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Pumpkin Powdery Mildew Fungicide Demonstration Trial Report - 2022

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Introduction

A powdery mildew (PM) fungicide evaluation trial was conducted on pumpkin at the Western Ag Research Station in South Charleston, OH at 39.857672, -83.667513. All treatments were applied to a powdery mildew susceptible hybrid (Pik-a-Pie, Rupp Seeds) to determine the impact of compounds on foliage health. No yield data was taken.

This goal of this powdery mildew demonstration trial is to evaluate fungicide programs and assess the effectiveness of a primary fungicide when used in combination with rotational fungicides such as Procure, Manzate Pro Stick, Vivando, Quintec, etc.

These fungicide programs have been designed to primarily manage powdery mildew and have inherent weaknesses against specific diseases such as downy mildew, bacterial and soil borne diseases.

The upper leaf surface is easier to protect with fungicides and typically has low levels of powdery mildew infestation, therefore this report focuses primarily on how well the lower leaf surface is protected by each treatment.

In the 2022 trial, precipitation totals for June, July, August were 3.2”, 6.8” and 2.5” respectively.

Plot Installment

The trial was direct seeded May 31 using a Monosem vacuum planter. Each treated plot consisted of one 85’ long row of Pik-a-Pie pumpkin (PM susceptible) with a final stand of 3-4’ within the row. Fifteen feet on the east side of each plot was not sprayed and served as an “untreated check” section to confirm the presence of PM.

Treated plots were separated by a 15’ drive lane on each side with a 20’ fallow buffer between the header and end of each plot to minimize spray drift between plots. The seeds were treated with FarMore FI400 to limit striped cucumber beetle feeding on seedlings and minimize transmission of bacterial wilt.

Weeds were managed by spraying Strategy (4.5 pints/A) plus Dual Magnum (1.3 pints/A) plus Liberty (32 oz/A) pre-emerge June 1, followed by a shielded post application of Sandea (1oz/A) and glyphosate (32oz/A) between the rows on June 24. Any major weed escapes were hand pulled or hoed out weekly. The prior crop was corn, and no cover crop was planted in the field.

Based on soil test results, no P or K was added to the field. On June 19, 75 pounds of nitrogen in the form of liquid 28-0-0 was side dressed six inches away from each row, approximately two inches deep in the soil.

Treatments

The fungicide programs (Table 1) were evaluated for powdery mildew control and will be referenced by their main attributes throughout the report. Treatment 9 was created by examining two leaves from each untreated plot area, for an average of 16 leaves per rating.

Table 1. Powdery mildew fungicide trial treatments, rates per acre, FRAC and manufacturer.

TRT	**Product, Rate, FRAC** **Sprays 1, 3, and 5**	**Product, Rate, FRAC** **Sprays 2, 4, and 6**
1*	Cevya 5 fl oz + Manzate Pro 2.5lbs + [FRAC 3 +M] (BASF, UPL)	Quintec 6oz + Manzate Pro 2.5lbs [FRAC 13 + M] (Gowan, UPL)
2*	Cevya 5 fl oz + Manzate Pro 2.5lbs [FRAC 3 +M] (BASF, UPL)	Merivon 4 fl oz + Manzate Pro 2.5 lbs, FRAC [7,11 + M] (BASF, UPL)
3*	Regalia 63oz + Stargus 87oz + Manzate Pro 2.5 lbs [FRAC P5 + BM02] (Marrone Bio)	Regalia 63oz + Stargus 87oz + Manzate Pro 2.5 lbs [FRAC P5 + BM02] (Marrone Bio)
4*	Stargus 96oz + Manzate Pro 2.5 lbs, [FRAC BM02+M] (Marrone Bio, UPL)	Stargus 96oz + Procure + Manzate Pro 2.5 lbs [FRAC BM02 + 3 + M] (Marrone Bio, UPL)
5*	Gatten 6.4 oz [FRAC U13] Nichino + (every 14 days)	(skip this spray, only every 14 days)
6*	Gatten 6.4 oz + Manzate Pro 2.5 lb [FRAC U13 + M] Nichino, UPL	Quintec 6 oz + Manzate Pro 2.5 lbs + [FRAC 13 + M] (Gowan, UPL)
7*	Procure 8 fl oz + Manzate Pro 2.5lbs + Vacciplant 14 fl oz (FRAC 3 + M +P4) (UPL)	Vivando 15.4 fl oz + Manzate Pro 2.5 lbs + Vacciplant 14 fl oz (FRAC U8 + M + P4) (BASF, UPL)
8*	Procure 8 fl oz + Dexter MAX 3.2 lbs + Vacciplant 14 fl oz (FRAC 3 + M, 11 + P4) (UPL)	Vivando 15.4 fl oz + Manzate Pro 2.5 lbs + Vacciplant 14 fl oz (FRAC U8 + M + P4) (BASF, UPL)
9	Untreated check	

* All sprays include Chemsurf 90 @ 0.125% (0.00125 v/v)

Ratings & Application

Powdery mildew was first detected in the trial July 25. Plot treatment ratings were conducted between 10am and noon on July 25, August 2, 10, 17, 25, September 2 and 9. Fungicide treatments were applied between 1-4pm on July 25, August 2, 10, 18, 26 and September 2. All

treatments were applied using a hydraulic boom sprayer at 36 GPA using hollow cone nozzles at 65 PSI.

Each treatment plot rating was evaluated using six randomly chosen leaves, inspecting the upper and lower leaf surface for powdery mildew colonies and assigning a rating value based on the established pictorial reference guide (**Figure 1**).

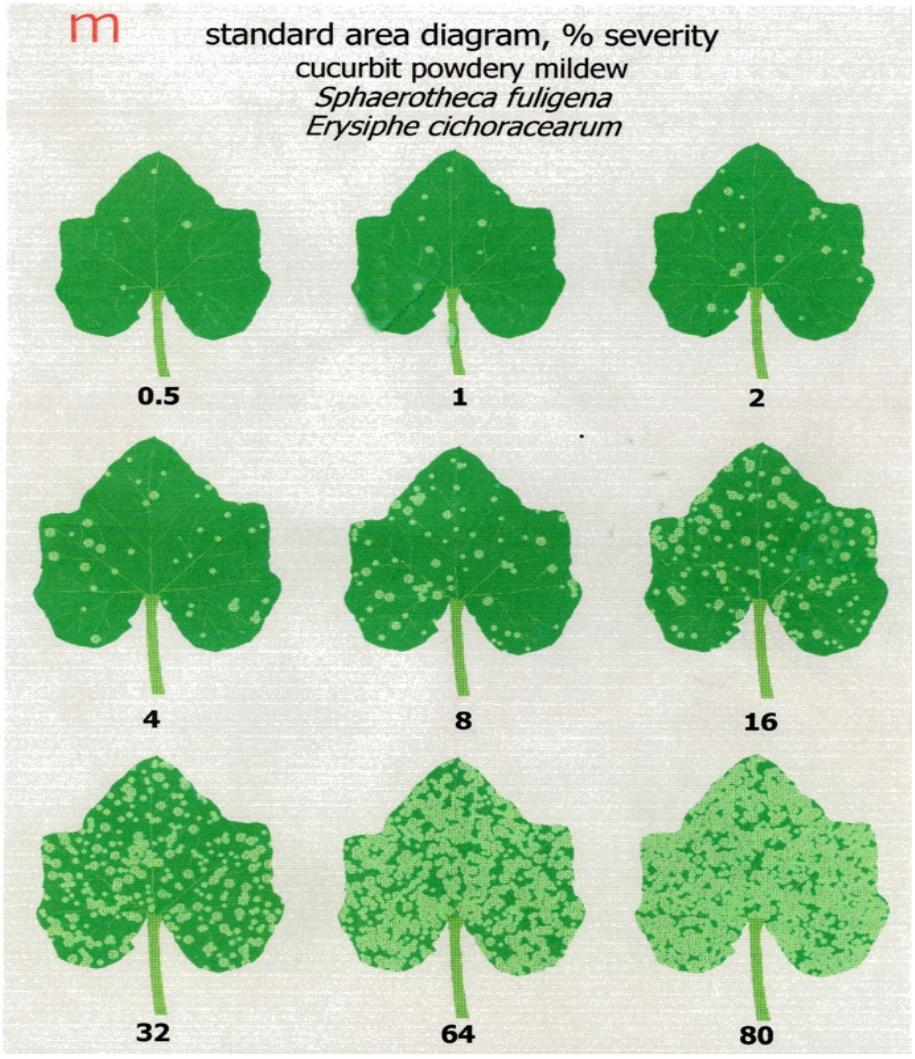

Figure 1. Percent powdery mildew infection chart.

Results
Season long powdery mildew infestation ratings for each treatment based on lower leaf surface only (Figure 2).

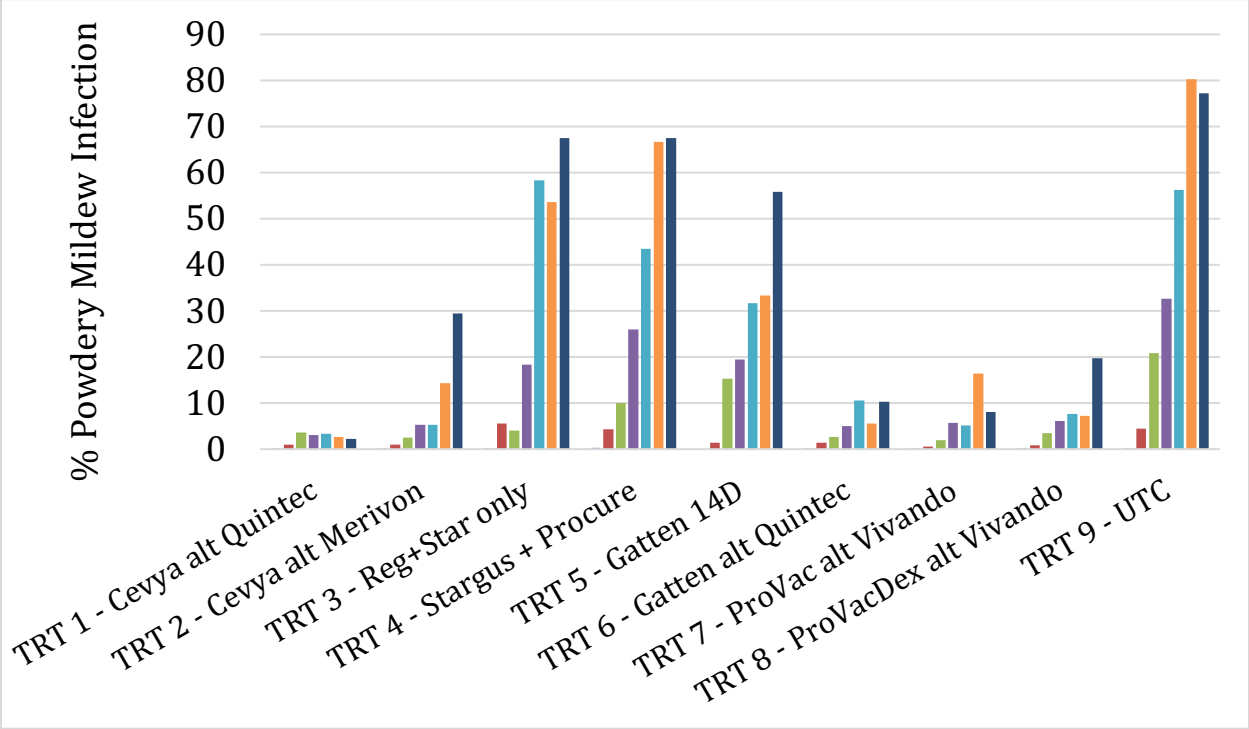

Figure 2. Powdery mildew infestation (%) on the lower leaf surface only from July 25 through September 9.

In addition to weekly percent disease infestation ratings comparing treatment performance over the season, the Area Under the Disease Progress Curve is also an accepted tool to quantify disease accumulation throughout the season (Table 2).

Table 2. The Area Under the Disease Progress Curve (AUDPC) for powdery mildew infestation based on lower leaf surface data only between July 25-September 9. Lower AUDPC values reflect lower overall disease accumulation and higher treatment efficacy.

Treatment	AUDPC	Overall Rating
TRT 1 - Cevya alt Quintec	111.0	Excellent
TRT 6 - Gatten alt Quintec	230.5	Very Good
TRT 7 - ProVac alt Vivando	254.5	Very Good
TRT 8 - ProVacDex alt Vivando	269.8	Very Good
TRT 2 - Cevya alt Merivon	332.3	Very Good
TRT 5 - Gatten 14D	983.4	Fair
TRT 3 – Reg + Star only	1322.8	Fair
TRT 4 - Stargus + Procure	1401.9	Fair
TRT 9 - UTC	1770.0	NA

Conclusions
All treatments had 2-4 modes of action (MOAs) that were alternated during the season consistent with recommended FRAC rotation rules to delay the onset of disease resistance (Table 1). The only exception to this was TRT 5 - Gatten 14D, which had only a single MOA applied every 14 days throughout the season. This would not be a recommended treatment schedule and would typically violate most current labels but used here for research purposes only.

The fungicide treatment programs broke into three main categories this year and all outperformed the untreated check, offering at least some level of control. The highest performing treatment (TRT1) did an **excellent** job of controlling PM on the upper and lower leaf surface all season. The next group of treatments (TRT 6,7,8,2) were close behind and rated **very good** at controlling PM on both leaf surfaces. Treatments 1, 2, 6, 7, 8 maintained decent foliage coverage until the end of the trial.

The final group of treatments were all listed as **fair**. Treatment 5 was only applied three times (every 14 days) resulting in PM accumulations mid to late season with a noticeable loss of foliage toward the end of the season. The last two treatments (TRT 3,4) had the highest AUDPC values resulting from the highest mid and late season PM infestation with noticeable foliage loss.

As you review this report remember this trial was designed as a large plot demonstration without randomization and replication, therefore no statistical analysis of these treatments is possible, but these observations may reveal a pattern of efficacy worth future exploration.

If you have any questions about the trial results, please contact me.

Respectfully,

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