



BETTER MICROBES
BETTER CROPS
BETTER WORLD™

IR-4 Workshop, 2019

AGBIOME™

AgBiome Update

- A Few Words on AgBiome
- Howler™ /Zio™ fungicide Update



AgBiome Building 1, Research Triangle Park, NC

AgBiome: Leading Ag Innovator



**Novel
microbiome-
based discovery
platform to
develop new
products**

Most advanced
and growing pipeline
of traits and biologicals
targeting large markets

Fastest pace
of discovery and
time to market

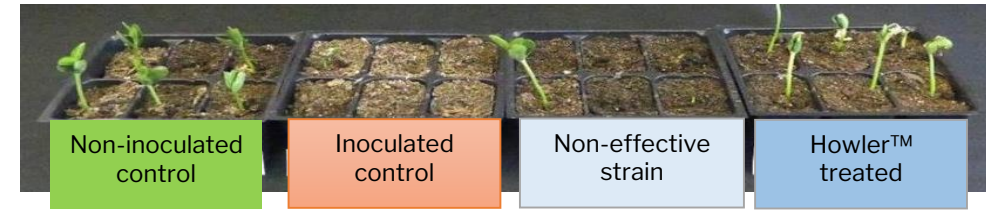
- *Broad base of strategic investors*
- *Best team in the industry – team behind multiple successes*
- *Novel organization unlocks top performance*



Zio™
Fungicide



- *Pseudomonas chlororaphis* AFS009: 50WP formulation
- Offered on wide variety of crops - OMRI listed fungicide
- Registration: EPA Approved
 - Technical: 2017
 - T&O: 2017
 - Food use: 2017



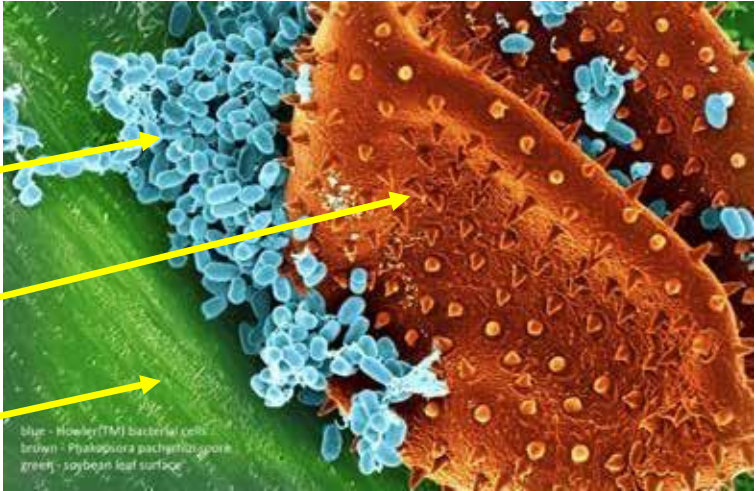
Pythium aphanidermatum on Soybean

- For use to control: *Rhizoctonia*, *Phytophthora* (soil), *Pythium*, *Fusarium*, *Colletotrichum* (anthracnose), *Botrytis*.
- A safe and effective fungicide
 - Exempt from US-EPA Tolerances
 - Minimal REI (4 hours) and PHI (0 day)

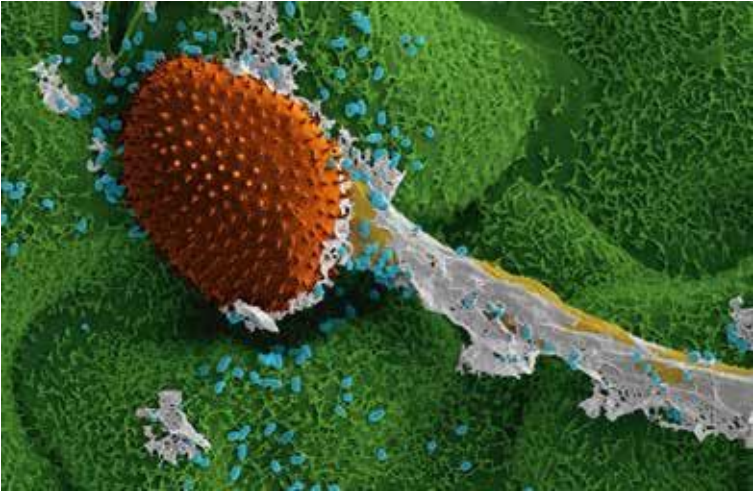
Howler Attacks Fungi to Prevent Infection

A: 1-day after inoculation.

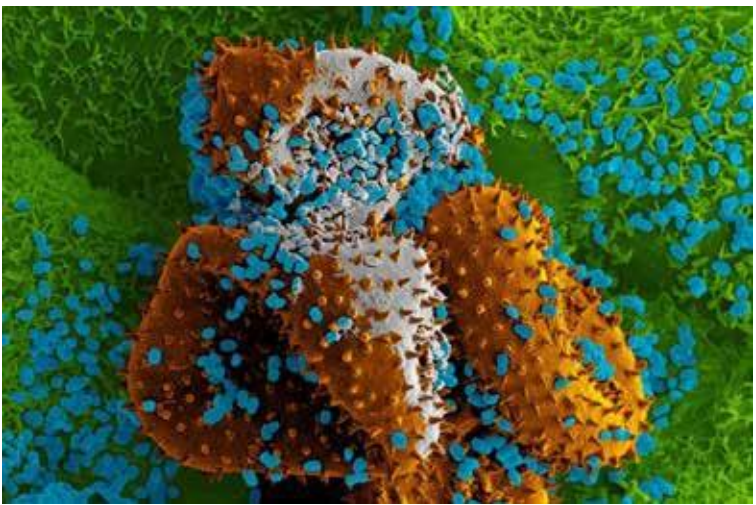
Howler
Fungal Spore
Soybean Leaf



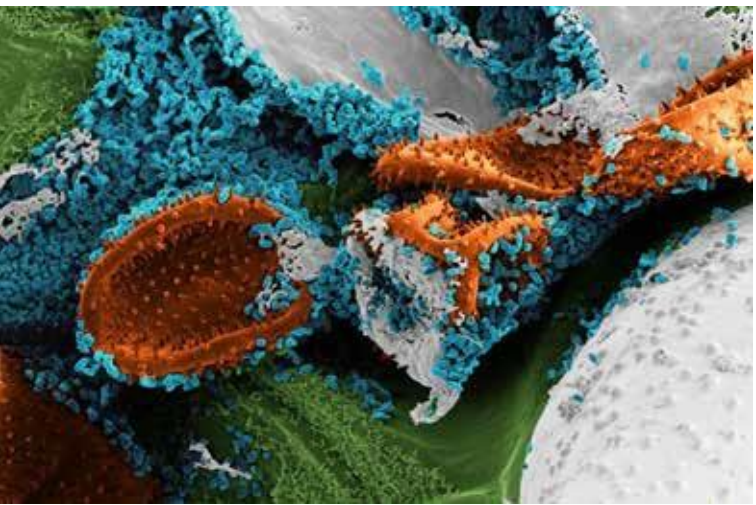
B: 3-days after inoculation



C: 5-days after inoculation.



D: 7-days after inoculation



Howler fungicide – Excellent Safety Profile

Study	Result	EPA Tox Category
Acute Oral Toxicity	LD ₅₀ >5000 mg/kg	IV
Acute Dermal Toxicity	LD ₅₀ >5000 mg/kg	IV
Acute Inhalation Toxicity	LD ₅₀ >5.04 mg/L	IV
Primary Eye Irritation	Not irritating	IV
Primary Skin Irritation	Not irritating	IV
Acute Oral Tox/Pathogenicity	Non-toxic at 3.73 x 10 ⁹ cfu/rat	



At levels expected in the environment, Howler fungicide is not anticipated to be toxic or pathogenic to fish, aquatic invertebrates, birds, wild mammals or non-target plants.

Excellent safety profile means that Howler fungicide is exempt from US tolerance and can be used the day of harvest: 4-hour REI and a 0-day PHI

Howler can be Applied Using Multiple Application Methods for Field and Greenhouse Uses

- Foliar applications (except aerial)
- Soil drench and incorporation
- Drip
- In furrow
- Transplant spray or dip
- Hydroponic or chemigation
- Seed treatment*
- Post harvest*



Howler – Partial Spectrum

Disease Complex	Rating
<i>Botrytis</i>	+++
<i>Rhizoctonia</i>	+++
<i>Colletotricum</i>	++
<i>Alternaria</i>	++
<i>Pythium</i>	++
<i>Phytophthora</i> – Soil	++
<i>Phytophthora</i> – Foliar	+
Powdery mildews	+
Downy mildews	+

Rating	Performance
+++	Excellent Control
++	Good Control
+	Suppression – useful component in mixes and possible rotations

Howler on Major Diseases of High Value Crops

Grapes/Vines:

- Botrytis
- Powdery mildew*
- Downy mildew*
- *Phomopsis*, Black rot: TBD

Strawberries/Small Fruits:

- Botrytis
- Anthracnose
- Powdery mildew*
- *Phytophthora* TBD
- Charcoal rot: TBD
- Other leaf spots and rots: TBD

Vegetables, Trees & Potatoes:

- *Rhizoctonia*
- *Alternaria*
- Anthracnose and leaf spots
- *Phytophthora* root rots
- Late Blight/downy mildews*
- Powdery mildew*

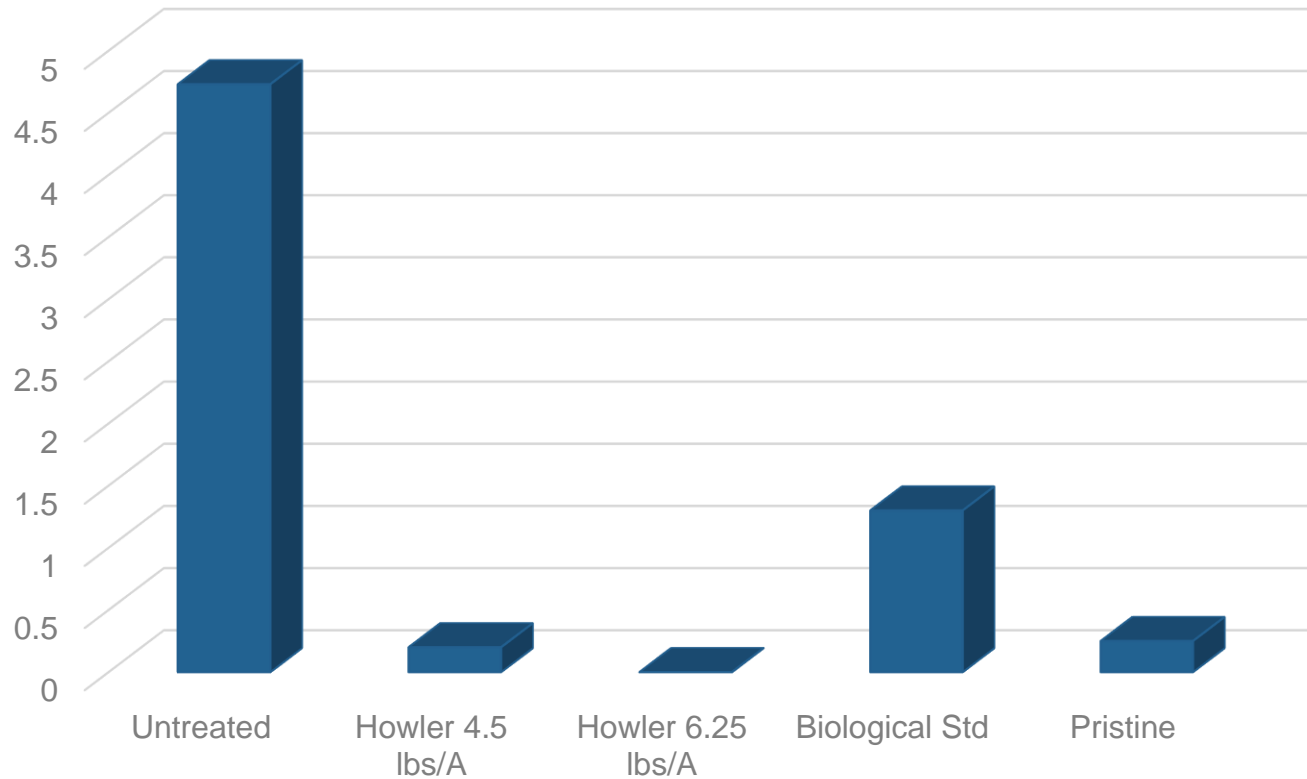
Turf Diseases

- Brown patch
- Pythium blight
- Dollar spot
- Anthracnose
- Powdery mildew*

*= suppression – for use in mixes and programs

Howler – Control of Botrytis Bunch Rot on Grapes– Mexico – 2018 - Field

Disease Incidence - Scale



Howler controls Botrytis bunch rot as well as synthetic standards and better than Biological standard under low disease pressure

4 foliar applications, 7 day interval, 700 l/ha

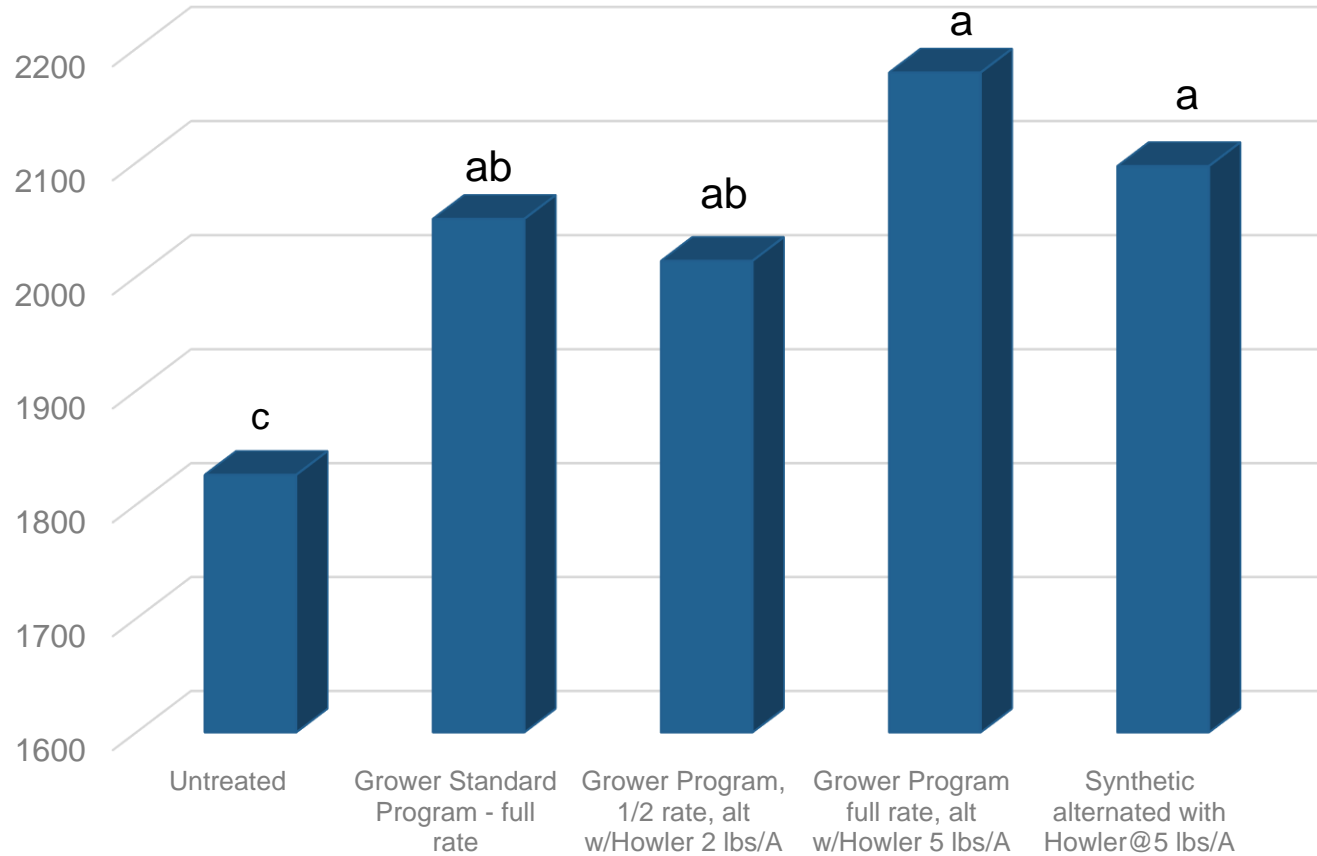
Assessment 38 days after application

All treatments were significantly better than the untreated and not statistically different from each other, using AUDPC and (Fisher's LSD, P=0.05)

Partner trial: FT-MX-27-2018

Howler – Strawberry Yield and Quality - Botrytis California 2018 - Field

Marketable Fruit Count, Seasonal Total



Howler performs well, even at reduced rates in programs.

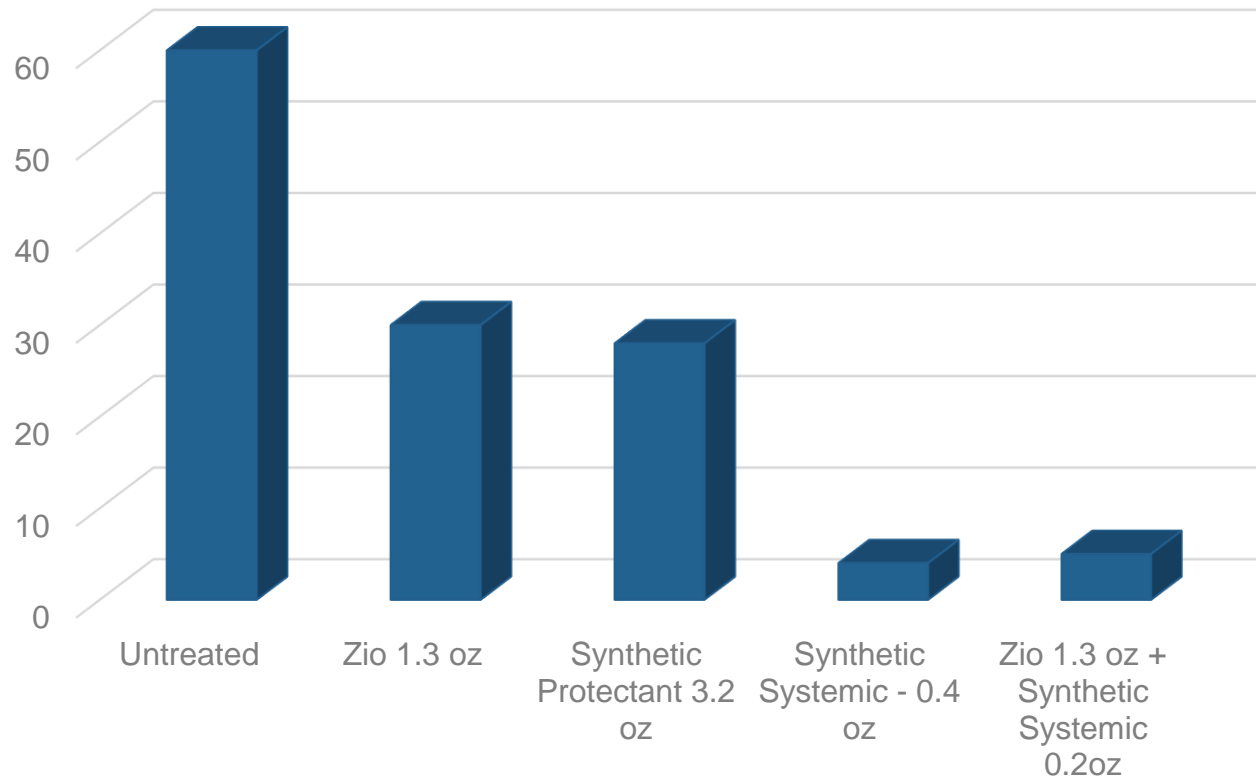
7 Foliar applications

All treatments were significantly better than the Untreated and not statistically different from each other (Fisher's LSD, P=0.05)

Plant Sciences Inc, 2018, California
Trial ID: 2017-18-Howler

Howler (Zio) - Control of Rhizoctonia Brown Patch on Turf - Foliar Application – 2018 – Field

Percent Turf Area Affected – Aug 6, 2018



Zio was as effective as the standard protectant reference

but less effective than the systemic reference

Half rate of Systemic combined with Zio had similar efficacy as the full rate of synthetic standard alone

Bruce Clark, 2018, Rutgers Univ, NJ In partner report

Howler Controls Soil-Born Vegetable Diseases - Drip -2019

- Burton farm, NC - 2019
- Howler applied at 5 lbs/A through Drip Irrigation
- Comments – “Howler will make the difference between having a harvest and not!”



Howler-Treated
Squash+grower program



Untreated + grower program

Thank you !