PUMPKIN (*Cucurbita pepo* 'Howden')
Powdery mildew; *Sphaerotheca fuliginea*

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Evaluation of fungicides for control of powdery mildew on pumpkin, 2019.

This study was conducted at the Michigan State University Plant Pathology Research Farm located in Lansing, MI, in a field of Capac loam soil previously planted to pumpkins. The field was prepared by plowing, discing, and applying preplant fertilizer (urea 46-0-0 100 lb/A) on 3 Jun. Raised beds, 2.5-ft wide and 110-ft long, were formed and covered with black plastic on 4 Jun. Beds were spaced 12 ft apart from bed center to adjacent bed center. Treatments were arranged in a randomized complete block design with four replicate plots per treatment. Pumpkin 'Howden' plants, 2-weeks old, were transplanted 24 in. apart into treatment plots on 27 Jun. Ten plants were planted per 20-ft plot with a 5-ft buffer between plots within a row. Weekly applications of 20-20-20 were applied at 5 lb/A through the drip irrigation. Plots were hand weeded as needed. Fungicide treatments were applied on 5, 12, 22, and 30 Aug using a CO_2 backpack sprayer and a broadcast boom equipped with four XR8003 flat-fan nozzles spaced 18 in. apart and calibrated at 50 psi to deliver 50 gal/A. Plants were evaluated for disease severity (percentage of the plot with foliar necrosis) on 26 Aug; 5, 11, and 18 Sep. Statistical analysis was conducted with SAS software (v9.3). Data were analyzed using an analysis of variance (ANOVA), with means separation performed using Fisher's protected least significant differences (LSD).

On 26 Aug, disease pressure was low and disease severity for fungicide treatments did not differ from the untreated control. From 5 to 18 Sep, disease pressure was moderate to high with disease severity reaching 71% in the untreated control plots on the last rating date. During this time, only Prolivo SC 4 and 5 fl oz rates + Kinetic SC and the three alternating fungicide programs significantly reduced foliar necrosis compared to the untreated control with one exception; the alternating program of Tebuzol 3.6F 6 fl oz and Rally WP 5 oz tank-mixed with Bravo WeatherStik SC 2 pt did not differ from the untreated control on the last rating date. On the last rating date, treatments of Prolivo SC with a spreader/sticker (Kinetic SC 3 fl oz) were highly effective at both rates (4 and 5 fl oz) compared to most other treatments and limited disease severity to ≤12.5%. On the last rating date, alternating programs which included either Vivando SC 15.4 fl oz or Aprovia Top SL 13.5 fl oz fungicides tank-mixed with Bravo WeatherStik SC 2 pt were equally effective but only the alternating program that included Vivando SC 15.4 fl oz was as effective as Prolivo SC (4 or 5 fl oz rates) + Kinetic SC at reducing disease severity.

	Disease severity (%)[y]			
Treatment and rate/A, (application date[z])	26 Aug	5 Sep	11 Sep	18 Sep
Untreated control	7.0 ab[x]	55.0 b	65.0 d	71.3 d
Quintec SC 4 fl oz, (A-D)	6.3 ab	55.0 b	62.5 cd	52.5 b-d
Quintec SC 6 fl oz + Bravo WeatherStik SC 2 pt, (A,D) *alt.* Torino SC 3.4 fl oz + Bravo WeatherStik SC 2 pt, (B) *alt.* Vivando SC 15.4 fl oz + Bravo WeatherStik SC 2 pt, (C)	1.8 ab	25.0 a	30.0 ab	28.8 ab
Prolivo SC 4 fl oz + Kinetic SC 3 fl oz, (A-D)	0.5 a	8.5 a	8.8 a	10.0 a
Prolivo SC 5 fl oz + Kinetic SC 3 fl oz, (A-D)	0.3 a	11.3 a	15.0 a	12.5 a
Bravo WeatherStik SC 2 pt + Tebuzol 3.6F 6 fl oz, (A,C) *alt.* Rally WP 5 oz + Bravo WeatherStik SC 2 pt, (B, D)	1.8 ab	24.3 a	40.0 bc	58.8 cd
Aprovia Top SL 13.5 fl oz + Bravo WeatherStik 2 pt, (A,D) *alt.* Quintec SC 6 fl oz + Bravo WeatherStik SC 2 pt, (B) *alt.* Torino SC 3.4 fl oz + Bravo WeatherStik 2 pt, (C)	2.0 ab	25.0 a	28.8 ab	38.8 bc
Kocide 3000-O DG 13.5 fl oz, (A-D)	9.8 b	55.0 b	66.3 d	70.0 d
AgriLife SL 25.6 fl oz, (A-D)	9.3 ab	55.0 b	68.8 d	65.0 d

[z] A = 5 Aug, B = 12 Aug, C= 22 Aug, and D =30 Aug; *alt.* = alternate.
[y]Based on a visual estimation of the percentage of necrotic foliage.
[x]Column means with a letter in common are not significantly different (LSD t Test; *P*=0.05).