Report To The Oregon Processed Vegetable Commission
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1. Title: Identification of Sweet Corn Hybrids Resistant to Root/Stalk Rot

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3. Project Status: Terminating 30 June 2003

4. Project Funding: $14,240 breeding
$1,200 processing
$15,440 total

Funding was used to establish, evaluate, and analyze data from sweet corn field plots established on the Joe Schumacher farm near West Scio, and at the Botany Farm, Corvallis. An additional observation trial was planted at the Vegetable Farm for evaluating ear and processing quality. Nineteen hybrids with sugary and/or sugary enhanced endosperm and five with supersweet endosperm were evaluated for symptoms of root rot, leaf firing, and yield in fumigated and nonfumigated plots. Ears were also evaluated for processing quality.

5. Objectives: 1) Characterize *su* and *se* and *sh2* sweet corn hybrids for reaction to root rot and processing quality. 2) Examine the effect of fumigation on root rot, firing, and yield.

6. Report of Progress:

As a result of several meetings to coordinate research this project underwent major metamorphosis. Major U.S. seed companies were contacted in early spring to request sweet corn hybrids with potential for resistance to root/crown rot. We requested both sugary or sugary enhanced and super sweet types. Twenty-four entries were included, but not in every trial. Standard entries were 'Jubilee' and 'Reward' as susceptible checks, and 'Bonus' as a resistant check (Table 1). Trials for root rot evaluation were grown on the Schumacher Farm near West Scio, and the Botany Farm east of Corvallis, where a root rot field had been established two years previously. In addition to hybrids as a variable, both sites had a set of two fumigation treatments applied (in addition to the control). An observation trial for evaluation of processing quality was also grown at the Vegetable Farm, Corvallis.

One row plots 20 ft. in length and replicated four and three times for the W. Scio and Botany Farm trials, respectively were established by planting with hand-pushed belt planters. The W. Scio trial was planted on June 24 and the Botany Farm trial on July 3. Plots were overplanted, then thinned to approximately one plant per nine inches. Seed companies applied standard fungicide treatments to the seed. The grower applied preemergent insecticide and herbicide, and irrigated and performed other cultural procedures (fertilizer application) in conjunction with care of the surrounding sweet corn crop. The fumigation treatments were applied orthogo-

nal to the replicates and consisted of an untreated control strip, methyl bromide, and metham sodium (Vapam). Vapam was applied broadcast at 75 GPA and methyl bromide + chloropicrin at 320 GPA followed by tarping to plots 22 ft wide by 120 long on June 4.

Root balls were dug, washed and examined for the presence of root rot at the five to six leaf stage, and again at harvest maturity. Leaf firing was rated using a 0-5 scale where 0= no symptoms; 1=leaf at first node necrotic; 2=leaf at first and second node necrotic; 3=leaves at first three nodes necrotic; 4=leaves at first 4 nodes necrotic; and 5=leaves to the ear or first 5 nodes necrotic. Ten plants per plot were rated. Plots were rated for firing on three dates

At the Vegetable Farm, the nearly all entries were established in observation trials (Table 1), and data were recorded on yield, and ear and quality measurements. Whole ears of these hybrids were processed and frozen at the OSU Pilot Plant. Because of significant non-uniformity in the trial, no hybrids from the supersweet observation trial at the Vegetable Farm were harvested and evaluated.

Results:

West Scio Trial: Evidence of early season root rot (four to six leaf stage) was observed in the trial (Table 2). We sampled roots from all check treatments and about half of the fumigated treatments. Significantly less root rot symptomology was observed in the fumigated plots compared to the same variety in nonfumigated plots. Differences among hybrids were small. Leaf firing in the West Scio trial was relatively mild this year, but did progress across readings dates (Table 3). Significantly more firing was observed in the fumigated compared to the nonfumigated plots (Table 4, Figure 1). In this and the Botany Farm trial, we do not believe that firing symptoms accurately reflected root rot symptoms or differences in yield. In addition, varietal ranking showed differences from what had been seen in previous years. For example, Eliminator and Jubilee had relatively little firing, while GH 1861 had some of the worst firing in the nonfumigated plots (Figure 1). Roots were dug when a hybrid reached harvest maturity. Because some hybrids matured much later than the surrounding field, and the grower needed to prepare the field for fall planting, we were able to harvest only 11 hybrids for root ratings and yield evaluation. Root rot symptoms were observed at harvest maturity, with a trial average of 38% infected roots (Table 5, Figure 2). Disease was more severe in the nonfumigated plot (Figure 2). Crown discoloration did not appear related to root rot disease (Table 5, Figure 3). Ear quality and yield measurements are shown in Tables 6 & 7, and Figure 4. When averaged across treatments, yield differences among hybrids were small, but Jubilee had the lowest yield with all experimental hybrids with higher yield (but only GH 2684 and Eliminator had significantly higher yield). No treatment effect was observed for yield, and in only three cases, were the methyl bromide treated plots numerically higher than their untreated counterparts. In most cases, yield of a hybrid across treatments was similar, but in case of GH 1861, yield of both fumigation treatments was lower than the check. We observed a delay in maturity associated with fumigation (based on % kernel moisture), which may explain why we did not observe a positive effect of fumigation on yield. The hybrid GH 9595 was noteworthy for its significantly larger root ball compared to other hybrids. This did not necessarily translate into less root rot or higher yields, but such a root system might tolerate more root pruning.

Botany Farm: Mostly complete data sets were obtained for the Botany Farm trial. Early season root rot was present at low levels (data not shown). At harvest maturity, similar levels of root rot (>50%) were observed compared to the West Scio trial (Table 8). Eliminator had the least amount of adventitious root rot and Jubilee ranked fairly low, while Bonus, Reward, Esquire and

Supersweet Jubilee had high levels of root rot. Adventitious root rot was also positively associated with *Diabrotica* feeding damage to roots. Other root characters (primary, mesocotyl, crown rot) showed moderate associations with adventitious root rot. Fumigation treatments significantly increased *Diabrotica* feeding and significantly decreased root rot symptoms (Table 9, Figure 5 & 6). One of the few significant treatment by hybrid interactions was observed for insect feeding. This manifests as some hybrids showing much higher feeding in the fumigated plots compared to the check, whereas other hybrids show little difference among treatments. Leaf firing was also significantly higher in fumigated treatments compared to the check (Table 10). Firing did progress during the season, and varietal differences were observed (Table 11), but again did not appear to be associated with root rot or yield. A significant treatment effect for yield was observed in this trial for Good T/A. Methyl bromide significantly increased yield for only Good T/A over Vapam and the check (Table 12, Figure 7). Jubilee was also the lowest yielding entry in this trial, with GH 4809 and GH 2684 among the top yielding hybrids (Table 13). For each hybrid, a composite sample across fumigation treatments was taken to obtain percent moisture, and yield was adjusted to 73% moisture (Table 13). These results should be interpreted carefully, because the relationship between moisture and yield may not be the same for every hybrid, and because moistures were generally higher in plots from the fumigation treatments when sampled on the same date.

A correlation analysis was run on all of the variables measured in the Botany Farm trial (Table 14). In general, root rot variables were correlated with one another, and yield characters likewise showed autocorrelation. Firing was not correlated with any other variable, and only in a few cases were relatively weak correlations detected between root rot and yield variables. Number of ears per acre was positively correlated at the 10% probability level with primary and mesocotyl root ratings. This might be explained as root rot causing smaller ears, but plants compensating by producing a greater number of ears. Node browning was negatively correlated with Good T/A at the 10% probability level. We do not know at present of what node browning is a symptom, but seems to indicate that higher yielding hybrids had less node browning.

Vegetable Farm: Entries grown at West Scio and the Botany Farm were also grown in an observation trial at the Vegetable Farm. Entries were included in replicated or unreplicated plots depending on the wishes of the seed company (Observation trials have been supported for several years now by charging seeded companies for the trial. Fee is based on amount of work required: unreplicated entry is evaluated primarily on quality, replicated also includes more accurate data on yield, and samples may be processed or not.) Separate trials for sugary – *se* types and supersweet hybrids were grown, but the supersweet trial was abandoned because of uneven stands. In the sugary trial, Reward and Jubilee were among the lowest yielding, while GH 2385, 8441107, and GH 4089 were highest in yield Table 15, Figure 8. Overall quality ratings are show in table 16, and pericarp toughness is graphed in figure 9.

Conclusions: Based on this year's experience in the three trials conducted to evaluate hybrid performance, we would make the following suggestions. To accurately test hybrids for tolerance to sweet corn decline, a field with uniformly high disease pressure is required. Testing in grower's fields is problematic because we are not always guaranteed a high level of disease, and must conform to the time schedule of the grower, particularly at harvest. It takes enormous resources to travel to remote sites to dig roots in a trial with 228 plots. Also, obtaining accurate yield data is difficult because of problems associated with obtaining rapid and accurate kernel moisture measurements, confounded by the differences in moisture between fumigation treat-

ments and the control plots. A more rapid moisture test is needed. It would be best to do evaluations in the plot established at the Botany Farm, or establish such a long term-plot at the Vegetable Farm, where we would have better control over these variables.

Among fumigation treatments, Vapam does not appear particularly effective, and only in the Botany Farm trial were we able to demonstrate a significant increase in yield associated with methyl bromide fumigation. Part of the problem in demonstrating a yield increase due to fumigation may be the confounding of later maturity with fumigation. Future trials should include a methyl bromide treatment in addition to an unfumigated treatment so that hybrid performance in the absence of disease could be compared to performance in the presence of disease.

In terms of data collection, early season root rot symptoms (6 leaf stage) should be evaluated to determine if disease is present in the field. If not, the trial can be stopped at that point. Leaf firing data are of limited value, particularly when percent rotted roots is less than 50% at harvest maturity. Too many factors will cause firing, including insect feeding, too little water, too much water, and nutrient availability. The higher degree of firing observed in this year's fumigated treatments is a case in point. One possible cause might have been that fumigation eliminated beneficial microorganisms that associate with corn roots and facilitate the uptake of nutrients. Alternatively, the higher level of root feeding by *Diabrotica* might have caused greater firing (insects are another factor that will need to be controlled). We recommend that in future trials, leaf firing data not be collected. It is important, however, for fieldmen and growers to pay attention to firing symptoms as they are an indicator that all is not well with the crop.

Hybrids need to be identified that are tolerant to the sweet corn decline syndrome. This includes, but is not limited to the ability to maintain roots in the presence of disease, and fully translocate photosynthate into the maturing ear. What we are most interested in are hybrids that perform well whether in fumigated or natural soils, and are higher yielding than hybrids currently in use. Our general observation is that it is relatively easy to find a hybrid that will out yield Jubilee, but more difficult to find one that also has acceptable processing quality. As such, quality evaluations should continue to be a part of future trials.

7. Summary:

Root rot trials were conducted on farm near West Scio, and at the Botany Farm. An observation trial was grown at the Vegetable Farm to assess processing quality. Root rot trials included 19 (W. Scio) and 24 (Botany) entries with three soil treatments (no fumigation, methyl bromide, Vapam). Data were collected on root rot at the six-leaf stage, progression of leaf firing as plants neared harvest maturity, root rot at harvest maturity, and yield. Fumigation generally had a significant effect on root rot (decreasing symptoms compared to the control), firing (increased in the fumigated treatments), and insect feeding (increased in fumigated plots). Only in the case of methyl bromide at the Botany Farm was a significant increase in yield demonstrated. There was little correlation between severity of root rot, firing symptoms, and yield. There does not appear to be resistance to root rot *per se* among hybrids, rather, some hybrids are more tolerant of the disease than others. Hybrids that had similarly high yields in both fumigated and nonfumigated plots (demonstrating some level of tolerance) were GH 5702, GH 2385, Esquire, GH 1861, GH 2757, and Bonus. As with any yield information, multiple locations and years would produce more accurate data. Among these, GH 2385 and GH 1861 were high yielding in the Vegetable Farm trials. GH 1861 was given a similar overall quality rating to Jubilee (3.5) whereas GH 2385 had tougher pericarp and was consequently rated lower (3.0).

Table 1. List of hybrids with "x" indicating trials in which they were grown in 2002.

Hybrid	Source	Endosperm type	Scio	Botany Farm	Vegetable Farm
Eliminator	Crookham	*su*	x	x	x
Dynamo	Harris Moran	*su*	x	x	x
8441107	Seminis	*su*	x	x	x
8482608	Seminis	*su*	x	x	x
Esquire	Seminis	*su*	x	x	
Bonus	Syngenta	*su*	x	x	x
GH 1861	Syngenta	*su*	x	x	x
GH 2041	Syngenta	*su*	x	x	x
GH 2385	Syngenta	*su*	x	x	x
GH 2547	Syngenta	*su*	x	x	x
GH 5702	Syngenta	*su*	x	x	x
GH 9590	Syngenta	*su*	x	x	x
GH 9595	Syngenta	*su*	x	x	x
Jubilee	Syngenta	*su*	x	x	x
Reward	Syngenta	*su*	x	x	x
GH 1829	Syngenta	*se*	x	x	
GH 2684	Syngenta	*se*	x	x	x
GH 2757	Syngenta	*se*	x	x	x
GH 4809	Syngenta	*se*	x	x	x
NE EDR	Germplasm release	*sh2*		x	
8492829	Seminis	*sh2*		x	
8705797	Seminis	*sh2*		x	
GSS 9299	Syngenta	*sh2*		x	
SSJubilee	Syngenta	*sh2*		x	

Table 2. Early season root rot symptoms from the Shumacher Farm for sweet corn hybrids grown in a root rot trial, Scio, 2002.

	Mean Disease Scores[z]											
	Radicle[y]			Mesocotyl[x]			Nodal Roots[w]			Crown[v]		
Hybrids	Methyl Bromide	Vapam	Untreated Check	Methyl Bromide	Vapam	Untreated Check	Methyl Bromide	Vapam	Untreated Check	Methyl Bromide	Vapam	Untreated Check
GH 9595	0.33		2.50	0.90		0.58	0.00		0.02	0.40		0.58
Bonus	0.10		2.83	0.60		0.33	0.00		0.12	0.67		0.75
Eliminator			2.92			0.50			0.04			0.83
GH 2385	0.33		2.58	0.33		0.25	0.00		0.01	1.00		0.92
Esquire	0.42		2.67	0.42		0.33	0.00		0.01	0.67		0.92
Reward			2.83			0.25			0.03			1.00
8482608	0.33		2.92	0.33		0.08	0.00		0.03	1.67		1.00
GH 2041	0.33		2.92	0.33		0.25	0.00		0.04	2.00		1.00
GH 4809	0.00		3.00	1.00		0.42	0.00		0.01	0.33		1.17
GH 1861	0.50		3.00	0.75		0.25	0.00		0.08	1.17		1.25
Dynamo			3.00			0.75			0.00			1.42
8441107			3.08			0.25			0.13			1.58
GH 5702	0.67		2.50	0.67		0.33	0.00		0.10	1.33		1.67
GH 2547			2.42			0.17			0.01			1.75
GH 9590	0.67		2.50	1.00		0.00	0.00		0.02	0.80		1.83
Jubilee	0.17	0.25	2.92	0.83	0.50	0.33	0.00	0.00	0.03	1.58	1.92	1.92
GH 2757	0.67		3.00	1.00		0.42	0.00		0.03	2.00		1.92
GH 2684			2.83			0.33			0.03			1.92
GH 1829	0.17		2.50	0.33		0.00	0.00		0.00	1.92		1.92
LSD @5%			0.45			0.36			0.11			0.41

[z]Roots were scored at the 5-6 leaf stage. For the untreated check, an average of 3 plants per plot in 4 replications were scored. For the methyl bromide and vapam treatments the number of replications varied from 1 to 4.

[y]0-4 scale with 0 = no symptoms and 4 = severe.

[x]0-2 scale with 0 = no symptoms and 2 = severe.

[w]% of roots infected.

[v]0-3 scale with 0 = no symptoms and 3 = severe.

Table 3. Leaf firing severity from the Shumacher Farm for sweet corn hybrids grown in a root rot trial, Scio 2002

Hybrid	Mean Disease Severity on dates[z]				AUDPC[y]
	12-Sep	19-Sep	26-Sep	3-Oct	
Esquire	4.33	4.92	6.42	7.25	115
GH 2684	6.08	5.42	7.08	9.25*	135
Jubilee	6.75	7.00	7.25	7.08*	141
Eliminator	7.58	5.67	8.33	8.67*	148
GH 2757	8.58	7.08	6.42	9.08	148
GH 2547	7.25	5.33	9.00	9.92	154
GH 9595	7.92	7.25	7.83	8.67	156
GH 9590	9.83	6.58	9.17	11.50	174
Dynamo	7.17	9.42	11.58	10.58*	199
8441107	10.33	10.00	10.17	11.00*	206
GH 4809	10.75	9.58	11.08	11.17	211
GH 2041	9.08	10.08	10.92*	12.58	213
Bonus	10.33	10.33	10.75	11.58	214
GH 2385	9.83	12.08	12.00	12.17	235
Reward	12.08	10.33*	12.17	13.17	235
GH 1861	10.00	11.75*	12.33	13.50	240
GH 1829	9.67	12.42	12.75	13.42*	246
8482608	12.33	11.83	13.08	13.58	253
GH 5702	13.83	14.17	15.92	14.25	295
LSD @5%	2.24	1.90	1.99	2.09	29

[z]Scale of 0-5 where 0 = no symptoms and 5 = necrotic leaves at five nodes or to ear. Average of 12 plots, 10 plants per plot (maximum score per plot is 50). * indicates approximate maturity date. Unstarred lines matured later than October 3.

[y]AUDPC = Area under the disease progression curve.

Table 4. Leaf firing severity in fumigation treatments from the Shumacher Farm for sweet corn grown in a root rot trial, Scio 2002

Fumigation Treatment	Mean Disease Severity on Dates[z]				AUDPC[y]
	12-Sep	19-Sep	26-Sep	3-Oct	
Methyl Bromide	10.99c	11.70c	13.00c	14.00c	249c
Vapam	9.59b	8.71b	10.03b	10.54b	192b
Untreated Check	6.69a	6.63a	7.64a	8.37a	146a
LSD @5%	0.89	0.76	0.79	0.83	11

[z]Scale of 0-5 where 0 = no symptoms and 5 = necrotic leaves at five nodes or to ear. Average of 76 plots, 10 plants per plot (maximum score per plot is 50). Means with different letters are significantly different at the .05 level.

[y]AUDPC = Area under the disease progression curve.

Table 5. Disease severity (root and crown symptoms) from the Shumacher Farm for sweet corn hybrids grown in a root rot trial, Scio 2002[z]

Hybrid	% of Roots Infected by Root Rot				Crown Discoloration Scores[y]			
	Methyl Bro-mide	Vapam	Untreated Check	Overall AV	Methyl Bro-mide	Vapam	Untreated Check	Overall AV
GH 1861	3.4	9.3	25.4	12.7				
Eliminator	5.3	10.1	33.3	16.3	1.7	1.7	1.7	1.7
Jubilee	8.3	14.2	29.4	17.3	2.2	2.3	2.1	2.2
GH 2684	7.4	9.8	37.5	18.2	2.8	2.8	2.7	2.8
GH 2757	5.3	11.7	41.7	19.6	1.7	2.1	2.3	2.0
GH 5702	6.8	20.0	33.3	20.1	1.7	2.0	2.3	2.0
GH 2041	4.8	12.1	43.8	20.2	0.8	0.7	1.3	0.9
GH 1829	6.2	13.3	41.7	20.4	2.2	2.7	2.7	2.5
8441107	5.8	9.8	47.9	21.2				
GH 2385	5.3	13.5	50.0	22.9	1.2	1.8	2.2	1.7
GH 9595	5.0	9.0			1.7	1.2		
Treatment AV	5.9	12.4	38.4		1.8	2.0	2.2	
LSD @5%				6.5				0.4

[z]Readings taken at harvest. Average of 3 plants per plot per treatment, with a non-uniform number of replications (1-4). LSD @5% for comparing treatments = 3.5 for roots and 0.2 for crowns.

[y]Scores based on 1-3 scale where 1 = mild symptoms and 3 = severe.

Table 6. Yield and ear measurements from the Schumacher Farm for selected sweet corn hybrids grown in a root rot trial, Scio, 2002.[z]

Entry	Source	Type	Days to Harvest	Good Ears				Cull (T/A)	Ear Length (in.)	Ear Diam. (in.)	Kernel Depth (mm)
				1000/A	T/A	Ears/Plant	Lbs/Ear				
GH 2385	Rogers	*su*	94	22.5	6.7	0.97	0.59	0.54	7.3	2.05	11.2
GH 2041	Rogers	*su*	94	22.3	6.8	0.96	0.60	0.49	7.7	2.10	12.2
8441107	Seminis	*su*	94	25.0	7.5	1.08	0.60	0.33	7.4	2.05	11.2
GH 2684	Rogers	*se*	94	24.8	7.7	1.07	0.63	0.58	7.9	2.05	12.7
Jubilee	Rogers	*su*	101	21.8	6.3	0.94	0.58	0.43	8.2	1.97	11.3
Eliminator	Crookham	*su*	101	24.5	7.8	1.05	0.63	0.26	7.9	1.90	11.2
GH 1829	Rogers	*se*	101	24.0	7.1	1.03	0.59	0.35	8.1	1.93	11.8
GH 1861	Rogers	*su*	101	23.3	7.1	1.00	0.59	0.95	7.9	2.08	12.7
GH 5702	Rogers	*su*	101	23.8	7.4	1.03	0.62	0.30	7.9	1.94	11.3
GH 2757	Rogers	*se*	101	23.3	7.1	1.00	0.61	0.18	7.8	1.92	10.8
GH 9595	Rogers	*su*	101	23.0	7.0	0.99	0.62	0.84	8.0	2.07	12.3
LSD @5%				NS	1.3	NS	0.06	0.46	0.3	0.06	0.9

[z]Planted June 27 in rows 30" apart, thinned to 9" between plants. 20 plants were harvested from each plot where available; where there were fewer than 20 plants, data was adjusted to a 20 plant plot. Yield data is the mean of 12 plots (treatments combined); all other data is the mean of 3 plots (one per treatment). All data except cull T/A were obtained from typical husked good ears. For ear length and ear diameter, the value used for each replication was the average of 10 individual ear measurements.

Table 7. Ear quality evaluations from the Shumacher Farm for selected sweet corn hybrids grown in a root rot trial, 2002.[z]

Entry	Row Straight-ness	Tip Fill	Ear Unif.	Mat Unif.	Kernel Unif.	Notes
GH 2385	3.8	3.2	3.0	2.8	3.8	Some shriveled kernels
GH 2041	3.5	4.0	3.5	3.0	3.2	Some shriveled kernels
8441107	3.7	2.0	3.2	3.0	3.7	Some shriveled kernels
GH 2684	3.8	4.3	3.3	3.5	3.7	Some shriveled kernels
Jubilee	3.8	4.2	3.7	3.0	3.7	
Eliminator	3.8	4.0	3.7	3.0	3.8	Some shriveled kernels; curved ears
GH 1829	4.0	4.3	3.7	3.0	3.8	
GH 1861	3.5	4.0	3.5	3.7	3.2	
GH 5702	4.0	4.0	4.0	3.0	3.8	
GH 2757	4.5	2.0	3.0	3.0	4.3	Some shriveled kernels
GH 9595	3.5	3.7	3.2	3.5	3.7	Curved ears

[z]Planted June 24. Scores based on a 1-5 scale, with 5 = best. Scores are an average across fumigation treatments from rep 2 (treatments were not significantly different).

Table 8. Means for Factors Related to Corn Root Rot by Hybrid, Botany Farm 2002

Hybrid	Adventitious Root Rot [z]	Insect Feeding [y]	Primary Root Rot [z]	Mesocotyl Rating [z]	Brown Node [z]	Crown Rot [x]
Eliminator	1.44	1.56	1.78	1.69	1.22	0.06
GSS 9299	1.59	1.30	1.92	1.35	1.37	0.09
8441107	1.61	1.58	1.43	2.00	2.15	0.75
GH 2547	1.61	1.85	1.46	1.67	1.15	0.54
GH 2684	1.63	1.48	1.70	1.85	2.63	0.96
GH 1829	1.65	1.26	2.00	1.67	1.80	0.26
Jubilee	1.65	1.52	1.75	1.73	2.26	0.47
GH 1861	1.67	1.52	1.88	1.81	1.98	0.20
NE EDR	1.67	1.78	2.19	2.83	2.07	0.63
GH 2757	1.69	1.48	1.41	2.26	1.91	0.50
Dynamo	1.72	1.30	1.70	1.33	1.89	0.13
GH 4809	1.72	1.37	2.11	2.50	1.04	0.13
GH 2041	1.80	1.59	1.85	1.72	1.89	0.27
GH 5702	1.87	1.56	2.14	2.19	1.37	0.31
8705797	1.89	1.19	1.41	1.61	1.26	0.05
GH 9590	1.89	1.96	1.65	2.35	1.59	0.64
GH 9595	1.89	1.67	1.98	2.76	0.82	0.35
Bonus	1.91	1.48	2.06	2.07	1.04	0.20
GH 2385	1.96	1.56	2.44	2.13	1.33	0.27
Reward	2.00	1.37	1.48	1.76	2.11	0.47
Esquire	2.11	1.96	1.81	1.57	0.96	0.10
SS Jubilee	2.15	1.37	2.30	2.46	1.67	0.87
8482608	2.50	2.04	2.50	2.92	1.37	0.93
8492829	2.65	1.85	1.83	2.04	0.89	0.44
LSD 0.05	0.37	[w]	[w]	[w]	[w]	0.24

[z] scale of 1-4 where 1=0-25% infection, 2=25-50%, 3=50-75%, and 4=75-100%.

[y] scale of 1-3 where 1=light damage, 2=moderate damage, 3=heavy damage.

[x] 1=crown present & 0=crown rot absent

[w] missing data did not allow calculation of LSD.

Table 9. Means for Root Rot Factors by Treatment, Botany Farm 2002

Treatment	Insect Feeding (1-3)[z]	Primary Root Rot (1-4)[y]	Mesocotyl Rating (1-4)[y]	Adventitious Root Rot (1-4)[y]	Brown Node (1-4)[y]	Crown Rot (0-1)[x]
Untreated	1.13 b	2.6 b	2.19 b	1.97 b	1.67 b	0.42 a
Vapam	1.81 a	1.37 a	1.97 a	1.78 a	1.49 a	0.33 a
Methyl Bromide	1.75 a	1.54 a	1.89 a	1.79 a	1.56 a	0.45 a

[z] Diabrotica larvae damage to roots (1= light damage, 3 =heavy damage)

[y] Percentage of Root Damage (1 = 0-25%, 4 = 75%-100%)

[x] Crown rot (0 = absent, 1 = present)

Table 10. Means for Leaf Firing by Treatment, Botany Farm 2002

			Date	
Treatment	AUDPC[z]	Sep 24	Oct 1	Oct 8
Untreated	109b	5b	8b	12b
Vapam	152a	9a	11a	15a
Methyl Bromide	155a	9a	11a	15a
LSD 0.05	11	1	1	1

[z] Area under the disease progress curve.

Table 11. Leaf Firing Means for Root Rot Corn by Hybrid, Botany Farm 2002

			Date		
Hybrid		AUDPC[z]	Sep 24	Oct 1	Oct 8
GH 2547		229	13	17	22
GH 9590		218	13	16	21
GH 2385		181	13	14	15
GH 5702		170	10	13	15
GH 4809		168	8	13	16
GH 2041		154	9	11	17
Reward		149	7	10	18
NE EDR		147	7	11	16
Bonus		143	9	10	14
GH 2757		139	7	10	15
GH 1861		135	7	9	15
8482608		131	7	9	14
GH 1829		130	8	9	13
Jubilee		129	7	9	14
8441107		128	8	10	11
GSS 9299		127	6	10	11
SSJubilee		120	7	8	14
GH 9595		118	6	9	12
Esquire		118	5	9	13
Dynamo		111	5	8	12
Eliminator		108	5	8	11
8705797		100	5	7	11
GH 2684		86	3	6	10
8492829		85	5	6	10
LSD 0.05		30	3	3	3

[z] Area under the disease progress curve.

Table 12. Means for Factors Related to Yield by Treatment, Botany Farm 2002

Treatment	Ears/Ac (x1000)	Gross (T/A)	Good (T/A)	Cull (T/A)
			T/A	
Methyl Bromide	24.18a	10.60a	6.88a	0.22a
Untreated	22.72ab	10.21ab	6.13b	0.31a
Vapam	22.28b	9.78b	6.16b	0.20a
LSD 0.05	1.62	0.68	0.55	ns

Table 13. Means for Yield by Hybrid, Botany Farm 2002

Hybrid	Moisture (%)	Ears/Ac (x1000)	Gross T/A	Good T/A	T/A adjusted to 73% moisture	Culls (T/A)
GH 4809	73.28	32.50	11.52	9.04	9.28	0.06
GH 2684	77.55	25.38	11.23	6.32	9.92	0.26
Esquire	76.10	25.21	13.31	7.83	10.30	0.29
GH 1829	74.08	25.08	11.27	7.12	7.98	0.03
GH 2385	76.19	24.71	10.07	6.91	9.47	0.00
GH 2757	75.27	24.56	10.92	6.78	8.60	0.00
SS Jubilee	73.29	24.39	9.37	5.94	6.17	0.15
8492829	75.86	24.32	10.05	6.43	8.72	0.21
Bonus	74.48	24.11	11.01	7.46	8.64	0.15
8482608	72.96	23.28	10.28	6.81	6.78	0.09
GH 5702	75.46	23.25	10.07	7.12	9.09	0.00
GH 2041	76.05	22.68	11.73	6.27	8.71	0.97
Eliminator	72.56	21.87	10.62	6.47	6.12	0.00
GH 9590	75.36	21.87	10.69	6.66	9.02	0.13
GH 9595	76.47	21.78	9.47	5.31	8.78	0.16
8441107	77.94	21.19	9.79	5.61	10.55	0.73
GSS 9299	77.78	21.00	7.68	5.07	8.89	0.08
GH 1861	73.69	20.77	11.17	5.89	6.44	0.90
Reward	73.07	20.67	10.00	5.66	5.72	1.05
Dynamo	78.80	20.16	9.89	5.93	10.57	0.10
8705797	69.62	19.74	7.62	5.64	2.26	0.07
Jubilee	77.91	18.78	6.56	4.33	8.26	0.00
LSD 0.05	--	4.38	1.83	1.48	--	0.31

Table 14. Simple Correlation Coefficients (R) Among Root Rot and Yield Variables, Botany Farm 2002

	Insect Feeding	Primary Root Rot	Meso-cotyl Rat-ing	Adventitious Root Rot	Brown Node	Crown Rot	AUDPC	Ears/Ac (x1000)	Gross T/A	Good T/A
Primary Root Rot	0.22	1.00								
Mesocotyl Rating	0.45*	0.48*	1.00							
Adventitious Root Rot	0.56*	0.38+	0.44*	1.00						
Brown Node	-0.29	-0.39+	-0.30	-0.43*	1.00					
Crown Rot MS	0.35	0.09	0.53*	0.31	0.47*	1.00				
AUDPC	0.19	0.22	0.31	-0.09	-0.04	-0.03	1.00			
Ears/Ac (x1000)	0.06	0.41+	0.40+	0.15	-0.31	0.03	0.17	1.00		
Gross T/A	0.36+	0.11	0.11	0.08	-0.11	-0.04	0.17	0.59**	1.00	
Good T/A	0.20	0.35	0.29	0.17	-0.42+	-0.17	0.32	0.86***	0.75***	1.00
Cull T/A	0.02	-0.32	-0.20	-0.02	0.40+	0.09	0.04	-0.24	0.25	-0.22

+, *, **, *** Indicates probability of R significantly different from 0 for P=0.10. 0.05, 0.01& 0.001, respectively.

Table 15. Yield and ear measurements from the OSU Vegetable Farm for sweet corn hybrids grown in an observation trial, 2002.[z]

Entry	Source	Type	Days to Harvest	Stand	Good Ears				Culls		Ear Length (in.)	Ear Diam. (in.)	Kernel Depth (mm)	Pericarp Toughness[x]
					1000/A	T/A	Ears/ Plant	Lbs/ Ear	1000/A	T/A				
Reward	Rogers	su	83	34	24.4	7.4	0.82	0.61	5.2	1.0	7.9	2.05	12.0	72
GH 1861	Rogers	su	83	29	35.7	10.9	1.41	0.61	0.0	0.0	8.3	1.90	12.0	76
GH 2041*	Rogers	su	92	28	28.5	9.4	1.20	0.70	1.5	0.2	8.0	2.05	12.0	108
8441107	Seminis	su	96	27	23.5	12.3	1.00	1.04	1.7	0.3	7.5	2.10	13.0	100
Dynamo	Harris Moran	su	96	27	26.1	10.6	1.11	0.81	0.9	0.1	9.0	2.10	13.0	97
Jubilee*	Rogers	su	99	28	32.2	9.8	1.30	0.60	1.5	0.4	7.7	2.00	13.0	79
Eliminator	Crookham	su	99	30	28.7	10.2	1.10	0.71	0.0	0.0	8.2	2.00	12.0	137
GH 2684*	Rogers	se	102	30	32.7	10.8	1.20	0.70	3.5	0.7	8.3	2.05	12.5	85
8482608	Seminis	su	102	29	28.7	11.4	1.14	0.79	0.0	0.0	8.1	2.15	13.0	75
GH 2385*	Rogers	su	103	27	36.4	13.0	1.50	0.70	0.4	0.1	7.8	2.20	13.0	103
GH 5702	Rogers	su	103	30	23.5	8.5	0.90	0.72	2.6	0.4	8.0	2.05	11.5	101
GH 9590	Rogers	su	103	29	30.5	11.7	1.21	0.77	6.1	1.5	8.7	2.15	12.0	88
GH 4809	Rogers	se	109	28	42.7	11.6	1.75	0.54	0.0	0.0	7.7	1.90	12.0	108
GH 2547	Rogers	su	109	34	29.6	10.2	1.00	0.69	1.7	0.3	8.2	2.05	12.0	92
GH 2757	Rogers	se	109	30	28.7	10.7	1.10	0.75	3.5	0.7	8.0	2.10	14.0	97
Bonus	Rogers	su	109	30	29.6	10.5	1.13	0.71	0.9	0.1	7.9	2.10	13.5	145
GH 9595	Rogers	su	109	28	27.9	8.1	1.14	0.58	0.0	0.0	6.9	2.05	12.0	108

[z]Planted June 27 in rows 30" apart, thinned to 9" between plants. Values for varieties marked * are means of 4 replications; all others are from a single 20' plot. All data except cull no. and T/A were obtained from typical husked good ears. For ear length, ear diameter, and tenderness, the value used for each replication was the average of 10 individual ear measurements.

[x]Tenderness determined by a spring-operated puncture gauge; lower numbers indicate more tender pericarp.

Table 16. Ear quality evaluations from the OSU Vegetable Farm for sweet corn hybrids grown in an observation trial, 2002.[z]

Entry	Kernel Refine-ment	Row Straight-ness	Tip Fill	Cylind. Shape	Ear Unif.	Mat Unif.	Kernel Unif.	Flavor	Overall Score	Row #	Notes
Reward	3.0	3.5	2.5	4.0	2.0	2.5	3.0	3.5	2.5	18	Badly lodged
GH 1861	3.0	3.5	4.5	5.0	3.0	2.5	3.0	3.5	3.0	16-22	
GH 2041	3.0	4.5	4.0	4.5	2.5	2.5	3.0	3.5	3.0	18	Some curved ears
8441107	2.5	3.5	3.0	4.0	2.0	3.0	4.0	3.0	3.0	18	Variable--about half the ears are not good type; kernels at tip shriveled on some ears; chews tough
Dynamo	2.5	4.0	3.5	2.0	3.0	2.0	4.0	3.0	2.5	18	
Jubilee	3.0	4.5	3.5	4.0	3.5	4.0	5.0	3.5	3.5	16-18	
Eliminator	3.0	3.0	2.0	2.5	3.5	2.5	3.0	2.0	2.5	18	Slightly curved ears
GH 2684	2.5	4.5	2.0	4.5	3.5	4.0	5.0	4.0	3.0	18	Coarse kernels and poor tip fill; otherwise very nice looking
8482608	4.0	3.0	4.0	4.0	3.0	3.5	3.0	2.5	3.0	20-22	Some curved ears
GH 2385	3.0	3.0	4.5	4.0	3.0	3.0	3.0	4.0	3.0	20	Some curved ears
GH 5702	3.5	3.0	4.0	4.0	2.5	2.5	3.0	3.5	3.0	20	Curved ears
GH 9590	3.0	4.0	2.5	4.5	3.5	3.5	4.0	4.0	3.5	20	Nice looking; very good yield
GH 4809	3.5	3.5	3.5	4.0	4.0	3.5	4.0	4.0	3.5	16	Many useable second ears
GH 2547	2.5	3.0	2.0	4.0	2.0	3.0	3.0	3.5	2.5	18	
GH 2757	2.5	3.5	3.0	3.5	3.0	3.0	3.0	3.5	3.0	18	
Bonus	2.5	3.0	2.5	4.0	3.5	3.0	3.0	3.0	3.0	20	
GH 9595	4.0	3.0	1.5	4.0	4.0	2.5	4.0	4.0	2.5	20	Chews tough; very short ears

zPlanted June 27. Scores based on a 1-5 scale, with 5 = best. Overall score, related to general characteristics of harvested ears, is based on processing potential.

Figure 1. Sweet Corn Root Rot Trial, Shumacher Farm, W. Scio 2002
Area Under the Disease Progress Curve for Firing Symptoms (AUDPC)

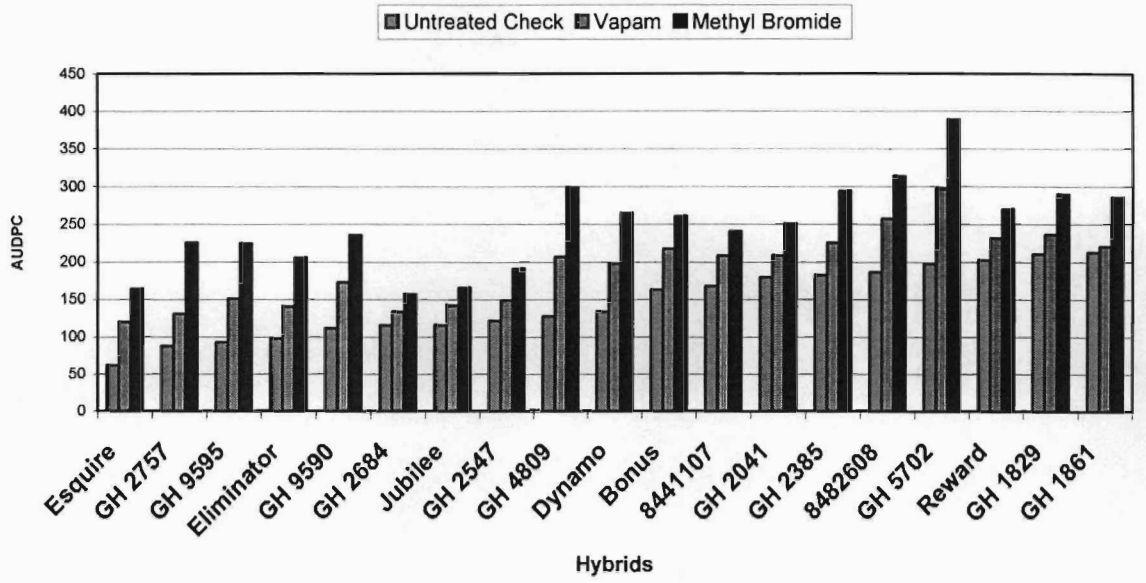

Figure 2. Disease Severity (Root Symptoms) in a Root Rot Trial of Sweet Corn Rated at Harvest Maturity, Shumacher Farm, W. Scio 2002

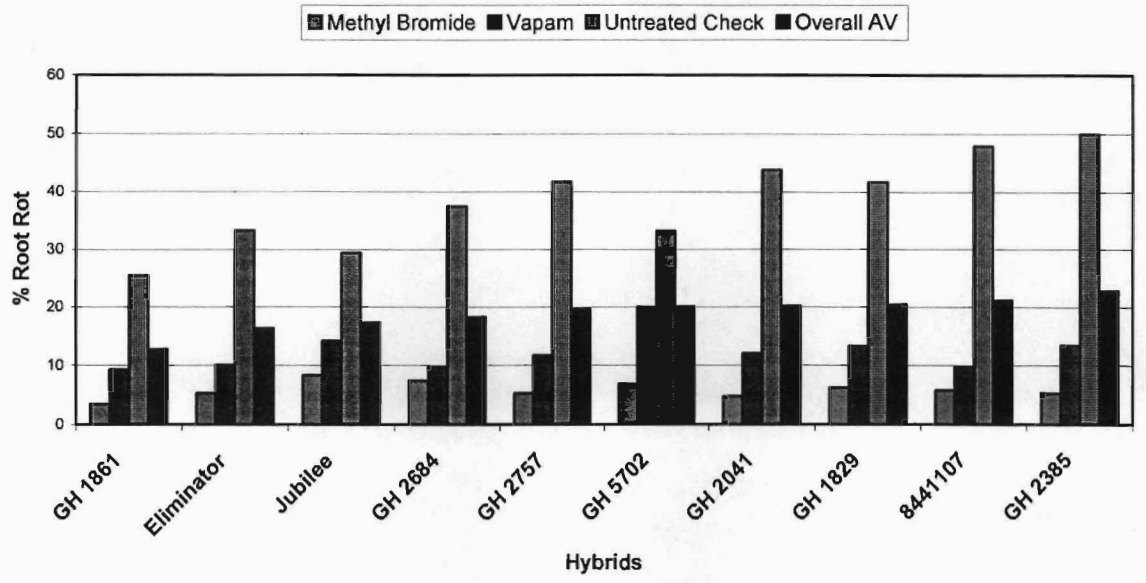

Figure 3. Crown Discoloration in a Root Rot Trial of Sweet Corn Rated at Harvest Maturity, Shumacher Farm, W. Scio 2002

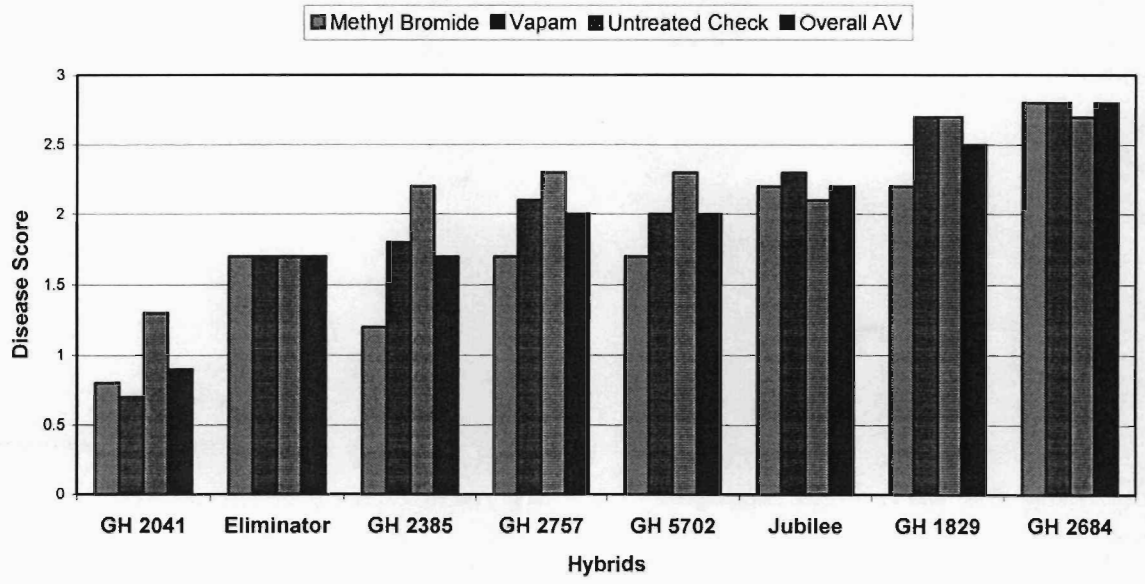

Figure 4. Yield of Sweet Corn Hybrids Grown in a Root Rot Trial, W. Scio, 2002.

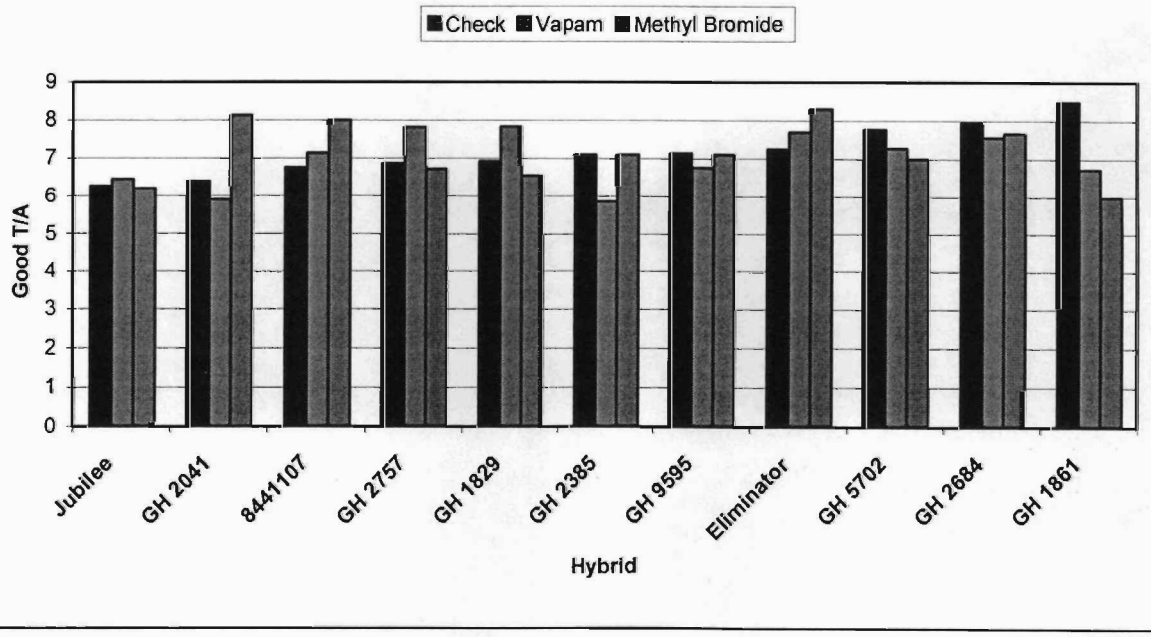

Figure 5. Insect Damage on Sweet Corn Hybrids Grown in Fumigated and Nonfumigated treatments, Botany Farm, 2002

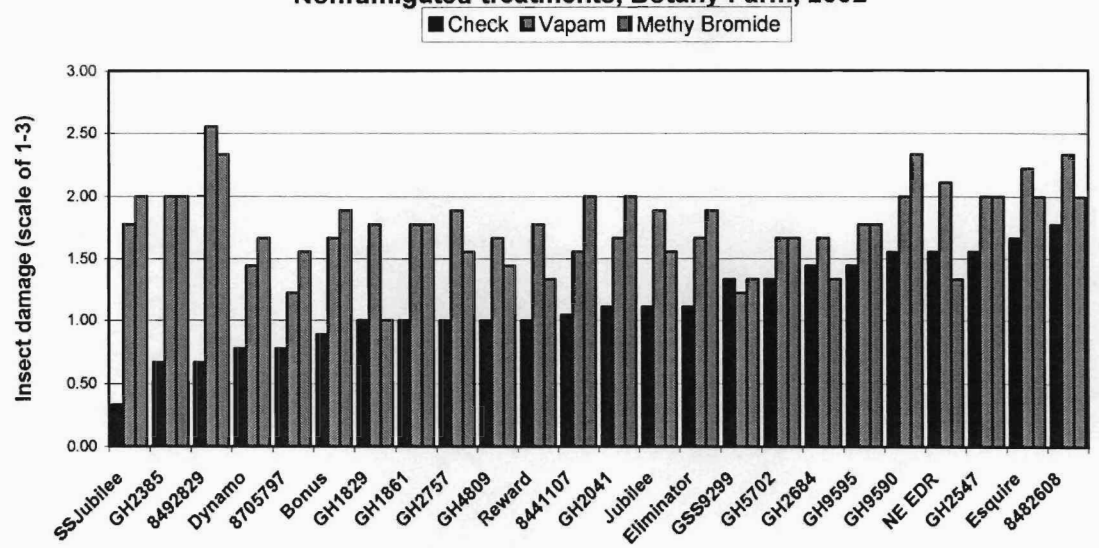

Figure 6. Adventitious Root Rot Symptoms for Sweet Corn Hybrids in Fumigated and Nonfumigated plots, Botany Farm 2002

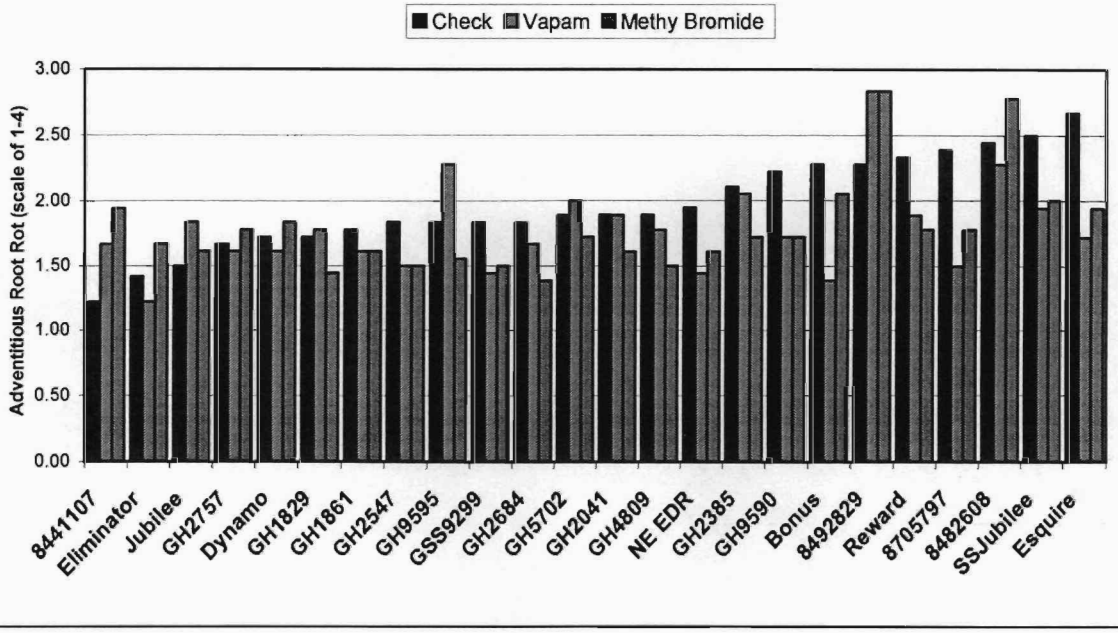

Figure 7. Yield (Good T/A) of Sweet Corn Hybrids Subjected to Three Fumigation Treatments in a Root Rot Trial, Botany Farm 2002

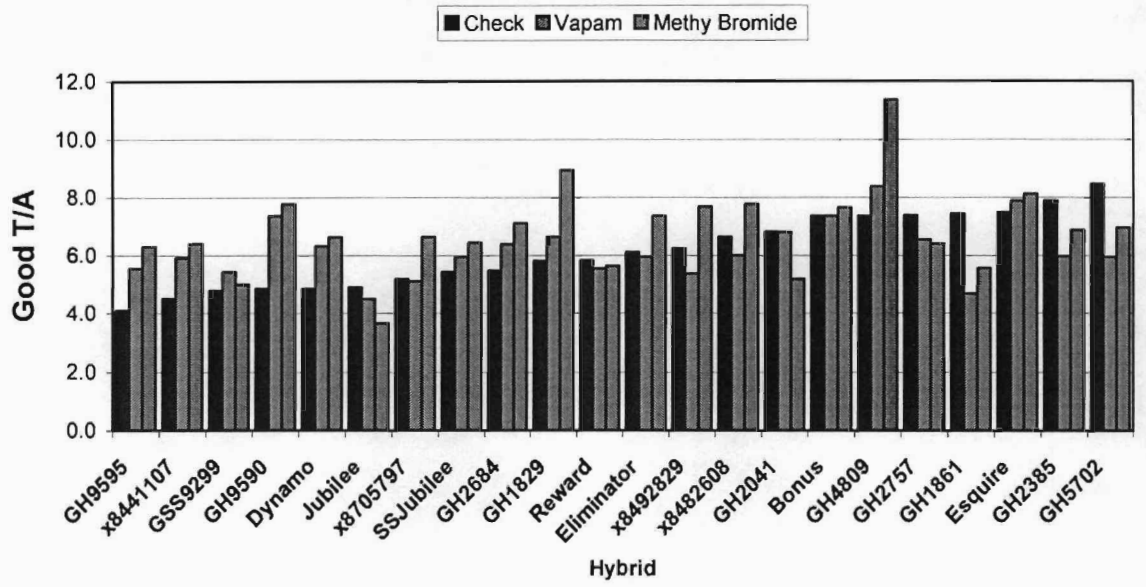

Figure 8. Yield of Sweet Corn Hybrids Grown in an Observation Trial, OSU Vegetable Farm, 2002.

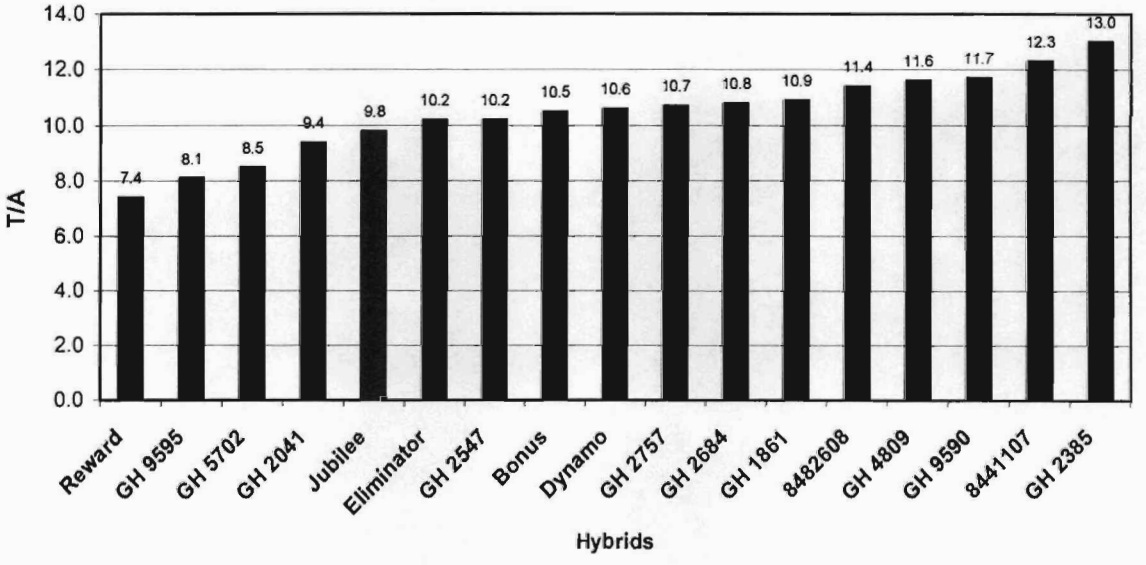

Figure 9. Pericarp Toughness of Sweet Corn Hybrids Grown in an Observation Trial, OSU Vegetable Farm, 2002.