Actigard:
An introduction to a new tool

Tomato Day
February 17, 2011
Cheryl Trueman, M.Sc.
519–674–1500 x63646
ctrueman@ridgetownnc.uoguelph.ca
Actigard

1. What is Actigard and how does it differ from standard products used for bacterial disease management?

2. Is Actigard effective against bacterial speck and bacterial spot?

3. How can Actigard be incorporated into a bacterial disease management program?
What is Actigard?

- Actigard contains the active ingredient acibenzolar-S-methyl (ASM)
  - Does not have anti-microbial activity like a traditional bacteriacide or fungicide
  - Triggers the plant’s own defense system to produce proteins and/or structures that enable resistance
    - Systemic acquired resistance (SAR)

- Actigard does not begin working right away
  - Usually takes about 4 days for plant’s resistance to increase
- Multi-site contact activity on bacteria
- When dissolved in water, copper ions (Cu++) are released, bind with proteins in bacteria, and disrupt their function (ie. denature).
- Tank-mixing EBDC fungicides improves control, helps manage copper resistance

(Cornell, 2010)

- No activity directly on bacteria.

(Systemic Induced Resistance)

(Pieterse et. al., 2009)
Actigard

- Approved label is available on the PMRA website, Syngenta Canada website
- Read carefully... some things to note:
  - Up to 8 applications per year (25 g product Ha\(^{-1}\) = 12.5 g a.i. Ha\(^{-1}\))
  - Apply at least 7 days apart
  - Increase water volume over time (as canopy increases)
  - Apply to healthy, vigorous plants (i.e. not to plants that are under stress)
  - May have a negative impact on yield
- Transplant shock: Syngenta technical bulletin suggests waiting a week after transplanting before first applications.
Is Actigard effective?

- Research results from southern US states
- Research results from nearby US states
- Ontario research results...

- Note that research results presented may have used procedures (ie. # apps, rates, water volume, etc.) that are different than the registered Canadian label.
In Florida... ... (Roberts et. al., 2008)

- Completed a total of 14 trials
  - Bacterial spot pathogens Group A and Group C
  - Total # applications from 6–11 per year; 7 day intervals.
  - # Actigard applications ranged from 5–11, but usually 5 or 6.
  - Actigard rate varied from 17 g a.i. Ha$^{-1}$ to 26.5 g a.i. Ha$^{-1}$. 
In Florida... ... (Roberts et. al., 2008)

- Actigard applied alone:
  - In 2 of 4 trials, not different than nontreated control
  - In 1 of 4 trials, equivalent to copper–mancozeb
  - In 1 of 4 trials, 6 applications of Actigard were better than 11 applications of copper–mancozeb

- 6 applications of Actigard alternated with 5 applications of copper–mancozeb:
  - In 1 of 2 trials, equivalent to standard copper–mancozeb.
  - In 1 of 2 trials, 38% less disease than standard copper–mancozeb.
Applications at 7–10 day intervals, 5 to 9 (?) applications per year, 10.5 g a.i. Ha⁻¹

3 trials with bacterial speck
- In 3 of 3 trials, Actigard had less disease than the standard copper–mancozeb.

3 trials with bacterial spot (groups not specified)
- In 3 of 3 trials, Actigard was better than the nontreated and equivalent to the standard copper–mancozeb.
- In 1 of 1 trial where applications began before symptoms were present, Actigard + copper was better than the standard copper–mancozeb.
In Ohio... ... (Miller et. al., 2002)

Actigard (1–4) then Kocide + Dithane (5–8)
Actigard (1–3) then Kocide + Dithane (4–8)
Actigard (2–4) then Kocide + Dithane (1, 5–8)
Kocide + Dithane (1–8)
Control

- # spot immature fruit
- # spot mature fruit
- % foliage

Legend:
- ab
- bc
- c
- ns

Graphical representation of the data from the study.
In Ohio... ... (Lewis Ivey et. al., 2005)

% disease on foliage

Actigard (1–6) + cover spray  f
Kocide + Manzate (1–10)   cd
Control                     a

AUDPC

Actigard (1–6) + cover spray  c-f
Kocide + Manzate (1–10)   c-f
Control                     a
Research in the early 2000s by Pitblado focused on greenhouse applications of Actigard (ie. 2 leaf stage).
  ◦ Actigard was beneficial BUT current Actigard registration does not allow greenhouse uses.

Research conducted by Trueman in 2010 focused on synergistic interactions with the plant growth regulator Sumagic.
AUDPC for evaluation of products (Sumagic applied in greenhouse, all others in the field) to manage bacterial disease, Ridgetown, ON, 2010.
Two trials completed by D. Cuppels as part of a large North American project

- Used H9478
- Actigard was applied at a rate of 35 g a.i. Ha\(^{-1}\), # applications is not specified
### Is there a negative impact on yield?

<table>
<thead>
<tr>
<th>Y/N</th>
<th>Type</th>
<th>Variety</th>
<th># Apps.</th>
<th>Rate (g a.i. Ha⁻¹)</th>
<th>Location</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Fresh</td>
<td>Various</td>
<td>6-12</td>
<td>17.0 – 26.5</td>
<td>Florida (14 trials)</td>
<td>Roberts et. al., 2008</td>
</tr>
<tr>
<td>Y (N-UTC)</td>
<td>Fresh</td>
<td>Mountain Fresh</td>
<td>4</td>
<td>26.3</td>
<td>Oklahoma</td>
<td>Damicone &amp; Trent, 2003</td>
</tr>
<tr>
<td>N</td>
<td>Fresh</td>
<td>Sunguard</td>
<td>4-6</td>
<td>26.3</td>
<td>Virginia</td>
<td>Alexander &amp; Waldenmaier, 2003</td>
</tr>
<tr>
<td>N</td>
<td>Fresh</td>
<td>Various</td>
<td>5-9?</td>
<td>10.5</td>
<td>Virginia (6 trials)</td>
<td>Graves &amp; Alexanders, 2002</td>
</tr>
<tr>
<td>N</td>
<td>Fresh</td>
<td>Sunchief VFF</td>
<td>6-10</td>
<td>26.3</td>
<td>New York</td>
<td>Lange et. al., 2007</td>
</tr>
<tr>
<td>Y (N-UTC)</td>
<td>Fresh</td>
<td>Sunchief VFF</td>
<td>6</td>
<td>26.3</td>
<td>New York</td>
<td>Lange &amp; Smart, 2005</td>
</tr>
<tr>
<td>N</td>
<td>Proc.</td>
<td>Peto 696</td>
<td>3-4</td>
<td>4.7</td>
<td>Ohio</td>
<td>Miller et. al., 2002</td>
</tr>
<tr>
<td>N</td>
<td>Proc.</td>
<td>Peto 696</td>
<td>6</td>
<td>11.2 – 26.3</td>
<td>Ohio</td>
<td>Lewis Ivey et. al., 2005</td>
</tr>
</tbody>
</table>
Is there a negative impact on yield?

- 22 trials across North America (35 g a.i. Ha\(^{-1}\)).
- 2 trials in Ontario (Diane Cuppels) with H9487.
  - No difference in yield – Actigard vs. Control (no standard incl).
- In 1 trial, yield in the Actigard treatment was lower than the standard.
  - Fresh market variety ‘Sunbeam’, Florida.
- In 1 trial, yield in the Actigard treatment was lower than the control.
  - Fresh market variety ‘Mountain Fresh’, NC.
- In 1 trial, yield in the Actigard treatment was higher than the standard and the control.
  - Fresh market variety ‘Mountain Spring’.

Louws et. al., 2001
How can Actigard be incorporated?

- Actigard is not a silver bullet solution!
- There are numerous trials that show Actigard is as effective or better than standard copper + mancozeb... **BUT**
  - Rates in trials are not consistent with Canadian label rate.
  - Most of these trials were not completed in Ontario.
  - None of the trials except Trueman, 2010 were completed using the Group D bacterial spot pathogen.
    - The Group D pathogen is prevalent in ON and is considered more aggressive than others (Cuppels, 2006)
How can Actigard be incorporated?

- **In Florida**
  - In a recent presentation in Indiana, a Florida researcher suggested that Actigard and copper+mancozeb be applied on 7 day intervals.

- **In New York**
  - Cornell University is to apply Actigard and copper+mancozeb on 7 day intervals, as well.
  - Also suggest 14 day intervals can be effective.
    (McGrath and Smart, 2010).
How can Actigard be incorporated?

- Consider Actigard as a supplement to current practices, as opposed to a substitute.
- Maintain diligence with sanitation, preventative copper applications in the greenhouse, etc.
- In the field, protect transplants early with copper and copper–mancozeb, if permitted. (Do not apply Actigard within 7 days of transplanting).
- Use common sense – avoid applications of Actigard if stressful conditions are anticipated.
- Syngenta Canada suggests always tank-mixing with copper.
  - Can the spray interval be extended to 14 days?
  - Can Actigard be alternated with copper or copper–mancozeb?
References