

Which Pumpkin Fungicide Program gives you the Best Bottom Line

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Pumpkins continue to be the one of the most significant vegetable crops grown in Northern New Jersey. The most significant production input is the cost of fungicide materials to control foliar and fruit rot diseases. This experiment is part of an ongoing project to determine cost control options for Powdery and Downy mildew in commercial pumpkin production. In 2004 and 2005 two research trials on pumpkin disease control were conducted at the Rutgers NJAES Snyder Research and Extension Farm in Pittstown, Hunterdon County, NJ, evaluating cost effective fungicide programs for downy and powdery mildew control.

Materials and Methods

The 2005 experiment established at the Rutgers Snyder Farm consisted of a randomized complete block design utilizing the cultivar Autumn King from Rupp Seed (<http://www.ruppseeds.com/>). The field was prepared with chisel plowing. Nutrition consisted of broadcasting 333 lbs/A of 15-15-15 plus 110 lbs/A of 0-0-50 which was incorporated with deep disking. The final seed bed was prepared utilizing a Culti-packer. Weed control consisted of Prefar at 6pt/A ppi with Strategy applied post plant followed by Sandea at 0.66oz applied post emergent. Furan L was banded over the seed rows at 3.8oz/1000 linear feet for early season cucumber beetle control.

The research plots were 10 feet by 20 feet in size. Disease control treatments for powdery mildew (PM) were initiated when the IPM threshold used in the Rutgers Pumpkin IPM Program (1 PM lesion per 50 older leaves) was reached. First spray treatments were applied August 5 based on this threshold and repeated on a 7 to 10 day schedule, 5 total applications. Downy mildew was first observed in the area ten days later.



(from left) Andy Wyenandt, Ph.D, Specialist in Vegetable Pathology, Kris Holmstrom, Vegetable IPM Program, and Win Cowgill, County Agricultural Agent evaluate field performance of pumpkin fungicide alternatives. Careful assessment of treatments, disease control, foliage, and marketable yield were compared with fungicide costs to arrive at Relative Net Crop Values. It is the right choice of fungicides that puts more money in your pocket per acre.

Table 1.

2005 Pumpkin Disease Control Treatments*	
1)	Untreated Control (UTC)
2)	5 pt Phostrol (weekly)
3)	5 pt Phostrol + 3 pt Bravo Weather Stick (weekly)
4)	5 pt Phostrol + 1 1/3 pt Champ 2 + 10 lbs Microsulf (sulfur)(weekly)
5)	5 pt Phostrol+ 2 lb Maneb 75 DF + 1 1/3 pt Champ (weekly)
6)	2 lb Maneb 75 DF + 1 1/3 pt Champ (weekly)
7)	3 pt Bravo Weather Stick + 5 oz Nova alt. 2 oz Flint WDG
8)	3 pt Bravo Weather Stick+ 5 oz Nova alt. 10 lbs Microsulf
9)	3 pt Bravo Weather Stick alt. 2 lbs Ridomil/Bravo
10)	3 pt Bravo Weather Stick alt. 18 oz Pristine

*All rates are per acre

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Table 2. 2005 Disease Control Ratings and Foliage Cover

	Treatment*	Powdery mildew**	Downy mildew**	Foliage cover***
1	UTC	4.0 d	5.0 d	5.0 b
2	5 pt Phostrol	3.5 cd	4.75 cd	4.5 b
3	5 pt Phostrol + 3 pt Bravo	3.0 bc	3.0 ab	3.25 a
4	5 pt Phostrol + 1 1/3 pt Champ + 10 lbs Microsulf	2.25 ab	2.75 ab	2.25 a
5	5 pt Phostrol + 2 lb Maneb + 1 1/3 pt Champ	2.75 abc	2.5 a	2.5 a
6	2 lb Maneb + 1 1/3 pt Champ	3.5 cd	3.5 ab	3.0 a
7	3 pt Bravo + 5 oz Nova alt. 2 oz Flint	2.75 abc	3.75 bc	3.25 a
8	3 pt Bravo + 5 oz Nova alt. 10 lbs Microsulf	2.5 ab	2.75 ab	3.0 a
9	3 pt Bravo alt. 2 lb Ridomil/Bravo	2.75 abc	3.25 ab	3.0 a
10	3 pt Bravo alt. 18 oz Pristine	2.0 a	3.5 ab	2.75 a

*All rates are per acre

**Powdery and downy mildew rating scale 0 to 5, 0 = none, 5 = 100%

***Foliage cover rating scale 0 = full (100%) 5 = none

Results and Discussion

Disease Control –UTC plots were defoliated at the end of the trial. Phostrol when used in combination with other protectant fungicides proved to be effective in powdery and downy mildew control. Table 2- treatments 3, 4, 5, 7, 8, 9 were equally effective for Powdery mildew control with treatment 10 having the best control. Treatments 3, 4, 5, 6, 8, 9,10 were equally effective statistically for Downy Mildew Control. There were no statistical differences in the amount of foliage cover at the end of the season in treatments 3-10. **Note** that the largest Relative Net Crop Value was with Treatment 10, Bravo (chlorothalonil, M4) alternated with Pristine. Pristine (pyraclostrobin + boscalid, 11 + 7). Treatments 3-9 were not statistically different with regard to Relative Net Crop Value. There were trends but not statistical differences. The untreated control and Phostrol alone (1 & 2) in 2005 produced significantly lower returns per acre than treatments 3-10.

Table 3. Disease ratings 2004 and 2005 combined

Treatment*	Powdery mildew	Downy mildew
Untreated Control (UTC)	4.6 a	5.0 d
5 pt Phostrol	3.8 b	4.3 c
5 pt Phostrol + 3 pt Bravo	3.3 b	2.8 a
3 pt Bravo + 5 oz Nova alt. 2 oz Flint	2.5 a	3.9 bc
Maneb + Champ	3.5 b	3.5 b

*Rates are per acre

**Powdery and downy mildew rating scale 0 to 5, 0 = none, 5 = 100%

Table 3.- Common fungicide treatments were analyzed over two years. Bravo + Nova alternated with Flint provided the best PM control while Bravo + Phostrol gave the best DM control.

Table 4. 2005 Fungicide Costs, Total Costs, Marketable Yield and Relative Net Crop Value

	Treatment*	Fungicide Cost/A for Five Applications (\$)	Total Costs/Acre (\$)	Marketable yield (Tons/Acre)	Relative Net Crop Value* \$/Acre
1	UTC	0	1579	7.1 a	2138 c
2	5 pt Phostrol	95	1674	8.9 ab	2680 bc
3	5 pt Phostrol + 3 pt Bravo	179	1758	12.8 bc	3851 abc
4	5 pt Phostrol + 1 1/3 pt Champ + 10 lbs Microsulf	140	1719	12.8 bc	3851 abc
5	5 pt Phostrol + 2 lb Maneb + 1 1/3 pt Champ	163	1742	14.9 cd	4466 ab
6	2 lb Maneb + 1 1/3 pt Champ	56	1636	14.1 bcd	4215 ab
7	3 pt Bravo + 5 oz Nova alt. 2 oz Flint	154	1733	14.7 cd	4402 ab
8	3 pt Bravo + 5 oz Nova alt. 10 lbs Microsulf	126	1705	15.7 cd	4700 a
9	3 pt Bravo alt. 2 lb Ridomil/Bravo	121	1700	14.3 bcd	4275 ab
10	3 pt Bravo alt. 18 oz Pristine	128	1707	18.7 d	5610 a

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The Bottom Line-Relative Net Crop Value— Fixed costs for pumpkin production were estimated per acre at \$1579 using data from Penn State and Rutgers University published crop budgets and analysis. Table 4.-Total costs per acre were calculated by taking the actual fungicide cost per acre for 5 sprays and adding it to the fixed cost of \$1579 to give total costs per acre for each treatment. The marketable yield was calculated from plot yields and extrapolated to yield per acre in tons. *The Relative Net Crop Value is the return to the grower.* It is interesting to note that reducing fungicide costs was not the major solution to increasing profitability. It is essential to use materials that provide adequate disease control under all conditions.

It is the increase in total marketable yield per acre with the right choice of fungicides that puts more money in your pocket per acre as a grower.

2007 Recommendations for Downy and Powdery Mildew Control

- Use the IPM threshold as outlined in the Rutgers Pumpkin IPM Program (1 PM lesion per 50 older leaves) to time the first powdery mildew spray. Begin downy mildew applications when first observed in the area/region, do not wait until it is on your farm.
- Use powdery mildew tolerant cultivars - these can delay the onset of treatment for Powdery Mildew several weeks if Downy is not present.
- Consider using preventative fungicides in your rotations and in combination i.e. Champ 2 (copper), Microsulf (sulfur), Maneb 75 (EBDC's) especially when only treating for Powdery Mildew.
- Fungicides for downy and powdery mildew control often belong to the same FRAC grouping (i.e. FRAC group 11 i.e. Cabrio, Tanos and Pristine). Therefore, fungicide programs for both downy and powdery mildew control should carefully be monitored during the production season for fungicide resistance development. FRAC group 11 fungicides should always be tank mixed with protectant fungicides to reduce chance for fungicide resistance development in powdery and downy mildew. FRAC group 11 fungicides should never be applied in consecutive applications.

2007 and beyond Considerations

- Push the pencil - **calculate your Relative Net Crop Value** and look at your fungicide selection and other production practices when planning your production for 2007 and the future.

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