



Pumpkin Disease Management Demonstration Trial at the Western Agriculture Research Station, South Charleston, Ohio, 2007

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Introduction

There were over 6,700 acres of pumpkins harvested in Ohio in 2006, valued at just over \$22 million dollars. According to a 2005-06 IPM survey of the North Central region pumpkin growers, 52% of 176 respondents indicated that disease management is their major production challenge in producing pumpkins. With the recent influx of insensitive powdery mildew strains and increasing downy mildew outbreaks, disease management is a major concern among growers.

This demonstration trial was designed to look at eight combinations of fungicides primarily for powdery mildew control, but also as a total disease management program including downy mildew, *Microdochium* blight (white speck), and *Alternaria* leaf blight.

Demonstration plots were 120 ft long and three rows wide based on 5 ft row spacing. These plots were not replicated, only 1 plot per treatment. Plants were spaced 3 ft within the row. All plots were direct seeded with Magic Lantern on June 11 into a killed and flattened winter rye cover crop, then treated in-furrow with Admire Pro to control striped cucumber beetles. The fertility program was 100 pounds of actual N-P-K broadcast just prior to seeding. Approximately 25 pounds of N was side-dressed at vine tip.

Results

The treatments used in the demonstration trial are listed in Table 1. The primary goal of each program was to control powdery mildew initially, then to control the other major fungal diseases, both foliar and fruit of pumpkin. Treatment 7 would be considered a standard recommended program in Ohio. Treatment 8 contains two products that were not labeled for pumpkins in Ohio during the 2007 field season.

Fungicide sprays began July 30th based on detection of powdery mildew colonies in several research plots, and were continued through to harvest on approximately a weekly schedule. A boom sprayer at 60-65 PSI using conejet nozzles at 50 GPA was used to treat the plots. Disease ratings began on August 8th, approximately one week after powdery mildew and downy mildew were present at the research station, one day after the second spray application.

The first disease observations for powdery and downy mildew were made by one person. The percent colonies covering the top and bottom leaf surface of 5 different plants at 5 separate locations were estimated for each plot. The mean rating is reported in Table 2. For *Microdochium* and *Alternaria* leaf blight, overall plot infestation in the immediate area was determined at five plot locations per treatment. At this initial evaluation, treatments 3 and 8 appear to have slightly less powdery mildew than the other treatments, but their ratings for the other diseases were similar to the other six treatments.

Table 1. Fungicide trial treatments on pumpkin, sprayed on approximately a 7 day schedule beginning July 30th.

Treatment	Rate / A ²	Rate / A ³
1	Cabrio @ 16 oz	Bravo @ 2.5 pints + Nova @ 5 oz
2	Cabrio @ 16 oz	Procure ¹ @ 6-8 oz + Bravo @ 2.5 pints
3	Procure ¹ @ 6-8 oz + Bravo @ 2.5 pints	Pristine @ 18.5 oz
4	Procure ¹ @ 6-8 oz + Bravo @ 2.5 pints	Pristine @ 18.5 oz + Bravo @ 2.5 pints
5	Pristine @ 18.5 oz + Bravo @ 2.5 pints	Microthiol @ 5 lbs + Manex 1.6 Qts
6	Microthiol @ 5 lbs + Tanos @ 8 oz + Manex 1.6 Qts	Bravo @ 2.5 pints + Nova @ 5 oz
7	Bravo @ 2.5 pints + Nova @ 5 oz	Quadris Opti @ 3.2 oz
8	Quintec* @ 6 oz + Bravo @ 2.5 pts	Revus Top* @ 7 oz + Manex @ 1.6 qts

¹ 6 oz for the first spray, 8 oz for all successive sprays.

² Fungicide sprays applied July 30th, Aug. 14th, Aug 31st, Sept. 14th.

³ Fungicide sprays applied Aug. 7th, Aug. 24th, Sept. 7th.

* Not labeled for pumpkins in Ohio.

Table 2. Initial disease ratings on August 8th of pumpkin leaves, petioles, and stems.

Treatment	% PM ^b upper leaf surface	% PM ^b lower leaf surface	% Downy Mildew ^b	<i>Microdochium</i> Blight ^a	<i>Alternaria</i> leaf spot ^a
1	3.0	3.0	1.0	1	2
2	3.0	3.0	2.0	1	2
3	1.0	1.0	2.0	1	2
4	3.0	3.0	2.0	1	2
5	3.0	3.0	3.0	1	3
6	3.0	3.0	3.0	1	2
7	5.0	5.0	2.0	1	2
8	0.0	0.0	3.0	1	3

^a Disease rating: 0-none (0%), 1-low (1-5%), 2-moderate (5-25%), 3-severe (>25%).

^b Powdery and downy mildew severity: % of leaf surface coverage.

The second disease rating was conducted on August 28th, where five individuals rated each treatment plot as outlined in the first rating. The mean of all five disease ratings are in Table 3, with the exception of *Alternaria* leaf blight which was dropped from the rating. While most

treatments performed similarly for powdery mildew control on the upper leaf surface, clearly treatments 3, 4, and 8 appear to have much lower infestation on their lower leaf surface. Downy mildew and *Microdochium* blight control with treatments 3, 4, and 8 do not differ greatly from the other treatments.

Table 3. Final mean disease ratings on August 28 of pumpkin leaves, petioles, and stems, based on five sets of observations.

Treatment	% PM ^b upper leaf surface	% PM ^b lower leaf surface	% Downy Mildew ^b	Microdochium Blight ^a
1	6.8	69.2	48.0	1.8
2	6.9	60.0	46.5	1.6
3	2.1	24.0	29.5	1.2
4	2.6	18.5	20.0	1.0
5	4.6	56.5	42.8	1.4
6	6.6	59.2	33.0	1.6
7	5.3	43.3	32.0	1.2
8	2.6	8.8	27.0	1.2

^a Disease rating: 0-none (0%), 1-low (1-5%), 2-moderate (6-25%), 3-severe (>25%).

^b Powdery and downy mildew severity: % leaf surface coverage.

Harvest Data

One 25 ft section of each plot row (3 plot rows per treatment) was harvested on September 17th. All fruit within each section were weighed and graded as cull, diseased, green, or orange (Table 4). All categories except orange fruit are considered non-marketable. Treatments 1 and 2 produced less orange fruit than the other six treatments, and treatment 6 has double the number of green fruit as the other treatments. The smallest orange fruit were produced in treatment 4 and the largest in treatment 7.

Table 4. Magic Lantern pumpkin harvest data from September 17th on three 25 ft sections of row per treatment. Row spacing was 5 feet.

Treatment	Orange Fruit			Green Fruit		
	# Fruit	Plot wt. (lbs)	Avg. (lbs)	# Fruit	Plot wt. (lbs)	Avg. (lbs)
1	25	318.2	12.7	8	60.2	7.5
2	28	322.3	11.5	9	71.5	7.9
3	36	433.6	12.0	8	73.0	9.1
4	38	386.4	10.2	10	79.8	8.0
5	33	366.4	11.1	10	62.3	6.2
6	32	400.7	12.5	15	134.6	9.0
7	32	432.9	13.5	8	62.3	7.8
8	32	390.7	12.2	7	66.6	9.5

Treatments 3, 4, and 8 had lower levels of culled (unmarketable) fruit compared to the other five treatments (Table 5). Bacterial spot was noticed in treatments 1, 2, and 6, but not the other treatments. Treatment 4 had the least amount of diseased fruit, half as much as the next lowest treatments, 8 and 3.

Table 5. Magic Lantern pumpkin fruit culled at harvested on September 17th from three 25 ft sections of each treatment plot. Row spacing was 5 feet.

Treatment	Cull Fruit			Bacterial Spot Fruit			Total Culled Fruit		
	# Fruit	Plot wt. (lbs)	Avg. (lbs)	# Fruit	Plot wt. (lbs)	Avg. (lbs)	# Fruit	Plot wt. (lbs)	Avg. (lbs)
1	13	150.6	11.6	2	16	8.0	15	166.6	11.1
2	9	127.4	14.2	4	46.6	11.7	13	174.0	13.4
3	7	61.9	8.8	0	0	0.0	7	61.9	8.8
4	4	33.9	8.5	0	0	0.0	4	33.9	8.5
5	12	99.8	8.3	0	0	0.0	12	99.8	8.3
6	13	123.3	9.5	2	19.6	9.8	15	142.9	9.5
7	11	124.6	11.3	0	0	0.0	11	124.6	11.3
8	6	61.2	10.2	0	0	0.0	6	61.2	10.2

Summary

Since this trial was conducted as a demonstration and not a replicated research project, it is not appropriate to draw significant conclusions about the performance of certain treatments. However, given the disease ratings, marketable and cull fruit harvested from each treatment, some trends do appear. Treatments, 3, 4, 8, and possibly 7 seem to have better disease protection properties, more marketable fruit, and fewer culls than the other treatments. Currently two products in treatment 8, Quintec and Revus, are not labeled for use in Ohio on pumpkin. The apparently “better performing” treatments, 3, 4, and 7, all contain a FRAC 11 fungicide alternated with a FRAC M + 3 fungicides. Treatments 1 and 2, which also conform to the same FRAC usage pattern of 11 alternated with M + 3, did not perform as well in our trial.

Now that we have some insight as to how these products perform at this location, we would like to continue this project in 2008 as a randomized replicated study, so we can determine the efficacy of these treatment combinations.

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