33 35 37.8 33 37 42.2 56 NW07505 37 32 36 42.6 57 VA06W-612 32 I 29 31 35.5 58 VA07W-594 32 I 30 32 34.3 59 VA07W-601 32 I 28 31 35.5 60 VA08W-734 36 30 34 45.3 100 AVERAGE 35 32 33 39.1 101 MINUMUM 30 25 30 33.1 102 MAXIMUM 43 44 38 47.3	1					39.4
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59 VA07W-601 32 I 28 31 35.5 60 VA08W-734 36 30 34 45.3 100 AVERAGE 35 32 33 39.1 101 MINUMUM 30 25 30 33.1 102 MAXIMUM 43 44 38 47.3						
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102 MAXIMUM 43 44 38 47.3						

Table 21. Summary of incidence (INC, %) data from 2009-2010 PNUWWSN.

		ALL	CLUSTE	R 1				CLUSTER	₹2		OUT
ENTRY	NAME			ILURB	MIELA	MOCOL	VABLA	AVG	INBRO	INLAY	KYLEX
1	ERNIE	49.1 I	70.5 h	91.7		100.0	5.0	3.3			55.0
2	TRUMAN	43.2	58.0 I	93.3	61.3	70.0	7.5	2.7	0.3	5.0	65.0
3	FREEDOM	62.2 h	70.2 h	90.0					25.0		80.0
4	PIONEER2545	71.0 h	76.8 h	100.0	94.8	100.0	12.5		45.0	55.0	90.0
5	E5017	74.8 h	77.2 h	96.7				60.0			
6	E8007	41.2	57.9 I	80.0			5.0	3.5			50.0
7	OH06-158-50	59.3	75.1 h	98.3				20.0 1			75.0
8	OH06-159-6	52.7 I	69.6 h	91.7				10.5			70.0
9	OH06-180-57	60.8	73.0 h	96.7	80.2	100.0	15.0	16.8			100.0
10	OH06-197-61	49.7 1	68.3	93.3			7.5	7.3			60.0
11	OH06-228-73	62.6 h	71.4 h	96.7				26.3	32.5		100.0
12	OH06-190-29	62.1	74.9 h	100.0	87.1	90.0	22.5	35.0	30.0	40.0	65.0
13	03207A1-7-5	54.1	73.2 h	96.7	86.2	100.0	10.0	7.8	3.0	12.5	70.0
14	03615A1-5-7	52.0 I	70.6 h	93.3			15.0	1.0	0.5	1.5	80.0
15	059A1-1-9-5	53.8	72.4 h	96.7	87.9	90.0	15.0			3.5	80.0
16	059A1-1-9-6	56.8	72.6 h	93.3	89.5	100.0	7.5	3.8 1	5.0		100.0
17	0527A1-9-9-3	53.4 I	77.4 h	98.3	91.1	100.0	20.0	2.3	3.5	1.0	60.0
18	0537A1-7-8	53.7	72.0 h	95.0	80.6	100.0	12.5	11.3	12.5	10.0	65.0
19	SE99-1015-7	59.3	76.1 h	98.3	88.4	100.0	17.5	15.5	6.0	25.0	80.0
20	SE-MO98-274-8	57.9	71.3 h	90.0	77.8	100.0	17.5	17.5	25.0	10.0	85.0
21	SE98-1094-C20	57.2	71.3 h	91.7	85.8	100.0	7.5	7.8	3.0	12.5	100.0
22	SE00-4040-10	58.4	71.6 h	88.3	85.7	90.0	22.5	26.3	12.5	40.0	70.0
23	SE00-10303-35	66.7 h	75.5 h	100.0	89.3	100.0	12.5	45.0	50.0	40.0	75.0
24	SE00-10286-7	64.4 h	77.1 h	98.3	90.1	100.0	20.0	36.3	22.5	50.0	70.0
25	MISC-HDS-148	74.8 h	75.4 h	96.7	89.7	100.0	15.0	81.3	n 80.0	82.5	60.0
26	M08*8005#	51.5 I	68.5	93.3	65.5	90.0	25.0	13.3	1.5	25.0	60.0
27	MH07-7474	49.9 I	67.5	91.7	70.8	100.0	7.5	12.3	9.5	15.0	55.0
28	IL06-13072	52.4 I	66.5	90.0	65.9	100.0	10.0	10.5	12.5	8.5	80.0
29	IL06-13708	49.9 1	69.6 h	93.3	77.6	100.0	7.5	8.0 1	10.0	6.0	55.0
30	IL06-13721	46.8 I	66.1	91.7	65.2	100.0	7.5	6.8 1		5.0	50.0
31	IL06-25634	57.1	72.8 h	95.0	86.3	100.0	10.0	9.3 1	8.5	10.0	90.0
32	IL06-27969	47.1 l	64.5 1	83.3	62.0	100.0	12.5	6.0 1	8.0	4.0	60.0
33	IL06-14325	47.9 I	64.5	91.7				3.8 1			70.0
34	KY02C-3007-55	52.7 I	66.1	88.3				4.8			95.0
35	KY03C-1237-23	66.9 h	75.9 h	98.3	90.1	90.0			10.0	70.0	85.0
36	KY01C-1070-02	62.7 h	72.3 h	98.3	80.9	100.0	10.0	45.0	20.0	70.0	60.0
37	KY01C-1531-17	60.3	75.8 h	95.0	88.1	100.0	20.0	29.5	14.0	45.0	60.0
38	KY03C-1136-18	71.5 h	77.6 h	98.3			20.0	52.5	40.0	65.0	85.0
39	KY03C-1092-13	60.5	75.9 h	95.0			17.5		15.0	40.0	
40	MO070933	53.0 I	63.3 I	88.3							100.0
41	MO080103	40.8	66.3 1	86.7			7.5	5.1			10.0
42	MO080373	44.4 1	65.1	91.7			10.0	5.3			40.0
43	MO081378	47.8 1	62.4	91.7			7.5	5.0			75.0
44	MO081772	48.8	63.1 I	95.0			5.0	9.5 1			70.0
45	MO081777	45.5	64.5 I	85.0				5.5			50.0
46	VA08W-622	58.8	73.0 h	96.7				27.5	20.0		65.0
47	VA08W-630	61.2	76.4 h	96.7			15.0	23.8	17.5		75.0
48	VA08W-653	61.8	76.8 h	98.3				20.3 1			85.0
49	VA07W-600	60.4	73.9 h	91.7			12.5	28.8	30.0	27.5	70.0
50	VA07W-607	49.4	75.2 h	93.3			15.0			10.0	25.0
51	VA08W-740	50.1 I	73.9 h	91.7			15.0				45.0
100	AVERAGE	55.9	70.9	93.6					15.1	22.3	70.2
101	MINUMUM	40.8	57.9	80.0			5.0	1.0	0.2		10.0
102	MAXIMUM	74.8	77.6	100.0	94.8	100.0	25.0	81.3	80.0	82.5	100.0
103	LSD(0.05)	12.7	8.8	·	•		<u> </u>	22.0		·	

Table 22. Summary of severity (SEV, %) data from 2009-2010 PNUWWSN.

			CLUS	TFR 1					OUT	OUT
ENTRY	NAME	AVG	AVG		INBRO	INLAY	MIELA	VABLA	KYLEX	MOCOL
1	ERNIE	21.9 I	18.4		3.5	4.2				
2	TRUMAN	18.2	16.9	1 41.1	2.0	13.3	20.8	7.5	38.0	
3	FREEDOM	32.9	22.7	48.0	7.5	15.0	33.1	10.0	40.3	76.7
4	PIONEER2545	51.7 h	46.1	70.7	40.0	41.7	55.6			
5	E5017	33.3	23.0	43.8	7.5	12.5				
6	E8007	15.1 i	10.3		3.5	5.0	12.6			
7	OH06-158-50	43.9 h	41.8	57.0		55.8		10.0		
8	OH06-159-6	25.7	22.9	42.6	20.0					
9	OH06-180-57	39.7 h	38.6	61.9	17.5	51.7				
10	OH06-197-61	26.2	25.0	39.6	37.5	2.5				
11	OH06-228-73	38.6 h	37.8	67.7	15.0					
12	OH06-190-29	35.6	38.1	73.3	17.5	29.2				
13	03207A1-7-5	25.9	26.1	54.8		6.0				
14	03615A1-5-7	20.1	13.7		1.0	5.0				
15	059A1-1-9-5	30.1	27.7	54.8	6.0					
16	059A1-1-9-6	40.4 h	26.9	50.8	5.0					
17 18	0527A1-9-9-3	22.2	20.8 21.9	1 39.3 34.8	2.0 5.0	19.2 35.0	28.6 22.2			
	0537A1-7-8 SE99-1015-7	26.0 27.7		34.8 66.3		8.3				
19 20	SE-MO98-274-8	39.8 h	27.9 29.7	59.4		27.5				
21	SE98-1094-C20	32.9	24.4	43.8						
22	SE00-4040-10	34.8	35.4	52.6	13.5	39.2				
23	SE00-4040-10	49.3 h	58.3		50.0			45.0		
24	SE00-10303-33	37.6	37.2	66.5	25.0					
25	MISC-HDS-148	41.0 h	38.5	56.6	30.0	36.7				
26	M08*8005#	22.3 1	18.3		1.5	4.2				
27	MH07-7474	29.3	29.6	61.1	12.5	15.0				
28	IL06-13072	28.2	28.6	61.9						
29	IL06-13708	22.8 1	21.1		5.0					
30	IL06-13721	15.6 I	13.0		6.0					
31	IL06-25634	22.2 I	16.7						55.4	16.9
32	IL06-27969	24.2	23.1	51.6	10.5	19.2	24.2	10.0	35.4	18.2
33	IL06-14325	22.5	20.0	1 40.8	2.5	23.3	23.2			
34	KY02C-3007-55	19.7	14.6							
35	KY03C-1237-23	30.7	25.9	53.6						
36	KY01C-1070-02	31.9	26.2	55.2	7.5					
37	KY01C-1531-17	37.6	40.6	60.7	27.5	48.3				
38	KY03C-1136-18	43.5 h	38.5	57.6	12.5	59.2				
39	KY03C-1092-13	33.8	33.5	55.1	12.5					
40	MO070933	28.3	21.3							
41	MO080103	12.2	12.9							
42	MO080373	21.1	18.2		0.5					
43	MO081378	34.5	24.7	67.0 52.2						
44	MO081772	30.1	22.7	52.2						
45	MO081777	16.8 I	14.1		2.5	9.2				
46	VA08W-622	23.6 I	20.1							
47	VA08W-630	34.1	28.7	51.5 63.5						
48	VA08W-653	33.9	28.6 21.8	33.6						
49	VA07W-600 VA07W-607	27.3 26.7	20.0							
50 51	VA07VV-607 VA08W-740	26.7	21.4		20.0 3.5					
100	AVERAGE	29.6	26.2	48.2						
100	MINUMUM	12.2	10.3	20.0						
101	MAXIMUM	51.7	58.3	73.3				45.0		
102	LSD(0.05)	13.2	11.4	70.0					5 1.0	
	LOD(0.00)	1 10.2	<u> </u>			·	·		11	

Table 23. Summary of index (IND, %) data from 2009-2010 PNUWWSN.

Γ		<u> </u>	CLUST	ER 1						OUT	OUT
ENTRY	NAME	AVG	AVG	ILURB	INBRO	INLAY	MIELA	онwоо	VABLA	KYLEX	MOCOL
1	ERNIE	17.6 I	15.2	39.3		0.1	28.0	23.3	0.5		35.7
2	TRUMAN	10.8 I	9.7			0.7		7.9	0.7		3.2
3	FREEDOM	24.5	14.6					8.0	0.8		76.7
4	PIONEER2545	41.5 h	34.5	70.7			52.3	40.0	3.0		70.6
5	E5017	29.9	20.6	42.5			34.6	32.2	2.7	49.9	65.2
6	E8007	9.1	6.0	17.1	0.1	0.2		12.8	0.5	11.1	25.7
7	OH06-158-50	28.6	24.4	56.3	7.5	8.4	48.7	23.6	1.8		36.1
8	OH06-159-6	17.7 I	14.0					12.2	0.9		37.5
9	OH06-180-57	27.3	22.3	59.8				30.0	3.0		30.2
10	OH06-197-61	15.5	13.9			0.1	28.2	13.6	0.8		16.7
11	OH06-228-73	29.1	25.6	65.5		7.8		22.8	1.0		12.9
12	OH06-190-29	25.1	26.2	73.3				23.3	6.3		20.6
13	03207A1-7-5	20.2	20.2	53.2			38.7	26.7	1.5		15.3
14	03615A1-5-7	16.0 I	11.5				20.4	18.9	1.5		15.6
15	059A1-1-9-5	21.6	18.8	52.9				13.8	2.3		17.3
16	059A1-1-9-6	32.7 h	18.8	46.8				18.3	1.3		54.1
17	0527A1-9-9-3	17.2	15.9	38.6		0.2		26.1	3.0		28.5
18	0537A1-7-8	16.8 1	12.5					18.9	1.5		34.6
19	SE99-1015-7	24.8	24.9	65.2			43.4	36.1	2.3		27.1
20	SE-MO98-274-8	34.1 h	25.4	53.7				57.8 26.1	1.8 0.9		63.4 40.1
21	SE98-1094-C20	26.1	16.8	40.1				37.8	4.2		24.3
22	SE00-4040-10 SE00-10303-35	25.6	25.5	46.5 n 68.8				35.0	5.3		16.3
23	SE00-10303-35 SE00-10286-7	32.8 h	36.4 h	65.3				41.7	5.5 6.5		29.0
24	MISC-HDS-148	30.4 h 37.9 h	30.1 37.1 h					60.0	2.0		60.3
25 26	M08*8005#	17.9 1	16.4	44.4				28.9	2.6		18.9
27	MH07-7474	21.5	21.5	56.1	1.2			39.4	1.3		26.3
28	IL06-13072	18.0 1	16.0	55.9				15.0	2.0		22.4
29	IL06-13708	13.7	11.9					8.2	0.7		19.4
30	IL06-13721	10.4	8.8					8.2	0.7		16.4
31	IL06-25634	18.8 1	14.0					28.3	1.3		16.9
32	IL06-27969	14.7 I	13.0					15.6	1.3		18.2
33	IL06-14325	14.1 I	11.0			1.2		11.9	1.0		20.3
34	KY02C-3007-55	11.9 1	5.8	17.5	1.4	0.2	6.3	8.0	1.5	39.1	21.4
35	KY03C-1237-23	26.3	22.7	52.7	1.0	7.6	34.0	35.6	5.5	47.7	26.3
36	KY01C-1070-02	25.7	21.6	54.4	1.5	8.2	29.8	33.9	2.0		50.7
37	KY01C-1531-17	24.8	25.7	57.9	3.9			26.7	4.5		20.8
38	KY03C-1136-18	39.0 h	34.3	57.0		38.5	37.6	63.3	4.5	1	74.4
39	KY03C-1092-13	27.4	27.4	52.9	1.9	13.0	41.5	51.1	4.0	26.5	28.0
40	MO070933	19.3 I	11.5					16.7	0.5		24.9
41	MO080103	8.0 I	8.6					6.3	0.8		12.1
42	MO080373	14.9 I	11.6					14.0	1.0		44.8
43	MO081378	23.5	15.8	61.5					0.5		26.1
44	MO081772	20.9	13.5						0.4		60.8
45	MO081777	11.1							0.8		29.1
46	VA08W-622	17.2	14.1						1.3		32.0
47	VA08W-630	26.6	20.9	49.8					3.3		66.7 4 7.9
48	VA08W-653	27.4	22.1	62.6				28.9	2.5		
49	VA07W-600	20.3	14.8						1.5 1.5		55.2 62.1
50	VA07W-607	17.3	11.7					10.2 19.9	3.3		59.9
51	VA08W-740	19.0	13.9						2.1		34.5
100	AVERAGE MINUMUM	22.0 8.0	18.4 5.8	4 5.6 17.1				6.3	0.4		3.2
101 102	MAXIMUM	41.5	37.1	73.3				63.3	6.5		76.7
102		11.5	9.1	13.3	20.0	30.0	39.0	03.3	0.0	7 37.3	70.1
103	LSD(0.05)	[11.5	3.1	•	•	•	•	*	•	.L:	·

Table 24. Summary of fusarium damaged kernel (FDK, %) data from 2009-2010 PNUWWSN.

		ALL	CLUS	TF	3 1				OUT
ENTRY	' NAME	AVG	AVG			INBRO	INLAY	KYLEX	MOCOL
1	ERNIE	18.3 I	12.8	ı	35.0	9.0	1.5	5.8	40
2	TRUMAN	10.8 1	8.5	ı	20.0	8.5	2.0	3.4	20
3	FREEDOM	42.8 h	33.6		45.0	40.2	42.5	6.5	80
4	PIONEER2545	52.9 h	42.4	h	75.0	30.0	52.5		95
5	E5017	37.1	36.4		70.0		52.5		40
6	E8007	13.1 I	10.1	1	18.3		2.0		25
7	OH06-158-50	34.6	28.3		70.0				60
8	OH06-159-6	44.7 h	32.1		70.0		15.0		
9	OH06-180-57	34.5	28.2		70.0		8.5		
10	OH06-197-61	38.3	24.1	ì	53.3		3.5		95
11	OH06-228-73	43.2 h	34.0		71.7		15.0		
12	OH06-190-29	43.6 h	35.8		75.0		30.0		
13	03207A1-7-5	34.3	20.4	į	53.3		5.0		
14	03615A1-5-7	22.7	18.4	I	33.3		1.0		40
15	059A1-1-9-5	30.6	23.2	ı	61.7		4.0		60
16	059A1-1-9-6	37.2	34.0		73.3		6.5		50
17	0527A1-9-9-3	28.6	17.0	-	36.7	9.8	7.5		75
18	0537A1-7-8	20.7	15.8		33.3		11.0		40
19	SE99-1015-7	41.8	33.5		73.3		32.5		75
20	SE-MO98-274-8	34.5	23.1	١	46.7		7.5		
21	SE98-1094-C20	39.7	30.9		53.3		15.0		
22	SE00-4040-10	52.0 h	42.5	h	60.0		52.5		
23	SE00-10303-35	59.3 h	54.1	h	76.7		35.0		
24	SE00-10286-7	38.7	35.9		60.0				50
25	MISC-HDS-148	60.1 h	50.1	h	91.7		75.0		
26	M08*8005#	17.1 I	15.2	l	33.3		6.0		I i
27	MH07-7474	31.0	23.8	<u> </u>	56.7		12.5		
28	IL06-13072	17.9	17.3	!	28.3		16.0		
29	IL06-13708	23.7	17.2 12.6	l l	26.7 30.0		3.5 4.0		
30	IL06-13721	12.1 l 17.0 l	15.1	- 1	38.3		4.0 6.5		
31	IL06-25634	11.0 1	9.7		36.3 21.7		3.5		20
33	IL06-27969 IL06-14325	19.7	14.6		30.0		3.0		
34	KY02C-3007-55	20.0 1	12.5	<u> </u>	25.0		5.0		
35	KY03C-1237-23	33.2	26.5	ı	41.7		37.5		
36	KY01C-1070-02	39.0	36.2		60.0		47.5		
37	KY01C-1531-17	39.3	34.2		60.0		27.5		
38	KY03C-1136-18	60.0 h	56.2	h	63.3		52.5		
39	KY03C-1092-13	46.1 h	38.8	h	46.7		52.5		
40	MO070933	18.6 I	18.2	ij	41.7				
41	MO080103	14.6	12.0	į	28.3		1.5		i .
42	MO080373	11.0	11.2	i	16.7				
43	MO081378	22.3	15.4	ĺ	26.7				
44	MO081772	15.5 I	14.4	ŀ	26.7		3.0		
45	MO081777	12.7	9.7	i	18.3				
46	VA08W-622	35.5	29.4		35.0				
47	VA08W-630	40.8	31.0		45.0				
48	VA08W-653	40.2	30.3		53.3				
49	VA07W-600	33.4	21.8	ı	26.7		30.0		
50	VA07W-607	25.6 1	17.0	Ī	26.7		2.0		60
51	VA08W-740	38.0	25.0	1	36.7				90
100	AVERAGE	31.6	25.3		46.5		19.5	11.1	56.7
101	MINUMUM	10.8	8.5		16.7	4.0	1.0	3.4	10.0
102	MAXIMUM	60.1	56.2		91.7	92.6	75.0	22.8	100.0
103	LSD(0.05)	18.0	17.8						<u>. </u>

Table 25. Summary of incidence x severity x FDK (ISK, %) data from 2009-2010 PNUWWSN.

		ALL	CLUS	TEF	₹1			OUT	OUT
ENTRY	NAME		AVG		LURB	INBRO	INLAY	KYLEX	MOCOL
1	ERNIE	29.2 I	20.9	ı	54.3	5.8		26.4	56.7
2	TRUMAN	24.3 I	19.6	i	48.3	4.1	6.3	32.3	30.4
3	FREEDOM	49.1	40.6		59.4	25.8	36.5	38.7	85.0
4	PIONEER2545	61.6 h	56.2	h	81.2	37.5	50.0	50.0	89.2
5	E5017	50.4	45.8		70.1	26.0	41.3	49.2	65.6
6	E8007	23.2 I	15.8		37.4			25.3	43.6
7	OH06-158-50	47.1	42.1		74.6	21.6		44.2	64.8
8	OH06-159-6	43.1	34.1		68.3			34.2	79.3
9	OH06-180-57	46.6	39.4		75.6	21.2		51.6	63.1
10	OH06-197-61	39.0	28.9		61.2			38.1	70.6
11	OH06-228-73	49.8	43.6		78.0	28.9		55.0	63.3
12	OH06-190-29	47.7	46.0		82.0	23.2		36.6	63.9
13	03207A1-7-5	38.0	27.9		66.8	9.2		36.0	70.6
14	03615A1-5-7	31.5	20.7	1	50.3	9.3		47.3	48.2
15	059A1-1-9-5	37.6	29.9		70.1	12.0		41.6	56.8
16	059A1-1-9-6	46.0	33.0		72.6	19.0		64.7	66.2
17	0527A1-9-9-3	33.9	23.6	!	56.0	5.6		30.5	68.5
18	0537A1-7-8	34.1	26.4	1	52.3	9.0	17.9	34.7	56.4
19	SE99-1015-7	43.2	37.0		78.7			37.0	68.1
20	SE-MO98-274-8	45.9	32.0		63.5	18.3		52.4	81.0
21	SE98-1094-C20	45.2	31.4		62.0	17.7		59.5	72.0
22	SE00-4040-10	49.1	44.9	L.	66.3	23.5		40.0	71.1
23	SE00-10303-35	59.6 h		h	81.3	67.0		38.3	66.9
24	SE00-10286-7	46.4	44.0	h	73.4 82.6	24.9		41.1	58.7 88.1
25 26	MISC-HDS-148 M08*8005#	62.2 h 30.1 l	62.6 23.8	h I	55.5	39.5 4.6		35.3 35.9	43.3
27	MH07-7474	37.4	32.3	ı	68.5	4.6 14.4	14.0	28.3	61.9
28	IL06-13072	33.7	28.9		56.9	16.2		37.2	44.7
29	IL06-13708	32.5 1	25.0	ı	49.5	14.9		32.0	55.8
30	IL06-13700	25.1 I	20.3	ŀ	47.9	8.6		25.7	38.9
31	IL06-25634	32.1 I	22.7	ļ	52.8	8.2		47.5	45.1
32	IL06-27969	28.1 I	21.6	i	49.1	7.2		32.4	43.5
33	IL06-14325	31.5 I	23.9	i	51.7	10.2		33.9	52.1
34	KY02C-3007-55	31.8 I	20.6	Ť	42.5	14.7		43.4	54.1
35	KY03C-1237-23	44.1	38.3	•	62.2	13.6		45.5	59.8
36	KY01C-1070-02	46.5	43.8		70.0	17.8	43.5	35.8	65.2
37	KY01C-1531-17	46.4	45.8		70.7	27.7	39.0	34.3	60.2
38	KY03C-1136-18	61.8 h	60.7	h	72.1	51.8		44.4	82.3
39	KY03C-1092-13	47.5	44.0		63.7	25.5		37.0	68.4
40	MO070933	34.2	25.7	1	50.3	4.4		52.4	41.4
41	MO080103	21.7 I	18.3	1	47.4	3.0	4.6	9.9	43.6
42	MO080373	26.0 I	21.6	l	48.1	8.4	8.3	17.7	47.4
43	MO081378	37.5	26.8	I	58.3	11.0	11.1	51.5	55.7
44	MO081772	34.0	26.2	1	54.8	15.0	8.7	35.0	56.3
45	MO081777	25.3 l	18.0	1	42.5	4.2	7.4	23.8	48.7
46	VA08W-622	40.7	35.0	-	55.7	23.1	26.2	34.9	63.6
47	VA08W-630	45.9	37.8		62.4	19.0		34.1	82.0
48	VA08W-653	47.0	38.2		69.9	11.6		43.9	76.4
49	VA07W-600	41.1	31.3		48.3	20.8		33.1	78.6
50	VA07W-607	33.8	25.9	ı	49.7	21.0	7.0	18.7	72.6
51	VA08W-740	37.9	27.9	<u> </u>	51.2	21.4	11.0	21.8	84.0
100	AVERAGE	39.9	33.2		61.1	17.8		37.8	62.2
101	MINUMUM	21.7	15.8		37.4	3.0	2.4	9.9	30.4
102	MAXIMUM	62.2	64.2		82.6	67.0	65.8	64.7	89.2
103	LSD(0.05)	11.8	12.8				•		

Table 26. Summary of deoxynivalenol (DON, ppm) data from 2009-2010 PNUWWSN.

		ALL		CLUS	TFI	R 1			OUT
ENTRY	NAME	AVG		AVG			OHWOO	VABLA	KYLEX
1	ERNIE	12.7	h	7.1	lh	7.7	13.1	0.5	29.6
2	TRUMAN		ł	3.6	ļ	7.4	2.9		
3	FREEDOM		1	4.0	l	7.0	4.4		15.6
4	PIONEER2545	12.0		9.3	h	11.4	15.7		20.1
5	E5017	18.3	h	9.7	h	20.5	7.8		44.1
6	E8007	8.6		4.0	- [7.0	4.3	0.6	22.7
7	OH06-158-50	9.7	I	5.3	-	10.4	4.8	0.6	22.9
8	OH06-159-6	11.3		5.2	1	9.6	5.5	0.6	29.3
9	OH06-180-57	9.5		5.7	1	5.5	10.9	0.6	20.9
10	OH06-197-61	5.8	I	4.4	-	6.7	5.8		9.9
11	OH06-228-73	10.8		6.1	lh	8.7	8.4		24.8
12	OH06-190-29	9.5	1	7.5	h	11.0	10.9		15.6
13	03207A1-7-5	9.6	1	6.7	lh	8.9	10.5	0.6	18.2
14	03615A1-5-7	5.2	1	3.6	ı	3.4	7.0	0.5	10.1
15	059A1-1-9-5	9.4	ł	6.3	lh	8.3	9.9	0.8	18.5
16	059A1-1-9-6	11.9		6.5	lh	9.4	9.6	0.5	28.2
17	0527A1-9-9-3	11.6		7.8	h	9.3	13.3	0.9	22.8
18	0537A1-7-8	8.5	I	5.1	I	8.8	5.7	0.7	18.8
19	SE99-1015-7	13.0	h	5.0	ı	6.2	8.4	0.5	36.8
20	SE-MO98-274-8	14.2	h	8.3	h	10.2	14.0	0.6	31.8
21	SE98-1094-C20	12.0		6.8	lh	9.0	10.5	0.9	27.6
22	SE00-4040-10	12.0		8.7	h	12.0	13.4	0.6	22.0
23	SE00-10303-35	13.1	h	8.4	h	14.7	9.7	0.8	27.1
24	SE00-10286-7		h	9.6	h	14.2	13.9		39.8
25	MISC-HDS-148	13.3		10.7	h	7.3			21.2
26	M08*8005#	11.6		6.1	lh	5.5	12.3		28.1
27	MH07-7474	7.7	I	5.5	1	7.9	8.1	0.6	14.0
28	IL06-13072	7.9	Τ	5.0		5.5	9.1	0.5	16.5
29	IL06-13708	5.4	Ι	3.8	-	5.1	5.8	0.5	10.1
30	IL06-13721	9.3	ı	3.9	-	5.9	5.4	0.5	25.3
31	IL06-25634	11.3		7.6	h	11.3	10.8		22.7
32	IL06-27969	5.3	1	4.0	-	5.9	5.5		9.2
33	IL06-14325		Ι	4.0	1	7.1	4.4	0.6	14.1
34	KY02C-3007-55	6.5	T	3.2		4.1	4.9		16.5
35	KY03C-1237-23	11.3		7.9	h	8.5	14.4	0.7	21.6
36	KY01C-1070-02	9.7	1	7.8	h	9.4	13.4	0.5	15.6
37	KY01C-1531-17		1	7.0	lh	8.4	11.9		14.3
38	KY03C-1136-18	11.8		9.5	h	9.3	18.6		18.6
39	KY03C-1092-13	11.1		7.2	lh	7.6	13.6	0.5	22.7
40	MO070933	11.4		5.5	I	9.6	6.2		29.1
41	MO080103	4.0	1	2.9	l	3.3	4.8		7.4
42	MO080373	6.2		4.3	l	5.7	6.6		12.2
43	MO081378	7.6		4.6	į	8.7	4.6		16.5
44	MO081772	4.7		3.1	i	6.7	2.1	0.5	9.5
45	MO081777	4.5		2.6	Ī	3.0	4.2		10.3
46	VA08W-622	6.9	Ī	4.8	1	7.2	6.6		13.4
47	VA08W-630	7.7	1	5.7	I	5.7	10.8		13.7
48	VA08W-653	9.7		6.0	I	5.7	11.8		20.8
49	VA07W-600	7.0		5.1	-	5.5	9.3		12.8
50	VA07W-607	5.8		4.4	ĺ	5.7	7.0		10.0
51	VA08W-740	12.9		7.0	lh	7.0	13.3		30.6
100	AVERAGE	9.5		5.9		8.0	9.2		20.0
101	MINUMUM	4.0		2.6	ì	3.0	2.1	0.5	6.8
102	MAXIMUM	18.3		10.7		20.5	24.3		44.1
103	LSD(0.05)	6.2		12.8					

Table 27. Summary of greenhouse severity from SPI (GHSEV, %) data from 2009-2010 PNUWWSN.

ENTRY	NAME	ILURB
1	ERNIE	17.5
2	TRUMAN	14.4
2 3	FREEDOM	5.0
4	PIONEER2545	80.3
5	E5017	7.7
6	E8007	3.0
7	OH06-158-50	100.0
8	OH06-159-6	37.3
9	OH06-180-57	91.8
10	OH06-197-61	19.3
11	OH06-228-73	88.5
12	OH06-190-29	64.8
13	03207A1-7-5	33.8
14	03615A1-5-7	5.0
15	059A1-1-9-5	21.0
16	059A1-1-9-6	28.6
17		
1	0527A1-9-9-3	3.0
18	0537A1-7-8	35.8
19	SE99-1015-7	74.4
20	SE-MO98-274-8	34.8
21	SE98-1094-C20	12.7
22	SE00-4040-10	26.0
23	SE00-10303-35	59.5
24	SE00-10286-7	53.0
25	MISC-HDS-148	58.8
26	M08*8005#	41.6
27	MH07-7474	27.2
28	IL06-13072	53.6
29	IL06-13708	18.0
l .	t t	
30	IL06-13721	14.0
31	IL06-25634	6.3
32	IL06-27969	55.3
33	IL06-14325	61.3
34	KY02C-3007-55	3.8
35	KY03C-1237-23	54.2
36	KY01C-1070-02	69.2
37	KY01C-1531-17	100.0
38	KY03C-1136-18	86.0
39	KY03C-1092-13	21.6
40	MO070933	6.3
41	MO080103	5.6
l .		
42	MO080373	7.4
43	MO081378	5.4
44	MO081772	9.5
45	MO081777	9.8
46	VA08W-622	42.2
47	VA08W-630	43.8
48	VA08W-653	7.6
49	VA07W-600	24.7
50	VA07W-607	16.0
51	VA08W-740	22.4
100	AVERAGE	35.1
101	MINUMUM	3.0
101	MAXIMUM	100.0
		100.0
103	LSD(0.05)	•

Table 28. Summary of heading date (HD, julian days) data from 2009-2010 PNUWWSN.

ENTRY	NAME	AVG	ILURB	KYLEX	MIELA	MOCOL	OHWOO
1	ERNIE	137	127	126	153	141	138
2	TRUMAN	144	134	134	156	151	142
3	FREEDOM	141	132	130	155	145	141
4	PIONEER2545	140	131	129	154	145	140
5	E5017	144	136	134	154	145	151
6	E8007	143	135	131	156	148	146
7	OH06-158-50	139	132	130	153	141	141
8	OH06-159-6	137	127	128	150	144	137
9	OH06-180-57	141	133	129	154	144	142
10	OH06-197-61	139	129	129	153	144	141
11	OH06-228-73	140	132	131	153	144	141
12	OH06-190-29	139	131	129	153	144	140
13	03207A1-7-5	138	127	128	151	144	140
14	03615A1-5-7	136	126	125	151	144	136
15	059A1-1-9-5	139	128	130	154	144	140
16	059A1-1-9-6	139	127	131	153	145	138
17	0527A1-9-9-3	138	128	128	151	144	139
18	0527A1-9-9-3 0537A1-7-8	139	128	129	151	144	140
19	SE99-1015-7	139	130	129	153	144	141
20	SE-MO98-274-8	141	133	130	156	144	142
21	SE98-1094-C20	142	133	130	155	143	146
22	SE00-4040-10	137	132	126	153	144	138
23	SE00-10303-35	140	131	128	153	144	141
24	SE00-10286-7	138	127	127	152	144	138
25	MISC-HDS-148	136	127	127	150	141	136
26	M08*8005#	136	126	126	151	141	137
27	MH07-7474	141	129	129	155	144	146
28	IL06-13072	138	130	128	151	144	137
29	IL06-13708	138	128	129	152	144	137
30	IL06-13721	134	125	123	149	137	135
31	IL06-25634	134	125	124	148	137	135
32	IL06-27969	137	127	128	152	144	137
33	IL06-14325	138	128	127	152	144	137
34	KY02C-3007-55	140	131	130	154	144	141
35	KY03C-1237-23	138	128	128	151	144	139
36	KY01C-1070-02	137	124	129	153	144	136
37	KY01C-1531-17	136	128	126	152	139	137
38	KY03C-1136-18	140	131	130	154	145	141
39	KY03C-1092-13	138	127	127	152	144	141
40	MO070933	147 h	138	138		147	155
41	MO080103	137	127	128	151	139	140
42	MO080373	139	128	127	154	145	139
43	MO081378	140	131	130	154	144	141
44	MO081772	140	130	131	155	145	141
45	MO081777	137	127	126	150	141	139
46	VA08W-622	137	126	130	152	144	136
47	VA08W-630	139	130	128	153	145	137
48	VA08W-653	140	132	129	155	145	140
49	VA07W-600	138	128	128	151	145	140
50	VA07W-607	138	129	127	151	145	137
51	VA08W-740	139	129	129	153	145	138
100	AVERAGE	139	129	128	153	144	140
101	MINUMUM	134	124	123	148	137	135
102	MAXIMUM	147	138	138	156	151	155
103	LSD(0.05)	2			,	•	
	202(0.00)			-			

Table 29. Summary of plant height (HGT, inches) data from 2008-2009 PNUWWSN.

ENTRY	NAME	KYLEX	
1	ERNIE	27.5	Ī
2	TRUMAN	33.0	•
3	FREEDOM	31.0	
4	PIONEER2545	32.5	
5	E5017	30.0	
6	E8007	30.5	
$\frac{3}{7}$	OH06-158-50	33.5	
1			
8	OH06-159-6	28.5	ı
9	OH06-180-57	32.0	
10	OH06-197-61	32.0	
11	OH06-228-73	32.0	
12	OH06-190-29	30.5	
13	03207A1-7-5	31.5	
14	03615A1-5-7	28.5	Ī
15	059A1-1-9-5	33.0	
16	059A1-1-9-6	31.5	
17	0527A1-9-9-3	28.5	I
18	0537A1-7-8	31.5	
19	SE99-1015-7	28.5	
20	SE-MO98-274-8	33.0	
21	SE98-1094-C20	32.5	
22	SE00-4040-10	33.5	
23	SE00-10303-35	34.0	h
24	SE00-10286-7	36.5	h
25	MISC-HDS-148	30.5	
26	M08*8005#	32.0	
27	MH07-7474	32.5	
28	IL06-13072	32.0	
29	IL06-13708	34.0	h
			11
30	IL06-13721	30.5	
31	IL06-25634	29.5	I
32	IL06-27969	31.5	
33	IL06-14325	30.5	
34	KY02C-3007-55	33.0	
35	KY03C-1237-23	31.0	
36	KY01C-1070-02	33.0	
37	KY01C-1531-17	30.5	
38	KY03C-1136-18	30.5	
39	KY03C-1092-13	31.5	
40	MO070933	36.0	h
41	MO080103	30.5	
42	MO080373	34.0	h
43	MO081378	35.5	h
44	MO081772	36.0	h
45	MO081777	32.0	
46	VA08W-622	31.5	
47	VA08W-630	31.0	
48	VA08W-653	27.0	ı
49	VA07W-600	32.5	•
50	VA07W-607	31.0	
51	VA07VV-007 VA08W-740	29.5	1
101		31.7	ı,
	AVERAGE		
	MINIMUM	27.0	
	MAXIMUM	36.5	
	LSD	2.5	

Table 30. Means for other traits collected on the 2009-2010 PNUWWSN

		MOCOL	ROFUN
		GH RACHIS SCORE	
ENTRY	NAME	0-9	
1	ERNIE	1.8	330.9
2	TRUMAN	1.0	428.9
3	FREEDOM	2.0	279.9
4	PIONEER-2545	4.1	713.1
5	NY99045-3110	0.9	500.0
6	OH07-176-56	3.6	764.9
7	NY94052-9340	1.2	570.4
8	NY99068-3251	1.8	514.1
9	NY88046-7088	2.8	724.3
10	E5011B	4.6	497.0
11	E5024	1.6	338.1
12	E3024	2.3	756.6
13	E6012	2.1	586.9
14	E8052	1.9	510.5
15	OH04-264-58	2.4	544.1
16	OH05-101-1	2.4	468.5
17	OH05-164-76	2.5	428.9
18	OH05-200-74	1.3	287.9
19	99691A2-5-4-16-1	4.4	289.3
20	01946A1-16-48-5	1.5	267.6
21	057RA1-8-5	1.0	565.0
22	059A1-2-4-3	1.1	556.4
23	TABOO	9.8	876.6
24	MONDO	3.8	296.6
25	PROBE	7.7	776.8
26	RUMOR	1.7	459.6
27	03M1539#019	6.6	834.3
28	03M1539#031	6.9	439.9
29	W1104	1.7	656.6
30	ML06-2097	3.9	593.2
31	GS-0-EM0681	2.4	625.7
32	GS-0-EM0614	4.8	695.1
33	GS-1-EM0362	3.9	784.4
34	ACF213003B	2.7	561.6
35	ACF126103	4.4	491.3
36	IL02-18228	2.1	309.8
37	IL04-24668	3.1	246.9
38	IL06-7550	3.3	203.5
39	IL06-14262	1.2	221.4
40	KY02C-3006-46 KY02C-3004-02	0.8	205.6
41		1.1	232.7
42	KY04C-2151	0.7	138.8
43	KY03C-1192-34	6.3	520.2
44	KY02C-3008-01	0.8 2.8	252.8 407.5
1	MD03W91-09-8		
46	MD03W61-09-1 MD02W135-08-9	2.3 6.0	189.6
47 48	MO071522	0.9	540.5 494.3
49	MO080104	1.8	494.3 486.6
50	MO080864	1.0	187.4
51	MO081652	1.4	315.2
52	WESLEY	1.4	576.4
53	WESLEYFHB1	3.3	705.0
54	NE06607	3.3	516.3
55	NE06469	3. i 4.4	792.6
56	NW07505	5.5	792.0
57	VA06W-612	2.3	546.6
58	VA07W-594	1.6	540.9
59	VA07W-601	1.2	360.3
60	VA08W-734	2.8	233.0
	1,10011104		200.0

	Rht-B1b	Rht-D1b	Γ		Г				Γ	Γ	Γ	T .	1		I	T					T
	dwarf	dwarf	١.	Ppd-D1a		Fhb	Fhb 2DL-		Fhb	!			1				Yr17				
	allele	allele		insens.	1	Ernie	Wuhan1	Fhb 5A	5A	ľ	ŀ	Sr24				Bdv2/	Lr37	Lr34	Bx7	Glu-	
NAME	(Rht1)	(Rht2)	Rht8	allele	Fhb1	3Bc	W14	Ernie	Ning	Sr2	Sr36	Lr24	1RS	H13	Н9	3	Sr38	Yr18	overexp	D1	Glu-A1
ERNIE	yes	het	no	yes	no	no	no	het	no	no	het	no	non-1RS	no	no	no	no	no	no	2+12	het
TRUMAN	yes	no	no	no	no	no	no	no	no	no	no	no	non-1RS	no	no	no	no	no	no	2+12	Ax1 or null
FREEDOM	yes	no	no	no	no	yes?	no	no	no	no	yes	no	1RS:1BL	no	no	no	no	no	no	2+12	Ax1 or null
PIONEER2545	het	yes	no	yes	no	no	no	no	no	no	no	no	non-1RS	no	no	no	no	no	no	2+12	Ax2*
NY99045-3110	no	yes	no	no	no	no	no	no	no	no	no	no	non-1RS	no	no	no	no	no	no	2+12	Ax1 or null
OH07-176-56	yes	no no	het	het	no	het?	no	no	no	no	no	no	non-1RS	no	no	no	no	no	het	het	Ax2*
NY94052-9340 NY99068-3251	no no	yes yes	no no	no no	no no	no no	no no	no no	no no	no no	no no	no no	non-1RS non-1RS	no no	no no	no no	no no	no no	het	2+12 2+12	Ax1 or null Ax2*
NY88046-7088	no	yes yes	no	no	no	no	no	no	no	no	no	no	non-1RS	no	no	no	no	no	no no	2+12	AX2
E5011B	no	yes	no	het	no	no	no	no	no	no	no	no	1RS:1BL	no	no	no	no	no	no	2+12	Ax2*
E5024	no	yes	no	yes	no	no	no	yes	no	no	no	no	1RS:1BL	no	no	no	no	no	no l	5+10	Ax1 or null
E3024	no	yes	no	no	yes	no	no	no	no	no	no	no	non-1RS	no	no	no	no	no	no	2+12	Ax2*
E6012	no	Unknown	no	yes .	no	no	no	yes	no	no	no	no	non-1RS	no	no	no	no	no	no	2+12	Ax1 or null
E8052	no	yes	no	yes	no	no .	no	no	no	no	no	no	non-1RS	no	no	no	no	no	yes	5+10	Ax2*
OH04-264-58	no	yes	no	yes	no	no	no	no	no	no	no	no	non-1RS	no	no	no	no	no	yes .	5+10	Ax2*
OH05-101-1	yes	no	no	yes	no	no	no	no	no	no	no	no	non-1RS 1RS:1BL	no	no	no	no	no	no	5+10 5+10	Ax1 or null Ax2*
OH05-164-76 OH05-200-74	yes ves	no no	no no	yes no	yes no	yes? no	no no	no no	no no	no no	no no	no no	TRS TAL	no no	no no	no no	no no	yes no	no no	2+12	Ax1 or null
99691A2-5-4-16-1	Ves:	no	no	Ves	no	no	no	no	no	no	no	no	non-1RS	no	no	no	no	no	het	2+12	Ax2*
01946A1-16-48-5	yes	no	no	yes	no	no	no	no	no	no	ves	no	1RS:1BL	no	no	het	no	no	no	2+12	Ax1 or null
057RA1-8-5	yes	Negative	no	no	no	no	no	no	no	no	yes	no	non-1RS	no	no	no	no	no	no	5+10	Ax1 or null
059A1-2-4-3	yes	no	no	no	no	no	no	no	no	no	yes	no	1RS:1BL	no	no	yes	no	no	yes	5+10	Ax1 or null
TABOO	yes	no	yes	no	no	no	no	no	no	no	no	no	1RS:1BL	no	no	no	no	no	no	2+12	Ax2*
MONDO	no no	no ves	no	no no	no no	no no	no no	yes no	no no	no no	no	no no	non-1RS non-1RS	no no	no	no no	no no	no no	no	2+12 5+10	het Ax2*
PROBE RUMOR	no	yes	yes no	no	no	no	no	no	no	no	yes no	no	non-1RS	no	no	no	no	no	no no	2+12	Ax1 or null
03M1539 019	yes	no	no	yes	no	no	no	no	no	no	no	no	1RS:1BL	no	yes	no	yes	no	no	het	Ax2*
03M1539 031	yes	no	no	yes	no	yes	no	no	no	no	no	no	non-1RS	no	yes	no	no	no	no	2+12	Ax2*
W1104	yes	no	no	yes	no	?	no	yes	no	no	no	no	1RS:1BL	no	no	no	no	no	yes	2+12	Ax2*
ML06-2097	yes	no	yes	yes	no	no	no	no	no	no	no	no	1RS:1BL	no	no	no	no	no	no	5+10	Ax2*
GS-0-EM0681 GS-0-EM0614	no yes	yes yes	no no	no no	no no	no no	no no	no no	no no	no no	no no	no no	1RS:1BL	no no	no no	no no	yes no	no ves	no no	5+10 2+12	Ax2* Ax2*
GS-1-EM0362	no	yes	no	no	no	no	no	no	no	no	no	no	1RS:1BL	no	no	no	no	yes	no	het	Ax2*
ACF213003B	ves	no	het	no	no	no	no	no	no	no	no	no	non-1RS	no	no	no	no	no	no	het	Ax1 or null
ACF126103	yes	no	yes	no	no	no ·	no	no	no	no	no	no	1RS:1BL	no	no	no	no	no	no	5+10	Ax1 or null
IL02-18228	yes	no	no	no	no	no	no	no	no	no	no	no	non-1RS	no	no	no	no	no	no	5+10	Ax1 or null
IL04-24668	yes	no	no	yes	no	no :	no	no	no	no	no	no	non-1RS	no	no	no	no	no	no	5+10	Ax2*
IL06-7550	yəs	no	no	no	no	no	no	no	no .	no	no	no	non-1RS	no	no	no	no	no	no		Ax2*
IL06-14262 KY02C-3006-46	yes yes	no no	no no	no yes	no yes	no no	no no	no no	no no	no no	no no	no no	non-1RS 1RS:1BL	no	no no	no no	no no	no no	no no	5+10 5+10	Ax2*
KY02C-3004-02	no	yes	no	no	yes?	no	no	no	no	no	no	yes	IRS TAL	no	no	no	no	¥98	no	5+10	Ax2*
KY04C-2151	no	no	no	ves	yes	no	het	no	no	no	no	no	1RS:1BL	no	no	no	no	yes	no	2+12	Ax2*
KY03C-1192-34	no	no	no	yers .	no	no	no	no	no	no	no	no	non-1RS	no	no	no	no	no	no	5+10	Ax2*
KY02C-3008-01	het	het	no	yes	no	no	no	no	no	no	no	no	1RS:1BL	no	no	no	no	yes	no	5+10	Ax2*
MD03W91-09-8													TRE THE								
	no	yes	no	yes	no	no	no	no	no	no	no	yes	1RS TAL	no	no	no	no	no	no	5+10	Ax2*
MD03W61-09-1 MD02W135-08-9	no	yes	no	γes	yes	no	no	no	no	no	no	no	1RS:1BL	no	no	no	no	no	no	2+12	Ax1 or null
WID0244130-06-9	no	yes	no	no	no	no	no	no	no	no	no	yes	1RS-TAL	no	no	no	no	no	no	2+12	Ax2*
MO071522	yes	no	no	het	no	no	no	no	no	no	no	no	non-1RS	no	no	no	no	no	no	5+10	Ax1 or null
MO080104	no	no	no	yes	no	no	no	no	no	no	no	no	non-1RS	no	no	no	no	no	no	5+10	Ax2*
MO080864	yes	no	no	no	no	no	no	het	no	no	no	no	non-1RS	no	no	no	yes	no	no	2+12	Ax1 or null
MO081652	no	no	no	yes	no	no	no	no	no	no	no	no	non-1RS	no	no	no	no	no	no	5+10	Ax2*
WESLEY	yes yes	rio no	yes no	no no	no yeas:	no no	no no	no no	no no	no no	no no	yes	non-1RS non-1RS	no no	no	no no	no no	no no	no no	5+10 5+10	Ax2* Ax2*
WESLEYFHB1 NE06607	yes	no	no	no	no no	no	no	no	no	no	no	yes no	non-1RS	no	no	no	no	no	no	5+10	Ax2*
NE06469	yes Yes	no	no	yes	no	no	no .	по	no	no	no	yes	non-1RS	no	no	no	no	no	no	5+10	Ax2*
NW07505	yes	no	no	no	no	no	no	no	no	no	no	no	non-1RS	no	no	no	no	no	no	5+10	Ax2*
VA06W-612	no	yes	no	no	no	no	no	no	no	no	yes	no	non-1RS	no	no	no	no	no	no	5+10	Ax2*
VA07W-594	no	yes	no	yes	no	no	no	no	no	no	yes	no	1RS:1BL	no	no	no	no	no	no	het?	het
VA07W-601	no	yes	no	по	no	no	no	no	no	no	yes	no	1RS:1BL?	no	no	no	no	no no	no	2+12 5+10	Ax1 or null
VA08W-734	yes	no	no	no	no	no	no	no	no	no	no	no	100	no	yes	no	no	110	no	3+10	Ax2*

FREEDOM yes no no no no no no no n	NAME															1		i			Γ	
ENNIC PRED PRE DO PRE		Rht-B1b	Rht-D1b		Ppd-D1a		Fhb	Fhb 2DL-	ĺ			l	1	1				Yr17				
ENNE		dwarf allele	dwarf allele	l	insens.		Ernie	Wuhan1	Fhb 5A	Fhb 5A								Lr37		Bx7	1	
TRUMAN 998		(Rht1)	(Rht2)	Rht8	allele	Fhb1	3Bc	W14	Ernie	Ning	Sr2	Sr36	Sr24 Lr24	1RS	H13	H9	Bdv2/3	Sr38	Lr34 Yr18	overexp	Glu-D1	Glu-A1
FREEDOM yes no	ERNIE	yes	no	по	по	no	yes	no	yes	ло	no	yes	no	non-1RS	no	по	по	no	no	no	2+12	Ax1 or nul
PONERFRAME FOR Post FOR Post FOR Post FOR		yes	no	по	по	no	no	no	по	no	no	по	no	non-1RS	no	no	no	no	no	no	2+12	Ax1 or null
E8017 no		yes	no	ло	no	no	yes?	no	no	no	no	yes	no	1RS:1BL	no	no	no	no	no	no	2+12	het
E8007 no yes no no no no no no no n			yes		yes		no		het													
CH06-158-50 yes no no no no no no no n																						
OHIGH-199-65																						
OH06-180-57)			k .			ı						4 SEARCH TRESONY TERROLOGY	4			
0+06-29-37 yes no				60000000000	8.000.00 (S.000.00)				1			l .	f I				1		1			
OH06-19-02-28-73													1									
O-10-19-29 yes no no no no no no no n))						1	1					1				
0.320/14.7-5 yes no no no no no no no n						t ł			ì									Į.	1			
0.3615.41-5-7 yes no																						
059A1-19-5-5 yes													1									
0592/14-19-8			1			(3					ł	1			
SE94-015-77 98	059A1-1-9-6																					Ax1 or null
SE99-1015-7 999 no no no no no no																						Ax1 or null
SEMOSH-274-8 yes no	0537A1-7-8	yes	no	no	yes	no	no	no	het	no	no	yes	no	non-1RS	по	no	no	no	no	по	het	Ax1 or null
SEOB-404-01 yes no no no no no no no n	SE99-1015-7	yes	no	no	no	no	no	no	no	no	no	yes	no	non-1RS	no	no	no	no	no	no	5+10	Ax2*
SEOU-1040-10 Yes no no Yes no no no no no no no n	SE-MO98-274-8	yes	no	no	no	no	no	no .	no	no	no	по	no	non-1RS	no	no	no	no	no	no	5+10	Ax2*
SEOR-10303-35 no yes no no no no no no no n		yes	no	по	no	no	het?	no	no	no	no	het	no			no	no	no		no		
SECO-10286-7 no no no yes no no no no no no no n		yes	no	no	yes	no	no	no		no	no	no	no		no	no	no	no	yes	no		
MISC-HDS-148 Yes no no pes no																						
M08*8005# Yes no no no no no no no n																						
MH07-7474 yes						1						ı							1			
IL06-13072 yes																						
ILD6-13708 yes no no no no no no no n																						
LI.08-13721 yes no no no no no no no n																			1			
1.108-25634 Yes no het het no 7 no no no no no no						1 1						ı										
LIGB-27968 Yes Unknown no no no no no no no																						Ax1 or null
LL08-14225 yes no no no no no no no n		(330) (310) (40) (40) (30) (30)								-			4 '						1			
KY03C-1237-22 yes no no yes no no no no no no no n			no	no	no	no		no	?	no		no	no	non-1RS	no	no		no	no	no	5+10	Ax2*
KY01C-1970-02 no	KY02C-3007-55	yes	no	ло	yes	yes	no	no	no	no	no	no	no	1RS:1BL	no	no	no	no	yes	по	5+10	Ax2*
KY01C-1531-17 No	KY03C-1237-23	yes	no	no	yes	het	no	no	по	no	no	по	no	non-1RS	no	no	no	no	no	no	5+10	
KY03C-1092-13 no yes no yes no no no no no no no n		no	no	no	yes	no	no	no	no	no	no	het	no		no	no	no	no	no	no	2+12	
KY03C-1092-13 no yes no no no no no no no n		no	yes	no	yes	no		no	no	no	no	no	no		по	no	no	no	no	no	1	
MO070933 yés no							F												1			
MO080103 no no no no ves no				_																		
MO080373 yes no					percentage of the second second second								1					į.				
MO081378 yes no					PC19.70 P000000000000							•	1					l .				
MO081772 Net no no no het no no no no no no no n					1 1													1				
MO0817777 no																						
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\text{VA08W4-630} \text{ no }																						
\[\subsection{VA08W-653} \] no \[\subsection{yes} \] no \[\no \no \] no \[\no \no \no \no \] no \[\no \no \no \no					1 1		1						3 :									
VA07W-600 no ves no																			1			
VA07W-607 het het no													1						1			Ax1 or null
													L						+			
1 VAUGUV-14UI NO 1:00-14G NOS COMENTA NO I NO	VA08W-740	no	ves	no	no	no	no	no	по	no	no	no	yes	1RS:1AL	no	no	по	no	no	no	het	het

Table 33. Quality data for entries in the 2009-2010 NUWWSN. Grain was from Lafayette IN provided by Herb Ohm. Data from the USDA Soft Wheat Quality Lab, Wooster OH.

	Modified		Modified		Modified			Whole				As Is		Estimated
	Milling		Baking		Softness		Test	Grain	Flour	Flour	Softness	Lactic		Cookie
	Quality		Quality		Equivalent		Weight	Protein	Protein	Yield	Equivalent		Sucrose	Diameter
ENTRY	Score		Score		Score		(LB/BU)	(%)	(%)	(%)	(%)		SRC (%)	(cm)
ERNIE	67.0	C	68.4	C	63.1	С	55.1	11.2	8.4	68.8	59.2	89.7	86.5	18.2
TRUMAN	63.6	С	62.3	С	68.1	С	57.1	9.9	7.6	68.0	61.6	79.3	92.2	18.0
FREEDOM PIONEER-2545	62.1 58.7	С D	70.5 65.5	B C	60.3 63.6	С	53.9 51.9	10.8 10.4	8.1 8.8	67.6 66.9	57.9 59.5	77.9 72.9	85.2 87.3	18.2 18.2
NY99045-3110	67.5	C	80.9	$\frac{c}{A}$	70.9	В	55.9	10.4	7.7	68.9	62.9	76.9	83.8	18.5
OH07-176-56	73.0	В	90.8	A	65.0	C	55.0	10.1	8.0	70.1	60.1	71.0	77.0	18.8
NY94052-9340	60.9	C	73.4	В	70.0	В	57.4	11.0	8.5	67.4	62.5	87.4	85.6	18.4
NY99068-3251	57.7	D	76.7	В	65.0	Ċ	58.5	10.2	7.9	66.6	60.1	80.9	83.9	18.4
NY88046-7088	68.0	С	72.3	В	68.2	С	56.3	10.3	8.2	69.0	61.6	81.4	86.4	18.3
E5011B	77.6	В	85.6	Α	73.8	В	55.0	9.2	7.0	71.2	64.4	74.4	83.6	18.6
E5024	66.5	С	76.1	В	62.1	С	54.9	9.9	7.7	68.7	58.7	73.2	83.8	18.3
E3024	78.2	В	96.4	Α	73.5	В	55.7	8.9	6.9	71.3	64.2	78.2	78.5	18.9
E6012	67.9	С	73.8	В	78.9	В	51.8	9.3	7.4	69.0	66.8	80.8	89.8	18.4
E8052	69.7 66.7	Ċ	67.8	Ċ	72.0 68.6	B C	52.7 51.7	10.1 10.0	8.0	69.4 68.7	63.5	93.4 99.1	89.7 90.8	18.2 18.1
OH04-264-58 OH05-101-1	60.8	ОО	64.9 49.2	С Е	72.8	В	51.7 51.8	10.0	7.8 7.7	67.3	61.9 63.8	99.1	99.5	17.7
OH05-164-76	54.7	D	69.9	C	65.5	C	54.2	10.2	7.8	65.9	60.3	84.0	87.5	18.2
OH05-200-74	64.2	C	74.2	В	70.6	В	54.9	9.6	7.5	68.1	62.8	89.2	87.4	18.3
99691A2-5-4-16-1	60.4	Ċ	49.3	E	70.2	В	53.2	10.8	8.4	67.2	62.6	88.8	97.4	17.8
01946A1-16-48-5	63.1	С	61.4	С	62.1	С	55.3	10.7	8.5	67.9	58.7	69.6	89.3	18.0
057RA1-8-5	65.7	С	54.9	D	71.9	В	52.2	10.0	7.9	68.5	63.4	93.4	96.2	17.9
059A1-2-4-3	60.6	С	76.7	В	63.9	С	53.0	10.7	8.5	67.3	59.6	64.5	82.5	18.4
TABOO	62.9	С	78.0	В	64.1	C	53.7	9.7	7.7	67.8	59.7	69.1	83.4	18.4
MONDO	59.7	D	53.2	D	64.8	С	54.5	10.6	8.6	67.1	60.0	76.2	93.9	17.9
PROBE	73.4	В	67.3	C	74.5 82.9	В	52.5 53.8	10.1 9.4	7.9	70.2 68.2	64.6 68.7	99.5 87.3	90.8 87.2	18.2 18.6
RUMOR 03M1539#019	64.7 62.5	C	80.4 71.3	A B	78.8	A B	54.1	10.0	7.7 7.4	67.7	66.7	78.7	91.1	18.3
03M1539#031	71.4	В	81.2	A	83.8	А	51.6	9.6	7.4	69.8	69.1	97.5	87.5	18.6
W1104	60.8	С	86.3	A	64.2	C	53.9	9.4	7.3	67.3	59.7	70.8	80.2	18.6
ML06-2097	63.0	С	75.7	В	65.1	Č	54.1	9.5	7.4	67.8	60.2	68.4	85.3	18.3
GS-0-EM0681	74.8	В	44.5	Ε	28.3	F	57.4	11.9	10.8	70.6	42.5	111.4	84.4	17.5
GS-0-EM0614	58.8	D	42.5	Ε	27.5	F	58.0	10.5	8.7	66.9	42.1	73.1	89.1	17.3
GS-1-EM0362	73.1	В	56.5	D	33.9	F	57.0	10.7	8.7	70.2	45.2	82.2	84.1	17.7
ACF213003B	66.9	С	69.3	C	63.2	С	56.1	10.5	8.0	68.7	59.3	72.6	86.9	18.2
ACF126103	66.5	C	64.5	<u>C</u>	67.4 60.5	<u>C</u>	54.9 56.7	9.9 10.1	7.9 8.1	68.6 67.9	61.2 58.0	69.2 81.1	90.4 93.9	18.1 17.8
IL02-18228 IL04-24668	63.1 68.9	C	52.7 66.3	С	71.4	В	55.8	10.1	7.8	69.2	63.2	87.5	90.7	18.2
IL06-7550	75.7	В	93.7	Α	82.5	A	54.3	8.9	6.9	70.7	68.5	77.6	82.1	18.9
IL06-14262	68.7	C	88.8	Α	77.9	В	55.2	9.2	7.1	69.2	66.3	90.8	82.8	18.7
KY02C-3006-46	60.5	С	67.2	С	63.6	С	56.0	9.8	7.8	67.3	59.4	75.5	88.3	18.1
KY02C-3004-2	60.5	С	54.0	D	61.8	С	58.8	9.7	7.4	67.3	58.6	77.2	94.9	17.7
KY04C-2151	42.6	Ε	46.4	Ε	58.1	D	59.2	10.4	8.7	63.2	56.8	77.1	95.2	17.6
KY03C-1192-34	67.2	С	70.9	В	65.1	С	55.8	9.8	7.6	68.8	60.2	84.4	87.2	18.2
KY02C-3008-01	51.9	D	43.9	E	65.0	C	55.7	9.9	7.8	65.3	60.1	76.0	99.8	17.6
MD03W91-09-8	64.9 53.3	C D	50.3 36.8	D F	64.4 59.6	C D	58.5 56.8	10.4 11.3	8.6 9.2	68.3 65.6	59.8 57.5	87.8 87.5	95.2 99.3	17.8 17.5
MD03W61-09-1 MD02W135-08-9	53.3 50.8	D	54.4	D	72.9	В	56.9	9.3	7.3	65.0	63.9	76.4	97.9	17.8
MO071522	67.2	C	79.2	В	75.1	В	56.8	10.1	7.8	68.8	64.9	92.4	85.4	18.5
MO080104	53.3	D	52.3	D	69.5	Č	55.7	9.8	7.6	65.6	62.3	93.4	97.3	17.8
MO080864	62.2	С	81.1	Α	69.9	С	57.9	8.7	6.7	67.7	62.5	73.0	85.2	18.4
MO081652	50.9	D	47.8	E	69.3	С	55.9	9.6	7.4	65.1	62.2	91.4	99.8	17.6
WESLEY	69.4	С	49.6	E	32.6	F	53.0	10.8	9.5	69.3	44.6	92.4	85.6	17.6
WESLEYFHB1	64.6	C	59.8	D	40.7	E	55.6	10.0	7.7	68.2	48.5	81.6	86.1	17.7
NE06607 NE06469	77.0	В	65.7 59.2	С	47.7 41.5	E	54.0 53.8	9.1 10.0	7.2 8.0	71.0 69.6	51.8 48.9	81.9 85.8	86.1 86.1	17.9 17.7
NE06469 NW07505	70.8 65.1	B C	59.2 60.7	D	37.5	F	53.8 51.9	9.2	6.7	68.3	46.9 46.9	72.8	86.8	17.7
VA06W-612	59.7	D	67.1	c	65.8	C	55.3	9.9	7.8	67.1	60.5	103.0	88.9	18.1
VA00V-012 VA07W-594	60.3	C	62.9	C	69.3	Č	55.1	10.2	8.1	67.1	62.2	97.7	91.3	18.1
VA07W-601	62.4	Č	55.6	D	60.4	č	61.1	10.8	8.6	67.7	57.9	94.4	91.5	17.9
AVERAGE	64.1		66.1		64.1		55.2	10.0	7.9	68.1	59.7	83.1	88.7	18.1
MINIMUM	42.6		36.8		27.5		51.6	8.7	6.7	63.2	42.1	64.5	77.0	17.3
MAXIMUM	78.2		96.4		83.8		61.1	11.9	10.8	71.3	69.1	111.4	99.8	18.9

Table 34. Summary of regression of the BLUP of standardized trait data (Y') from two-year rolling means onto time period for the 1998-2010 P+NUWWSN entries.

	ALL 12	PERIODS	LAST	NINE	PERIODS	
	R2	PROB	R2	PROB	INTERCEPT	SLOPE
INC	0.03	0.58	0.03	0.66	0.18	-0.01
SEV	0.34	0.05	0.58	0.02	0.72	-0.08
IND	0.34	0.05	0.86	0.00	0.71	-0.09
FDK	0.24	0.10	0.02	0.70	0.23	-0.02
ISK	0.02	0.69	0.23	0.19	0.48	-0.49
DON	0.00	0.98	0.47	0.04	0.28	-0.03
GHSEV	0.02	0.70	0.21	0.22	0.18	-0.13