

PUMPKIN (*Cucurbita pepo*)
Powdery mildew; *Podosphaera xanthii*

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Bioassay for evaluation of pumpkin cultivars for resistance to powdery mildew in OH, 2017.

The experiment was conducted in a greenhouse located at The Ohio State University - Ohio Agricultural Research and Development Center (OARDC) in Wooster, OH. Pumpkin seeds were sown on 2, 18 and 31 Aug and 12 Sep into 4 in. pots filled with Baccto Professional Grower Potting Mix. The experiment was set up in a randomized complete block design with four replications. Each replication consisted of three individual potted plants. Plants were hand watered daily, and fertilized (N-P-K 20-20-20; 0.53 oz/gal water) once per week from germination through the end of the experiment. Plants were inoculated when the second true leaf was fully expanded. Pumpkin leaves containing >80% powdery mildew severity were used for inoculation. Fifteen leaves were shaken on top of the seedlings per replication; leaves remained in the room for approximately 8 hours. Leaves with powdery mildew inoculum were collected from three cucurbit fields: OARDC North Central Agricultural Research Station in Fremont, OH, OARDC Western Agricultural Research Station in South Charleston, OH, and the OSU South Centers in Piketon, OH. Inoculum was collected at two time points: early and late during the season. Inoculum from each location was used in separate greenhouse rooms. Any new growth after the third true leaf was removed. Severity of powdery mildew was evaluated per plant by rating the upper surface of the three true leaves at 3, 7, 10, and 14 days after inoculation (DAI) and the Area Under the Disease Progress Curve (AUDPC) was calculated. An extra rating was performed at 21 DAI. Disease severity per leaf was assessed using a rating scale illustrating powdery mildew at 0.5, 1, 2, 4, 8, 16, 32, 64, and 80 percent foliage affected. Experiments were performed twice for each location, except OSU South Centers. Analysis of variance was performed on the angular transformed ($\arcsine [\sqrt{\text{severity}/100}]$) powdery mildew percent severity data using the GLIMMIX procedure, and transformed means were separated by Fisher's least significant difference test with SAS software. Powdery mildew severity data were analyzed independently for each location and for each experiment. Transformed means were back-transformed by squaring the sine of the means. Average maximum and minimum temperature for each experiment before inoculation was: Fremont early season inoculation: 92.0 F and 80.0 F, Fremont late season inoculation: 86.4 F and 72.3 F, South Charleston early season inoculation: 94.6 F and 75.3 F, South Charleston late season inoculation: 92.1 F and 71.8 F, and Piketon early season inoculation: 86.8 F and 76.9 F. Average maximum and minimum temperature for each experiment after inoculation was: Fremont early season inoculation: 86.3 F and 78.8 F, Fremont late season inoculation: 84.1 F and 66.0 F, South Charleston early season inoculation: 87.1 F and 69.1 F, South Charleston late season inoculation: 84.9 F and 68.8 F, and Piketon early season inoculation: 86.0 F and 74.8 F.

It was observed that each individual cultivar showed >80% powdery mildew severity in at least one of the experiments, except cultivars Bella Trix, EX#5, JPN62005R, Renegade, and RPX6880, which showed <80% powdery mildew severity on all experiments (Table 1).

Table 1. Powdery mildew severity (percent) in 30 different pumpkin cultivars 14 days post inoculation (DPI). Inoculum from three different locations in Ohio was used. The experiment was performed once using early season inoculum and once with late season inoculum, except for Piketon (early season only).

Cultivar	Company	Powdery Mildew severity - 14 DPI ^{z y x}				
		Early season inoculum			Late season inoculum	
		Fremont ^w	South Charleston ^u	Piketon ^v	Fremont ^w	South Charleston ^u
Cronus	Harris Moran	47.0 e-g	70.9 a-c	89.2 ab	76.9 a-g	82.4 a-c
Kratos	Harris Moran	69.0 a-c	68.5 a-f	86.2 a-e	76.7 a-g	81.3 a-c
Rhea	Harris Moran	51.1 c-g	70.1 a-d	86.8 a-d	79.5 a-d	81.7 a-c
Zeus	Harris Moran	64.9 a-f	63.4 c-f	85.1 b-f	84.0 a	84.0 a-c
Bellatrix	Enza Zaden	58.1 a-g	71.2 a-c	79.6 e-i	74.0 c-h	79.9 a-e
EX#3	Enza Zaden	70.1 a-g	66.9 a-f	89.2 ab	76.9 a-f	78.2 b-f
EX#5	Enza Zaden	61.2 a-f	61.3 ef	75.8 i	68.4 f-h	77.0 c-f
1512	Abbott & Cobb	73.5 ab	61.3 ef	86.8 a-d	82.9 a	81.3 a-c
1543	Abbott & Cobb	73.5 ab	73.4 ab	82.1 c-i	83.1 a	77.0 c-f
ACX7606	Abbott & Cobb	75.2 ab	71.7 a-c	86.8 a-d	81.7 a-c	78.6 b-f
JPN62005R	Johnny's	52.3 c-g	61.8 d-f	78.1 f-i	69.3 f-h	78.4 b-f
JPN62009	Johnny's	49.2 d-g	66.7 a-f	80.4 d-i	73.0 d-h	83.4 a-c
JPN-14-4090	Johnny's	61.3 a-f	63.8 c-f	83.8 b-h	69.7 e-h	72.3 ef
Renegade	Johnny's	65.8 a-f	63.4 c-f	76.8 hi	67.1 h	73.0 d-f
BayhorseGold	Rupp	62.3 a-f	63.8 c-f	85.2 b-f	72.3 d-h	80.9 a-d
EagleCityGold	Rupp	68.9 a-d	73.4 ab	83.5 b-h	82.4 ab	83.8 a-c
PX6229	Rupp	70.3 a-c	74.2 a	88.4 a-c	74.6 b-h	84.9 ab
RPX6208	Rupp	45.9 fg	61.3 ef	83.4 b-h	66.0 h	80.1 a-e
RPX6880	Rupp	57.9 b-g	59.3 f	77.6 g-i	68.2 gh	71.4 f
RPX6883	Rupp	51.1 c-g	61.3 ef	82.7 c-i	69.7 e-h	70.9 f
RPX6927	Rupp	62.3 a-f	72.6 ab	87.0 a-d	78.9 a-d	84.2 a-c
SkidooGold	Rupp	65.2 a-f	61.1 ef	84.3 b-h	82.4 ab	80.7 a-d
SolidGold	Rupp	76.7 a	73.4 ab	89.3 ab	79.3 a-d	83.9 a-c
CrackerJack	Sakata	52.5 c-g	64.2 c-f	86.8 a-d	74.0 c-h	82.4 a-c
Diablo	Sakata	66.9 a-e	74.2 a	87.9 a-c	81.5 a-c	81.3 a-c
Hulk	Sakata	68.2 a-d	65.1 b-f	88.2 a-c	74.7 b-h	80.2 a-e
JackSprat	Sakata	65.2 a-f	65.9 a-f	88.4 a-c	78.8 a-d	86.8 a
SPU6016	Sakata	75.6 ab	70.1 a-d	91.3 a	78.1 a-e	84.0 a-c
Blaze	SeedWay	39.8 g	63.3 c-f	86.8 a-d	80.5 a-d	81.3 a-c
Jason	SeedWay	67.8 a-d	73.7 a	85.1 b-f	78.1 a-e	84.4 a-c
P-value		0.0109	0.0002	0.0001	<0.0001	0.0023
Average		62.3	67.0	84.8	76.1	80.3
Maximum		76.7	74.2	91.3	84.0	86.8
Minimum		39.8	59.3	75.8	66.0	70.9

^zDisease ratings based on a scale of 0-100% foliage affected using a rating scale that illustrates powdery mildew at 0.5, 1, 2, 4, 8, 16, 32, 64, and 80 percent foliage affected.

^yValues are the back-transformed means.

^xMeans followed by the same lower case letter within a column are not significantly different at P<0.05. Means were separated using Fisher's least significant difference test on angular transformed data.

^wOhio Agricultural Research and Development Center North Central Agricultural Research Station, Fremont, OH.

^vOSU South Centers, Piketon, OH.

^uOhio Agricultural Research and Development Center Western Agricultural Research Station, South Charleston, OH.