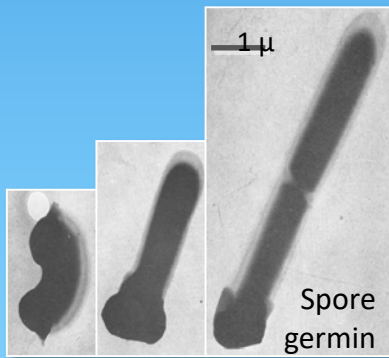


Bacillus mycoides isolate J (BmJ)

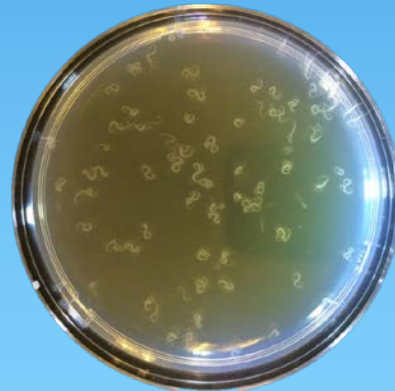
Biological Plant Activator

Brett Highland, PhD.

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Modified from Hillier et al. 1994
Bacteriol. 56: 569-576.



CERTIS

2017 Agrow Award for Best New Biological Product

2017 2nd place Blum Award, ABIM, Basil Switzerland.



- **Worlds first** Biological Plant Activator who's active ingredient is microbial in origin. (*Bacillus mycooides isolate J*)
- Mode of action-Systemic acquired resistance mechanism, similar to Actigard
- No direct adverse affect on pathogens.
- Stability similar to Bt WDG's (**2 – 3 years if kept dry**).
- **Compatible** with fungicides, insecticides, **fertilizers**.
- **Most coppers** are OK for tank mixing.
- “Normal” commercial use rate vegetables, **1-2 oz./acre, range 1-4.5 oz./acre.**
- Apply **before infection** occurs.
- **NOP and OMRI** approved, 0 PHI, 4 hr. REI
- **No phytotoxicity** or yield reduction detected.
- Takes about **3 hrs.** for plants to become induced.
- New unique **FRAC group- P6**

LifeGard WG Labeling- Additions 2018

CROPS	DISEASES
Almonds	<i>Alternaria</i> leaf spot
Carrots	<i>Alternaria</i> leaf blight (Early blight)
Citrus	Citrus canker
Cole crops	Downy mildew
Cucurbits	Anthracnose, Powdery mildew, Downy mildew, Gummy stem blight
Fruiting veg	Bacterial spot & speck, Early blight, Gray mold, Late blight
Grapes	Downy mildew
Lettuce	Downy mildew, Powdery mildew, <i>Cladosporium and Stemphylium</i> leaf spots
Legumes	White Mold
Pecans	Pecan scab
Pome fruit	Fire blight
Potatoes	Early blight, late blight, White mold , <i>Potato virus Y</i> (seed potatoes)
Spinach	Downy mildew, Leaf spots (<i>Cladosporium, Stemphyllium</i>)
Sugar beets, Garden (table) beets	<i>Cercospora</i> leaf spot
Tobacco	Blue mold

BoteGHA™ ES

EMULSIFIABLE SUSPENSION MYCOINSECTICIDE

- *Beauveria bassiana* Strain GHA
(Currently also available as BotiniGard® ES from Bioworks Inc.)
- MOA, direct parasite of insects and mites
- Conidia, contains 2×10^{13} spores per quart
- 11.3% ES formulation
- Storage between 40 - 85°F, do not freeze
- 4hr REI and 0 day PHI.



Mycosis in whitefly nymphs after treatment with *Beauveria bassiana* strain.

BoteGHA™ ES

EMULSIFIABLE SUSPENSION MYCOINSECTICIDE

- Now sold by Certis USA for outdoor agriculture, Registered Q1 2018.
- Labeled Pests Include: Whitefly, aphids, thrips, psyllids, mealybugs, leaf/planthoppers, stem boring Lep.s., leaf-feeding beetles, Scarab beetles, plant bugs, Orthoptera, spider mites.
- Registration on: Vegetables, fruits & berries, tree nuts, agronomic crops, herbs & spices.
- NOP and OMRI approved.

Use Rates and Application

- Application rates of ¼ to 1 quart per acre.
- Ground (5-100 gpa), chemigation and aerial applications
- No spreading agents needed.

Tank mix compatibility

- Can be tank mixed with most insecticides and surfactants.
- Cannot be tank mixed with **most** fungicides



Wu et al. 2016. Exp. Appl. Acarol. 70: 421-435

Mycosis in twospotted spider mite six days after treatment with *Beauveria bassiana* strain.

CERTIS

AgriPhage™

BACTERIOPHAGE BACTERICIDE

AgriPhage - Tomato Spot and Speck

- *Xanthomonas campestris vesicatoria* (XCV)
- *Pseudomonas syringae tomato* (PST)
- Manufactured by Omnilytics, Inc.
- It is an 8 phage mixture, and also with the phage of *Xanthomonas gardneri* added in 2018
- Effective phage titers persist on the leaf surface for 3-5 days.
- In the presence of active lesions, phage will persist for 10 days+



AgriPhage™

BACTERIOPHAGE BACTERICIDE

- Field Rate: 1-2 pints per acre, usual timing 1-2 applications per week
- Apply as a preventive to tomatoes or peppers.
- Apply in the field with conventional ground spray equipment or via aerial application.
- In the greenhouse, apply as a foliar spray or by fogging.
- Water pH: best if 6.5-9
- Storage, do not exceed 90 deg. F, store if possible in cool conditions.
- Can be mixed with most insecticides, fungicides, fertilizers. Cannot be mixed with copper fungicides (consult compatibility lists, CertisUSA)
- Residue exempt, 4 HRI, 0 PHI, NOP approved

AgriPhage™-CMM

BACTERIOPHAGE BACTERICIDE

- AgriPhage Tomato Canker
 - *Clavibacter michiganensis michiganensis* (CMM)
 - Systemic, internal disease. Phages cross root barrier for systemic control.
 - Common pest in greenhouses in the U.S. and Canada.
 - Primary disease in shade grown field tomatoes in Mexico.
 - Can be an important pest in field grown tomatoes in the US.

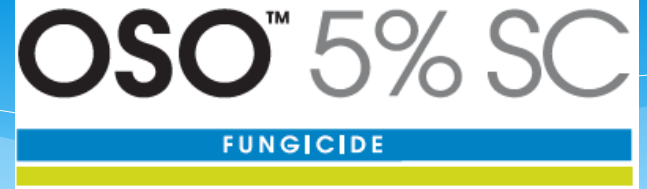


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New Phage Products Soon to be Introduced

- AgriPhage for fire blight, pome fruit, *Erwinia amylovora*
- AgriPhage for citrus canker, *Xanthomonas axonopodis citri*
- Both expected to be labelled by 1st Q 2019





- Polyoxin D zinc salt (5% Suspension Concentrate)
- Naturally derived from *Streptomyces* sp.
- Broad spectrum chitin synthase inhibitor, prevents fungal cell wall formation.
- Best when used preventatively, usually on a 7-14 day schedule.
- Application rates: **6.5** - 13 fluid ounces/acre
- 4 hr. REI, 0 days to harvest (exempt from residue tolerance)
- Minimum PPE requirement:
 Long-sleeved shirt, long pants, socks, shoes, chemical-resistant gloves.
- Broad tank mix compatibility.



Important Crops registered:

- Fruits: Berries, Pome, Stone, Citrus
- Vegetables: Fruiting, Cucurbit, Leafy, Bulb, Brassica, Legume
- Herbs & Spices

Key Target diseases/pathogens:

- *Monilinia*
- Powdery mildew, downy mildew, white rust (spinach)*
- *Botrytis*
- Anthracnose
- Mummy berry
- Pome fruit summer diseases and fruit rots*

Organic use:

- **Favorable NOSB recommendation; NOP approval anticipated Jan. 2019**
- **WSDA application submitted; approval anticipated 1Q-2019**

(* not labeled at this time)



Homeplate (H06) Non-Selective Herbicide

- 80% Fatty acid (combo of caprylic and capric fatty acids). Highest concentration in the market.
- EPA label approved August, 2018.
- OMRI, NOP & Residue Exempt.
- Full crop label.
- Pre-plant, in season and desiccant label language.



- Kocide 3000 – O was registered February of 2017.
- NOP approved for organic production.
- Registered for use on vegetables, tree and small fruit crops, vine crops, and others, for a variety of fungal and bacterial diseases.
- Formulation delivers a maximum amount of biologically active copper at low rates.
- Same label as Kocide 3000.
- Certis still selling :

Kocide[®]
2000

ManKocide[®]

CERTIS

Questions or Comments. Thank you !



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