

Hard-rind pumpkin cultivar evaluation for *Phytophthora* fruit rot, 2007.

The first pumpkins developed with hard rinds (shells), that are like gourds, demonstrated to produce fruit that when mature were much less susceptible to *Phytophthora* fruit rot than pumpkins with conventional rinds in experiments conducted at the Long Island Horticultural Research and Extension Center (LIHREC) in 1997-8. One of these, Lil' Ironsides, is now available commercially. The experiment conducted in 2007 was a continuation of research started in 2006 to examine new cultivars and experimental cultivars with this trait plus a cultivar with a tough skin (Cannon Ball), all developed by Harris Moran. Two of the experimental cultivars were named and released for the 2008 season: Gargoyle (HMX 5683) and Warlock (HMX 6685). The experiment was conducted at LIHREC in Riverhead, NY, in a field of Haven loam soil where *Phytophthora* blight has been observed since 1991. All 13 pumpkin cultivars and experimental cultivars were seeded in the greenhouse and transplanted into bare ground plots on 2 Jul. Each plot consisted of ten plants spaced 2-ft apart in two 10-ft rows spaced 8.5-ft apart. The buffer zone between plots was planted with summer squash 'Multipik' plant in each row. The experimental design was a randomized complete block with four replications. Fertilizer (N-P-K 10-10-10) at 400 lb/A was broadcast and incorporated on 27 Jun. Water was provided as needed using overhead irrigation. Weeds were controlled by applying Strategy (2 pt/A) between rows after transplanting, cultivating, and hand weeding. Powdery mildew was controlled with applications of Procure (8 fl oz/A) on 17 Aug, 26 Aug, and 22 Sep and Quintec (6 fl oz/A) on 1, 10, and 28 Sep. Fruit were examined for symptoms of *Phytophthora* fruit rot and other types of fruit rot on 3 and 18 Oct. Symptoms that included spores of the pathogen were considered definitive. Fruit with suspected symptoms were also counted. Fruit were not harvested. Average monthly high and low temperatures (°F) were 79/61 in Jun, 82/66 in Jul, 82/65 in Aug, 77/60 in Sep, and 70/56 in Oct. Rainfall (in.) was 3.37, 3.63, 2.60, 1.51, and 1.84 for these months, respectively.

Phytophthora blight developed in the low end of the research field following rain events in August, which resulted in death for most plants in replication 4 before fruit set. Few symptoms of fruit rot were observed in the rest of the experiment until the end of Sep. A high percentage of fruit of the susceptible cultivars, Magic Lantern and Mystic Plus, developed symptoms. Cannon Ball did not have significantly fewer affected fruit than these susceptible cultivars, suggesting that a tough skin is not a sufficient barrier for *Phytophthora capsici*. Apprentice had the fewest fruit with symptoms of *Phytophthora* fruit rot and the most healthy-appearing fruit. This cultivar also performed well in 2006. Lil' Ironsides and Iron Man did not perform as well as they did in 2006, when less than 3% of fruit developed definitive plus suspected symptoms by 9 Oct; however, these did not have significantly more affected fruit than Apprentice in 2007. Warlock and HMX 7791 have a new source of the hard shell trait compared to other cultivars and experimental cultivars in this experiment. This trait is associated with a softer, carvable, hard shell. Warlock and HMX 7791 differed greatly in the proportion of fruit that developed symptoms of *Phytophthora* fruit rot; however, many fruit of Warlock rotted due to other causes, consequently these two experimental cultivars had a similar low percentage of good fruit.

| Pumpkin cultivar/ experimental | % Mature fruit with <i>Phytophthora</i> fruit rot | | | | | | | | % Rotten fruit other causes | | % Healthy-appearing fruit | | # Healthy-appearing fruit/plant | | |
|-----------------------------------|---|-----|--------|-----|--------------|----|--------|-------|-----------------------------|-----|---------------------------|----|---------------------------------|-----|----------|
| | Definitive symptoms | | | | All symptoms | | | | 18-Oct | | 3-Oct | | 18-Oct | | |
| | 3-Oct | | 18-Oct | | 3-Oct | | 18-Oct | | 18-Oct | | 3-Oct | | 18-Oct | | |
| Apprentice | 0.0 | c | 0.5 | c * | 0.0 | b | 10.2 | e | 15.2 | bc | 90 | 75 | 5.2 | a | |
| Lil' Ironsides | 1.4 | bc | 2.7 | c | 1.4 | b | 36.2 | bcde | 29.4 | abc | 68 | 34 | 0.9 | bcd | |
| Iron Man | 1.3 | bc | 19.7 | bc | 19.4 | ab | 34.7 | bcde | 3.7 | c | 89 | 62 | 1.6 | b | |
| Gargoyle | 0.0 | c | 2.2 | c | 0.0 | b | 12.3 | e | 39.5 | ab | 60 | 48 | 1.3 | bc | |
| Warlock | 3.7 | bc | 14.4 | bc | 3.7 | b | 18.1 | de | 40.4 | ab | 56 | 41 | 0.4 | cd | |
| HMX 4682 | 1.0 | bc | 1.0 | c | 1.9 | b | 14.4 | de | 51.6 | a | 53 | 34 | 1.1 | bcd | |
| HMX 4684 | 0.0 | c | 1.3 | c | 0.0 | b | 26.4 | bcde | 37.4 | ab | 73 | 36 | 0.9 | bcd | |
| HMX 5681 | 6.5 | bc | 12.1 | bc | 10.7 | b | 23.2 | cde | 27.6 | abc | 68 | 49 | 0.7 | bcd | |
| HMX 5680 | 10.6 | bc | 48.1 | ab | 10.6 | b | 62.4 | ab | 4.8 | c | 78 | 33 | 0.6 | bcd | |
| HMX 7791 | 27.8 | ab | 76.2 | a | 27.8 | ab | 76.2 | a | 0.0 | c | 68 | 24 | 0.2 | d | |
| Cannon Ball | 14.5 | bc | 20.8 | bc | 47.9 | a | 58.3 | abc | 1.7 | c | 48 | 40 | 0.6 | bcd | |
| Mystic Plus | 43.5 | a | 45.6 | ab | 46.3 | a | 49.5 | abcd | 0.0 | c | 50 | 50 | 0.6 | bcd | |
| Magic Lantern | 19.9 | abc | 27.9 | bc | 19.9 | ab | 42.0 | abcde | 21.8 | abc | 58 | 36 | 0.4 | cd | |
| <i>P</i> -value | 0.0747 | | 0.0124 | | 0.0357 | | 0.0141 | | 0.0170 | | 0.114 | | 0.197 | | < 0.0001 |

*Numbers in each column with a letter in common are not significantly different according to Fisher's Protected LSD ($P=0.05$) except the first column. Mean separation values are included for the first variable.