

## **Hard-rinded Pumpkin Cultivar Evaluation for Phytophthora Fruit Rot, New York 2006**

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Phytophthora fruit rot is a destructive disease on pumpkin causing total loss in some areas and has proven to be extremely difficult to control, even with fungicides. The first pumpkins developed with hard rinds (shells) that are like gourds were 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 goal of the experiment conducted in 2006 was to examine eight new pumpkins with this trait plus a cultivar with a tough skin (Cannon Ball), all developed by Harris Moran. Size of fruit for these ranges from 1 to 25 lbs. They were compared to Lil' Ironsides and to two commonly-grown cultivars with conventional soft rinds (Mystic Plus and Magic Lantern). All cultivars tested, except Apprentice and Lil' Ironsides, have resistance to another important disease, powdery mildew.

**Materials and Methods:** The experiment was conducted at LIHREC in Riverhead, NY in a field of Haven loam soil where Phytophthora blight had developed in at least part of the field in 1991 to 1993, 1995 to 1999, and 2003 to 2005. All 12 pumpkin cultivars and experimental lines were seeded on 9 Jun in the greenhouse and transplanted into bare ground plots on 27 Jun. Each plot consisted of two 10-ft rows spaced 68-in. apart with a 2-ft plant spacing, and the buffer zone was planted with Multipik summer squash. The experimental design was a randomized complete block with five replications. Powdery mildew was controlled with one application of Quintec (4 fl oz/A) on 31 Aug. The insecticide Asana XL EC (9.6 fl oz/A) was applied to control cucumber beetles on 30 Jul and 7 Aug. During the season weeds were controlled by cultivation and hand weeding along with one application of Select 2EC 8 fl oz/A on 31 Jul. Since Phytophthora blight had not developed naturally by mid-Aug, likely due to low rainfall, on 24 Aug fruit of border squash plants were inoculated with a single mycelial plug of *Phytophthora capsici* cut with a number nine cork borer from the edge of a 10-day-old actively expanding culture. The field was overhead irrigated immediately afterwards. On 5 Sep all border plants were examined for symptoms of Phytophthora blight and approximately 50% of these plants had not yet become infected. The border plants were re-inoculated by placing a 1 by 1-in. piece of infected pumpkin fruit on the squash fruit near the base of the plant. Fruit were examined for symptoms of Phytophthora fruit rot and other types of fruit rot on 28 Sep and 9 Oct. Symptoms with spores of the pathogen were considered definitive. A square root transformation was used when needed prior to analysis to achieve homogeneity of variance. Fruit were not harvested.

**Results and Discussion:** Lil' Ironsides had the lowest percentage of fruit with definitive symptoms of Phytophthora fruit rot as well as definite plus those likely caused by the pathogen. Many fruit rotted because of bacterial leaf spot and other reasons however. Six entries had a statistically similar percentage of fruit with Phytophthora fruit rot symptoms on both dates. Most of these produce small (1 to 4 lb) fruit, based on evaluations conducted elsewhere. One, HMX 6685, was the only large-fruited (20 lb) entry tested. Apprentice, Iron Man, and HMX 5683 had significantly more healthy fruit with no symptoms of rot of any cause than Lil' Ironsides. HMX 5683 fruit tended to be warty. The greatest quantity of symptomatic fruit was observed for Magic Lantern, a commonly grown cultivar producing medium-large fruit with conventional rind. The two hard-rinded experimentals producing medium-sized fruit, HMX 5680 (16 lb) and HMX 5681 (17 lb), had significantly fewer affected fruit than Magic Lantern for only one of the four Phytophthora fruit rot values. These two had similar percentage affected fruit as Cannon Ball, which has a tough skin, and as Mystic Plus, the second control cultivar included in this experiment because it produces fruit with conventional rind. It produces small-medium fruit.

Iron Man and HMX 5683 are the top choices among the entries evaluated because they have resistance to powdery mildew and they had relatively low proportion of fruit that were affected by Phytophthora fruit rot or another type of fruit rot in this experiment.

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**Table 1. Occurrence of Phytophthora fruit rot in hard-rinded, tough-skinned, and conventional soft-rinded pumpkin cultivars from Harris Moran Seed Company compared on Long Island, NY, 2006. Cultivars are in order based on quantity of fruit that developed definitive and suspected symptoms by the last assessment date.**

Cultivar	# Fruit/plant	% Mature Fruit with Phytophthora Fruit Rot				% Healthy Fruit	
		Definitive Symptoms		All Symptoms		9/28	10/9
		9/28	10/9	9/28	10/9		
Lil' Ironsides	1.8 cd <sup>z</sup>	0.0 a	0.0 a	0.0 a	0.3 a	40.0 abc	28.7 abc
Apprentice	1.9 d	0.2 ab	0.4 abc	0.2 ab	0.4 ab	79.5 def	73.1 ef
Iron Man	1.4 abcd	0.0 a	0.0 a	0.0 a	2.7 abc	92.6 f	81.5 f
HMX 5683	1.7 bcd	0.3 ab	0.3 ab	0.3 ab	3.5 abc	84.7 ef	67.7 def
HMX 4684	1.4 abcd	0.5 abc	0.5 abc	0.5 abc	4.6 abc	57.9 cd	40.7 bcd
HMX 6685	0.9 a	3.3 abc	4.8 abc	3.3 abcd	4.8 abc	58.8 cde	33.0 abc
HMX 4682	1.8 cd	1.0 abc	1.0 abc	1.0 abcd	6.8 abc	63.8 cde	40.0 bc
HMX 5681	0.8 a	8.0 bcd	8.0 abcd	12.2 de	12.2 bc	19.4 a	14.4 ab
HMX 5680	1.1 ab	9.5 cd	9.5 bcd	11.1 cde	12.4 bc	55.9 cd	35.3 bc
Cannon Ball	1.2 abc	7.6 bcd	7.6 abcd	9.0 bcd	9.0 abc	48.0 bc	32.4 abc
Mystic Plus	1.3 abcd	2.9 abc	13.1 cd	2.9 abcd	23.7 cd	77.6 def	47.1 cde
Magic Lantern	1.2 ab	20.7 d	31.8 d	34.4 e	46.6 d	25.3 ab	5.7 a
<i>P</i> -value	0.0081	0.0145	0.0044	0.0015	0.0091	0.0001	0.0001

<sup>z</sup> Numbers in each column followed by the same letter are not significantly different from each other according to Fisher's protected LSD ( $P=0.05$ ).