

**Report to the OSU Agricultural Research Foundation**  
for the  
**Oregon Processed Vegetable Commission**

**Title:** Cultivar Evaluation for Control of Common Smut in Sweet Corn in the Columbia Basin of Oregon and Washington.

**Principle Investigators:** George Clough and Philip Hamm, Hermiston Agricultural Research and Extension Center, Oregon State University, PO Box 105, Hermiston, OR 97838.

**Support:** Oregon Processed Vegetable Commission; Abbott and Cobb; Crookham Co.; Illinois Foundation Seed; Syngenta Seed, Inc.

**Materials & methods**

Twenty-five sweet corn cultivars were evaluated for resistance to natural infection by common smut (Table 1). Plots were seeded to ~27,000 plants/acre on May 7 and Jun 5 on the Hermiston Agricultural Research and Extension Center on Adkins fine sandy loam (pH 6.8, 0.7% organic matter). The four 30 ft rows/plot were spaced 30 inches apart. The experimental design was a randomized complete block, with four replications.

Normal commercial production practices were followed. At ear maturity, plant stand was recorded, and the number and location (at base, between base and ear, on ear, between ear and tassel, on tassel) of smut galls were noted for each plant. Some plants had more than one infection location. Six cultivars (Jubilee, Crisp n Sweet 710, Krispy King, Summer Sweet 500, Summer Sweet 610, and Supersweet Jubilee) were included in the evaluation in all ten years, to gauge the relative severity of smut pressure over that time. Data were analyzed with the SAS GLM procedure following arcsine transformation. Duncans multiple range test was used for mean separation. Results are presented in Tables 3-6.

**Results**

In general, disease pressure was light in 2008 as compared to the previous years (Table 2). Over the ten years of this trial, the percentage of plants with smut infections at the different plant locations increased from the early to later planting (Table 2); however the increase was not statistically significant for the ear. In 2008, the percent plants with infections on the ear increased from 5.3 to 6.2% from the early to late planting date, again not a statistically significant difference. At all other locations, the percent smut infections increased significantly from the May to the June planting date.

Table 1. Sweet corn cultivars evaluated for common smut resistance, Hermiston, OR. 2008.

Cultivar	Source
<u>Su:</u>	
Evita	Crookham
GH 1703	Syngenta
GH 2690	Syngenta
GH 6377	Syngenta
GH 6462	Syngenta
Jubilee <sup>1</sup>	Syngenta
Tamarack	Crookham
<u>sh<sub>2</sub>:</u>	
170A	Illinois Foundation Seed
179A	Illinois Foundation Seed
1379	Illinois Foundation Seed
ACX 4032W	Abbott & Cobb
ACX 4092W	Abbott & Cobb
ACX 5137Y	Abbott & Cobb
ACX SS 7078W	Abbott & Cobb
Crisp n Sweet 710 <sup>1</sup>	Crookham
Fortitude (CSHYP3-99)	Crookham
GSS 1477	Syngenta
GSS 7314	Syngenta
Krispy King <sup>1</sup>	Syngenta
Magnum II	Syngenta
Marvel	Crookham
Marvel Edge	Crookham
Summer Sweet 500 <sup>1</sup>	Abbott & Cobb
Summer Sweet 610 <sup>1</sup>	Abbott & Cobb
Supersweet Jubilee <sup>1</sup>	Syngenta

<sup>1</sup> Six cultivars in trial 1999-2008.

As in past years, the different cultivars responded somewhat differently, depending on planting date. At the earlier planting date, there was no difference between cultivars for galls on the base (Table 3). Magnum II, followed by GSS1477, Crisp n Sweet 710, Supersweet Jubilee and Fortitude, had the highest percent galls on the lower stalk. And Summer Sweet 500 and ACX 4092W had more infected ears than the other cultivars. Supersweet Jubilee and GH 6377 had the most galls on the upper stalk, followed by Jubilee. Fortitude and GH 1703 had the highest percent galls on the tassels.

Table 2. Effect of year and planting date on development of common smut in sweet corn, Hermiston, OR, 1999-2008.

Cultivar	Gall location <sup>z</sup>				
	Base	Lower stalk	Ear	Upper stalk	Tassel
<u>Year</u>	<i>Percent (%)</i>				
1999	6.3 c	4.2 e	15.3a	10.5a	24.7 b
2000	9.1 b	21.0ab	6.7 bcd	8.3 b	20.1 c
2001	11.2a	23.4a	7.6 bc	6.6 bc	40.4a
2002	7.5 bc	22.7a	9.5 b	6.7 bc	21.5 bc
2003	5.9 c	23.6a	4.6 de	5.8 c	13.8 de
2004	3.1 d	18.0 b	6.1 cde	4.9 cd	17.6 cd
2005	1.4 d	7.6 de	7.2 bcd	2.1 e	3.2 gh
2006	3.4 d	8.0 de	3.6 e	5.3 cd	7.0 fg
2007	1.8 d	14.3 c	8.5 bc	5.1 cd	2.2 h
2008	1.4 d	9.3 d	5.8 cde	3.6 de	10.8 ef
	****	****	****	****	****
<u>Planting date 1999-2007</u>					
Apr/May	2.4	9.7	7.6	5.6	8.8
May/June	8.6	22.0	7.8	6.7	24.7
	****	****	NS	**	****
<u>Planting date 2008</u>					
May	0.0	1.1	5.3	2.4	0.9
June	2.7	17.7	6.2	4.8	20.7
	****	****	NS	**	****

<sup>z</sup> Means of six cultivars trialed in all 10 years.  
 NS, \*\*, \*\*\*, \*\*\*\* Effect of year or planting date not significant or significant at  $P \leq 0.05$ ,  $P \leq 0.001$  or  $P \leq 0.0001$ , respectively. Means followed by different letters significantly different at  $P=0.05$  (Duncans multiple range test).

With the later June 5 planting date, Magnum II had significantly more galls on the base than the other varieties (Table 4). Magnum II also had the most galls on the lower stalk, followed by GSS 1477, and Crisp n Sweet 710. The highest percent infected ears was found in Jubilee, followed by Crisp n Sweet 710 and Supersweet Jubilee. Upper stalk infection was greatest with Krispy King, followed by 1379, and Supersweet Jubilee. Fortitude had the highest tassel infection rating, followed by Summer Sweet 610, then GSS 1477 and ACX 5137Y.

Table 5 summarizes the most and least susceptible varieties of the 38 evaluated in at least 3 of the 10 years this trial has been conducted.

Table 3. Susceptibility of sweet corn cultivars to natural common smut infection, May 7 planting, Hermiston, OR., 2008.

Cultivar	Gall location				
	Base	Lower stalk	Ear	Upper stalk	Tassel
	Percent (%)				
<u>su:</u>					
Evita	0.0	1.2 b	2.7 c	0.6 de	1.3 bc
GH 1703	0.0	0.7 b	1.2 c	0.4 e	4.7ab
GH 2690	0.0	1.3 b	2.1 c	0.2 e	1.3 bc
GH 6377	0.0	0.8 b	1.9 c	4.8ab	0 c
GH 6462	0.0	1.2 b	0.9 c	0.2 e	0.2 c
Jubilee	0.0	0.2 b	4.6 bc	4.6abc	0 c
Tamarack	0.0	0.4 b	1.3 b	1.3 cde	2.6 bc
<u>sh<sub>2</sub>:</u>					
170A	0.0	0 b	3.4 c	0 e	0 c
179A	0.0	0 b	1.1 c	0 e	0 c
1379	0.0	0 b	1.8 c	4.1abcd	0.8 c
ACX 4032W	0.0	0 b	11.7ab	0.3 e	0.9 bc
ACX 4092W	0.0	1.0 b	14.1a	0 e	1.4 bc
ACX 5137Y	0.0	0.5 b	4.6 bc	0.4 e	1.5 bc
ACX SS 7078W	0.0	0.8 b	7.6abc	0.7 de	2.5 bc
Crisp n Sweet 710	0.0	2.2ab	2.1 c	0.4 e	1.1 bc
Fortitude	0.0	1.6ab	0.8 c	1.0 de	6.9a
GSS 1477	0.0	2.4ab	2.7 c	3.4abcde	1.7 bc
GSS 7314	0.2	0.3 b	4.4 bc	1.2 cde	1.6 bc
Krispy King	0.0	1.2 b	4.0 c	2.4abcde	0.3 c
Magnum II	0.5	4.6a	7.8abc	0.6 de	1.3 bc
Marvel	0.0	0.8 b	1.0 c	0.6 de	0.6 c
Marvel Edge	0.0	0.6 b	3.9 c	0.2 e	0.5 c
Summer Sweet #500	0.0	0 b	13.9a	1.6 bcde	2.5 bc
Summer Sweet #610	0.0	1.3 b	0.3 c	0.4 e	1.3 bc
Supersweet Jubilee	0.0	1.6ab	5.0 bc	5.2a	0.5 c
	NS	*	****	****	****

NS, \*, \*\*\*\* Cultivar effect not significant or significant at  $P \leq 0.05$  or  $P \leq 0.0001$ , respectively.

Means followed by different letters significantly different at  $P=0.01$  (Duncans multiple range test).

Table 4. Susceptibility of sweet corn cultivars to natural common smut infection, Jun 5 planting, Hermiston, OR., 2008.

Cultivar	Gall location				
	Base	Lower stalk	Ear	Upper stalk	Tassel
	Percent (%)				
<u>su:</u>					
Evita	0.2 c	5.2 cde	1.1 d	0.7 cd	9.9 def
GH 1703	1.0 bc	8.8 cde	1.8 cd	1.9 cd	70.0a
GH 2690	3.0 bc	13.6 bcde	0.7 d	0 d	2.4 ef
GH 6377	0.7 bc	5.4 cde	0.8 d	2.4 cd	1.2 f
GH 6462	0.5 bc	5.8 cde	1.7 cd	0.6 cd	1.9 ef
Jubilee	2.4 bc	23.7abcd	15.8a	4.1 bcd	19.2 bcdef
Tamarack	2.6 bc	19.7 bcde	0.9 d	0.5 cd	29.7 bcd
<u>sh<sub>2</sub>:</u>					
170A	0.1 c	0.9 e	2.1 cd	1.4 cd	3.0 ef
179A	0.2 c	0.5 e	1.2 d	0.7 cd	0.5 f
1379	2.9 bc	5.1 de	2.8 cd	8.9ab	24.5 bcde
ACX 4032W	0.2 c	.9 e	0.5 d	0.7 cd	5.0 ef
ACX 4092W	0.4 bc	4.6 de	3.1 cd	0.3 cd	28.3 bcd
ACX 5137Y	1.1 bc	3.5 de	1.0 d	1.6 cd	34.1 bc
ACX SS 7078W	3.8 bc	4.0 de	0.9 d	0.4 cd	17.8 cdef
Crisp n Swt 710	2.4 bc	26.2abc	9.5 b	1.3 cd	9.7 def
Fortitude	4.9 b	9.5 cde	1.8 cd	0.7 cd	81.4a
GSS 1477	3.8 bc	32.0ab	3.5 cd	3.9 bcd	34.2 bc
GSS 7314	0.3 c	2.9 de	0.8 d	1.4 cd	4.4 ef
Krispy King	3.8 bc	23.0abcd	3.3 cd	13.7a	22.8 bcdef
Magnum II	10.4a	42.8a	4.0 cd	1.9 cd	24.2 bcde
Marvel	1.2 bc	1.0 e	0.1 d	1.5 cd	9.8 def
Marvel Edge	0.8 bc	0.8 e	1.5 cd	1.6 cd	15.4 cdef
Summer Swt #500	0.8 bc	3.2 de	2.4 cd	1.0 cd	17.8 cdef
Summer Swt #610	4.4 bc	15.5 bcde	1.2 d	2.4 cd	40.9 b
Sprswt Jubilee	2.4 bc	14.2 bcde	5.3 c	6.6 bc	13.8 cdef
	****	****	****	****	****

\*\*\*\* Cultivar effect significant at  $P \leq 0.0001$ .

Means followed by different letters significantly different at  $P=0.01$  (Duncans multiple range test).

Table 5. Susceptibility of sweet corn cultivars<sup>z</sup> to natural common smut infection of the ear, Hermiston, OR., 1999-2008.

Cultivar	Ears infected	Years tested
	(%)	(No.)
<u>Most susceptible</u>		
1861	16.1	3
Jubilee	13.3	10
2684	12.5	3
Challenger	11.0	3
Accession	9.4	3
Supersweet Jubilee	8.9	10
Krispy King	7.0	10
Summer Sweet 500	7.1	10
Summer Sweet 8100	7.3	5
<u>Least susceptible</u>		
Cinch	1.2	5
ACX232	1.1	5
Intrigue	1.0	3
Eliminator	0.9	3
GH2547	0.9	7
Sockeye	0.9	7
Marvel	0.8	9
GH6462	0.9	4
Conquest	0.6	3

<sup>z</sup> Of the 38 cultivars evaluated in at least 3 of the 10 trial years.