

Hard-Rinded Pumpkin Cultivar Evaluation for Phytophthora Fruit Rot, New York 2007

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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 1997-1998. One of these, Lil' Ironsides, is now available commercially. The goal of the experiment conducted in 2007 was to continue a research started in 2006 to examine new pumpkins with this trait plus a cultivar with a tough skin (Cannon Ball), all developed by Harris Moran. The size of fruit for these varieties ranges from 1 to 25 pounds. 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, New York, 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 2006. All 13 pumpkin cultivars and experimental lines were seeded in the greenhouse and transplanted into bare ground plots on July 2. Each plot consisted of 10 plants spaced 2 feet apart in two 10-foot rows spaced 8.5 feet apart. The buffer zone between plots was planted with a Multipik summer squash plant in each row. The experimental design was a randomized complete block with four replications. Fertilizer (N-P-K 10-10-10) at 400 lbs./A was broadcast and incorporated on June 27. 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 Procure (8 fl oz./A) applied on August 17, 26, and September 22; and Quintec (6 fl oz./A) applied on September 1, 10, and 28. Fruit were examined for symptoms of Phytophthora fruit rot and other types of fruit rot on October 3 and 18. Symptoms with spores of the pathogen were considered definitive. Fruit with suspected symptoms were also counted. Fruit were not harvested.

Results and Discussion

Rain in August provided favorable conditions for Phytophthora blight in the low end of this experiment, which resulted in death of most plants in replication 4. Few symptoms of fruit rot were observed in the rest of the experiment until the end of September. A high percentage of fruit of the susceptible cultivars, Magic Lantern and Mystic Plus, developed symptoms. Cannon Ball, which has a tough-skin, did not have significantly fewer affected fruit. Apprentice had the fewest fruit with symptoms of Phytophthora fruit rot and the most healthy-appearing fruit. This variety also performed well in 2006. Lil' Ironsides and Iron Man did not perform as well as in 2006, when less than 3% of fruit developed definitive plus suspected symptoms by October 9; however, these did not have significantly more affected fruit than Apprentice in 2007. HMX

6685 and HMX 7791 have a new source of the hard shell trait than the other cultivars and experimentals in this experiment. This trait is associated with a softer, carvable, hard shell. These two differed greatly in the proportion of fruit that developed symptoms of Phytophthora fruit rot; however, many fruit of HMX 6685 rotted due to other causes, consequently these two experimentals had a similar low percentage of good fruit.

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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, New York, 2007.

Pumpkin Cultivar	% Mature Fruit with <i>Phytophthora</i> Fruit Rot				% Rotten Fruit Other Causes	% Good Fruit	
	Definitive Symptoms		All Symptoms			Oct. 3	Oct. 18
	Oct. 3	Oct. 18	Oct. 3	Oct. 18	Oct. 18		
Apprentice	0.0 c	0.5 c ^z	0.0 b	10.2 e	15.2 bc	61.7 a	51.7 a
Lil' Ironsides	1.4 bc	2.7 c	1.4 b	36.2 bcde	29.4 abc	13.7 bcd	9.0 bcd
Iron Man	1.3 bc	19.7 bc	19.4 ab	34.7 bcde	3.7 c	18.3 b	15.7 b
HMX 4682	1.0 bc	1.0 c	1.9 b	14.4 de	51.6 a	13.3 bcd	11.0 bcd
HMX 4684	0.0 c	1.3 c	0.0 b	26.4 bcde	37.4 ab	18.0 b	9.0 bcd
HMX 5683	0.0 c	2.2 c	0.0 b	12.3 e	39.5 ab	16.3 bc	12.7 bc
HMX 5680	10.6 bc	48.1 ab	10.6 b	62.4 ab	4.8 c	7.7 cde	5.7 bcd
HMX 5681	6.5 bc	12.1 bc	10.7 b	23.2 cde	27.6 abc	6.3 de	6.7 bcd
HMX 6685	3.7 bc	14.4 bc	3.7 b	18.1 de	40.4 ab	5.3 de	4.0 cd
Cannon Ball	14.5 bc	20.8 bc	47.9 a	58.3 abc	1.7 c	7.0 de	6.0 bcd
Magic Lantern	19.9 abc	27.9 bc	19.9 ab	42.0 abcde	21.8 abc	6.0 de	4.3 cd
Mystic Plus	43.5 a	45.6 ab	46.3 a	49.5 abcd	0.0 c	5.7 de	6.3 bcd
HMX 7791	27.8 ab	76.2 a	27.8 ab	76.2 a	0.0 c	3.7 e	1.7 d
<i>P</i> -value	0.0747	0.0124	0.0357	0.0141	0.0170	< 0.0001	< 0.0001

^zNumbers in each column followed by the same letter are not significantly different from each other according to Fisher's protected LSD ($P=0.05$) except the first column. Mean separation values are included for the first variable.