LifeGard™ WG

BIOLOGICAL PLANT ACTIVATOR

A New Microbial Product for Crop Disease Management




Michael Dimock, Ph.D.
Certis USA, Columbia, Maryland
ABIM 2017

CERTIS USA
The Biopesticide Company

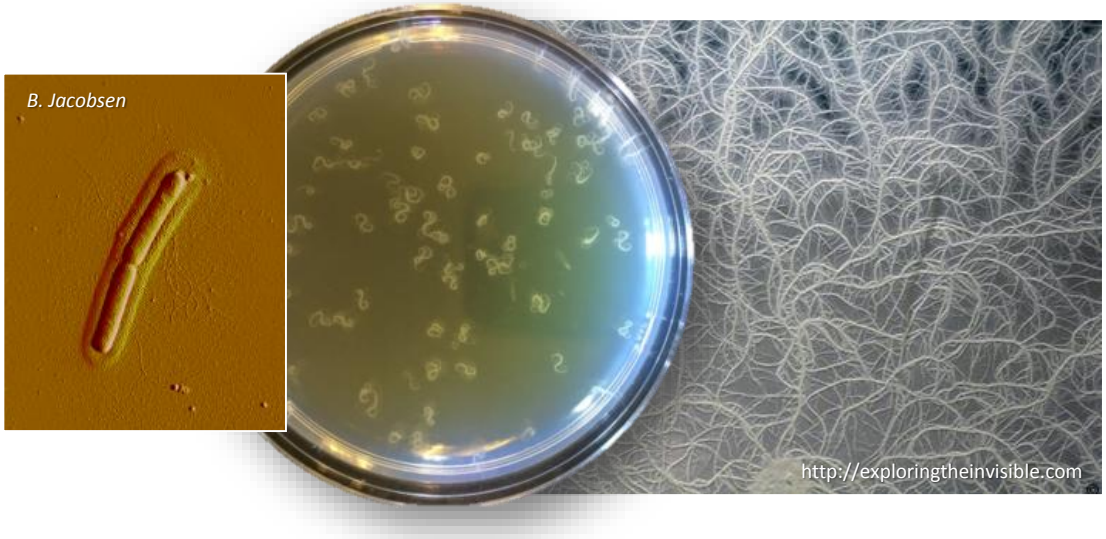
CERTIS

LifeGard™ WG
BIOLOGICAL PLANT ACTIVATOR

Active ingredient:

Viable endospores of *Bacillus mycoides* isolate J (BmJ)

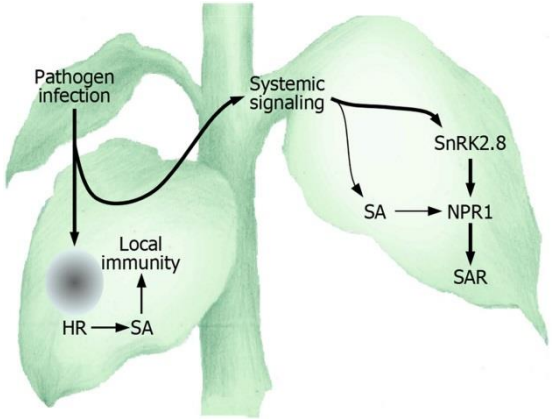
- Common bacterium in soil and plant samples worldwide.
- "Isolate J" from asymptomatic sugar beet foliage in field with severe outbreak of *Cercospora beticola* (Montana).
- Strain licensed to Certis USA by Montana State University.
- Fermentation methods & formulation developed by Certis USA.



BmJ Mode of Action

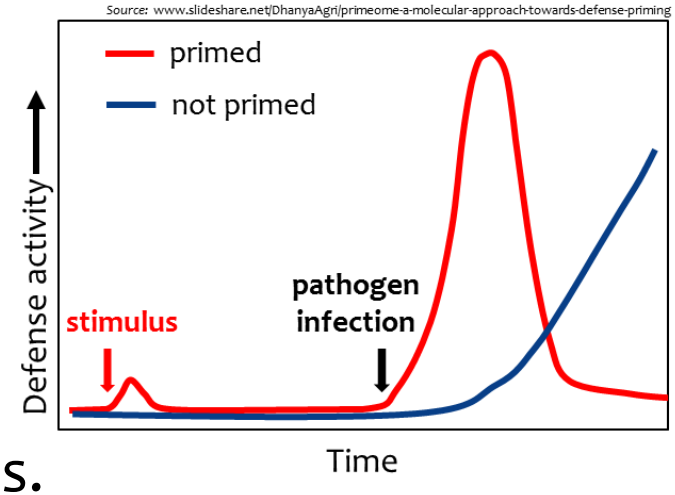
Defense Priming

- BmJ triggers immune response in plant (elicitor of induced resistance)
- Activates NPR1 downstream of salicylic acid (SA)
- Up-regulation of pathogenesis-related (PR) proteins native to the host plant
- Similar to chemical elicitor acibenzolar-S-methyl
- New FRAC group:
  P6: Microbial inducer of plant resistance



Timing and duration

- NPR1 activation detectable within 3 hours.
- PR proteins detectable within 24 hours.
- Primed state lasts 18 - 21 days.



No phytotoxicity in 20+ years of field trials.

BmJ Mode of Action

BmJ does not kill or compete with plant pathogens!

Live BmJ cells stimulate plants to produce their own natural antimicrobial compounds.

Family	Type member	Properties
1	PR-1	anti-oomycete
2	β-1,3-glucanase	endogluconase
3	Chitinase	endochitinase
4	Chitinase	endochitinase
5	Thaumatin - like	fungal membrane disruption
6	Proteinase inhibitor	inhibits pathogen proteinases
7	Endoproteinase	inhibits pathogen proteinases
8	Chitinase	endochitinase
9	Peroxidase	liginification
10	Ribonuclease - like	digests RNA
11	Chitinase	endochitinase
12	Defensin	plasma membrane disruption
13	Thionin	plasma membrane disruption
14	Lipid Transfer Protein	plasma membrane disruption

Pathogenesis-related (PR) proteins

- Coded by host plant genes, expressed only in disease or stress situations.
- Different plant species produce different suites of PR proteins.
- Some are antimicrobial, others signal infection or stress to nearby cells.

CERTIS

LifeGard™ WG
BIOLOGICAL PLANT ACTIVATOR

Registration/Labeling

- USA & Canada registrations in 2016 (Joint EPA/PMRA review)
- 40% water-dispersible granule
- Minimum 3×10^{10} (30 billion) viable BmJ spores per gram.
- Application rate: 33 grams/100 liter water (= 10^7 spores/ml)
- EPA Signal word: CAUTION
- REI = 4 hours
- Exempt from residue tolerance (no PHI or MRLs)
- Can be used in organic production (NOP - OMRI - ECOCERT)

CERTIS

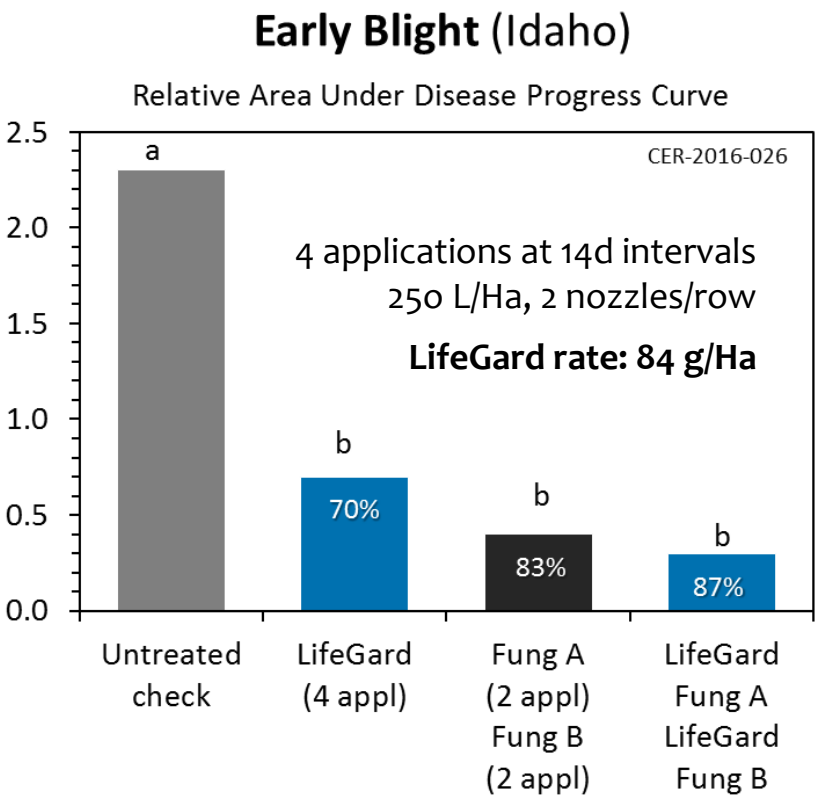
LifeGard™ WG
BIOLOGICAL PLANT ACTIVATOR

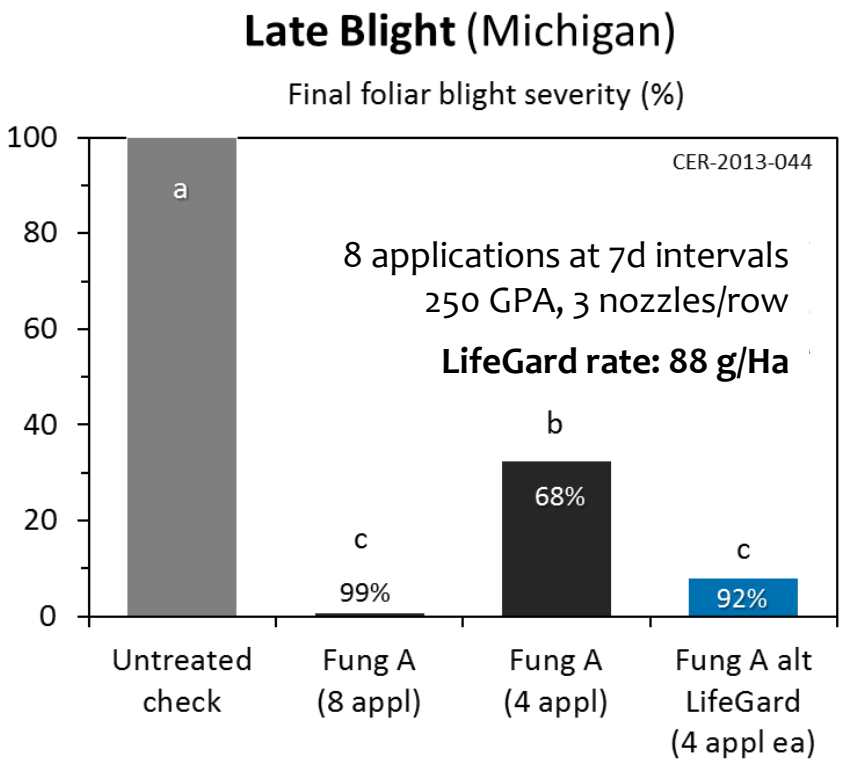
USA Labeled uses

CROP	TARGET DISEASE
Almond	*Alternaria* leaf spot
Brassicas	Downy mildew
Carrot	*Alternaria* leaf blight
Citrus	Citrus canker
Cucurbits	Anthracnose, Powdery mildew, Downy mildew, Gummy stem blight
Fruiting vegetables	Bacterial spot & speck, Early blight, Late blight, Gray mold
Grapes	Downy mildew, Powdery mildew
Leafy vegetables	Downy mildew, Powdery mildew, Leaf spots
Legume vegetables	White mold
Pecan	Pecan scab
Pome fruit	Fire blight
Potato	Early blight, Late blight, White mold, Potato virus Y (seed potato)
Sugar & garden beet	*Cercospora* leaf spot
Tobacco	Blue mold

Fungi, Oomycetes, Bacteria, Viruses

Efficacy as a stand-alone and in fungicide programs in potato





Efficacy (% reduction compared to Untreated Check) indicated on bar for each treatment.

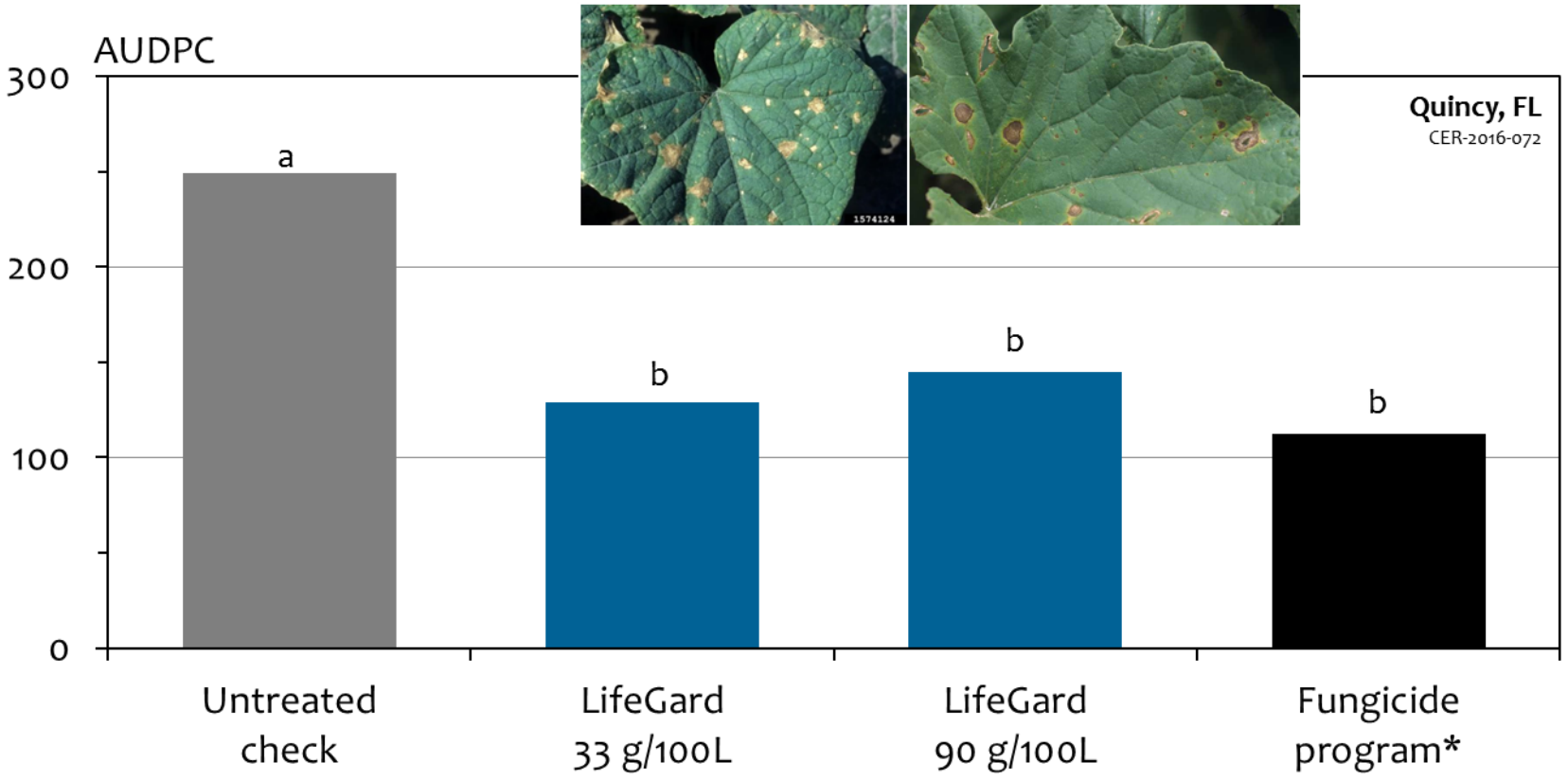
Downy Mildew of Grapevines

(Chardonnay variety)

LifeGard WG
33 g/100L

Untreated control

Anthracnose & Target Spot in Cucumber



Three weekly with CO_2 backpack sprayer delivering 260 L/ha.

*Standard fungicide treatment : Chlorothalonil (ABC), Propamocarb (A,C), Cyazofamid (B)

Handling, Storage, and Use

- Start as **preventive** application prior to infection.
- Alternate or mix with fungicides to improve control and reduce overall need for fungicide applications.
- Storage stability: At least 18 months (study in progress)
- Rainfastness:
  - 3 hours to activate NPR1
  - Once initiated, SAR process occurs inside the plant
- Compatible with most fungicides tested so far:

Triazoles	Mancozeb	Bicarbonates
Copper hydroxide	Chlorothalonil	Phosphites
Oils up to 2%	Thiophanate-methyl	Phosphorous acid
Other *Bacillus* spp.	Sulfur (dry & liquid)	Polyoxin D zinc salt

For more information:

www.certisusa.com

www.facebook.com/CertisUSA

@CertisUSA

mdimock@certisusa.com