Project Title: Management of Sweet Corn Root and Crown Rot in the Pacific Northwest

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Background: Leaf-firing and an associated yield reduction has been observed on sweet corn plantings in the Willamette Valley. Sweet corn fields have been affected throughout the Pacific Northwest since the syndrome was first observed in the Willamette Valley in the early 1990's. Symptoms were originally observed on the widely-planted cultivar 'Golden Jubilee' but have since been observed on other cultivars. Root rot can be prevalent in symptomatic fields but in some affected fields crown rot is the primary symptom. Fungal complexes have been recovered from affected field samples, primarily *Fusarium* species and *Pythium* species. My lab has found a preponderance of *Fusarium* species in tissues sampled from sweet corn plants with root rot and/or crown rot as well as from necrotic stalk node tissue samples. Our observations are based on sampling 10 to 30 plants per field as follows:

- Root and crown rot ratings in 1999-2003 seasons; isolations made during 1999 (7 fields) and 2000 (6 fields)
- Mesocotyl rot ratings in 1999-2003 seasons; isolations made during 2000 (6 fields), 2001 (8 fields), and 2004 (15 fields).
- Stalk node necrosis ratings in 1999-2003 seasons; isolations made from node tissues with discoloration in stalks during 2001 (8 fields), 2003 (10 fields), and 2004 (15 fields).
- Crown ratings in 2002-2004 season; isolations made from node tissues with discoloration in stalks during 2002 (8 fields), 2003 (10 fields), and 2004 (15 fields).

We continued investigations into the pathogenicity of *Fusarium* species in 2004 field, lab, and greenhouses studies. This work included evaluations of root rot (both primary and adventitious roots), crown rot, stalk node necrosis, and ear yield. We have evidence that there is a relationship between necrosis of the nodes and crown, ear weight, and flow of fluid through the stalk. Plants with darker nodes have lower yields and reduced fluid flow through the stalk. This trend has been found with plants collected from growers' fields during 2002, 2003, and 2004. Perhaps a fungal toxin causes necrosis at the nodes, followed by colonization of the nodes by the *Fusarium* species or perhaps the pathogens colonize nodes prior to the development of necrosis. *Fusarium* species have been isolated from symptomatic stalk tissues from plants in growers' fields during past field seasons. Our pathogenicity experiments that suggest *Fusarium* spp. have a negative impact on plant health and yield but other factors are probably involved as well. There is also evidence to suggest that the Western Spotted Cucumber Beetle preferentially feeds on *Fusarium*-infected plants and possibly vectors *Fusarium* spp. to non-infected plants.

Management of the pathogen factors that contribute to the sweet corn yield decline have been the major focus of my lab group efforts since 2000. We found root rot and crown rot to be generally decreased by soil fumigation in 2002 field experiments. Strip applications of fumigant granules (vapam) are promising for disease management. Rot of the primary root, adventitious root system, and the crown were significantly less severe in the vapam strip fumigation treatment than in the nonfumigated soil. Grower harvest showed approximately a 2 ton/acre increase in ear weight on plants grown in vapam fumigation strip, however the strip was not replicated and only sub-sampling could be done. Studies were conducted in grower fields and at the Botany and Plant Pathology Field Lab in 2002 with MC33 and vapam in tarped fumigation plots. These studies showed similar decrease in rot of the primary root and mesocotyl when plants were grown in soil after fumigation with either material. Fumigation treatments also resulted in lower rot severity of adventitious roots. The high cost of fumigation may preclude its use as a standard response to this problem. Only a large increase in ear yield, or a reduction in other inputs, would make fumigation a reasonable option.

Disease management through the application of materials such as fungicides, biocontrol agents, or other materials has been investigated by my lab group. Evaluation of labeled fungicides or experimental chemistries as seed treatments have not shown significant reduction in rot severity ratings but this is not surprising as fungicide seed treatments protect plants as germlings from seed rot, damping-off, and seedling blight, but not from later season root rot. The CMO-mix1 and T-22 both had significantly less rot in the adventitious root system than the conventional seed treatments, Maxim/Apron and Captan/Thiram. Companion, another biological control product, was associated with a reduced crown rot incidence while the crown rot incidence in the Maxim/Apron treatment was the highest. Mixtures of biopesticides with conventional fungicides were investigated during 2004 for control of crown rot and no treatment combination appeared to reduce crown rot incidence. The combination of the experimental CMO-mix 1 with Maxim/Apron resulted in greater ear numbers and better tip fill, suggesting that plants from seeds receiving this treatment combination had a delay in disease onset or host reaction of the pathogens (host tolerance).

Host tolerance is another management tactic that shows promise for sweet corn root and crown rot and associated yield decline. However, the development of tolerance to root and crown rot requires a long term investment and a better understanding of the causal organisms for successful screenings. Collaborative studies during 2002 and 2003 showed some promise for the varieties HMX7384 and Prelude but wider replication of large field screenings during 2004 showed Prelude to have lower yields, though rot of crowns and stalk nodes appeared to be low. Some varieties appeared to yield well with little rot development in 2004 and included GH2298, Punch, and HMX7384. However, adventitious root rot was relatively less severe during 2004 and yields may vary depending on environmental parameters. Primary root rot and crown rot were variable among grower sites and sweet corn varieties. Discolored crowns and crown rot were relatively high in lowest yielding variety (WSS3681). A multivariate analyses of the 29 field plots from 2004 indicate that site has a strong association on the development of root and crown rot and that these two diseases, root rot and crown rot, develop without necessarily associating with the other, that they may be separate disease syndromes.

Objectives for 2005 and Accomplishments:

Objective 1: Evaluation commercial sweet corn varieties in small plots for susceptibility to seed rot/damping-off as well as crown rot.

An experimental field site study on the Botany Farm that we've used for evaluation of microbial and chemical seed treatments was continued during 2005 for varietal screenings. This experimental corn plot was originally infested with pathogens via corn crowns, roots, and lower stalk portions from severely affected plants collected from a grower's field during 2000. This field was also infested in spring 2002, 2003, 2004, and 2005 with a complex of *Fusarium* species by field application of colonized cornmeal-sand and oat kernel inoculum in the furrows during planting. Since 2001, we have used this experimental plot for sweet corn disease studies. Root and crown rot were evident in "mature" plants each year of our study and seed rot/damping-off was prominent during 2003. Sweet corn varieties evaluated during the 2005 growing season are listed in Table 1.

Table 1. Sweet corn varieties or germplasm evaluated on the OSU-Botany Farm in 2005

Trt #	Variety or Germplasm	Year+1 of seed lot	Source
1	UT2503 (NZ sweet corn breeding line)	2004	National Frozen Foods
2	GH2684	2003	Syngenta
3	H8431 (dent corn)	2003	Syngenta
4	Prelude (NZ sweet corn variety)	2003	National Frozen Foods
5	Inbred Code 1	2005	Syngenta
6	Inbred Code 2	2005	Syngenta
7	Inbred Code 3	2005	Syngenta
8	Inbred Code 4	2005	Syngenta
9	Inbred Code 5	2005	Syngenta
10	Inbred Code 6	2005	Syngenta
11	Inbred Code 7	2005	Syngenta
12	G. Jubilee	2004	Syngenta
13	G. Jubilee	2005	Syngenta
14	GH-1861	2005	Syngenta
15	GH-2669	2005	Syngenta
16	Punch	2005	Crites-Moscow Growers, Inc.
17	Columbus	2005	Crites-Moscow Growers, Inc.
18	UY0712OJ	2005	Crites-Moscow Growers, Inc.

Each treatment was replicated in six 40-foot long rows. Plants were irrigated weekly with 1.5” of water. Stand counts were made 2, 3, and 4 weeks after sowing. A plot code was used so that treatments not known while evaluations of stand as well as root, crown, and stalk node rot were made. Plants were evaluated two times, pre- and post-silking by digging up 15 plants from each plot, washing soil from the root balls of each plant, and rating for the disease severity – all in the same day. It is important to not store unwashed plants because root rot will develop or increase during storage. Plants sampled at the pre-silking stage were at the 6 to 7-leaf stage. Plants sampled post-silking were dug 55 days after sowing, for evaluation of rot of roots, crown, and stalk nodes. Plants were examined late season for stalk rot as well. The root, crown, and stalk rating scheme used was as follows:

Primary root rating	**1** = < 25 % of primary root is necrotic
	2 = 26 - 50 % of primary root is necrotic
	3 = 51 - 75 % of primary root is necrotic
	4 = >75 % of primary root is necrotic
Mesocotyl rating	**1** = < 25 % of mesocotyl is necrotic
	2 = 26-50 % of mesocotyl is necrotic
	3 = 51-75 % of mesocotyl is necrotic
	4 >75 % of mesocotyl is necrotic
Adventitious root rating	**1** = < 25 % of adventitious (brace) roots have necrosis
	2 = 26 - 50 % of adventitious roots have necrosis
	3 = 51 - 75 % of adventitious roots have necrosis
	4 = >75 % of adventitious roots have necrosis
Nodal rating	**0** = no discoloration of stalk nodes above crown
	1 = node 1 above crown is dark brown
	2 = node 2 above crown is dark brown
	3 = node 3 above crown is dark brown, etc.
Crown rot rating	**0** = no discoloration of crown area (creamy-colored) or tan-light brown crown area (normal)
	1 = crown rot
	b = crown discoloration (suspected as early stage of crown rot)
Root worm feeding	**0** = no root worm feeding is evident
	1 = root worm feeding is evident
	2 = < 75 % of adventitious roots at a single whorl have root worm feeding
	3 = ≥ 75 % of adventitious roots at a single whorl or ≥ 50 % of adventitious roots at two whorls have root worm feeding

Rot of the primary root was severe, greater than a rating of 3, in most varieties in the pre-silking sample except for Prelude, inbred 1, and the dent corn, H8431 (Table 2). In these latter three corn lines, the primary root rot was still only slightly less than 3. Only the dent corn primary root rot rating was still below 3 at the post-silking stage, significantly less than the other lines evaluated. Rot of the adventitious roots was very slight in the pre-silking samples while at post-silking, adventitious root rot was more severe, only Columbus, H8431, Prelude, and UY0712OJ continued to have relatively healthy adventitious root systems with ≤ 50 % of the roots rotted. All corn lines had generally healthy mesocotyls at the pre-silking stage but mesocotyl rot of inbred 3 and 7 were relatively more severe than most of the other corn lines. In the post-silking samples, the dent corn line (H8431) and UY0712OJ still had relatively healthy mesocotyls, better than most other corn lines evaluated.

Crown rot was evident in some lines by the 6 to 7-leaf stage (pre-silking samples) and GH 2684 and inbred 5 had the greatest incidence at this sampling time (Table 3). When the plants were sampled post-silking, these two lines, along with most of the inbred lines evaluated had a greater than 90 % incidence of crown rot. Prelude, Punch, UY0712OJ, and the dent corn line (H8431) had a lower incidence of crown rot by the post-sampling sample time while Columbus, GH1861, GH2669, and UT2503 had a moderate incidence of crown rot compared to the other more-susceptible corn lines evaluated. The measurement of non-healthy crowns included plants with crown rot and the additional plants with strongly discolored crowns. Prelude, Punch, and the dent corn line (H8431) had a lower incidence of non-healthy crowns by the post-sampling sample time compared to the other corn lines evaluated. The number of stalk nodes with discoloration was relatively few by the post-silking sample time and a number of lines averaged less than one stalk node above the crown with discoloration.

Late season stalk rot (well past the time of harvest for processing) was prevalent in a few of the corn lines evaluated, including GH2684, UT2503, the dent corn line H8431, and several of the inbred lines (Table 4). Root feeding by the Western Spotted Cucumber Beetle (*Diabrotica undecimpunctata undecimpunctata*) was fairly severe in some corn lines evaluated, especially the majority of the inbred lines evaluated. At least 75 % of the adventitious roots at a single whorl of GH1861, and GH2669 exhibited root worm feeding or tunneling injury.

Objective #1 summary: Some of the corn lines appear to have resistance to the rot pathogens present in the OSU-BPP field site. Columbus, Prelude, Punch, and UY0712OJ appear vigorous with lower disease level of the crown and adventitious root system in our field trial. GH1861 and GH 2669 appeared to have disease severity and incidence levels in-between these more resistant varieties and the highly susceptible corn lines. Because Prelude has had more crown rot problems in some grower fields, the question remains of how weather, soil type and properties, and/or cultural practices may influence development of crown and root rot diseases of sweet corn. The inbred screenings showed that some inbred lines have greater tolerance to crown rot and/or root rot.

Table 2. Results of 2005 root and mesocotyl disease evaluations of corn germplasm evaluated on the OSU-Botany Farm

		Mean primary root rot rating*				**Mean mesocotyl rot rating***				**Mean adventitious root rot rating***			
Cultivar	**Year**	**Pre-silking**		**Post-silking**		**Pre-silking**		**Post-silking**		**Pre-silking**		**Post-silking**	
Columbus	2005	3.15	BCDEF	3.93	A	1.10	C	2.82	DE	1.00	C	1.77	H
G. Jubilee	2004	3.62	ABC	3.93	A	1.21	BC	3.68	ABC	1.00	C	2.38	EFG
G. Jubilee	2005	3.56	ABCD	3.86	A	1.17	C	3.07	CDE	1.04	C	2.58	BCDEF
GH1861	2005	3.41	ABCDE	3.93	A	1.11	C	3.22	BCD	1.07	BC	2.39	DEFG
GH2669	2005	3.76	AB	3.97	A	1.11	C	2.75	DE	1.00	C	2.23	EFG
GH2684	2003	3.64	ABC	3.93	A	1.16	C	3.62	ABC	1.04	C	2.60	BCDEF
H8431	2003	2.64	F	2.36	B	1.19	C	1.62	G	1.00	C	1.00	I
Inbred Code 1	2005	2.79	EF	3.84	A	1.07	C	3.41	ABCD	1.02	C	2.96	AB
Inbred Code 2	2005	3.71	AB	3.97	A	1.12	C	3.88	AB	1.20	AB	2.80	ABC
Inbred Code 3	2005	3.78	AB	3.97	A	1.76	A	3.14	BCDE	1.24	A	2.78	ABCD
Inbred Code 4	2005	3.58	ABCD	3.83	A	1.10	C	2.83	DE	1.07	BC	2.53	CDEF
Inbred Code 5	2005	3.56	ABCD	3.97	A	1.14	C	4.00	A	1.02	C	3.04	A
Inbred Code 6	2005	3.93	A	4.00	A	1.12	C	3.31	ABCD	1.00	C	2.84	ABC
Inbred Code 7	2005	3.71	AB	3.84	A	1.67	AB	3.26	ABCD	1.09	BC	2.22	FG
Prelude	2003	2.97	DEF	3.58	A	1.07	C	2.43	EF	1.00	C	1.82	H
Punch	2005	3.07	CDEF	3.91	A	1.17	C	3.21	BCD	1.09	BC	2.02	GH
UT2503	2004	3.63	ABC	3.95	A	1.10	C	3.05	CDE	1.00	C	2.62	BCDE
UY0712OJ	2005	3.84	A	3.60	A	1.07	C	1.97	FG	1.05	C	1.23	I

* Means are based on the rot ratings of 15 plants per plot, replicated three times, for a total of 45 plants per treatment on each sampling date. Column numbers followed by the same letter are not significantly different at *P*=0.05 as determined by Tukey's multiple range test.

Table 3. Results of 2005 crown and stalk disease evaluations of corn germplasm evaluated on the OSU-Botany Farm

		Incidence of Crown Rot*				Incidence of nonhealthy crowns*				Mean stalk node # discolored*	
Cultivar	Year	Pre-silking		Post-silking		Pre-silking		Post-silking		Post-silking	
Columbus	2005	0.00	F	43.18	CDE	7.14	D	79.55	ABC	0.80	EF
G. Jubilee	2004	53.33	B	60.00	BC	91.11	A	100.00	A	1.24	CD
G. Jubilee	2005	24.44	CDE	75.56	AB	86.67	A	97.78	A	1.69	AB
GH1861	2005	6.67	EF	47.73	CD	28.89	B	100.00	A	1.00	DE
GH2669	2005	0.00	F	51.16	CD	26.67	BC	74.42	BCD	0.49	FGH
GH2684	2003	91.11	A	91.11	A	100.00	A	100.00	A	1.76	AB
H8431	2003	26.67	CDE	29.55	DEF	33.33	B	45.46	F	0.50	FG
Inbred Code 1	2005	0.00	F	95.56	A	9.09	CD	100.00	A	1.87	A
Inbred Code 2	2005	70.46	B	97.78	A	100.00	A	100.00	A	1.53	ABC
Inbred Code 3	2005	31.11	C	91.11	A	97.78	A	100.00	A	1.49	ABC
Inbred Code 4	2005	27.27	CD	91.11	A	97.73	A	100.00	A	1.82	A
Inbred Code 5	2005	72.73	AB	86.67	A	100.00	A	100.00	A	1.42	BC
Inbred Code 6	2005	0.00	F	37.78	CDEF	2.22	D	55.56	EDF	0.07	I
Inbred Code 7	2005	9.09	DEF	82.22	AB	84.09	A	100.00	A	1.76	AB
Prelude	2003	2.33	F	20.00	F	4.65	D	24.44	G	0.11	HI
Punch	2005	0.00	F	24.44	EF	31.11	B	53.33	EF	0.13	GHI
UT2503	2004	2.27	F	48.89	CD	29.55	B	91.11	AB	0.62	EF
UY0712OJ	2005	0.00	F	31.82	DEF	30.23	B	68.18	CDE	0.59	F

* Means are based on the rot ratings of 15 plants per plot, replicated three times, for a total of 45 plants per treatment on each sampling date. Column numbers followed by the same letter are not significantly different at *P*=0.05 as determined by Tukey's multiple range test.

Table 4. Results of 2005 stalk rot and root worm injury evaluations of corn germplasm evaluated on the OSU-Botany Farm

		Internode # with stalk rot*		**Mean rootworm injury***			
Cultivar	**Year**	**Post-silking**		**Pre-silking**		**Post-silking**	
Columbus	2005	0.60	CDE	1.43	B	1.82	CDE
G. Jubilee	2004	0.30	DE	0.93	F	1.78	DE
G. Jubilee	2005	0.60	CDE	1.02	DEF	1.42	FG
GH1861	2005	0.60	CDE	1.00	EF	2.00	CDE
GH2669	2005	0.00	E	1.00	EF	2.07	BCD
GH2684	2003	2.70	A	1.07	DEF	1.71	EF
H8431	2003	2.40	AB	1.02	DEF	1.02	H
Inbred Code 1	2005	0.90	BCDE	1.68	A	2.64	A
Inbred Code 2	2005	0.00	E	1.00	EF	2.04	CD
Inbred Code 3	2005	2.10	ABC	1.13	CDE	2.53	A
Inbred Code 4	2005	1.80	ABCD	1.07	DEF	2.38	AB
Inbred Code 5	2005	2.70	A	1.00	EF	2.11	BC
Inbred Code 6	2005	1.20	ABCDE	1.00	EF	2.49	A
Inbred Code 7	2005	0.90	BCDE	1.18	CD	1.71	EF
Prelude	2003	0.60	CDE	1.02	DEF	1.44	FG
Punch	2005	0.00	E	1.11	DE	1.42	FG
UT2503	2004	2.10	ABC	1.02	DEF	1.42	FG
UY0712OJ	2005	0.00	E	1.30	BC	1.16	GH

* Means are based on the rot ratings of 15 plants per plot, replicated three times, for a total of 45 plants per treatment on each sampling date. Column numbers followed by the same letter are not significantly different at *P*=0.05 as determined by Tukey's multiple range test.

Objective 2: Evaluation of tolerance of commercial varieties to root and crown rot in split field studies on-farm.

In collaboration with National Frozen Foods and cooperating growers, sweet corn varieties planted on-farm in small plots and were evaluated pre-silking and post-silking for root, mesocotyl, and crown rot as well as stalk node necrosis. When each field-variety combination was sampled, 40 plants were dug from each plot in four transects, bagged, and brought to the OSU Botany Farm where soil was washed from the root balls of each plant. A code was used so that the variety and site not known during rot evaluation. Plants were rated by C. Ocamb for the disease severity the same day plants were removed from the field. During the post-silking sampling, crown cross sections were also scanned for analyses later. Ear harvest was not done.

Symptomatic crown and lower stalk node tissues were sampled for fungal presence. Five plants from each variety evaluated were saved by placing both halves of root ball and stalk section (after longitudinal cut for crown/stalk evaluation) in a plastic bag, and then in a cooler. Samples for fungal isolations were brought to the laboratory and were stored at 5 C until isolations were made.

Pre-silking plants were approximately at the 6-leaf stage and these samples as well as post-silking samples generally had little rot on the primary root, except for site F3, were considerably more rot (averaged > 3) was detected (Table 5). Mesocotyls were generally healthy at the pre-silking and post-silking sample times except for the plants at site F3 where most varieties averaged greater than 3 by post-silking sample time. Rot of the adventitious roots was generally low and significant differences were detected only at site F3 where only one variety (CSHYP2-57) was > than 2.

Crown rot was present at all three sites but not evident on all varieties at each site (Table 6). At site F1, Enterprise had the highest incidence of crown rot both pre- and post-silking. At the second and third sites, F2 and F3, GSS2914 and Suregold had the highest incidence of crown rot both pre- and post-silking. Mean stalk node number above the crown with discoloration was relatively low, similar to levels found on the OSU-BPP farm site. Root injury by root worm feeding was low, all varieties at all sites averaged less than a rating of 2 (data not presented).

Isolations from symptomatic tissues yielded predominately *Fusarium* species, including on medium nonselective for *Fusarium*. Digital analyses of the crown images are under way but not near completion at the time of writing this report. Halves of samples will be sent on to collaborators for testing for *Fusarium*-produced mycotoxins.

Objective #2 summary: Most of the varieties screened appear to have resistance to crown rot, with the exception of Enterprise, GSS2914, and Suregold. The varieties of interest to the industry should be planted out on split field trials during 2006 in order to determine yield and performance across a wider range of conditions.

Objective 3: Cooperate with other sweet corn projects (breeding lines, cover-cropping, co-sampling firing fields, irrigation effects, etc.) within and outside of OSU.

I rated corn plants for rot in field studies conducted by Drs. Ed Peachy and Jim Myers and collaborated with private breeders in evaluating inbred germplasm.

Table 5. Results of 2005 root and mesocotyl disease evaluations of corn varieties evaluations on-farm

		Mean primary root rot rating*				**Mean mesocotyl rot rating***				**Mean adventitious root rot rating***			
Farm	**Cultivar**	**Pre-silking**		**Post-silking**		**Pre-silking**		**Post-silking**		**Pre-silking**		**Post-silking**	
F1	CSEYP1-3	1.03	B	1.34	B	1.09	B	1.38	A	1.00	A	1.08	A
	CSUYP2-28	1.18	B	1.41	B	1.11	AB	1.32	A	1.00	A	1.00	A
	Enterprise	1.05	B	1.55	B	1.05	B	1.53	A	1.00	A	1.00	A
	GH2669	1.95	A	2.71	A	1.41	A	1.33	A	1.00	A	1.05	A
	Punch	1.00	B	1.62	B	1.03	B	1.63	A	1.00	A	1.00	A
	OJ712UYO	1.05	B	1.84	B	1.00	B	1.63	A	1.00	A	1.00	A
F2	ACR1262Y	1.00	A	1.23	A	1.00	A	1.35	A	1.00	A	1.00	A
	ACX1138Y	1.00	A	1.04	A	1.08	A	1.15	A	1.00	A	1.00	A
	COLUMBUS	1.00	A	1.19	A	1.00	A	1.00	A	1.00	A	1.03	A
	CSHYP2-57	1.00	A	1.00	A	1.00	A	1.08	A	1.00	A	1.00	A
	CSHYP3-99	1.03	A	1.00	A	1.03	A	1.17	A	1.00	A	1.00	A
	GSS2914	1.00	A	1.06	A	1.00	A	1.20	A	1.00	A	1.00	A
	GSS8357	1.00	A	1.03	A	1.00	A	1.30	A	1.00	A	1.03	A
	SUREGOLD	1.05	A	1.00	A	1.00	A	1.14	A	1.00	A	1.03	A
F3	ACR1262Y	3.19	B	4.00	A	1.23	ABC	3.18	AB	1.00	A	1.48	C
	ACX1138Y	3.31	B	4.00	A	1.28	ABC	3.58	AB	1.00	A	1.30	CD
	BASIN	3.71	AB	3.97	A	1.25	ABC	2.33	C	1.00	A	1.10	D
	COLUMBUS	3.93	A	4.00	A	1.55	A	3.64	AB	1.00	A	1.40	CD
	CSHYP2-57	3.61	AB	4.00	A	1.29	ABC	3.37	AB	1.00	A	2.10	A
	CSHYP3-99	3.36	B	4.00	A	1.03	C	2.92	BC	1.00	A	1.38	CD
	GSS2914	3.55	AB	4.00	A	1.08	BC	3.28	AB	1.00	A	1.25	CD
	GSS8357	3.97	A	4.00	A	1.08	BC	3.31	AB	1.00	A	1.85	AB
	SUREGOLD	3.62	AB	4.00	A	1.54	AB	3.84	A	1.00	A	1.55	BC

* Means are based on the rot ratings of 40 plants per treatment on each sampling date. Column numbers **for each site** followed by the same letter are not significantly different at *P*=0.05 as determined by Tukey's multiple range test.

Table 6. Results of 2005 crown and stalk disease evaluations of corn varieties evaluations on-farm

		Incidence of Crown Rot				Incidence of nonhealthy crowns				Mean stalk node # discolored			
Farm	**Cultivar**	**Pre-silking**		**Post-silking**		**Pre-silking**		**Post-silking**		**Pre-silking**		**Post-silking**	
F1	CSEYP1-3	2.70	B	7.50	C	21.62	B	42.50	B	0.22	BC	0.00	C
	CSUYP2-28	0.00	B	0.00	C	7.50	B	22.50	B	0.13	C	0.18	C
	Enterprise	32.50	A	97.50	A	100.00	A	100.00	A	1.15	A	1.28	A
	GH2669	0.00	B	15.00	C	17.50	B	97.50	A	1.13	A	0.95	B
	Punch	0.00	B	10.00	C	12.50	B	90.00	A	0.05	C	0.18	C
	OJ712UYO	12.50	B	57.50	B	27.50	B	95.00	A	0.43	B	0.88	B
F2	ACR1262Y	0.00	C	15.00	CD	17.50	B	65.00	BCD	0.00	A	0.78	BC
	ACX1138Y	10.00	BC	10.00	CD	30.00	B	57.50	BCD	0.03	A	0.45	CD
	COLUMBUS	0.00	C	2.50	D	17.50	B	60.00	BCD	0.00	A	0.45	CD
	CSHYP2-57	0.00	C	15.00	CD	22.50	B	45.00	D	0.03	A	0.55	CD
	CSHYP3-99	0.00	C	7.50	D	20.00	B	55.00	CD	0.00	A	0.08	D
	GSS2914	27.50	A	75.00	A	87.50	A	100.00	A	0.13	A	1.30	A
	GSS8357	2.50	C	35.00	BC	12.50	B	82.50	ABC	0.00	A	0.93	ABC
	SUREGOLD	20.00	AB	52.50	AB	70.00	A	85.00	AB	0.13	A	1.18	AB
F3	ACR1262Y			2.50	C			55.00	CD	0.20	CDE	0.38	DE
	ACX1138Y			2.50	C			37.50	D	0.55	BC	0.50	DE
	BASIN			0.00	C			40.00	D	0.43	BCD	0.15	E
	COLUMBUS			0.00	C			67.50	BCD	0.03	E	0.83	BCD
	CSHYP2-57			2.50	C			77.50	ABC	0.95	A	0.98	ABC
	CSHYP3-99			2.50	C			65.00	BCD	0.25	CDE	0.58	CDE
	GSS2914			42.50	B			90.00	AB	0.68	AB	1.13	AB
	GSS8357			0.03	C			62.50	BCD	0.10	DE	0.75	BCD
	SUREGOLD			67.50	A			100.00	A	0.95	A	1.33	A

* Means are based on the rot ratings of 40 plants per treatment on each sampling date. Column numbers **for each site** followed by the same letter are not significantly different at *P*=0.05 as determined by Tukey's multiple range test.