Good Use Practices for Kasumin, and other new tools for managing fire blight

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NYSAES

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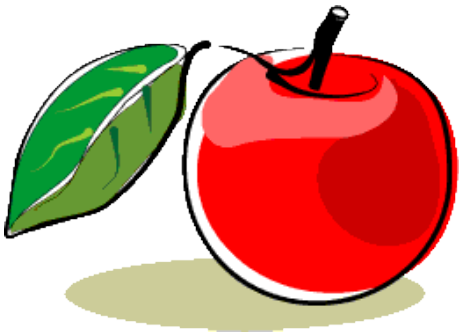
Cornell University

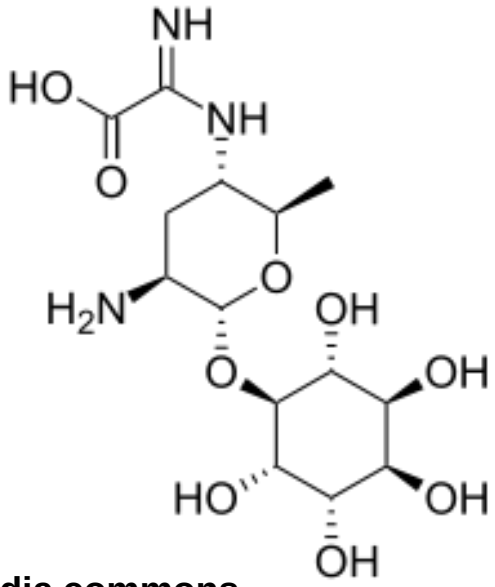


Outline

- Kasugmycin (Kasumin 2L)
- Other chemical tools
  - Biologicals
  - Coppers
- Fire blight product efficacy
- Fire blight chemical management plan

Kasugamycin (Kasumin 2L)

- Aminoglycoside antibiotic developed as rice blast fungicide (protectant)
  - Same class but different MoA: inhibits protein production
- Resistance: mutations in 16S rRNA methyltransferase *ksgA gene*
- No resistance reported in *E. amylovora*
  - Resistance found in other environmental bacteria



Wikipedia commons

Kasugamycin (Kasumin 2L)

- Evaluated in 1980s for fire blight: testing suspended for phytotoxicity
  - Arysta Lifescience's Kasumin 2L: New formulation – safe for apples
- 2010-2014 seasons: section 18 label for MI
- 2015 season: section 3 label for US, NYSDEC is expediting NY request

ACCEPTED
FOR REGISTRATION
January 21, 2015
New York State Department
of Environmental Conservation
Division of Materials Management
Pesticide Product Registration

Kasumin® 2L

PEEL HERE TO OPEN

DOC ID 541104

GROUP 24 FUNGICIDE

For Agricultural Use Only
For Control of Fireblight in Pome Fruit

ACTIVE INGREDIENT:	
*Kasugamycin Hydrochloride Hydrate	2.3%
OTHER INGREDIENTS:	97.7%
TOTAL:	100.0%

*(Equivalent to 2.0% kasugamycin)
Contains 0.168 pounds kasugamycin per gallon

KEEP OUT OF REACH OF CHILDREN
CAUTION / PRECAUCIÓN

See inside of booklet for additional Directions for Use and Additional Precautionary Statements
For Product Information Call: 1-866-761-9397

Produced for:
Arysta LifeScience North America, LLC
15401 Weston Parkway, Suite 150
Cary, NC 27513

EPA Reg. No. 66330-404
EPA Est. No. 070815-GA-001
AD090814
103137—100814A

NET CONTENTS: 2.5 GALLONS

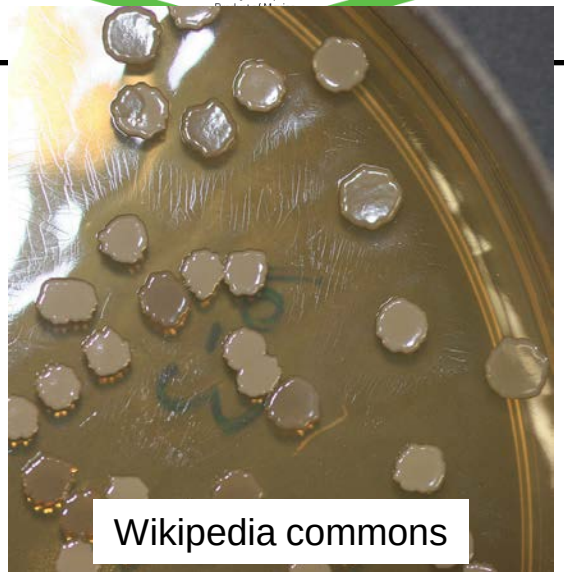
Arysta LifeScience

Outline

- Kasugmycin (Kasumin 2L)
- Other chemical tools
  - Biologicals
  - Coppers
- Fire blight product efficacy
- Fire blight chemical management plan

Serenade Optimum

- A.I. & M. O. A.: *Bacillus subtilis*-antibiotic metabolites
- Diseases: Fire blight & apple scab, anthracnose, botrytis, rusts
- My experiences
  - Fungal diseases: sooty blotch, fly speck, & rusts: moderate
  - Fire blight: >50% control at heavy pressure & 100% control light pressure



DoubleNickel55/LC

- A.I. & M.O.A/: *Bacillus amyloliquefaciens* strain D747-antibiotic metabolites
- Diseases: fire blight & foliar & fruit diseases
- My experiences
  - Fungal diseases: sooty blotch, fly speck, & rusts: moderate to high
  - Fire blight: >50% control at heavy pressure & 100% control light pressure


DoubleNickel55™

BIOFUNGICIDE

Water Dispersible Granular Biofungicide

FOR ORGANIC PRODUCTION

OMRI™ Listed

Active Ingredient:
Bacillus amyloliquefaciens strain D747* ..... 25.0 %
Other Ingredients: ..... 75.0 %
Total ..... 100.0 %
*Contains a minimum of 5×10[illegible] colony-forming units (cfu) per gram

Net Contents: 5 Pounds
EPA Reg. No. 70051-108
EPA Est. No. 70051-CA-001
Lot No:

Manufactured by:
Certis USA, L.L.C.
9145 Guilford Rd, Suite 175
Columbia, MD 21046

CERTIS

KEEP OUT OF REACH OF CHILDREN
CAUTION

FIRST AID - Agricultural Use
If in eyes: Hold eyes open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.
If on skin: Take off contaminated clothing. Rinse skin with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.
If inhaled: Move person to fresh
911 or an ambulance, then giv
mouth-to-mouth if possible. Call
for further treatment advice.
Have the product label with yo
center or doctor.
Hot Line No.: 1-800-255-3924 fo

USER SAFETY RECOMMENDATIONS
Users should:
- Remove clothing/PPE immediately if pesticides get inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

PRECAUTIONARY STATEMENT
HAZARDS TO HUMANS & DOM
CAUTION: Causes moderate eye
repeated skin contact may ca
individuals. Avoid contact with eye
mist. Wash thoroughly with soap a
eating, drinking, chewing gum, us

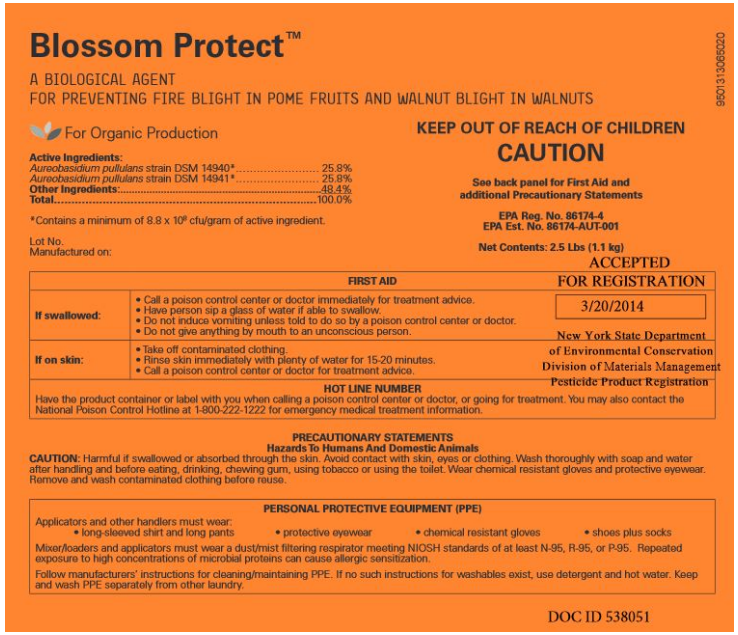
PERSONAL PROTECTIVE EQU
Applicators and other handlers m
- Long-sleeved shirt and long pa
- Waterproof gloves
- Shoes plus socks

Mixer/loaders and applicators
respirator meeting NIOSH standa
Repeated exposure to high conc
cause allergic sensitization. Foll
cleaning and maintaining PPE.
use detergent and hot water for
separately from other laundry.

When handlers use closed syst
a manner that meets requiremen
Standard (WPS) for agricultur
requirements may be reduced or

Wikipedia commons

Blossom protect



Blossom Protect™

A BIOLOGICAL AGENT
FOR PREVENTING FIRE BLIGHT IN POME FRUITS AND WALNUT BLIGHT IN WALNUTS

For Organic Production

KEEP OUT OF REACH OF CHILDREN
CAUTION

See back panel for First Aid and additional Precautionary Statements

Active Ingredients:
Aureobasidium pullulans strain DSM 14940*..... 25.8%
Aureobasidium pullulans strain DSM 14941*..... 25.8%
Other Ingredients..... 48.4%
Total..... 100.0%

*Contains a minimum of 8.8 x 10^8 cfu/gram of active ingredient.

Lot No.
Manufactured on:

EPA Reg. No. 86174-4
EPA Est. No. 86174-AUT-001

Net Contents: 2.5 Lbs (1.1 kg)

ACCEPTED
FOR REGISTRATION
3/20/2014
New York State Department of Environmental Conservation
Division of Materials Management
Pesticide Product Registration

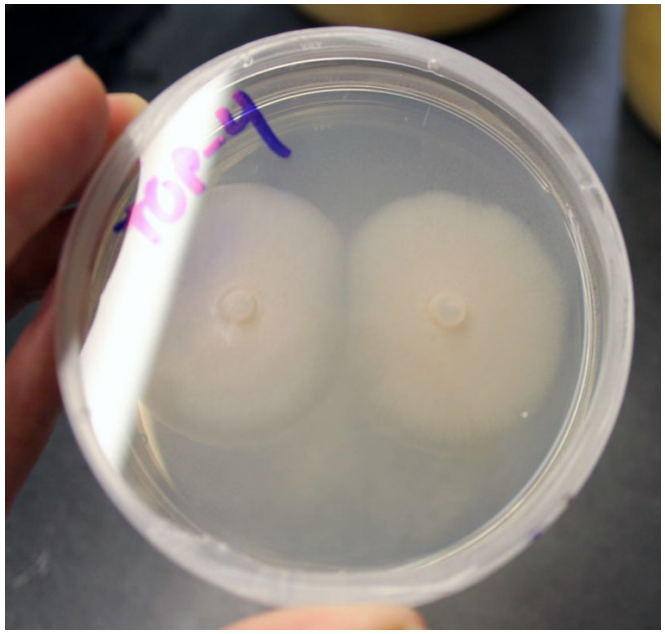
FIRST AID	
If swallowed:	• Call a poison control center or doctor immediately for treatment advice. • Have person sip a glass of water if able to swallow. • Do not induce vomiting unless told to do so by a poison control center or doctor. • Do not give anything by mouth to an unconscious person.
If on skin:	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15-20 minutes. • Call a poison control center or doctor for treatment advice.

HOT LINE NUMBER
Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact the National Poison Control Hotline at 1-800-222-1222 for emergency medical treatment information.

PRECAUTIONARY STATEMENTS
Hazards To Humans And Domestic Animals
CAUTION: Harmful if swallowed or absorbed through the skin. Avoid contact with skin, eyes or clothing. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco or using the toilet. Wear chemical resistant gloves and protective eyewear. Remove and wash contaminated clothing before reuse.

PERSONAL PROTECTIVE EQUIPMENT (PPE)
Applicators and other handlers must wear:
• long-sleeved shirt and long pants • protective eyewear • chemical resistant gloves • shoes plus socks
Mixer/loaders and applicators must wear a dust/mist filtering respirator meeting NIOSH standards of at least N-95, R-95, or P-95. Repeated exposure to high concentrations of microbial proteins can cause allergic sensitization.
Follow manufacturers' instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry.

DOC ID 538051



- A.I. & M.O.A.: *Aureobasidium pullulans* strains x2 = competitive inhibition of stigmatic surface
- Diseases: fire blight
- Known experiences and concerns
  - 50-80% control of fire blight under high pressure
  - Fruit russeting shouldn't happen – 80% bloom

Copper products

- **MasterCop:** Copper sulfate pentahydrate 5.4% MCE
- Bloom rate + 1-3 lbs./hyrdated lime
- Experiences:
  - Effective on fire blight (50-75% control
  - Mixing issues with strep
  - Phyto./russeting 1 year

MASTERCOP®

Fungicide / Bactericide

FOR USE IN: CITRUS, VEGETABLES, TREE CROPS, SMALL FRUITS, VINES, AND FIELD CROPS.

ACTIVE INGREDIENT:	% BY WT.
Copper sulfate pentahydrate*†	21.46%
INERT INGREDIENTS:	78.54%
TOTAL:	100.00%

*CAS No. 7758-99-8

†Metallic copper content 5.4%

EPA Reg. No. 55272-18-66222 EPA Est. No. 55272-MEX-001

KEEP OUT OF REACH OF CHILDREN

DANGER/PELIGRO

Si usted no entiende la etiqueta, busque al alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

FIRST AID	
If in eyes:	• Hold eye open and rinse slowly and gently with water for 15-20 minutes. • Remove contact lenses, if present, after the first 5 minutes, then continue rinsing. • Call a poison control center or doctor for treatment advice.
If swallowed:	• Call a poison control center or doctor immediately for treatment advice. • Have person sip a glass of water if able to swallow. • Do not induce vomiting unless told to by a poison control center or doctor. • Do not give anything to an unconscious person.
If on skin:	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15-20 minutes. • Call a poison control center or doctor for treatment advice.
If inhaled:	• Move person to fresh air. • If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth, if possible. • Call a poison control center or doctor for further treatment advice.

Have the product container or label with you when calling a poison control center, doctor, or going for treatment. For emergency information concerning this product, call the National Pesticides Information Center (NPIC) at 1-800-858-7378 seven days a week, 6:30 am to 4:30 pm Pacific Time (NPIC website: www.npic.orst.edu). You may also contact CHEMTREC (800) 424-9300 (24 hours) for emergency medical treatment information.

For additional precautionary, handling, and use statements, see inside of this booklet.

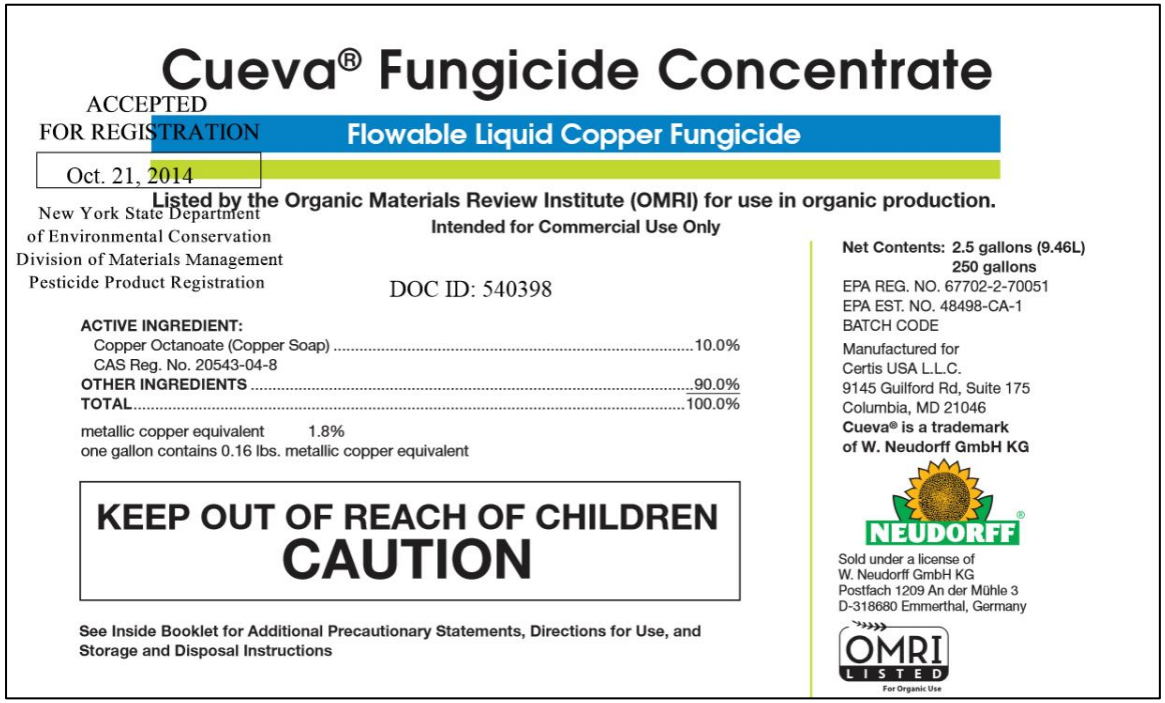
Manufactured for:
Makhteshim Agan of North America, Inc.
4515 Falls of Neuse Road, Suite 300
Raleigh, NC 27609

M A N A

EPA 030110/Notif 101411/ Rev A

Net Contents: 2.5 Gallons

Copper products



Cueva® Fungicide Concentrate

ACCEPTED
FOR REGISTRATION
Oct. 21, 2014
New York State Department
of Environmental Conservation
Division of Materials Management
Pesticide Product Registration

Flowable Liquid Copper Fungicide

Listed by the Organic Materials Review Institute (OMRI) for use in organic production.

Intended for Commercial Use Only

DOC ID: 540398

ACTIVE INGREDIENT:
Copper Octanoate (Copper Soap) 10.0%
CAS Reg. No. 20543-04-8
OTHER INGREDIENTS 90.0%
TOTAL 100.0%

metallic copper equivalent 1.8%
one gallon contains 0.16 lbs. metallic copper equivalent

KEEP OUT OF REACH OF CHILDREN
CAUTION

See Inside Booklet for Additional Precautionary Statements, Directions for Use, and Storage and Disposal Instructions

Net Contents: 2.5 gallons (9.46L)
250 gallons
EPA REG. NO. 67702-2-70051
EPA EST. NO. 48498-CA-1
BATCH CODE
Manufactured for
Certis USA L.L.C.
9145 Guilford Rd, Suite 175
Columbia, MD 21046
Cueva® is a trademark
of W. Neudorff GmbH KG

NEUDORFF

Sold under a license of
W. Neudorff GmbH KG
Postfach 1209 An der Mühle 3
D-318680 Emmerthal, Germany

OMRI LISTED
For Organic Use

- **Cueva:** Copper Octanoate (Copper Soap) 1.8%MCE, OMRI
- Bloom rate, but guidelines issues with label text
- Experiences:
  - effective on sooty blotch flyspeck late season, no phyto issues

Copper products

- **Badge X2 (OMRI):** Copper Oxychloride & Hydroxide 28% MCE
- Bloom rate + 1-3 lbs./hydrated lime
- Experiences:
  - Effective on fire blight (75% control) and fly speck sooty blotch late season
  - No mixing or phyto. Issues
  - Enhanced strep

OCT 06 2014

Doc ID: 540222

New York State Department
of Environmental Conservation
Division of Materials Management
Pesticide Product Registration

Badge® X2

B2880855

DRY FLOWABLE

FUNGICIDE/BACTERICIDE FOR AGRICULTURAL USE

ACTIVE INGREDIENT:
Copper Oxychloride (CAS No. 1332-40-7)* 23.82%
Copper Hydroxide (CAS No. 20427-59-2)* 21.49%
OTHER INGREDIENTS: 54.69%
TOTAL: 100.00%
*Metallic Copper (Cu) Equivalent is 28% by weight

OMRI LISTED

KEEP OUT OF REACH OF CHILDREN

WARNING - AVISO

See Attached Label (back) for Additional Precautions and Directions For Use

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle.
(If you do not understand the label find someone to explain it to you in detail.)

FIRST AID	
IF SWALLOWED	• Call a poison control center or doctor immediately for treatment advice. • Have person sip a glass of water if unable to swallow. • Do not induce vomiting unless told to do so by a poison control center or doctor. • Do not give anything by mouth to an unconscious person.
IF IN EYES	• Hold eye open and rinse slowly and gently with water for 15 to 20 minutes. • Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. • Call a poison control center or doctor for treatment advice.
IF ON SKIN	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15 to 20 minutes. • Call a poison control center or doctor for treatment advice.
IF INHALED	• Move person to fresh air. • If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth, if possible. • Call a poison control center or doctor for further treatment advice.
NOTE TO PHYSICIAN: Possible mucosal damage may contraindicate use of gastric lavage.	
Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact 1-800-222-1222 for emergency medical treatment information. For Chemical Emergency Spill Leak Fire Exposure or Accident Call CHEMTREC Day or Night Domestic North America 800-424-9300 International 703-527-3883 (collect calls accepted)	

EPA Registration No.: 80289-12

EPA Establishment No.: 79558-ITA-1

FOR ORGANIC PRODUCTION

Outline

- Kasugmycin (Kasumin 2L)
- Other chemical tools
  - Biologicals
  - Coppers
- Fire blight product efficacy
- Fire blight chemical management plan

Managing FB: product efficacy

- Orchard site
  - 4-5 year old ‘Idared’ trees on B.9
- Artificial inoculum (Ea 273 at $1x10^{7-8}$ $CFUml^{-1}$)
  - Spray for BB or Scissor dip for SB

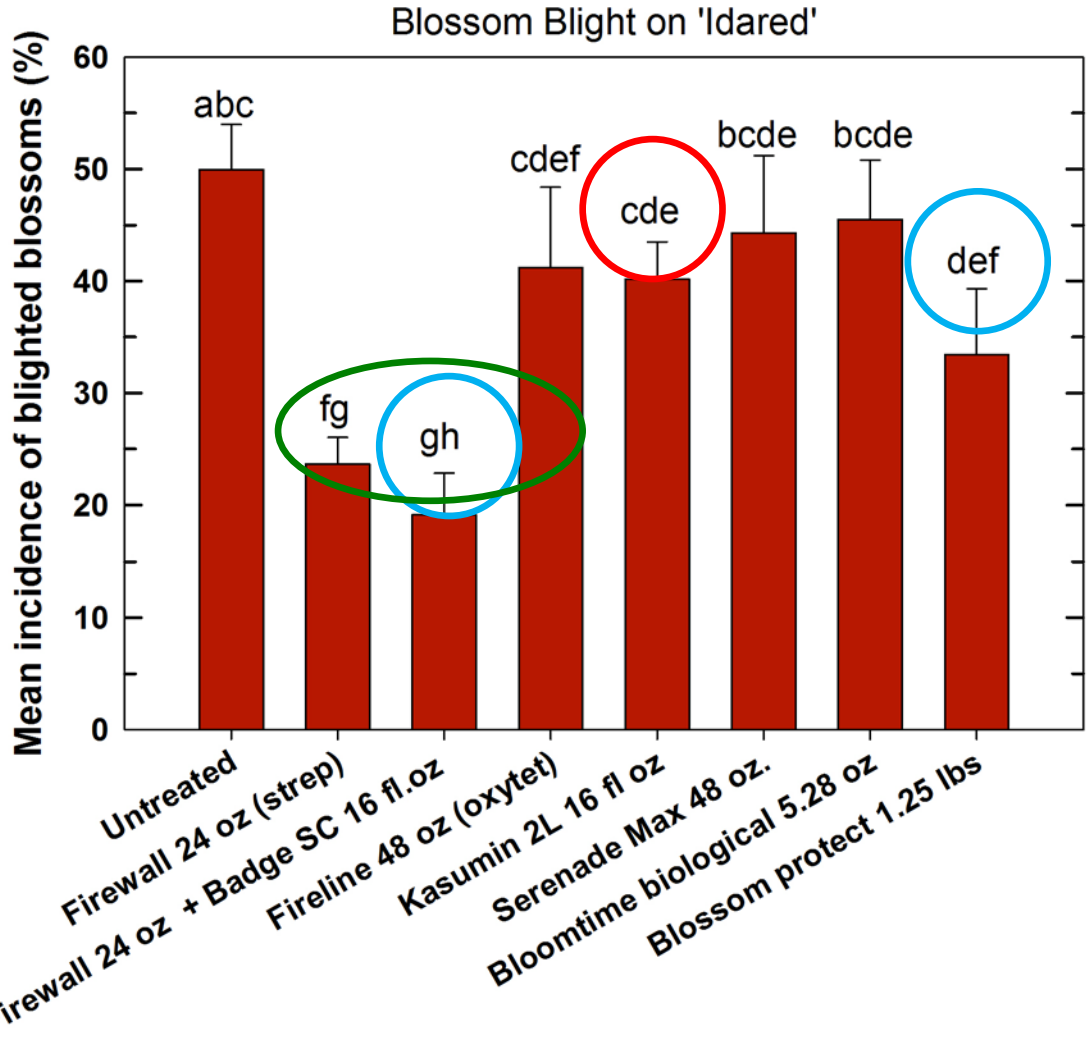
Managing FB: product efficacy

- Blossom blight application timing
  - Pre-bloom timings for biopesticides
  - All antibiotics & biopesticides @ 80% bloom
- Blossom blight incidence: percentage of blighted blossoms (5 reps)

Managing FB: product efficacy

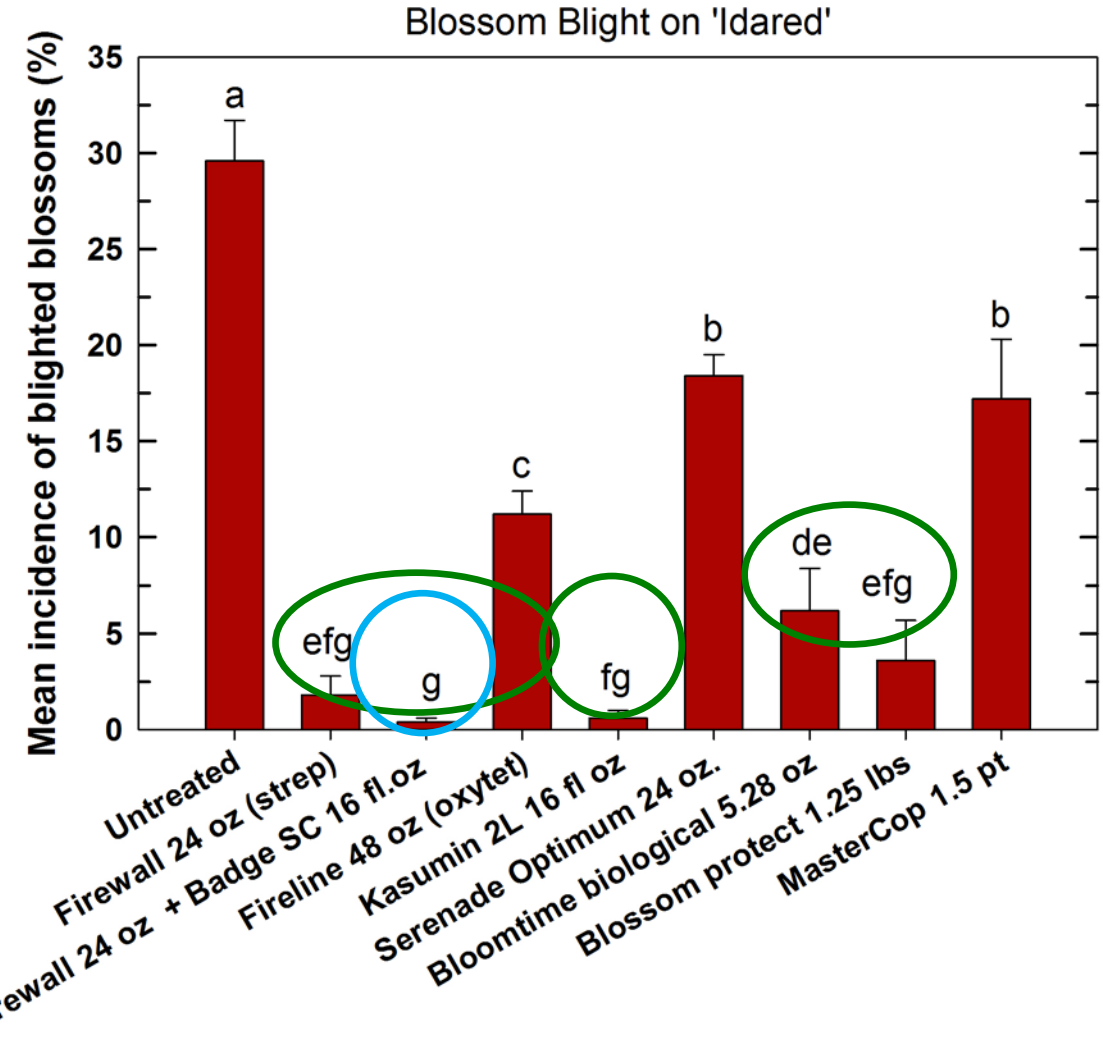
- Shoot blight application timing
  - Active terminal growth (5-7”): 24 hours after inoculation (trauma)
  - Apogee (PF/1-2”) or 5-days prior: Actigard
- Shoot blight: progression of canker of 20 shoots (5 reps)

2012 Blossom Blight Trial



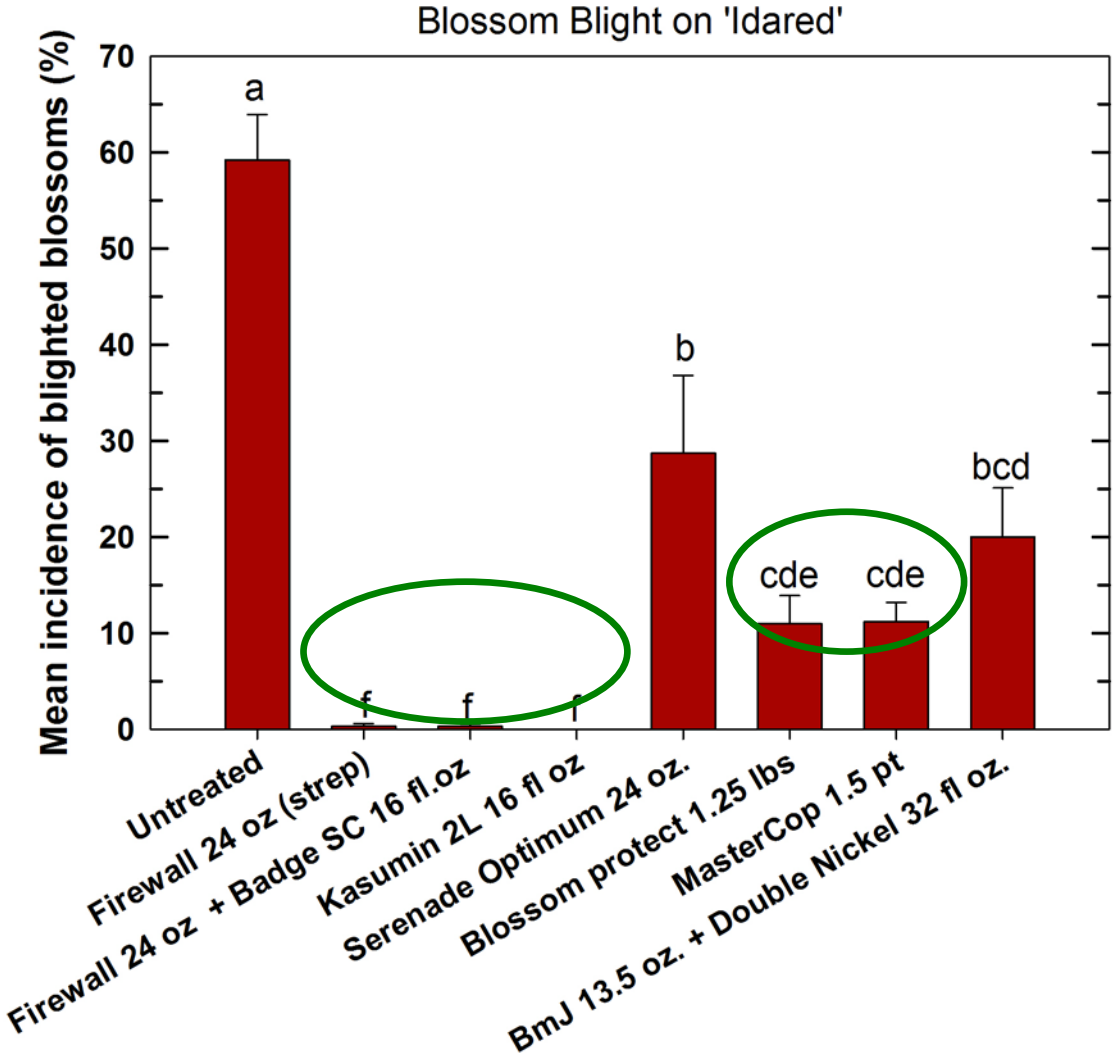
- **High pressure year:** Streptomycin programs, Strep + low copper, Kasumin 2L, Blossom Protect

2013 Blossom Blight Trial



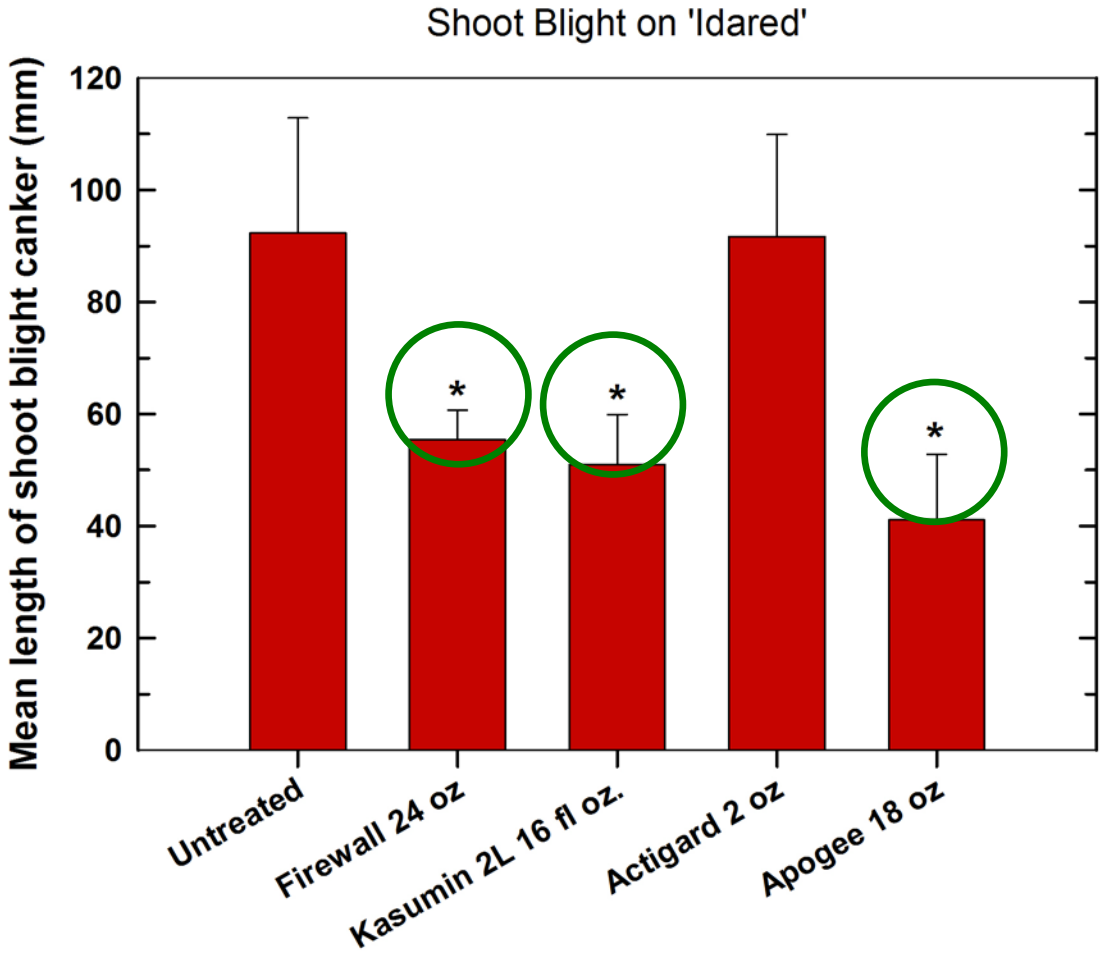
- **Low pressure year:** Streptomycin programs, Strep + low copper, Kasumin, Blossom Protect, Bloomtime Biological

2014 Blossom Blight Trial



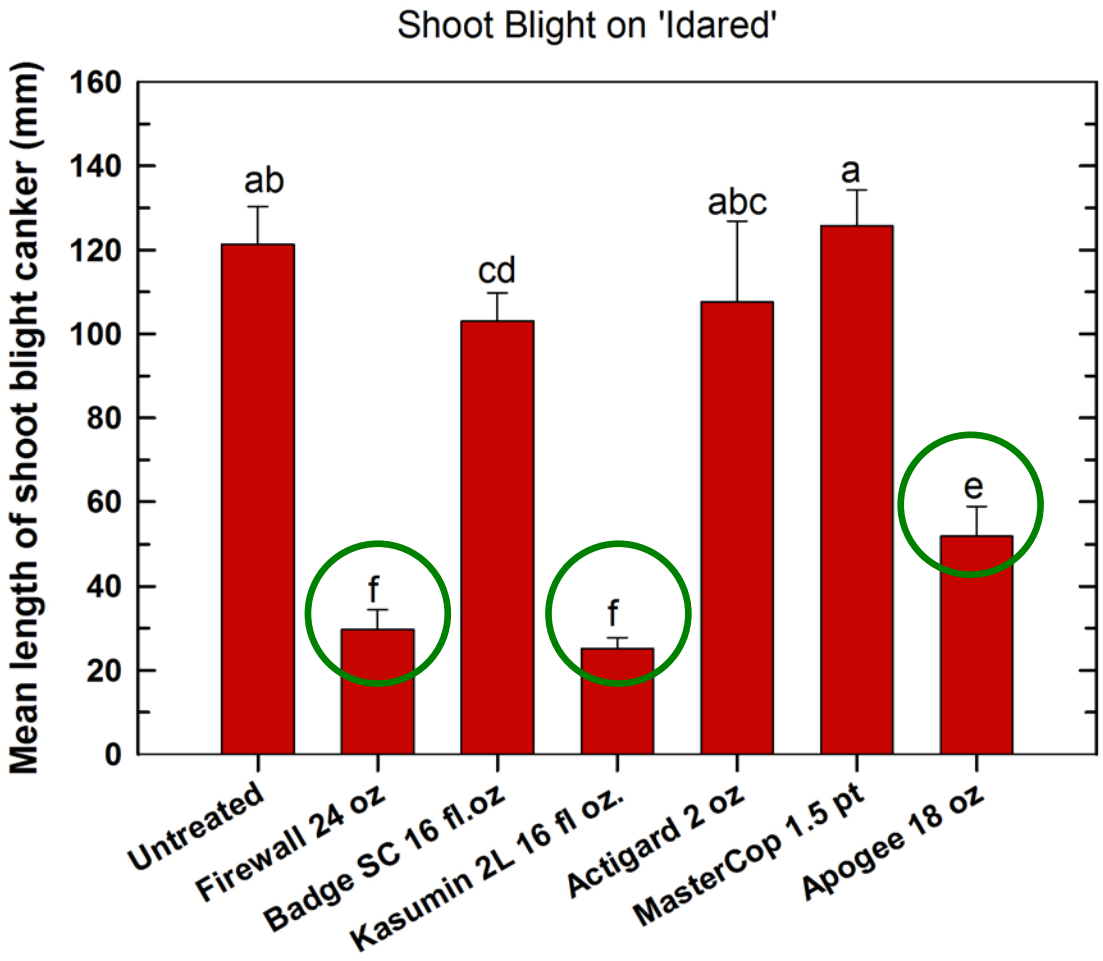
- **Moderate pressure year:** Antibiotic programs, Blossom Protect, MasterCop, BmJ & Double Nickel

2012 Shoot Blight



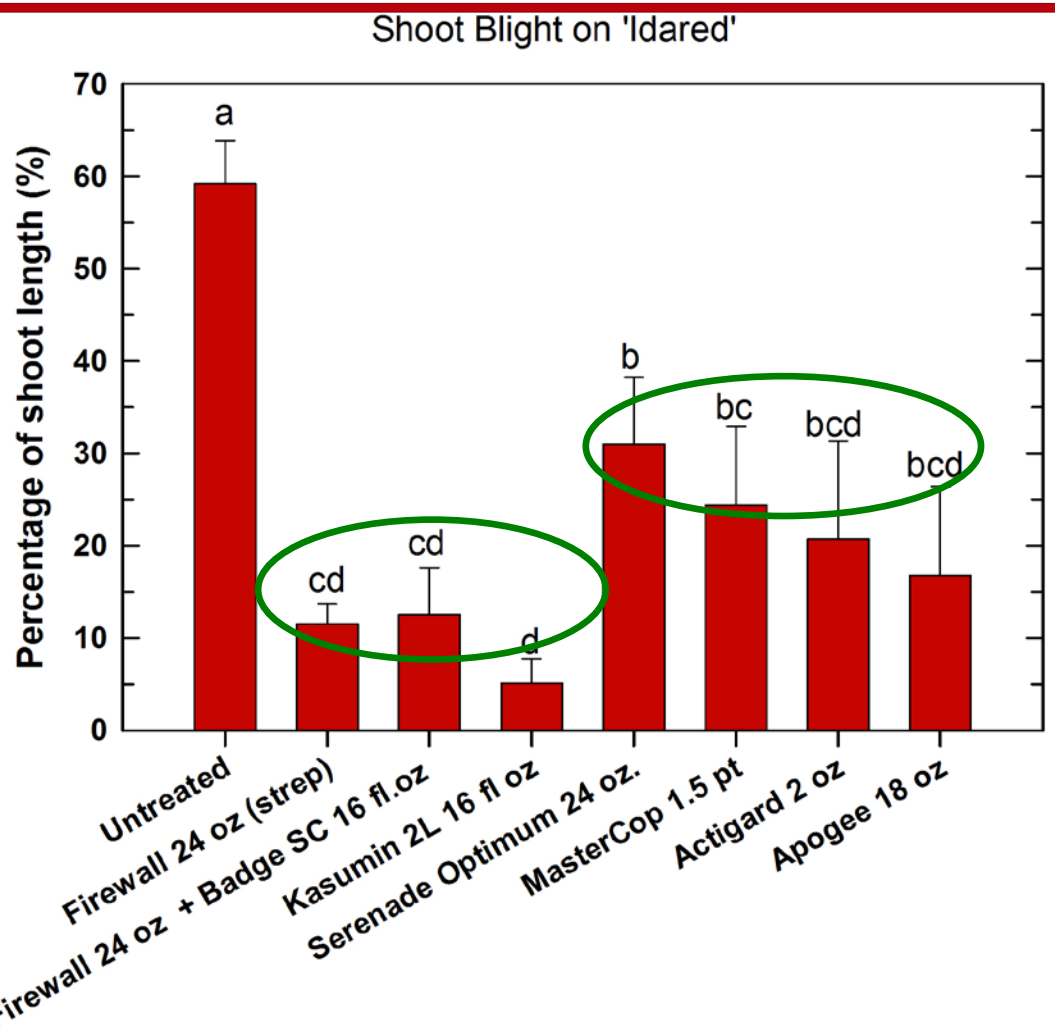
• 2012: Only Apogee and the **two antibiotics** provided a significant reduction of shoot blight progression

2013 Shoot Blight



- 2013: Only Apogee and the **two antibiotics** provided a significant reduction of shoot blight progression

2014 Shoot Blight



- 2014: **Antibiotics** provided strongest reduction of shoot blight progression; biologicals, Apogee, and Actigard > good effect

Blossom Blight Summary

- Streptomycin greatest activity against BB
  - Improved by bloom rate of buffered copper: No phyto!
- Kasugamycin 2L (protectant):effective as strep
  - Resistant management: not necessary in region where SmR Ea not confirmed or suspected
- Biologicals & Low MCE coppers
  - They work, but more effective against lower inoculum levels & variable in performance
  - Often equivalent to oxytet **(does not kill)**

Shoot Blight Summary

- Antibiotics greatest effect on trauma shoot blight
  - Don’t use antibiotics for shoot blight outside trauma events
- Apogee
  - Even single application provides considerable control: important for high vigor varieties
- Copper & Actigard
  - Variable in performance, and strongest effect against realistic inoculum levels

Fire blight management at Bloom

- Watch for CCE alerts and disease model forecasts for fire blight infection periods (NEWA & MaryBlyt 7.1)

- If **SmR Ea** has been confirmed at your operation:
  1. When the first blossom infection is forecast, apply Kasumin 2L
  2. At the 2nd high risk period, apply a tank mix of streptomycin with either oxytetracycline or a bloom time rate of a registered copper product
  3. At the 3rd or 4th high risk periods, repeat steps ‘1’ and ‘2’, respectively

Fire blight management at Bloom

- Watch for alerts and disease model forecasts for fire blight infection periods (NEWA & MaryBlyt 7.1)

- If **SmR Ea** has **not** been confirmed at your operation:
  1. When the first blossom infection is forecast, apply a tank mix of streptomycin with either oxytetracycline or a bloom time rate of a registered copper product
  2. At the 2nd high risk period, apply Kasumin 2L
  3. At the 3rd or 4th high risk periods, repeat steps ‘1’ and ‘2’ depending on concerns about the effectiveness of streptomycin

Acknowledgments

- State, federal, and institutional funds appropriated to the New York State Agricultural Experiment Station
- Funding support by the NYS Apple Research and Development Program
- New York State Department of Agriculture & Markets - Specialty Crop Block Grant
- Summer Crew!

Questions?