Plant Health Attributes of Azoxystrobin
Initially we realized that Az was an outstanding new fungicide

*Oudemansiella mucida*  
*(Oudemansin A)*

*Strobilurus tenacellus*  
*(Strobilurin A)*

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Inhibition of Mitochondrial Respiration

● In fungal cells (parasitic), inhibition of respiration leads to reduced energy production and death

● In higher plants, physiological changes include:
  - Carbon fixation
  - Increases in nitrate reductase and nitric oxide
  - Decreases in ethylene production
  - Anti–oxidant production
Strobilurin Fungicide Reduced Transpiration

Mid-portion of 2nd fully expanded leaf on wheat main stem
Measurements 1 day after application of water & acetone (50/50) (Blank) or half field rate of strobilurin & acetone (50/50)
Azoxystrobin maximizes water use efficiency

Increased CO₂ assimilation

PLUS ...

Decreased transpiration

means increased water use efficiency (WUE) by Azoxystrobin
Strobilurin Fungicides Block Ethylene Production

Strobilurins

Strobilurins are ACC synthase inhibitors. Therefore, ethylene production is blocked.

Grossmann & Retzlaff Pest Sci. 50:11-20 1997
Azoxystrobin Prolongs Green Leaf Area (Wheat)

Strobilurins Delay Senescence

- Oxidative stresses produce harmful ROS (superoxides)
- Accelerated senescence → reducing growth and quality

Strobilurins:
1. Reduce production of ROS
2. Enhance activity of anti-oxidative enzymes
3. Reduce ethylene
Strobilurins Increase Nitrate Reductase (NR) Levels

- Nitrate is the preferred uptake & transport form of N in most crop plants.
- Once nitrate reaches the cell, it is reduced to nitrite by NR & subsequently to ammonium.
- The ammonium -N is transferred to carbon-containing compounds to produce amino acids (building blocks of proteins).
- In this way, NR regulates amino acid production and, hence, plant growth.

By increasing NR, strobilurins make nitrates more readily available for plants to use to produce essential proteins.

Plant Physiological Effects of Strobilurins

● Numerous studies conducted by university and industry scientists

● Strobilurins can:
  - Delay senescence by reduction of either ethylene and/or oxidative stresses, or both
  - Improve CO$_2$ assimilation and therefore plants are more photosynthetically efficient
  - Improve Nitrogen utilization by increasing nitrate reductase which leads to increased protein production and enhanced growth
Evaluation of Syngenta Fungicides for Plant Health Qualities

Objectives:
Evaluate whether a spray of Mural® and Heritage® fungicides enhance root growth in Poinsettia.

Treatments:
- Non-Treated Control
- Mural 4 oz Spray
- Heritage 4 oz Spray
- Heritage 2 oz Spray
- Pageant® 4 oz Spray

Method:
Treatments were applied as a spray to Poinsettia ‘Mirage’ cuttings four days after stick. Plant height and root development were evaluated 23 days later.
Root Rating Scale

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Comparison of Control vs Heritage 2 oz.

Non-Treated Control

Heritage 2 oz Spray

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Comparison of Control vs Heritage 4 oz.

Non-Treated Control

Heritage 4 oz Spray

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Comparison of Control vs Mural 4 oz.
Comparison of Fungicides

Heritage 2 oz Spray

Pageant 4 oz Spray

Photos are either the property of Syngenta or used under agreement.
Comparison of Fungicides

Mural 4 oz Spray

Pageant 4 oz Spray

Photos are either the property of Syngenta or used under agreement
Root Rating

Control   Heritage 4 oz   Heritage 2 oz   Mural 4 oz   Pageant 4 oz

Treatments

2017 – Gibson
Evaluation of Mural for Control of Pythium Root Rot

Objectives:
1. Does Mural fungicide provide protection against Pythium root rot?
2. Does a drench treatment of Mural improve or negatively affect root growth and development?

Treatments:
Treatments were applied after transplanting using 80 ml/4 inch pot.
- Non-Inoculated Control
- Inoculated Control
- Mural 2oz Drench (Non-inoculated)
- Mural 2oz Drench (Inoculated)
- Heritage® fungicide 1.2oz Drench (Inoculated)
- Orkestra™ 10floc Drench (Inoculated)

Methods:
- Geranium plants were transplanted in potting media infested with *Pythium irregulare* (3g millet/l of potting media).
Evaluation of Geranium Roots – Top View

Can’t make assessment by rating the outside only!

More roots found on the inside!

Inoculated Control  Non-Inoculated Control  Mural 2oz DR Non-inoculated
Comparison of Geranium Root Mass

Root mass is slightly larger than Control

The more roots = the more difficult to clean

Can’t make assessment by rating the outside only!

More roots found on the inside with Mural 2oz drench application!

Non-inoculated Control Non-inoculated Control Non-inoculated Mural 2oz Non-inoculated Mural 2oz Non-inoculated Mural 2oz

Photos are either the property of Syngenta or used under agreement.
Comparison of Root Mass – Mural 2oz Drench (Non-inoculation)

- More Fibrous Root System
- Difficult time washing roots clean of small peat fibers

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Close Up of Geranium Roots with Mural 2oz Drench Treatment

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Conclusions

- Mural has significantly greater root development than the control in the absence of disease, but statistically similar to Pageant 4 oz and Heritage 2 oz.

- Lower rates of Heritage 2 oz and Mural 4 oz had the highest root ratings (numerically) out of all the treatments.

- No significant differences in height were seen across the treatments, though the Mural 4 oz rate treatment showed a slight increase.

- *Plant health effects are seen at lower rates of Strobilurin products*. Heritage 2 oz and Mural 4 oz fungicides rates are typically used on young plants in production for effective disease control.
Other Benefits

Heritage fungicide is a member of Syngenta’s Plant Performance™ product line that can improve plant vigor and quality. The additional benefits are due to positive effects on plant physiology, which can vary according to plant species and growing environment.
Resistance Management

- FRAC codes listed on labels
- Resistance management recommendations provided on label
- Mixtures
- Number of sprays per crop
- Rotations
- Timing
- Plant health effects are seen at lower rates of Strobilurin products. Heritage 2 oz and Mural 4 oz fungicides rates are typically used on young plants in production for effective disease control
- Reduced rates (lower than label for most diseases) solely for physiological effects are not recommended
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