Greenhouse Growers Seminar

**Fungicides for Commercial Greenhouses**

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**REPEAT**

- **R** = Resistance
- **E** = Exclusion
- **P** = Protection
- **E** = Eradication
- **A** = Avoidance
- **T** = Therapy

**Integrated Pest Management (IPM)**

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**Why use fungicides?**

- Other management strategies are ineffective
- Other management strategies are impractical
- High probability of economic loss
- High quality demanded by end consumers
- Unexpected disease outbreaks occur
- Liability is an issue

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**Fungicide Use**

- **When to use fungicides?**
  - Based on historical disease issues
  - Based on reports of a disease outbreak
  - Based on scouting

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**Fungicide Use**

- **What fungicide to use?**
  - Labeling
    - Legal/registered in Wisconsin
    - Greenhouse
    - Broad vs. narrow plant range
  - Efficacy/spectrum/mode of action
    - Effectiveness against the disease in question
    - Broad vs. narrow pathogen range
    - Resistance develop (FRAC code/group)

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**Fungicide Use**

- **What fungicide to use?**
  - Safety
    - Human (Danger, Warning, Caution)
    - Crop/Plant
    - Environment
  - Formulation (G, L, LF, EC, DF, W)
  - Longevity/weathering properties
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**Fungicide Use**

- **What fungicide to use?**
  - Application
    - Where (foliage, soil, water)
    - How (spray, fog, drench)
    - When (once, more than once)
  - Organic vs. non-organic
  - Cost

- **Organic vs. non-organic**

- **Cost**

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**Fungicide Use**

- **What fungicide are available?**
  - Nucleic Acid Synthesis (A)
    - Mefenoxam (4)
    - Metalaxyl (4)
      (ONE FRAC CODE)
  - Mitosis and Cell Division (B)
    - Fluopicolide (43)
    - Thiophanate-methyl (1)
      (TWO FRAC CODES)

- **Respiration (C)**
  - Ametocladan (45)
  - Azoxystrobin (11)
  - Boscalid (7)
  - Cyazofamid (21)
  - Fenamidone (11)
    (FOUR FRAC CODES)

- **Lipid Synthesis and Membrane Integrity (F)**
  - Alkyl dimethyl benzyl ammonium chloride (14?)
  - Alkyl dimethyl ethylbenzyl ammonium chloride (14?)
  - Etridiazole (14)
  - PCNB (14)
  - Propamocarb (28)
  - *Bacillus amyloliquefaciens* (44)
  - *Bacillus subtilis* (44)
    (THREE FRAC CODES)
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Fungicide Use

What fungicide are available?

- Sterol Biosynthesis in Membranes (C)
  - Fenhexamid (17)
  - Fenpyrazamine (17)
  - Imazalil (3)
  - Metconazole (3)
  - Myclobutanil (3)
  (THREE FRAC CODES)
  - Piperalina (5)
  - Tebuconazole (3)
  - Triadimefon (3)
  - Triflumizole (3)
  - Trichlorazone (3)

- Cell Wall Biosynthesis (H)
  - Dimethomorph (40)
  - Mandipropamid (40)
  - Polyoxin D (zinc salt) (19)
  (TWO FRAC CODES)

- Melanin Synthesis in Cell Wall (I)
  - None

- Host Plant Defense Induction (P)
  - Cyromazine (27)
  - Fosetyl-Al (33)
  - Oxathiapiprolin (U15)
  (THREE FRAC CODES)

- Not Classified
  - Aliphatic petroleum hydrocarbons (NC)
  - Carbonic acid (monopotassium salt) (NC)
  - Phosphorous acid (mono- and di-potassium salts) (NC)
  - Sodium percarbonate (NC)

- Canola oil (NC)
  - Caprylic acid (NC)
  - Neem oil (NC)
  - Rhamnolipid biosurfactant (NC)
  - Bacillus licheniformis (NC)
  - Bacillus pumilus (NC)
  - Gliocladium viride strain G-21 (NC)

- Pythium oligandrum strain DV 74 (NC)
  - Streptomyces griseoviridis (NC)
  - Streptomyces lydicus (NC)
  - Trichoderma asperellum (NC)
  - Trichoderma gamsii (NC)
  - Trichoderma harzianum (NC)
  - Trichoderma virens (NC)
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Fungicide Use

• Summary
  – Consider ALL disease management options
  – Integrate disease management with other management needs
  – Use the right fungicide for each situation
  – Manage fungicide active ingredients properly
  – Use fungicide products effectively and safely
  – Find help when you need it

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Fungicide Use

• Resources
  – Kelly Solutions (www.kellysolutions.com)
  – Fungicide Resistance Action Committee (Search on “FRAC code” + current year)
  – WI DATCP (datcp.wi.gov)
  – Pesticide Applicator Training (ipcm.wisc.edu/pat)
  – County UW-Extension office (www.uwex.edu)
  – Plant Disease Diagnostics Clinic (pddc.wisc.edu)

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How to Contact the PDDC

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