Ag Madness
Pumpkin Production

April 16, 2020

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THE OHIO STATE UNIVERSITY

COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

Topics

- Mustard Cover Crop / Biofumigation
- Powdery Mildew fungicide efficacy
- Pumpkin / Squash hybrids
- Insect Management

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Biofumigation using Mustard cover crops

- **Research 2018/19/20**
- Reduce soil borne diseases (Filthy Four)

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What is biofumigation

Biofumigation - the incorporation of fresh and finely ground plant biomass into the soil, releasing several substances able to **suppress** soil-borne pests (bacteria, fungi, nematodes, weed seeds)

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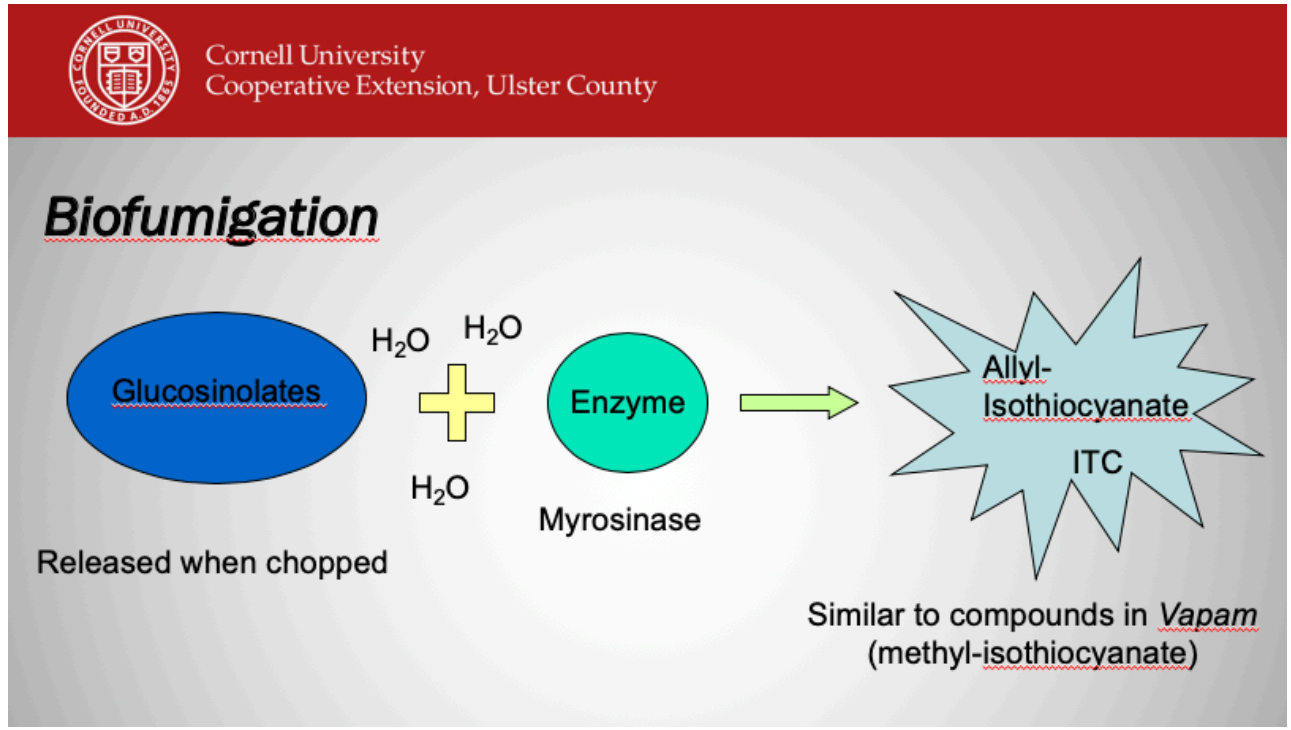
What is biofumigation

- 20+ year old practice
- Mustard plants produce Glucosinolates (GSL)
- *Brassica juncea* - highest GSL
- GSL peak during flowering
- Suppresses diseases and nematodes
- Variable efficacy
- Treat MCC like cash crop
  - Biomass
  - 50-100 lb N / A
  - N:S (6N:1S) / A



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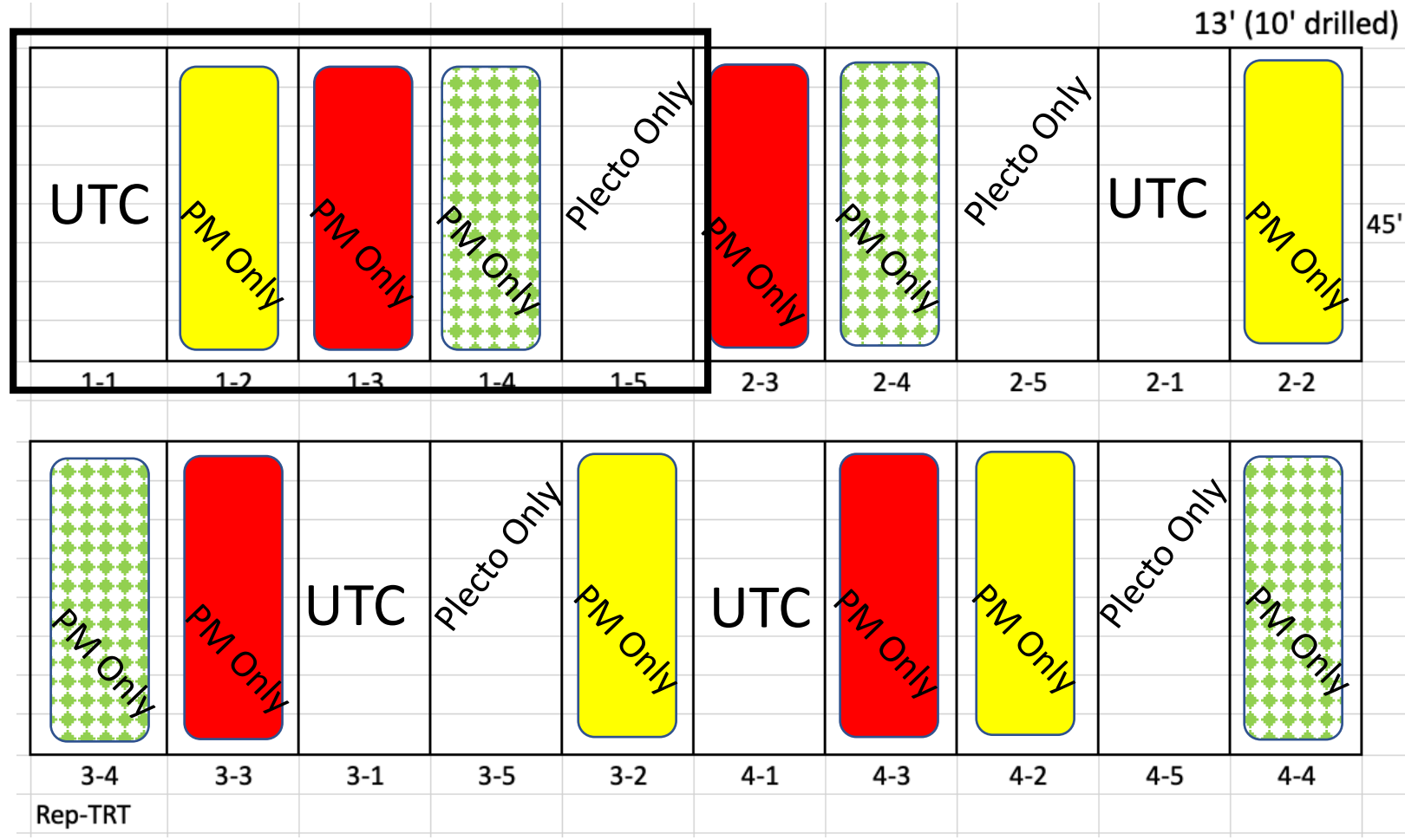
Our Study – Trial Design

Pacific Gold
6.5 lb/A
$6.5 / lb

Caliente 199
11 lb / A
$6.5 / lb

½ rate PG + C199



Our Study - Operations

- Seeded April 10, 2019 - emerged April 23
- Processed MCC June 4 (Trt 2 only); June 12 (Trts 3 & 4)

Our Study – Equipment Recap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- Process MCC at peak flowering
- All operations in 10-15 minutes
- Wait 10-14 days to DS or transplant

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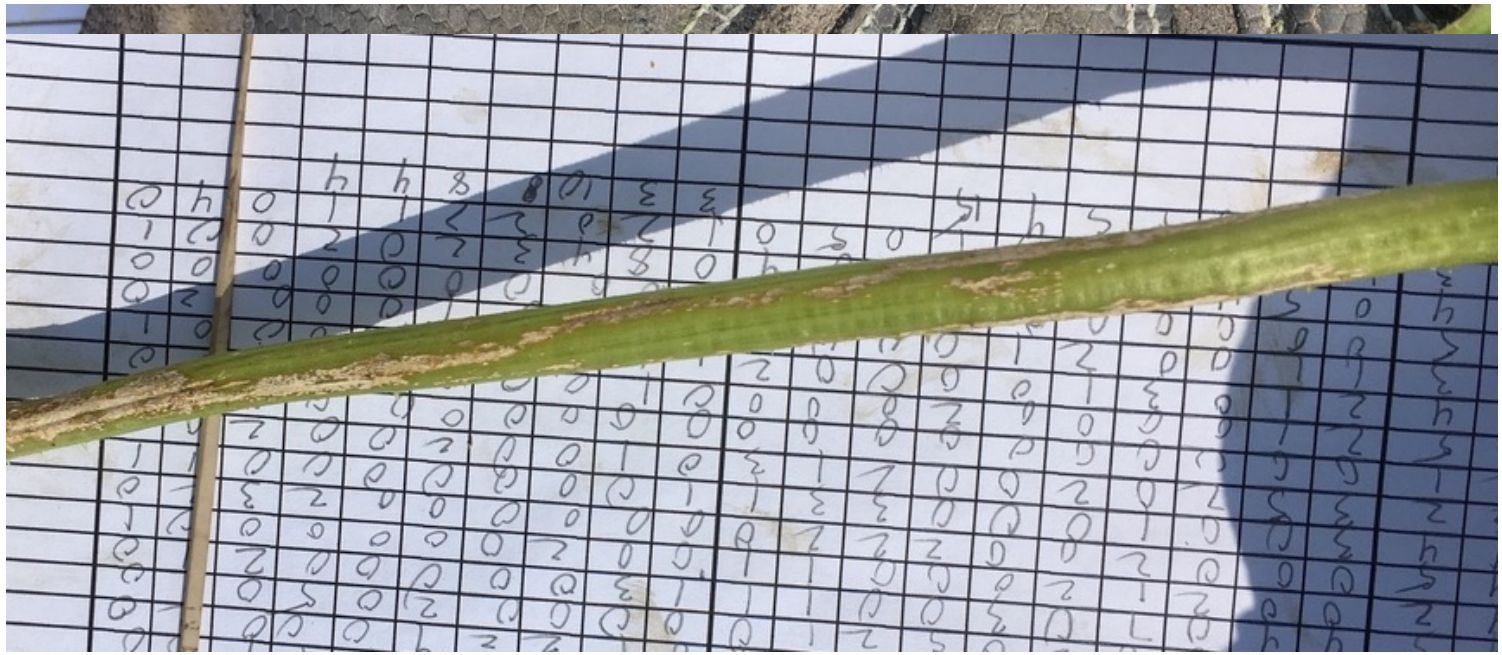
Plectosporium Blight on Foliage

- Plecto is a fungal blight on petioles, leaves, vines, fruit and handles
- Soil borne & overwinters as a spore; thrives in 77F, humid, wet weather
- Disease on the upswing in Ohio



Plectosporium Blight on Fruit

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Our Study – Conclusions

- Weather in 2019 (at station) not conducive to Plectosporium
- Very little disease detected on foliage (NS, <3%), none on fruit
- Possible effect on fruit wt. (Caliente 199)
- Strobilurons do NOT control PM, need other fungicides
- Establishment of MCC early in spring is challenging (weather)
- Processing MCC requires bush hog, roto-tiller, and packer; can be sprayed with water, all within minutes
- Repeat study 2020 - Focus on measuring biomass produced

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Our Study – Additional Benefits

- Pollinators / Beneficial insects
- 1-7,000* lbs / A organic matter back into soil
- Increased soil health

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Biofumigation – Final Thoughts

- Researchers now understand the beneficial effects observed may not always be related to the activity of GSL-based hydrolysis compounds

- Other mechanisms may play a complimentary or more dominant role in disease suppression

- Incorporating large amounts of organic matter into the soil
- Potentially improving soil structure
- Increased nutrient availability
- Increased water holding capacity
- Stimulation of beneficial / pathogen-suppressive microbial communities

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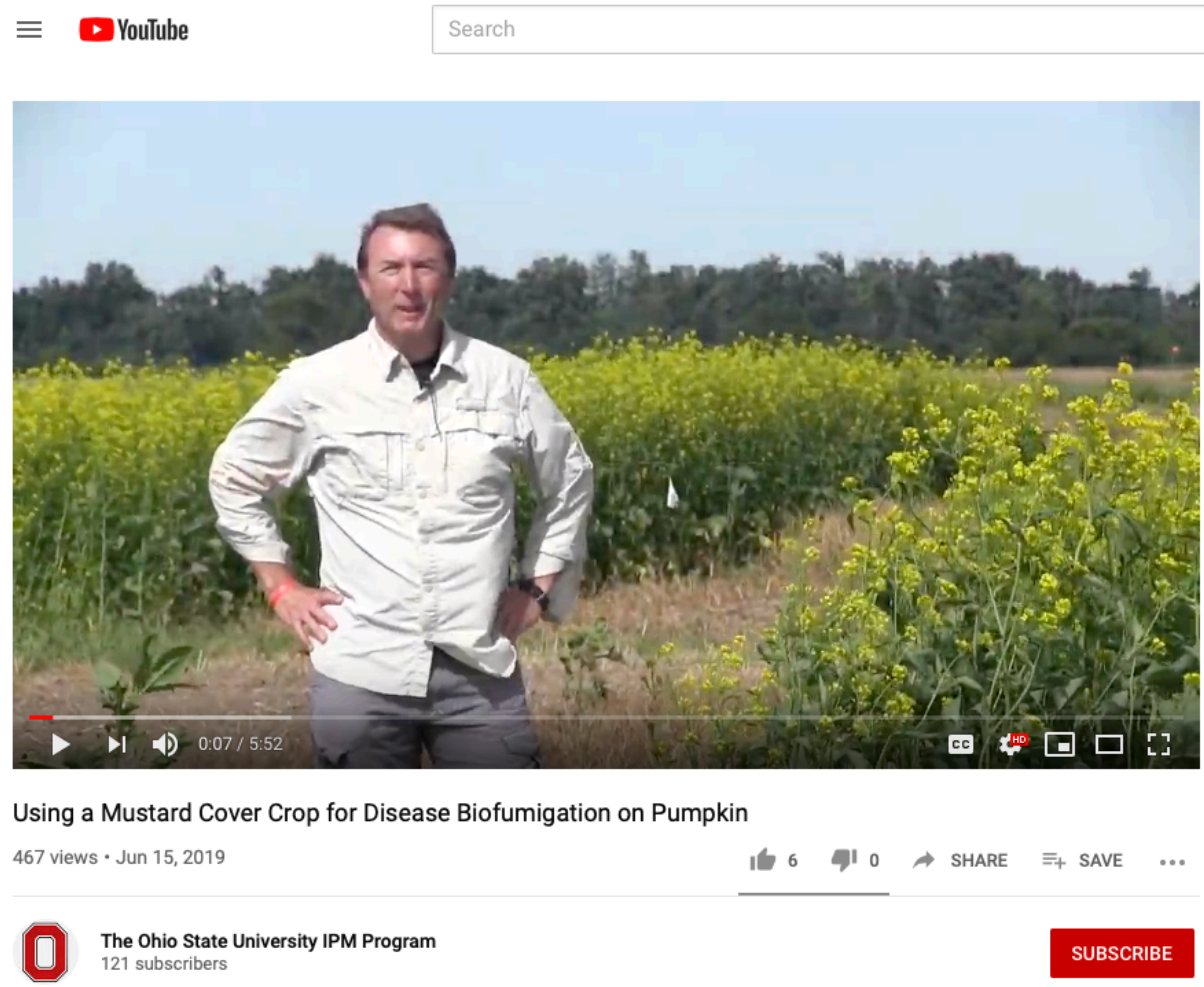
Additional Resources

- Biofumigation video
- OSU IPM YouTube Channel



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Powdery Mildew

-Occurs every year in OH, does **not** overwinter in OH
-Scout mid-July, top & bottom leaf surface, begin trt when first detected
-Trt 7-14 day schedule, 35-50 GPA, 60^{+}PSI, rotate FRAC numbers
-Ex. Quintec (13) alt. w/ Procure (3)
-Ex. Luna Experience (3,7) alt. w/ Vivando (U8)
-Can use M fungicides (Chlorothalonil, Manzate) every spray

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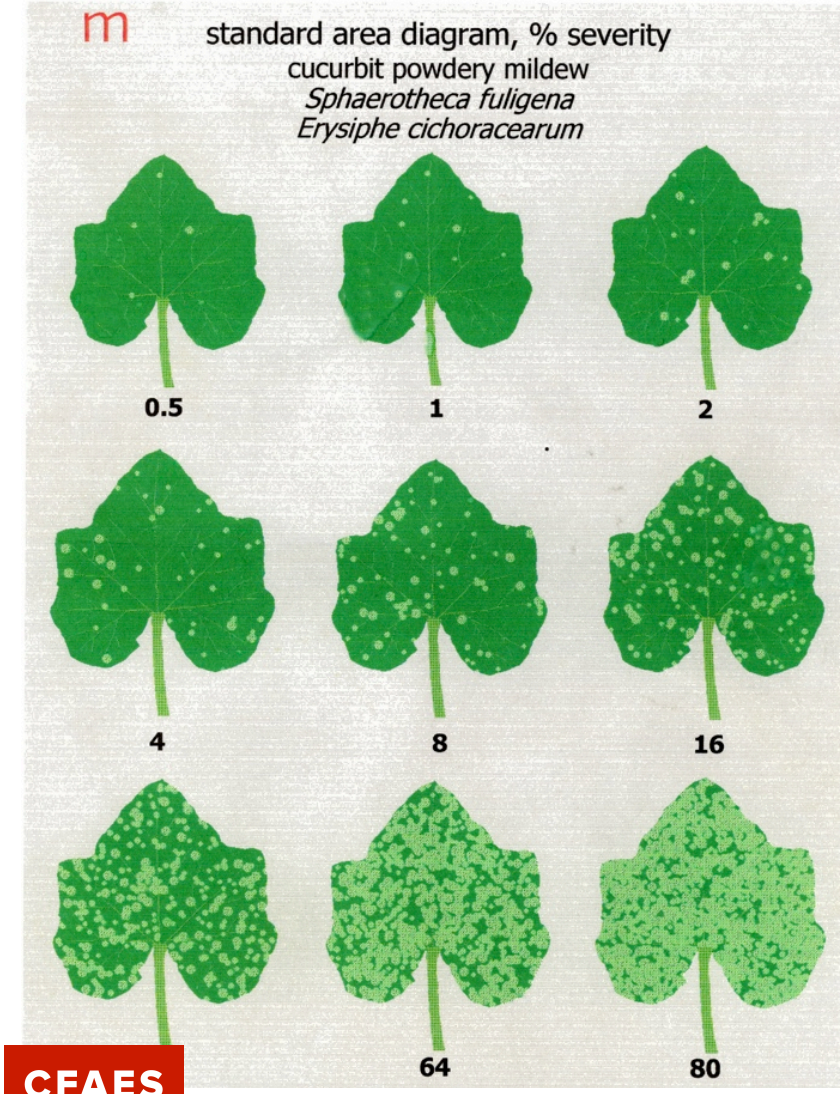
Powdery Mildew Demo Trial



nt powdery mildew infection chart.

- Efficacy of fungicide combinations
- Each TRT non-replicated, 80ft row
- Use PM **susceptible** hybrids
- Begin rating/spraying end of July
- Trt 7-14 days until mid Sept
- 6 random leaves per TRT
- % PM upper & lower leaf surface
- Part of pumpkin field day
- Compile report
- u.osu.edu/jasinski.4/pumpkin

Powdery Mildew Demo Trial

TRT	Product, Rate, FRAC Sprays 1, 3, and 5	Product, Rate, FRAC Sprays 2, 4, and 6
1	**Luna Experience** (6 fl oz) + NIS (0.125 v/v) [FRAC 7,3] (Bayer)	**Vivando** (15.4 fl oz) + Manzate (2.5lb) + NIS (0.125 v/v) FRAC [U8 + M] (BASF and UPL)
2	**Luna Sensation** (6 fl oz) + NIS (0.125 v/v) (FRAC 7,11) (Bayer)	**Vivando** (15.4 fl oz) + Manzate (2.5 lb) + NIS (0.125 v/v) FRAC [U8 + M] (BASF and UPL)
3	**Microthiol** (4lb) + **Topsin** M (8oz) (FRAC M + 1) (UPL)	**Trionic** (8oz) + Manzate (2.5 lb) (FRAC 3+M) (UPL)
4	**Microthiol** (4lb) + **Topsin** M (8oz) (FRAC M + 1) (UPL)	**Procure** (8oz) + Manzate (2.5 lb) (FRAC 3 + M) (UPL/Arysta)
5	**Miravis Prime** (11.4oz, FRAC 7 + 12) + NIS (0.125 v/v) (Syngenta)	**Procure** (8 oz) + Manzate (2.5 lb) + NIS (0.125 v/v) [FRAC 3 + M] (UPL / Arysta)
6	**Inspire Super** (20oz, FRAC 9 + 3)+ NIS (0.125 v/v) (Syngenta)	**Vivando** (15.4 fl oz) + Manzate (2.5lb) + NIS (0.125 v/v) FRAC [U8 + M] (BASF and UPL)
7	**Miravis Prime** (11.4 oz, FRAC 7 + 12) + NIS (0.125 v/v) (Syngenta)	**Inspire Super** (20oz) + Manzate (2.5lb) + NIS (0.125 v/v) (FRAC 9 + 3, M) (Syngenta)

Powdery Mildew Demo Trial
Fungicide Ratings Last Few Years
South Charleston (WARS)

Good to Great Products	Miravis Prime, Inspire Super (new)
	Luna Experience, Luna Sensation
	Merivon, Vivando, Fontelis, Torino
	Quintec – decreasing performance
Rotational Partners	Procure, Rally, Pristine (Good)
Cover Sprays	Bravo or Manzate (Good/OK)

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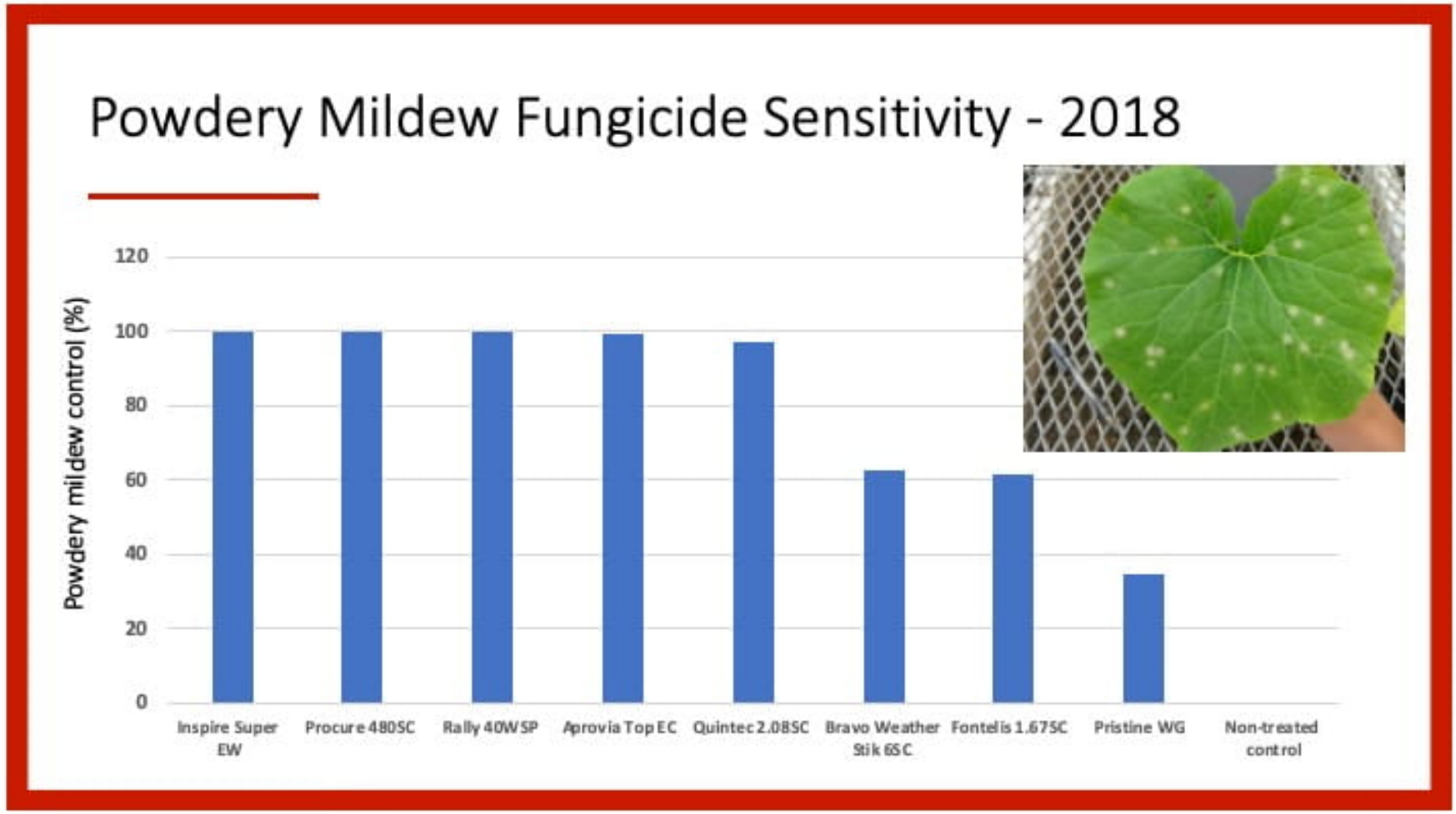
Powdery Mildew – Fungicide Efficacy

- http://u.osu.edu/vegnetnews/2019/06/29/cucurbit-powdery-mildew-start-scouting-now/



- Merivon and Torino also tested, results not consistent with other researchers/locations
- Several good to great options for PM control

2019 Pumpkin & Squash Hybrid Demo Trial Small Fruit

- Single plots, 45’ long, non-replicated
- Focus of trial is PMT/R Hybrids
- Even PMT/R Hybrids need to be protected with fungicides

Hybrid	Company	PMT/PMR	Maturity (days)	# Mature Fruit / 45' row	AVG fruit wt. (lb)
Half Pint	Siegers	PMT	80	74	1.2
Mini Warts	Harris	PMT	110	>44	1.8
Snowball	Siegers	PMT	100	>60	1.8
Cinnamon Girl	Johnnys	PMT	85	34	2.5
Sanchez	Harris	NA	95	28	3.2
Warty Gnome	Harris	PMT	95	33	3.3
Hybrid Pam	Harris	NA	100	26	4.1


Half Pint
Siegers Seeds, PMT
2019 Pumpkin and Squash Hybrid Trial
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Snowball
Siegers Seeds, PMT
2019 Pumpkin and Squash Hybrid Trial
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Mini Warts
Harris Seeds, PMT
2019 Pumpkin and Squash Hybrid Trial
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Warty Gnome
Harris Seeds, PMT
2019 Pumpkin and Squash Hybrid Trial
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2019 Pumpkin & Squash Hybrid Demo Trial
Medium Fruit

Hybrid	Company	PMT/PMR	Maturity (days)	# Mature Fruit / 45' row	AVG fruit wt. (lb)
Blanco	Harris	NA	105	31	5.7
Gum Drop	Johnnys	NA	100	16	6.4
Moonshine	Harris	NA	100	16	6.7
Galeaux	Harris	NA	95	12	10.0
Fairytale	Harris	NA	110	11	10.7
Thor	Siegers	NA	105	10	11.1
Knucklehead	Johnnys	NA	105	11	12.4
One too Many	Harris	PMT	110	12	12.4
Red Warty Thing	Harris	NA	110	12	12.5
Warty Goblin	Harris	PMT	105	17	12.7
Blue Doll	Harris	PMT	100	14	12.9


Thor
Siegers Seeds
2019 Pumpkin and Squash Hybrid Trial
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Moonshine
Harris Seeds
2019 Pumpkin and Squash Hybrid Trial
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Knucklehead
Johnnys Seeds
2019 Pumpkin and Squash Hybrid Trial
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Gum Drop
Johnnys Seeds
2019 Pumpkin and Squash Hybrid Trial
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2019 Pumpkin & Squash Hybrid Demo Trial Large Fruit

Hybrid	Company	PMT/PMR	Maturity (days)	# Mature Fruit / 45' row	AVG fruit wt. (lb)
Carbonado Gold	Rupp	PMT	100	13	13.1
Hermes	Harris Moran	PMT	90-95	16	13.2
Zues	Harris	PMT	110	14	13.8
Renegade	Johnnys	PMT	95	13	14.2
20 Kt Gold	Rupp	PMT	100	13	14.4
Indian Doll	Harris	PMT	100	18	14.5
Valenciano	Johnnys	NA	110	2 (only 8 set)	16.2
Orange Sunrise	Harris	PMT	100	19	16.4
Bayhorse Gold	Rupp	PMT	100	15	21.3


Orange Sunrise
Harris Seeds, PMT
2019 Pumpkin and Squash Hybrid Trial
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SPALDING
NBA


Renegade
Johnnys Seeds, PMT
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Zues
Harris Seeds, PMT
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Bayhorse Gold
Rupp Seeds, PMT
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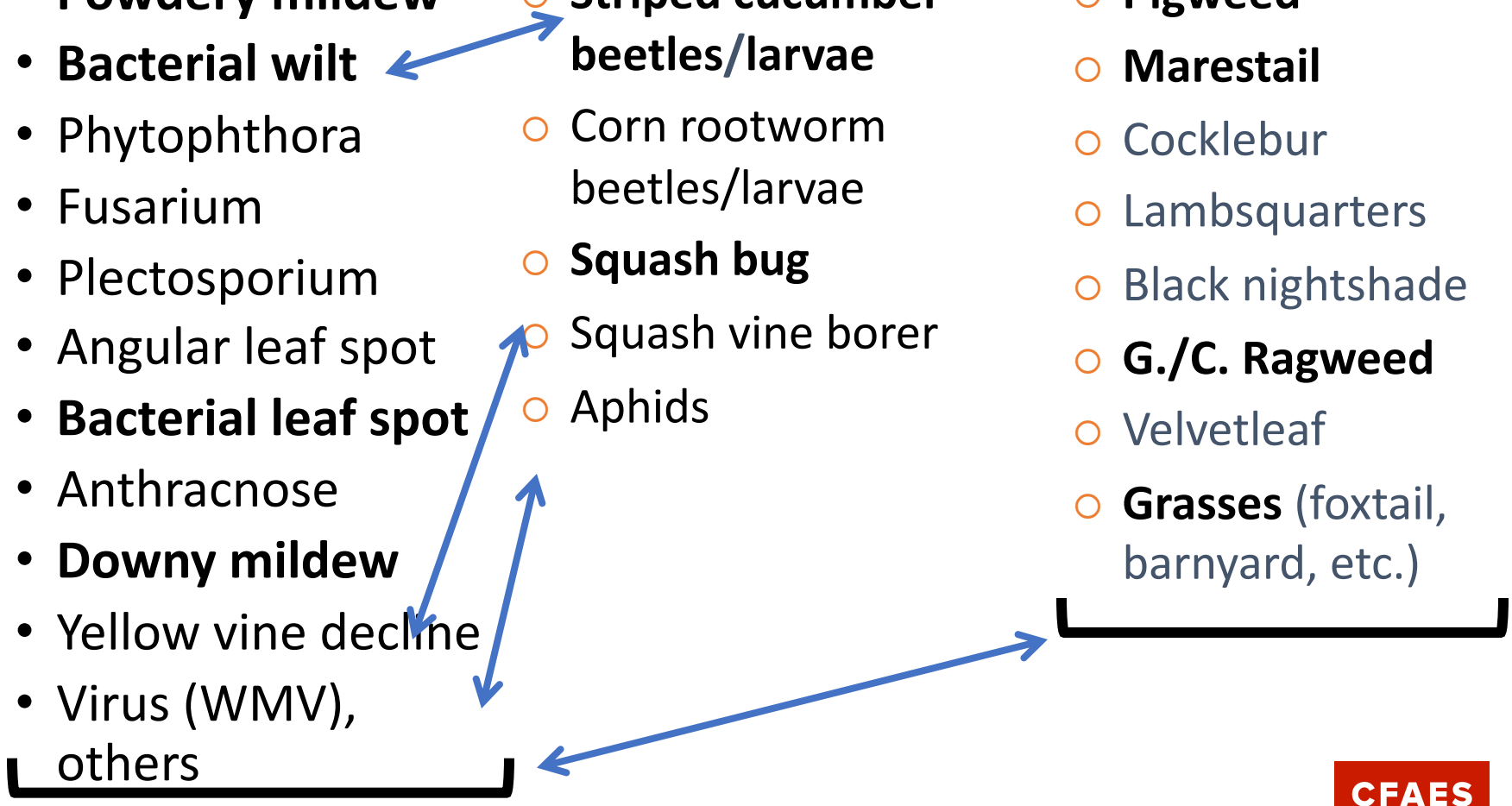
2019 Pumpkin & Squash Hybrid Demo Trial

Back (L to R) – Knucklehead, Bayhorse Gold, Orange Sunrise, Hermes, 20 Kt, Warty Goblin, Red Warty Thing
Back Middle (L to R) – Thor, Zues, Carbonado Gold, Renegade, Gumdrop, Blanco, Moonshine
Front Middle (L to R) – One Too Many, Valencia, Blue Doll, Galeaux, Indian Doll, Fairytale
Front (L to R) – Hybrid Pam, Cinnamon Girl, Warty Gnome, Sanchez, Snowball, Mini Warts, Half Pint

Spectrum of Pumpkin/Squash Pests

- Key Diseases:
  - **Powdery mildew**
  - **Bacterial wilt**
  - Phytophthora
  - Fusarium
  - Plectosporium
  - Angular leaf spot
  - **Bacterial leaf spot**
  - Anthracnose
  - **Downy mildew**
  - Yellow vine decline
  - Virus (WMV), others
- Key Insects:
  - **Striped cucumber beetles/larvae**
  - Corn rootworm beetles/larvae
  - **Squash bug**
  - Squash vine borer
  - Aphids
- Key Weeds:
  - **Pigweed**
  - **Marestail**
  - Cocklebur
  - Lambsquarters
  - Black nightshade
  - **G./C. Ragweed**
  - Velvetleaf
  - **Grasses** (foxtail, barnyard, etc.)



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Striped Cucumber Beetle

-**THE** key early season pest

-Protect seedlings cotyledon – 4th leaf from feeding

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Bacterial Wilt

Vectored by Striped and Spotted Cucumber Beetles

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Cucumber Beetles & Bacterial Wilt

- **Must protect seedling from cotyledon through 3rd - 4th leaf**
- Shift seeding or transplanting later to avoid beetles (mid June)
- Scout and use foliar products when threshold is reached
  - 0.5 btl / plant (cotyl-1st), 1 btl / plant (2-3 leaf), 2 btl / plant >4 leaf
- Use systemic seed treatments (2-3 weeks protection)
- Use systemic materials as transplant drenches (2-3 weeks protection)
- Use in-furrow materials during seeding (4-6 weeks control, least desirable)
- Use row covers over small plantings (remove at flowering)
- Protect fruit rind later in the season

Vector Bacterial Wilt

Vector BW,CMV,SqMV

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Systemic Insecticide Efficacy

Cotyledon

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Squash Bugs / Yellow Vine Decline

SB overwinter as adults
Attach seedlings in spring/summer
Plants turn yellow, stunt
Brown ring around stem

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Squash Bugs / Yellow Vine Decline

- Squash bugs can vector bacteria to plants early to mid season
- **Symptoms** –yellow plants- appear ca. 30+ days after infection
- **Crop rotation** – plant fields far apart
- **Row covers** for small acreages
- **Scout** seedlings early, treat **nymphs** with foliar insecticides if > 1 egg mass / plant found

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Take Home Messages

- Biofumigation **may** control some soil borne diseases; jury is still out in OH
- Mustard beneficial to pollinators and soil health
- Diseases susceptibility changes over time; explore new fungicides if needed
- Wide variety of hybrids on market, choose PMT/R and fit those to your market needs
- Scout for pests, seed trts OK to use, minimize pollinator harm
- Do small scale research / demo on your farm, start small, take notes, see what works, iterate

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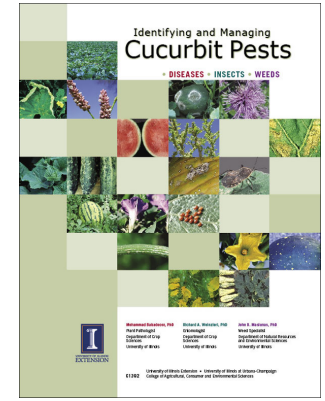
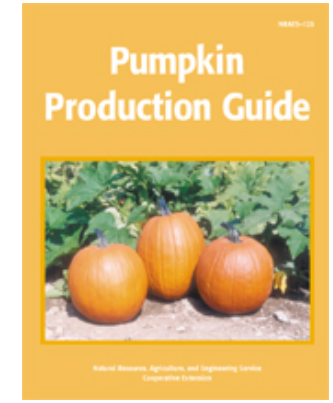
Pumpkin IPM Publications

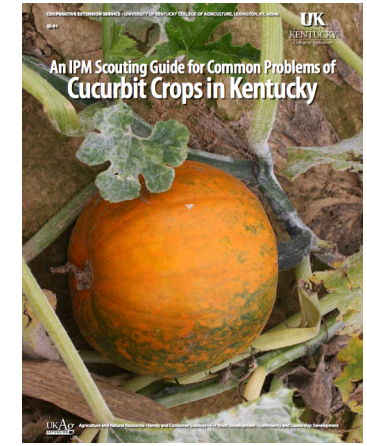
- Identifying and Managing Cucurbit Pests (IL) $11



- Pumpkin Production Guide (NRAES-123) $39



- IPM Scouting Guide for Common Problems of Cucurbit Crops in Kentucky
  -pdf (free)



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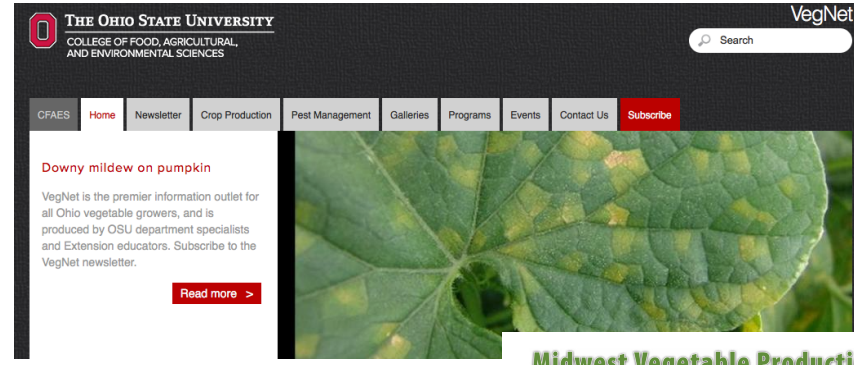
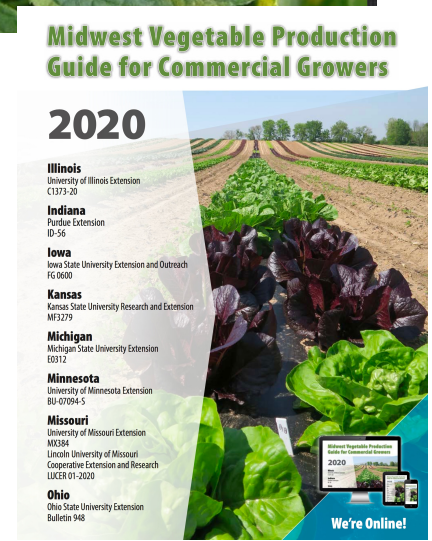
Current Sources of IPM Information

- VegNet Newsletter/Blog
  - Updated daily/weekly through the season
- OSU IPM YouTube
  - Research, DIY, Hybrids
- Midwest Vegetable Production Guide
  - Updated annually by OSU & 7 other States vegetable specialists





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Contact Information

Questions?

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