CASE STUDIES OF USING BIOCONTROL FOR DISEASE CONTROL IN GREENHOUSE CROPS

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BioControl in the Greenhouse
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Overview

Our Goal:
• Learn how to develop your own disease management program with biopesticides
  – Foliar Disease Management
  – Soilborne/Root Disease Management
  – Evaluating Biopesticides in your operation

Biopesticide Basics

1. Low REIs and PHIs
2. Safer for workers, consumers, & environment
   – Many exempt from tolerances and MRLs
3. Reduce development of resistance to synthetic pesticides – no known resistance to multiple-MOA biopesticides
4. Improve efficacy of chemical- and bio-pesticides
5. Some can provide cost-effective disease control
6. Improve plant, soil and environmental health over time with continued use

Why Growers Start and Continue to Use Biopesticides

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Biopesticide Basics

What do they do?
1. Suppress plant diseases and pests via one or more of modes of action (MOAs)
2. Act preventively rather than curatively (most)
3. Are effective at low to moderate disease pressure
4. Frequently provide other beneficial effects

What they don’t do
1. Offer 100% protection – no pesticide does
2. Cure diseases (few exceptions)
3. Work in environmental extremes
4. Work at high disease pressure
5. Last indefinitely
   – most have defined shelf lives and storage conditions
   – may require frequent application, especially on foliage
6. Make a bad grower good
Biopesticide Best-Use Practices for Integrated Disease Management

1. Think proactive or preventive: exclusion, sanitation, environment
2. Obtain accurate diagnosis of the problem
3. Select the right product for the right disease
4. Follow label instructions: rates, safety, storage
5. Appropriate formulation for the job:
   - WP, WDG, ES, EC (spray, sycrench, dip or drench)
   - Granular or WP (soil or seed treatment)
6. Test new products on a smaller scale before going “all out”
   - Set-up a good comparison
   - Integrate vs. replace

General Best-Use Practices

7. Proper application
   - Select the most appropriate application method
   - Select the right equipment for the job
   - Calibration and maintenance of equipment are critical
8. Pay attention to shelf life and storage conditions/limits — Many biopesticides are living organisms
9. Consider compatibility with other products and practices
   - Tank-mix or rotational compatibility can help economize programs and increase efficacy
   - Find alternatives or time applications to overcome incompatibilities

Use Compatibility to your advantage

- Types:
  - Tank mix: sprays, drenches, dips
  - Short-term post application
  - Rotation/alternation
- Resistance management (conventional chemistries and antibiotics)
- Reduced input programs (reduced chemical exposure)
- Clean-up/quick knock-down of chemical and extended protection by biopesticide
- Increased efficacy and cost efficiency (labor)

Foliar Programs (Preventive)

- Initial Spray (single or tank mix)
- Repeat Applications 5-10-day Interval

- First True Leaves or at Transplant

General Characteristics of Foliar Biopesticides

- Act or respond immediately to many fungal and bacterial pathogens
- Good coverage and proper concentration are critical
  - Typically not systemic
- Require frequent reapplication or rotation with other products during disease periods
  - New growth of plant parts
  - Lack nutrients for sustained growth on aerial plant surfaces
  - Environmental degradation or loss (UV, precipitation, etc.)
- Compatible with many chemical- and bio-pesticides
General Characteristics of Soil/Root Biopesticides

- May act quickly or after a lag period
- Typically act via 2 or more modes of action
- Good distribution and proper concentration are critical – typically not systemic
  - Bacterial require nutrients and free moisture to move, grow
  - Fungal are less dependent on moisture to move but still require nutrients for growth in absence of pathogen
- Activity for 2-12 weeks, depending on the AI
  - Reapplication may still be needed to keep at effective levels
- Compatible with many chemical- and bio-pesticides

Soilborne Programs

“Soilborne” + Preventive

Chemical Knockdown Drench

Transplant

Biopesticide Drench

How do you measure these?

Tips for Developing Your Own Program

1. Think proactive or preventive: exclusion, sanitation, environment
2. Properly identify the disease issues (don’t assume)
3. Determine which products, practices, and timings you are currently using for these and their costs in use: be wary of unregistered products
4. Identify gaps in your current program:
   - Efficacy
   - Resistance
   - Compatibility
   - Safety
   - Convenience
   - Market
   - Labor
   - How do you measure these?

6. Define what success looks like
7. Contact manufacturer and extension for advice: a lot of great application information is not on the label
8. Test new products on a smaller scale before going “all out”
   - Set-up a good comparison
   - Integrate vs. replace
9. Document your tests
   - Keep track of what, how and when
   - Record what you and your staff see and experience
   - Photos: the good, the ugly, and the surprises