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for the
Oregon Processed Vegetable Commission

Control and Management of Common Smut on Corn in the Columbia Basin of Oregon and Washington

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Planting date/cultivar evaluation: Forty-two sweet corn cultivars were evaluated for resistance to common smut (Table 1). Seed of several cultivars arrived too late for the first planting. Plots were seeded to 30,800 plants/acre on May 2 and Jun 6 on the Hermiston Agricultural Research and Extension Center on Adkins fine sandy loam (pH 6.7, 0.9% 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. Data were analyzed with the SAS GLM procedure following arcsine transformation.

Ear quality evaluation: For each planting date, and at optimum moisture, ears were sampled from FX516, Sheba and Supersweet Jubilee plants with either no gall, or only a single gall. Location on plant and size of gall were recorded, and fresh weight, length, diameter and kernel depth of the husked ear were measured. Data were analyzed with the SAS GLM procedure to determine impact of gall location and size on these important processing characteristics.

Additional ears of the same 3 cultivars were sampled from commercial fields planted in late June near Walla Walla and Patterson, WA. Quality was evaluated as previously described.

Results

Planting date/cultivar evaluation: Disease pressure was somewhat reduced in 2003 as compared to previous years (Table 2). The percentage of plants with smut infections on the base, on the lower stalk (between base and ear), on the ear, on the tassel,

and the percentage of plants infected overall increased from the first to second planting (Table 3).

The shrunken 2 (sh_2) genotype was more susceptible to smut infection on the ear and upper stalk than the normal sugar (*su*) or the sugary-enhanced (*se*) genotypes, while the *se* type had more galls on the tassel than the other types (Table 3).

Since there were differences in genotype response, the cultivars were sorted by genotype, and susceptibility by genotype is reported (Tables 4, 5, 6, 7, 8). The varieties most susceptible to infection of the ear over both planting dates included Crisp n Sweet 710, Summer Sweet 500, ACX 711 and Supersweet Jubilee, all sh_2 genotypes (Table 6). Marvel, Intrigue, ACX 232, and Shaker were in the group with the least percent infected ears. Jubilee and HMX 7384 were the most susceptible of the *su* types, while FMX 516, GH 2148R, HMX 0395, and GH 2690 were the least susceptible.

Ear quality evaluation: In 2003, ear fresh weight, diameter, and kernel depth were reduced in the later planting (Jun 6), most likely due to extreme temperatures during ear development and growth (Table 9). Fresh weight was reduced 10 percent by galls on the base and tassel, and reduced more than 20 percent by galls on the lower and upper stalk. Ear diameter also was reduced by the presence of galls on the lower or upper stalk. As might be expected, the larger the gall size, the greater the impact (reduction) on ear fresh weight and diameter. Orthogonal contrasts, which compared the effect of galls (averaged across all locations and sizes) vs none demonstrated that galls significantly reduced ear fresh weight and length; diameter and kernel depth also were reduced, but the differences this year were not statistically significant.

Similar results were obtained from the off-station fields (Table 10). Galls located on the upper and lower stalk reduced fresh weight, length, diameter and kernel depth, while galls on the tassel or base had reduced or no effects on these parameters. And again, as gall size increased, fresh weight, length, diameter and kernel depth decreased.

These data indicate that direct ear loss is not the only economic impact of common smut. Fresh weight loss may exceed 20 percent due to galls on the upper or lower stalk; this translates into a direct tonnage loss coming out of the field. And galls in any location may significantly reduce ear length, diameter and kernel depth, which can restrict processing uses and limit product recovery.

Table 1. Sweet corn cultivars evaluated for resistance to common smut, Hermiston, OR. 2003.

Cultivar	Source
su type:	
EX8482608*	Asgrow
FMX 516	Harris Moran
GH 2148R	Syngenta
GH 2385	Syngenta
GH 2547	Syngenta
GH 2690	Syngenta
HMX 0395	Harris Moran
HMX 2390	Harris Moran
HMX 0395	Harris Moran
HMX 7384	Harris Moran
Jubilee	Syngenta
Legacy	Harris Moran
sh_2 type:	
EX08413137*	Asgrow
EX08414737*	Asgrow
EX08705797*	Asgrow
EX08705808*	Asgrow
EX08716636*	Asgrow
ACX 232	Abbott & Cobb
ACX 711	Abbott & Cobb
ACX 1011*	Abbott & Cobb
ACX 1073*	Abbott & Cobb
Basin*	Asgrow
Crisp n Sweet 710	Crookham
GSS 8357	Syngenta
GSS 8388	Syngenta
HMX 0393S	Harris Moran
Intrigue	Crookham
Krispy King	Syngenta
Marvel	Crookham
Obsession	Asgrow
Shaker	Asgrow
Sheba	Asgrow
Shogun	Crookham
Summer Sweet #500	Abbott & Cobb
Summer Sweet #610	Abbott & Cobb
Summer Sweet #8100	Abbott & Cobb
Supersweet Jubilee	Syngenta
se type:	
EX08715864*	Asgrow
EX08716607*	Asgrow
Chase	Asgrow
Cinch	Asgrow
CSEYP1-5*	Crookham
CSEYP1-25*	Crookham

* Second planting (Jun 6) only.

Table 2. Effect of year and planting date on development of common smut of sweet corn, Hermiston, OR., 1999-2003.

	Gall location					Plant
	Base	Base-Ear	Ear	Ear-Tassel	Tassel	(_)
	Percent (%)					
Year[z]						
1999	5.8 bc	4.1 c	8.6a	6.6a	21.4 b	41.5 b
2000	7.6 b	18.8 b	6.5 b	4.1 b	19.6 b	43.5 b
2001	10.8a	22.9a	5.3 b	2.5 c	39.5a	59.5a
2002	6.9abc	20.7ab	5.7 b	2.6 c	22.0 b	49.1 b
2003	4.9 c	21.7ab	4.7 c	2.2 c	14.2 c	43.8 b
	****	****	****	****	****	****
Planting date						
Apr/May	4.0	10.4	6.9	5.0	12.5	31.8
May/Jun	10.4	24.8	10.0	7.2	34.3	63.2
	****	****	****	****	****	****

[z] Means of 8 cultivars trialed for all 5 years.

**** Effect of year or planting date significant at P≤0.0001.

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

Table 3. Effect of planting date and type on development of common smut of sweet corn, Hermiston, OR., 2003.

	Gall location					Plant (_)
	Base	Base-Ear	Ear	Ear-Tassel	Tassel	
	Percent (%)					
Planting date						
May 2	1.2	7.3	1.5	1.9	9.7	20.6
Jun 6	6.2	21.2	4.2	2.5	20.2	48.5
	****	****	**	NS	***	****
Type						
sh_2	3.8	14.8	4.6a	3.2a	16.7 b	38.9
se	6.1	14.5	1.1 b	1.8ab	27.4a	44.6
su	4.2	17.8	1.0 b	0.6 b	10.3 b	31.4
	NS	NS	****	**	**	NS

NS, **, ***, **** Effect of planting date, or type not significant or significant at P≤0.01, P≤0.001, or P≤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 common smut infection of the base, Hermiston, OR., 2003.

Cultivar	Planting date: May 2	Planting date: Jun 6	Average(_)
su type		Percent (%)	
EX8482608	-	2.3 cd	2.3 b
FMX 516	1.7	2.8 cd	2.5 b
GH 2148R	1.7	15.9ab	8.8ab
GH 2385	0.5	5.9 cd	3.2ab
GH 2547	1.4	4.6 cd	3.0ab
GH 2690	2.6	4.2 cd	3.4ab
HMX 0395	0.4	4.4 cd	2.4 b
HMX 2390	1.5	1.4 d	1.5 b
HMX 7384	1.3	17.2a	9.3a
Jubilee	1.8	9.7 bc	5.8ab
Legacy	3.7	7.6 cd	5.7ab
	NS	****	*
se type			
Chase	0.2	8.3	4.3 b
Cinch	1.8	4.7	3.3 b
CSEYP1-5	-	11.9	11.9a
CSEYP1-25	-	5.1	5.1 b
EX08715864	-	8.3	8.3ab
EX08716607	-	9.0	9.0ab
	NS	NS	*
sh_2 type			
ACX 232	2.4ab	10.3 bcd	6.4ab
ACX 711	0.0 b	7.6 bcde	3.8 b
ACX 1011	-	2.8 de	2.8 b
ACX 1073	-	4.6 cde	4.6 b
Basin	-	3.4 de	3.4 b
Crisp n Sweet 710	0.7ab	6.4 bcde	3.6 b
EX08413137	-	2.0 e	2.0 b
EX08414737	-	4.3 cde	4.3 b
EX08705797	-	2.3 e	2.3 b
EX08705808	-	3.5 de	3.5 b
EX08716636	-	1.5 e	1.5 b
GSS 8357	3.7ab	5.4 cde	4.6 b
GSS 8388	3.0ab	5.5 cde	4.3 b
HMX 0393S	0.0 b	4.5 cde	2.3 b
Intrigue	0.6ab	4.2 cde	2.4 b
Krispy King	4.0a	18.0a	11.0a
Marvel	0.2 b	3.2 cde	1.7 b
Obsession	-	3.7 cde	3.7 b
Shaker	0.2 b	4.4 cde	2.3 b
Sheba	0.3 b	4.5 cde	2.4 b
Shogun	0.0 b	5.9 cde	2.9 b
Summer Sweet #500	0.0 b	1.9 e	1.0 b
Summer Sweet #610	0.5ab	12.9ab	6.7ab
Summer Sweet #8100	0.4ab	2.5 de	1.5 b
Supersweet Jubilee	3.5ab	11.5abc	7.5ab
	*	***	****

NS, *, ***, **** Cultivar effect not significant or significant at P≤0.05, P≤0.001, or P≤0.0001, respectively.
Means within a *type* followed by different letters significantly different at P≤0.05 (Duncans multiple range test).

Table 5. Susceptibility of sweet corn cultivars to common smut infection of the lower stalk, Hermiston, OR., 2003.

Cultivar	Planting date: May 2	Planting date: Jun 6	Average(_)
su type		Percent (%)	
EX8482608	-	6.8 e	6.8 c
FMX 516	2.6 b	31.0 bc	16.8 bc
GH 2148R	11.4 b	36.4 b	24.0 b
GH 2385	1.7 b	31.3 bc	16.5 bc
GH 2547	5.8 b	20.4 cde	13.1 bc
GH 2690	7.7 b	14.3 de	11.0 bc
HMX 0395	5.5 b	30.9 bc	18.2 bc
HMX 2390	7.4 b	10.3 e	8.6 c
HMX 7384	7.7 b	29.0 bcd	18.3 bc
Jubilee	33.6a	62.2a	47.9a
Legacy	1.9 b	14.9 de	8.4 c
	****	****	****
se type			
Chase	1.7	18.0ab	9.9 b
Cinch	3.0	7.7 b	5.4 b
CSEYP1-5	-	10.7 b	10.7 b
CSEYP1-25	-	28.2a	28.2a
EX08715864	-	18.4ab	18.4ab
EX08716607	-	28.1a	28.1a
	NS	*	**
sh2 type			
ACX 232	5.9 cde	25.8 ccdef	15.8 cdefg
ACX 711	1.2 e	3.0 fg	2.1 g
ACX 1011	-	4.3 efg	4.3 g
ACX 1073	-	2.0 g	2.0 g
Basin	-	10.7 defg	10.7 efg
Crisp n Sweet 710	7.3 bcde	24.9 bcdefg	16.1 cdefg
EX08413137	-	4.3 efg	4.3 g
EX08414737	-	37.3abc	37.3a
EX08705797	-	6.3 defg	6.3 fg
EX08705808	-	13.9 defg	13.9 cdefg
EX08716636	-	5.7 defg	5.7 fg
GSS 8357	16.5ab	38.5ab	27.5abc
GSS 8388	15.7abc	54.3a	35.0ab
HMX 0393S	7.0 bcde	8.3 defg	7.6 efg
Intrigue	2.4 e	20.6 bcdefg	11.5 defg
Krispy King	13.2abcd	28.6 bcd	20.9 bcdef
Marvel	1.5 e	3.1 fg	2.3 g
Obsession	-	1.6 g	1.6 g
Shaker	3.8 de	14.9 cdefg	9.3 fg
Sheba	0.3 e	9.8 defg	5.0 fg
Shogun	6.9 bcde	38.3ab	22.6abcde
Summer Sweet #500	0 e	12.8 defg	6.4 fg
Summer Sweet #610	1.4 e	27.8 bcde	14.6 cdefg
Summer Sweet #8100	13.5abcd	40.4ab	27.0abcd
Supersweet Jubilee	18.1a	52.9a 35.6ab	
	****	****	****

NS, *, **** Cultivar effect not significant or significant at P≤0.05, or P≤0.0001, respectively.

Means within a *type* followed by different letters significantly different at P≤0.05 (Duncans multiple range test).

Table 6. Susceptibility of sweet corn cultivars to common smut infection of the ear, Hermiston, OR., 2003.

Cultivar	Planting date: May 2	Jun 6	Average(_)
su type	Percent (%)		
EX8482608	-	1.1 b	1.1 bc
FMX 516	0.0 b	0.0 b	0.0 c
GH 2148R	0.0 b	0.1 b	0.1 c
GH 2385	0.4 b	1.0 b	0.7 bc
GH 2547	0.3 b	0.8 b	0.6 bc
GH 2690	1.0 b	0.0 b	0.5 c
HMX 0395	0.4 b	0.1 b	0.3 c
HMX 2390	1.0 b	0.6 b	0.8 bc
HMX 7384	1.6 b	4.0a	2.8ab
Jubilee	6.5a	1.4 b	3.9a
Legacy	1.2 b	0.2 b	0.7 bc
	***	***	****
se type			
Chase	0.4	2.5	1.4
Cinch	0.8	0.9	0.8
CSEYP1-5	-	0.7	0.7
CSEYP1-25	-	1.0	1.0
EX08715864	-	0.6	0.6
EX08716607	-	2.2	2.2
	NS	NS	NS
sh_2 type			
ACX 232	0.0 d	1.1 g	0.5 hij
ACX 711	2.1 bcd	9.8 bcdef	6.0 defghi
ACX 1011	-	7.6 cdefg	7.6 def
ACX 1073	-	13.4 bcd	13.4 bc
Basin	-	3.5 fg	3.5 efghij
Crisp n Sweet 710	0.9 cd	14.8 bc	7.8 de
EX08413137	-	9.8 bcdef	9.8 cd
EX08414737	-	6.0 defg	6.0 defghi
EX08705797	-	27.3a	27.3a
EX08705808	-	7.0 cdefg	7.0 defghi
EX08716636	-	1.1 g	1.1 hij
GSS 8357	2.7 bcd	1.9 fg	2.3 efghij
GSS 8388	1.1 cd	1.9 fg	1.5 ghij
HMX 0393S	3.6 bc	1.7 fg	2.7 efghij
Intrigue	0.2 cd	0.7 g	0.5 ij
Krispy King	1.8 bcd	2.2 fg	2.0 fghij
Marvel	0.2 cd	0.3 g	0.2 j
Obsession	-	16.5 b	16.5 b
Shaker	0.2 cd	1.1 g	0.6 hij
Sheba	4.5 b	1.6 fg	3.1 efghij
Shogun	0.4 cd	4.8 efg	2.6 efghij
Summer Sweet #500	0.4 cd	12.1 bcde	6.2 defgh
Summer Sweet #610	1.0 cd	2.3 fg	1.6 ghij
Summer Sweet #8100	0.7 cd	8.2 cdefg	4.5 defghij
Supersweet Jubilee	8.1a	3.8 fg	6.0 defghi
	****	****	****

NS, ***, **** Cultivar effect not significant or significant at P≤0.001, or P≤0.0001, respectively.

Means within a *type* followed by different letters significantly different at P≤0.01 (Duncans multiple range test).

Table 7. Susceptibility of sweet corn cultivars to common smut infection of the upper stalk, Hermiston, OR., 2003.

Cultivar	Planting date: May 2	Planting date: Jun 6	Average(_)
su type		Percent (%)	
EX8482608	-	0.2 b	0.2 c
FMX 516	0.0 b	0.0 b	0.0 c
GH 2148R	0.0 b	0.0 b	0.0 c
GH 2385	0.6 b	0.2 b	0.4 c
GH 2547	0.0 b	0.0 b	0.0 c
GH 2690	0.0 b	0.0 b	0.0 c
HMX 0395	0.4 b	0.0 b	0.2 c
HMX 2390	0.2 b	0.0 b	0.1 c
HMX 7384	1.2 b	3.8a	2.5a
Jubilee	3.5a	0.4 b	2.0ab
Legacy	1.3 b	0.7 b	1.0 bc
	**	****	****
se type			
Chase	3.8	3.1a	3.5a
Cinch	1.7	0.4 c	1.2 b
CSEYP1-5	-	1.1 bc	1.1 b
CSEYP1-25	-	1.0 bc	1.0 b
EX08715864	-	1.2abc	1.2 b
EX08716607	-	2.4ab	2.4ab
	NS	*	*
sh_2 type			
ACX 232	0.7 c	1.5 de	1.1 e
ACX 711	0.5 c	0.8 de	0.6 e
ACX 1011	-	1.0 de	1.0 e
ACX 1073	-	0.4 e	0.4 e
Basin	-	0.0 e	0.0 e
Crisp n Sweet 710	0.9 c	2.7 de	1.8 e
EX08413137	-	34.3a	34.4a
EX08414737	-	7.6 c	7.6 cd
EX08705797	-	0.0 e	0.0 e
EX08705808	-	3.4 de	3.4 de
EX08716636	-	1.1 de	1.1 e
GSS 8357	0.0 c	0.3 e	0.3 e
GSS 8388	0.2 c	0.0 e	0.1 e
HMX 0393S	0.0 c	0.9 de	0.9 e
Intrigue	0.8 c	0.3 e	0.7 e
Krispy King	19.4a	13.6 b	16.5 b
Marvel	0.4 c	0.5 e	0.5 e
Obsession	-	3.7 de	3.7 de
Shaker	0.6 c	0.2 e	0.4 e
Sheba	0.0 c	0.8 de	0.8 e
Shogun	0.0 c	0.7 de	0.7 e
Summer Sweet #500	1.4 c	1.3 de	1.4 e
Summer Sweet #610	3.0 c	3.4 de	3.2 de
Summer Sweet #8100	0.2 c	4.4 cd	2.3 e
Supersweet Jubilee	12.7 b	7.3 c	10.0 c
	****	****	****

NS, *, **, **** Cultivar effect not significant or significant at P≤0.05, P≤0.01, or P≤0.0001, respectively.

Means within a *type* followed by different letters significantly different at P≤0.05 (Duncans multiple range test).

Table 8. Susceptibility of sweet corn cultivars to common smut infection of the tassel, Hermiston, OR., 2003.

Cultivar	Planting date: May 2	Planting date: Jun 6	Average(_)
su type		Percent (%)	
EX8482608	-	6.9abc	6.9 bcde
FMX 516	34.9a	12.5abc	23.7a
GH 2148R	13.8 b	0.4 c	7.1 bcde
GH 2385	13.8 b	15.7abc	14.7abc
GH 2547	0.3 c	0.0 c	0.2 e
GH 2690	2.6 bc	0.0 c	1.3 de
HMX 0395	30.5a	5.7 bc	18.1ab
HMX 2390	9.3 bc	17.6ab	13.5abcd
HMX 7384	0.0 c	6.0 bc	3.0 cde
Jubilee	10.0 bc	0.8 c	5.4 bcde
Legacy	13.6 b	22.6a	18.1ab
	****	*	****
se type			
Chase	14.0	52.1 b	33.0 b
Cinch	13.4	19.7 cd	16.6 bc
CSEYP1-5	-	6.4 d	6.4 c
CSEYP1-25	-	18.1 cd	18.1 bc
EX08715864	-	28.1 c	28.1 bc
EX08716607	-	67.3a	67.3a
	NS	****	****
sh_2 type			
ACX 232	4.3 c	9.2 ef	6.8 de
ACX 711	4.2 c	1.4 f	2.8 e
ACX 1011	-	9.2 ef	9.2 de
ACX 1073	-	23.0 bcdef	23.0abcde
Basin	-	39.9abcd	39.9a
Crisp n Sweet 710	2.6 c	26.0 bcdef	14.3 bcde
EX08413137	-	42.5abc	42.5a
EX08414737	-	11.0 def	11.0 cde
EX08705797	-	36.2 bcde	36.2a
EX08705808	-	31.9 bcdef	31.9ab
EX08716636	-	4.3 f	4.3 de
GSS 8357	7.8 c	23.0 bcdef	15.4 bcde
GSS 8388	47.4a	25.7 bcdef	36.5a
HMX 0393S	2.4 c	8.0 ef	5.2 de
Intrigue	1.2 c	20.9 bcdef	11.0 cde
Krispy King	6.9 c	66.0a	36.4a
Marvel	1.6 c	12.2 cdef	6.9 de
Obsession	-	16.2 cdef	16.2 bcde
Shaker	20.9 b	40.3abcd	30.6abc
Sheba	0.3 c	48.8ab	24.5abcd
Shogun	3.1 c	20.9 bcdef	12.0 cde
Summer Sweet #500	0.0 c	14.6 cdef	7.2 de
Summer Sweet #610	8.8 c	18.8 cdef	13.8 bcde
Summer Sweet #8100	2.5 c	10.5 def	6.5 de
Supersweet Jubilee	1.0 c	10.8 def	5.9 de
	****	****	****

NS, **** Cultivar effect not significant or significant at P≤0.0001.
Means within a *type* followed by different letters significantly different at P≤0.05 (Duncans multiple range test).

Table 9. Effect of cultivar, planting date, gall location and gall size on sweet corn ear characteristics, Hermiston, OR., 2003.

	Fresh weight (oz)	Length (in)	Diameter (in)	Kernel depth (in)
Variety[z]				
FMX 516	10.4 b	8.0 b	1.95 b	0.38
Sheba	10.6 b	8.4ab	1.97 b	0.39
Sprswt Jubilee	12.3a	8.7a	2.05a	0.50
	****	**	*	NS
Planting				
May 2	11.9	8.1	2.08	0.47
Jun 6	9.5	8.2	1.88	0.37
	****	NS	****	*
Gall Location				
None	11.2a	8.4	2.00a	0.43
Base	9.8 b	8.1	1.94a	0.37
Lower Stalk	8.7 c	8.2	1.84 b	0.36
Upper Stalk	9.0 c	7.9	1.80 b	0.36
Tassel	10.0 b	8.1	1.95a	0.39
	***	NS	*	NS
Gall Size				
None	11.2a	8.4	2.00a	0.43
Small (<2")	10.0 b	8.1	1.94 b	0.38
Medium (2-4")	9.3 c	8.1	1.86 c	0.36
Large (>4")	8.2 d	8.0	1.81 d	0.35
	****	NS	***	NS
Contrast (Gall vs None)				
None	11.2	8.4	2.00	0.43
Gall	9.4	8.1	1.89	0.37
	****	*	NS	NS

[z] Variety means of uninfected plants.

NS, *, **, ***, **** Cultivar effect not significant or significant at P≤0.05, P≤0.01, P≤0.001, or P≤0.0001, respectively.

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

Table 10. Effect of cultivar, gall location and gall size on sweet corn ear characteristics, commercial production fields, Patterson, WA, 2003.

	Fresh weight (oz)	Length (in)	Diameter (in)	Kernel depth (in)
Variety[z]				
FMX 516	9.3 b	7.9 b	1.95 b	0.35 b
Sheba	10.3a	7.6 c	2.02a	0.38a
Sprswt Jubilee	9.7ab	8.4a	1.83 c	0.35 b
	**	****	*	*
Gall Location				
None	9.8a	8.0a	1.92 b	0.36 b
Base	8.8 b	7.8a	1.88 bc	0.36 b
Lower Stalk	8.2 c	7.5 b	1.84 c	0.35 b
Upper Stalk	7.6 d	7.5 b	1.72 d	0.33 c
Tassel	10.2a	7.8a	2.03a	0.38a
	****	****	*	*
Gall Size				
None	9.8a	8.0a	1.92a	0.36a
Small (<2")	9.2 b	7.7 b	1.92a	0.36a
Medium (2-4")	8.7 b	7.6 b	1.87 b	0.35ab
Large (>4")	7.6 c	7.5 b	1.79 c	0.34 b
	****	*	*	**

[z] Variety means of uninfected plants.
NS, *, **, **** Effect not significant or significant at P≤0.05, P≤0.01, or P≤0.0001, respectively.
Means followed by different letters significantly different at P≤0.01 (Duncans multiple range test).