

**Report To The Oregon Processed Vegetable Commission  
1999-2000**

Title: Identification of Sweet Corn Hybrids Resistant to Root/Stalk Rot

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Project Status: Terminating 30 June 2000

Project Funding for this Period: \$12,000

Funding was used to establish, evaluate, and analyze data from sweet corn field plots established on the Jim Belden farm near Stayton. Eighteen hybrids with *se* or *su* endosperm were evaluated for resistance to root/crown rot. Ears were also evaluated for processing quality.

For the past several years a "stalk rot" disease has been afflicting commercial sweet corn fields grown in the Willamette Valley. The disease seems to have a pathogenic basis, but the exact causal agent is unknown. For growers with this disease, yield and quality are reduced, and increased lodging makes harvesting more difficult. While the disease can be found in fields around the Willamette Valley, greatest severity occurs in the Stayton area where rotation times and choices are minimal.

Objectives: Characterize *su* and *se* sweet corn hybrids for reaction to root/crown rot.

Report of Progress:

Major U.S. seed companies were contacted in early spring to request sweet corn hybrids with potential for resistance to root/crown rot. Fifteen entries were received. We also included 'Jubilee' and 'Reward' as susceptible checks, and 'Bonus' as a resistant check (Table 1). A plot for the trial was identified on Belden's Farm on Brick Rd.

One row plots 30 ft. in length and replicated six times were established by planting with hand pushed belt planters. Plots were over-planted, then thinned to approximately two plants per foot. 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.

Disease severity 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. The same plants were also evaluated for lodging. At flowering, silking date was estimated. At harvest, plots were visited 15 Sep., 21 Sep., 29 Sep., 4 Oct., 11 Oct., and 18 Oct. to observe disease severity. Root

samples were collected from selected hybrids over time and were evaluated by Mary Powellson's group.

At the Vegetable Farm, the same entries were established in observation trials, 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.

Differences were observed for disease severity across varieties (Table 1, Figure 1). Disease severity increased as varieties passed through harvest maturity. For example, Reward showed relatively little disease severity at the three earliest evaluation dates, but quickly fell apart after optimum harvest maturity. Other entries, most notably Eliminator, El Toro, GH 1861, Jubilee, FMX 516 and Intrigue showed similar but less extreme trends. Bonus had the lowest disease incidence followed by GH 5702, XP 8410347, and Dynamo. No clear separation among entries was found, which is reflected in the large LSDs.

Four hybrids had overall ear quality that equaled Jubilee (Table 2 and 3, Figures 2 and 3). Three of these, Legacy, Conquest, and GH 2783, showed medium-low to medium disease incidence that appears somewhat better than Jubilee. As in previous trials, Bonus performed well, but may not be acceptable to processors because it has a tough pericarp that becomes more apparent as ears go past optimum harvest time. In our observation trial, Bonus had a tougher pericarp than Jubilee, but was generally in the middle of the group.

Summary: Disease scores steadily increased over evaluation dates. Thirteen hybrids had lower disease scores than Jubilee. As in past years, Bonus appeared most resistant. Other resistant lines were GH 5702, XP 8410347, Dynamo, and GH 7419. Several hybrids, including Legacy, Conquest and GH 2783 had moderate to good resistance and ear equality equal to Jubilee.

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**Table 1. Disease severity for sweet corn hybrids grown in a crown/root rot trial, 1999.**

Hybrid	Mean Disease Severity on dates <sup>z</sup>					
	15-Sep	21-Sep	29-Sep	4-Oct	11-Oct	18-Oct
Bonus	0.33	2.17	4.17	6.00	9.33	8.33
GH 5702	0.83	4.17	5.00	7.83	9.67	10.00
XP 8410347	3.00	5.67	6.50	8.67	10.83	10.83
Dynamo	0.33	1.33	2.67	5.17	9.50	11.83
GH 7419	1.67	3.50	6.00	8.00	10.00	12.00
Legacy	3.00	6.50	8.33	10.17	13.00	12.67
GH 2783	2.33	5.33	7.33	10.67	12.17	12.83
GH 7445	1.33	6.00	7.83	9.83	11.83	13.83
Conquest	2.00	3.50	3.83	8.17	10.67	14.00
HMX 7384	3.00	6.50	8.50	8.83	10.33	14.00
Esquire	2.00	5.17	6.83	8.67	12.00	14.17
Intrigue	1.50	2.67	4.50	8.50	13.67	17.67
FMX 516	4.17	9.17	9.50	11.50	15.00	19.17
Jubilee	4.33	7.67	9.83	11.17	16.17	20.33
GH 1861	1.33	3.83	3.83	6.00	12.83	22.00
El Toro	4.00	7.67	8.67	11.00	16.83	23.00
Eliminator	4.00	7.67	8.17	12.33	23.50	28.33
Reward	4.83	6.50	10.50	24.50	40.33	46.17
LSD @5%	2.89	3.59	4.1	6.41	6.84	7.71

<sup>z</sup>Scale of 0-5 where 0 = no symptoms and 5 = necrotic leaves at five nodes or to ear.  
Average of 6 plots, 10 plants per plot.

**Table 2. Yield and ear measurements for sweet corn hybrids grown in a crown/root rot trial, 1999.<sup>z</sup>**

Entry	Days to Harvest	Stand	Good Ears				Culls		Ear Length (in.)	Ear Diam. (in.)	Kernal Depth (mm)	Pericarp Toughness <sup>y</sup>
			1000/A	T/A	Ears/ Plant	Lbs/ Ear	1000/A	T/A				
Reward	88	27	19.6	5.4	1.00	0.55	0.7	0.11	8.0	1.95	11.0	101
GH 1861	94	26	18.9	6.6	1.00	0.70	0.7	0.15	8.2	2.10	12.0	150
Intrigue	96	26	20.7	6.1	1.09	0.59	0.0	0.00	7.5	1.95	10.8	115
Jubilee	98	28	29.4	8.3	1.48	0.57	2.0	0.29	7.9	1.95	11.1	96
Legacy	98	26	24.0	7.6	1.27	0.64	2.2	0.40	8.1	1.95	10.5	92
HMX 7384	98	28	31.9	10.0	1.57	0.63	4.4	0.73	7.7	1.95	11.0	108
GH 7445	98	28	21.8	6.9	1.07	0.64	0.0	0.00	8.3	1.95	10.0	104
El Toro	98	26	19.6	7.3	1.04	0.74	0.7	0.18	7.9	2.10	11.0	145
Dynamo	98	28	21.8	7.0	1.07	0.64	0.0	0.00	8.3	2.00	11.0	126
FM 516	98	28	24.0	6.8	1.18	0.56	0.0	0.00	7.6	1.85	11.0	141
GH 7419	98	26	17.4	4.5	0.92	0.52	0.0	0.00	7.4	1.85	11.0	148
Eliminator	98	25	31.2	9.7	1.72	0.62	0.7	0.11	8.2	2.00	10.0	156
GH 5702	98	26	28.3	8.4	1.50	0.59	1.5	0.22	7.7	2.00	11.0	126
XP 8410347	101	28	20.2	7.8	1.01	0.78	1.8	0.37	7.7	2.15	11.3	101
Esquire	103	27	29.2	9.6	1.52	0.66	1.3	0.25	8.1	2.08	12.3	83
Bonus	103	27	26.9	7.9	1.37	0.59	0.7	0.07	7.7	2.00	12.0	102
Conquest	103	27	23.1	7.3	1.20	0.64	2.2	0.33	8.3	1.99	11.3	98
GH 2783	105	27	30.5	9.3	1.56	0.61	1.5	0.18	8.1	2.00	12.0	81

<sup>z</sup>Planted June 11 in rows 36" 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.

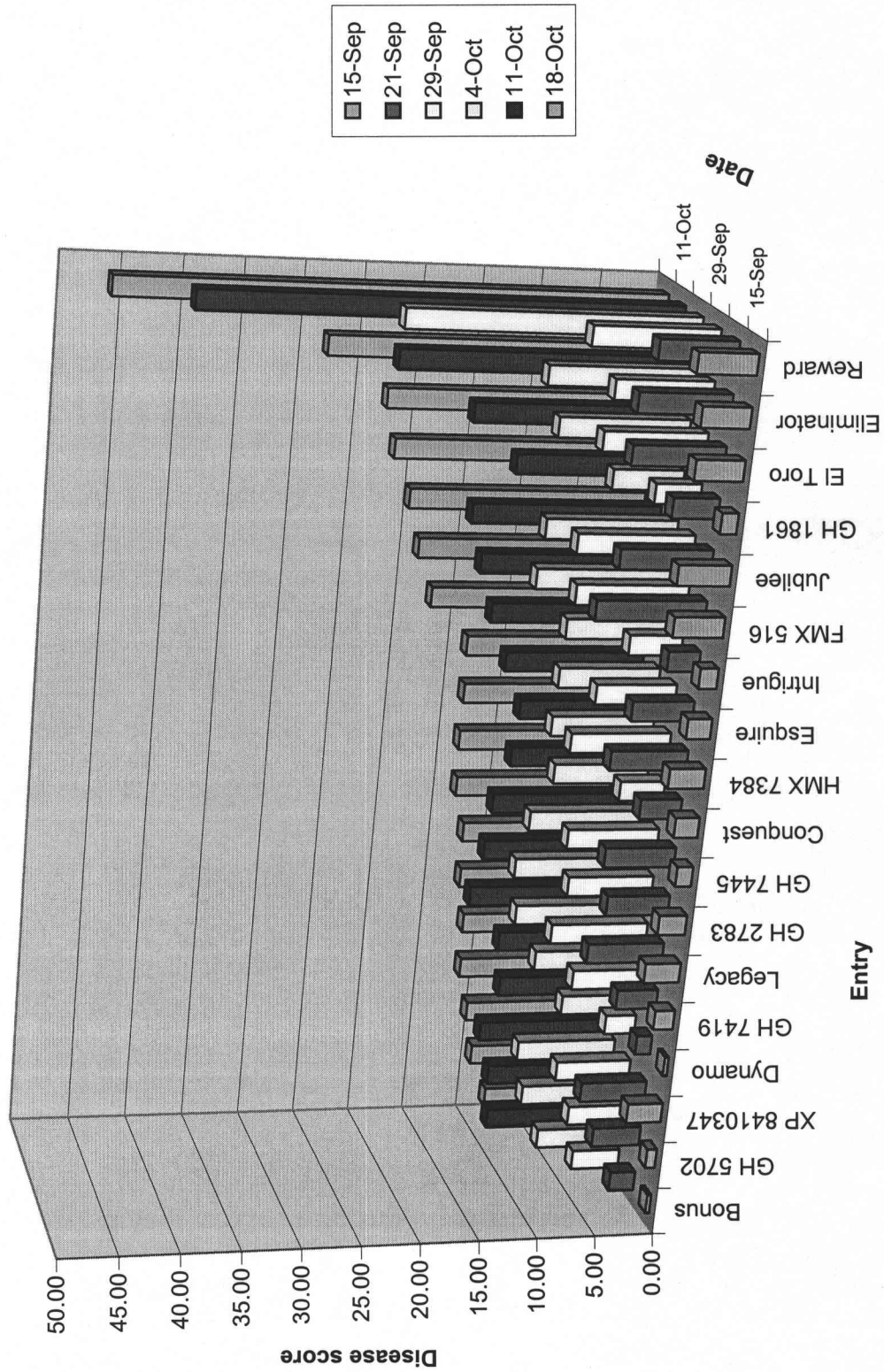
\*Tenderness determined by a spring-operated puncture gauge; lower numbers indicate more tender pericarp.

Table 3. Ear quality evaluations for sweet corn hybrids grown in a crown/root rot trial, 1999.<sup>2</sup>

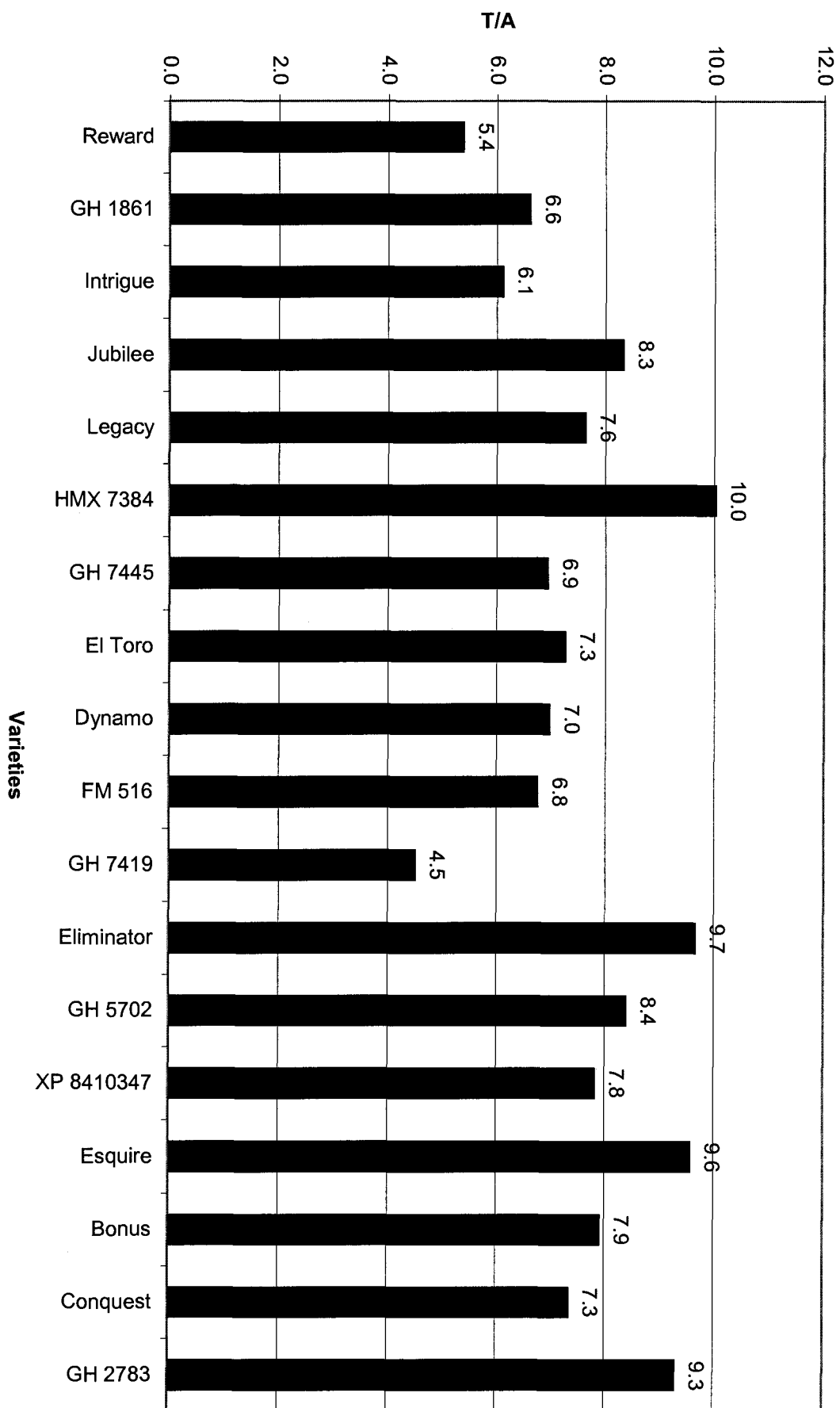
Entry	Kernel Refinement	Row Straightness	Tip Fill	Cylind. Shape	Ear Unif.	Mat. Unif.	Kernel Unif.	Flavor	Overall Score	Row #	Notes
Reward	3	2.5	2.5	3.5	2.5	2	2	3	2.5	16-20	short plants, several ears with jumbled kernels
GH 1861	3	2.5	5	4	2	4	2	2.5	2.5	18-20	
Intrigue	4	3	4.5	3.5	4	4	3	2.5	3.5	20	
Jubilee	3.5	4.5	3	4.5	3.5	3.5	4	4	3.5	18	
Legacy	3.5	3.5	3	3.5	3	2	3.5	3.5	3.5	20	earworm damage
HMX 7384	4	3	5	3.5	3	3	4	3	3	20	
GH 7445	2.5	3.5	3	4	2.5	2	3	4	2.5	16-18	
El Toro	2	4	2.5	2.5	3.5	3	3.5	1	2.5	18	not sweet
Dynamo	3	3	2.5	3.5	2	2	2	2	2	16-18	earworm damage
FM 516	4.5	3	4	3.5	3	3	3	3	3	18-20	curved ears
GH 7419	4.5	3	4	4	4	2	3	3.5	3	20	poor yield, small ears, seems tough
Eliminator	3	4	2.5	3	2	2.5	3.5	1.5	2	16-20	earworm damage, seems really tough
GH 5702	3.5	2.5	4.5	4	3	4	2.5	4	3	18	earworm damage
XP 8410347	2.5	3	4.5	4.5	3.5	2.5	3	3	3	20	flat ears, blunt tip
Esquire	3	3.5	2	4	3	3	3.5	2.5	3	18-22	seems tough
Bonus	3.5	3	2	4	2.5	2.5	3	2.5	3	18-20	
Conquest	4.5	3.5	2.5	4	3.5	3.5	3.5	3	3.5	20-22	seems tough
GH 2783	3.5	3.5	2	4	3.5	3.5	4	3.5	3.5	20	

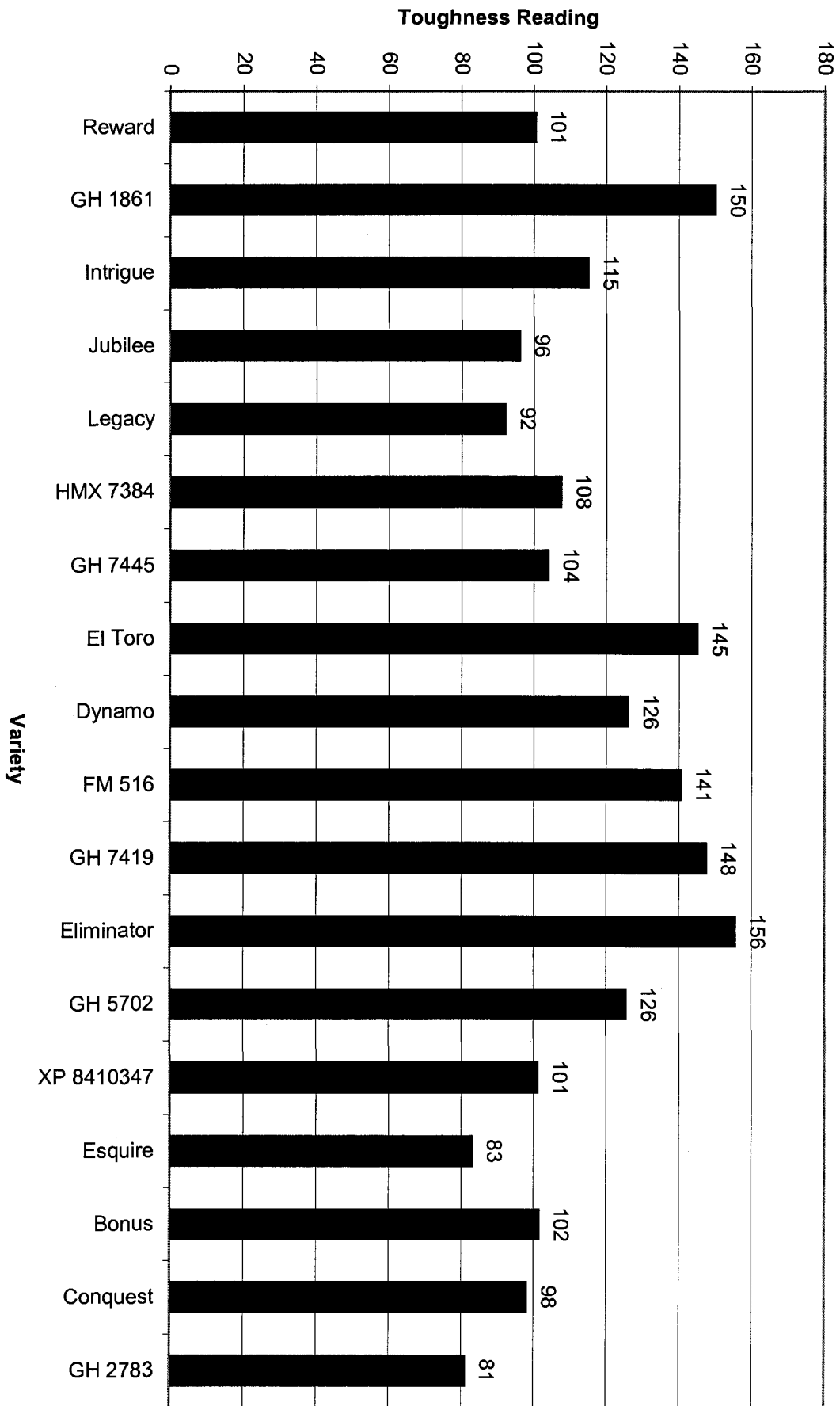
<sup>2</sup>Planted June 11. Scores 1-5 scale, 5 = best. Overall score, related to general characteristics of harvested ears, is based on processing potential and does not necessarily reflect home garden potential.

**Figure 1. Disease progression for 18 sweet corn hybrids over 6 dates.  
no disease = 0; all plants completely fired = 50**



**Figure 2. Yield of Sweet Corn Hybrids**





**Figure 3. Sweet Corn Hybrid Toughness**