

# **Fire Quencher, an Organic Treatment for Fire Blight**

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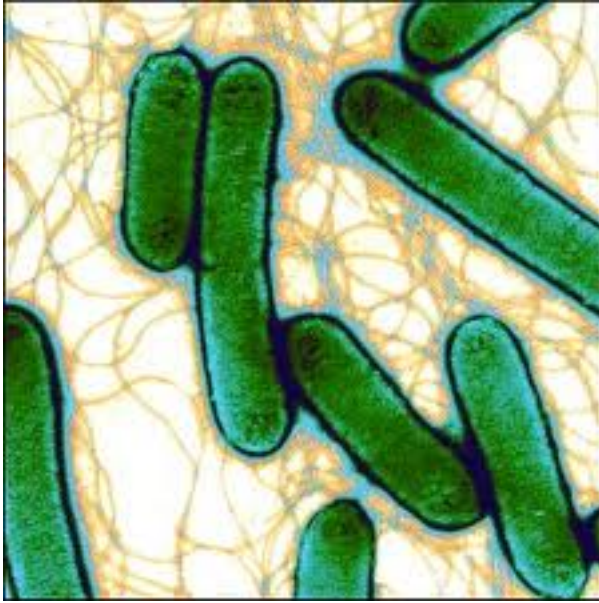
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# Fire Blight, a Devastating Agricultural Disease



Spreads quickly in warm and wet weather

# *Erwinia amylovora*: the Causative Agent of Fire Blight



*Erwinia amylovora*  
a close relative to *E. coli* and *Salmonella*



Insects, rain/wind and pruning tools are the primary carriers of fire blight

# Primary US Apple Production

Washington (64%)

\$1,142,105,000

175,000 acres x \$240/acre = \$42 million



New York  
\$172,860,000

Fire blight leads to 100-500 million dollars worth of apple agricultural loss in the US/year

# Current Fire Blight Prevention



**Treatment of choice  
Agrimycin (streptomycin sulfate)**

**4 applications spring, 4 application fall  
\$30/acre/application = \$240/year/acre**

**Many non-responsive infections (20-70% efficacy reported)**

# Our Solution: Fire Quencher

## DIRECTIONS FOR USE

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling. Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirement specific to your State and Tribe, consult the agency responsible for pesticide regulation.

## USER SAFETY RECOMMENDATIONS

Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.

## AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. This standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and green houses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE), notification to workers, and restricted-entry interval. The requirements in this box apply to uses of this product that are covered by the Worker Protection Standard.

No restricted entry interval (REI) – 0 hours  
No Pre-Harvest interval (PHI) – 0 hours  
No PPE requirements.

For prevention and treatment of Fire Blight (*Erwinia amylovora*) in apple trees, pear trees, cherry trees, rose bushes and chrysanthemums.

Dilute Fire Quencher at a rate of 1 to 2 pints per 100 gallons of water to cover approximately 1 acre. The diluted solution should be applied by conventional aerial spray equipment prior to budding and/or flowering and every other day for the next six days (for a total of 4 treatments) depending on weather conditions. More frequent application may be necessary during periods of heavy or persistent rains.

To prepare diluted solution, fill the mix tank with the desired amount of water and add Fire Quencher with agitation to mix thoroughly. The volume of diluted solution necessary for adequate coverage will depend on spray equipment weather, and local conditions. Apply enough solution for thorough coverage without runoff.



## FIRE QUENCHER

Bactericide for Use on Apples and Pears

Biological Control for Fire Blight

Active Ingredient	Bacteriophages*	0.0002%
Other Ingredients		99.998%
Total		100.000%

\*For (*Erwinia amylovora*)

Contains at least  $10^{12}$  phages per pint

Keep Out Of Reach of Children

CAUTION

See side panels for precautionary statements.

EPA Reg No. XXXXX-X

EPA Est. No. XXXXXX-UT-001

Manufactured by:

Net contents: 1 pint

## FIRST AID

Call a poison control center or doctor for treatment advice.

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 eye.

If on Skin or Clothing: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes.

Have the product container or label with you when calling a poison control center or doctor, or going for treatment.

## PRECAUTIONARY STATEMENTS

### ENVIRONMENTAL HAZARDS

Do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment washes.

### STORAGE AND DISPOSAL

Do not contaminate water, food, or feed by storage and disposal.

Pesticide Storage: Store this product in a cool dry area, away from direct sunlight and heat to avoid deterioration.

Pesticide Disposal: Wastes resulting from the use of this product may be disposed of on site or at approved waste disposal facility.

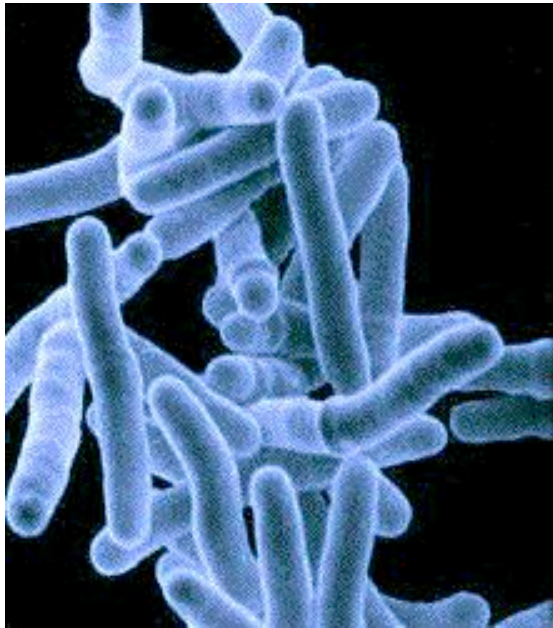
Container Disposal: Non-refillable container. Do not reuse or refill this container. Triple rinse empty containers. Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by incineration, or if allowed by state and local authorities, by burning. If burned, stay out of smoke.

### WARRANTY STATEMENT

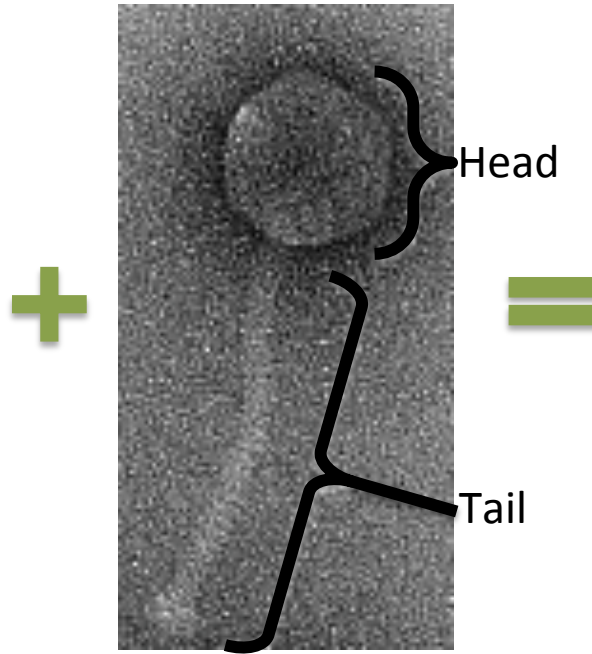
XXXXXXX, Inc. warrants that this material conforms to the description on the label and is reasonably fit for the purposes referred to in the Directions for Use. XXXXXXX, Inc. makes no other express or implied warranty or fitness or merchantability, or any other express or implied warranty. In no case or circumstance shall XXXXXXX, Inc. or seller be liable for consequential, special, or indirect damages resulting from the use or handling of this product including, but not limited to, loss of profits, business reputations, or customers; labor cost, or any other expenses incurred in planting, cultivating, or harvesting.

# Introducing Bacteriophage

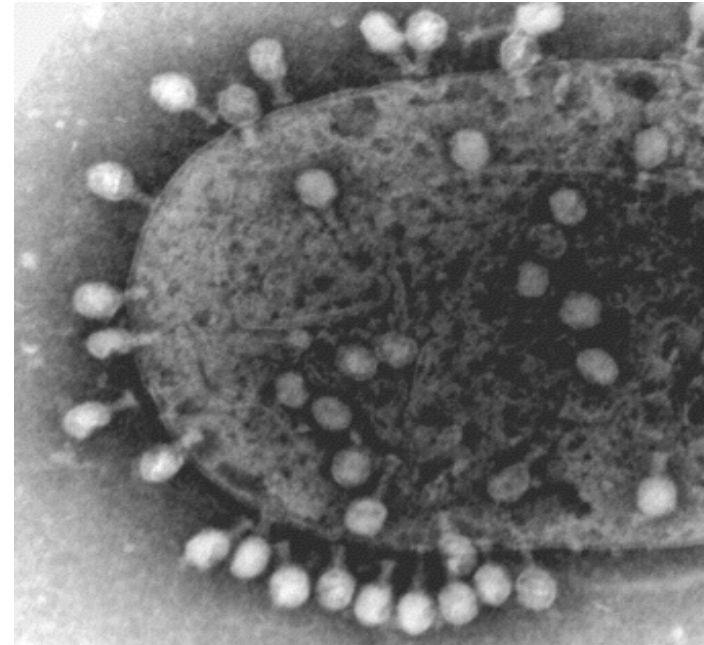
**Problem  
Bacteria:**



**Bacteria's  
worst enemy:**

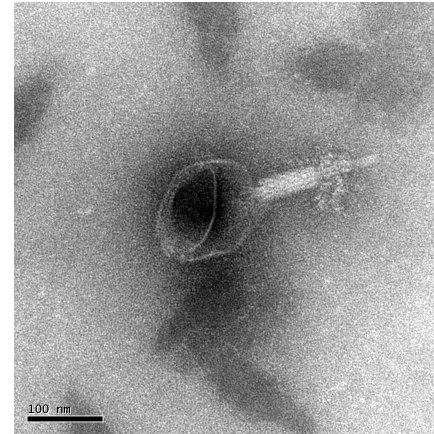
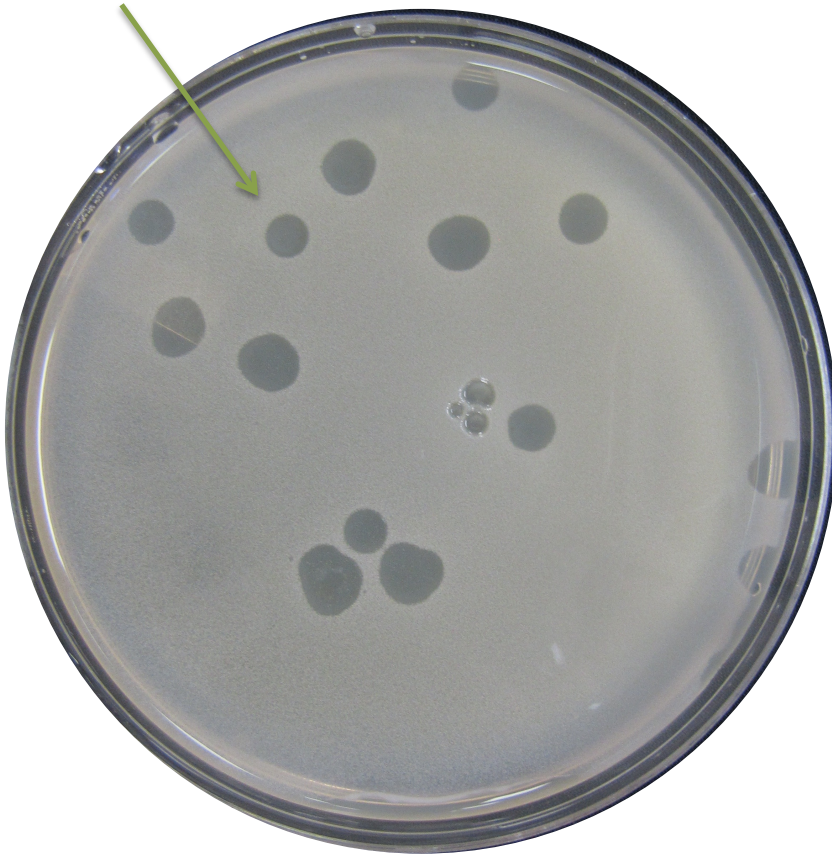


**"Phage"**

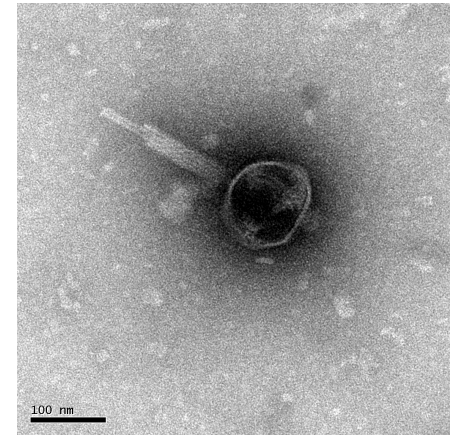


# Our Phage

“plaques”  
formed by phage



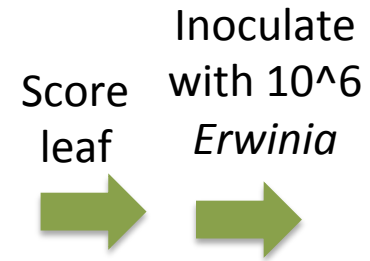
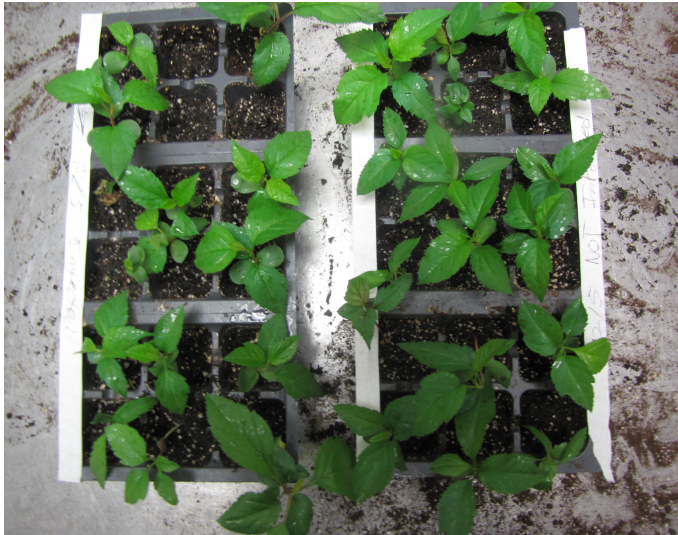
Phage Hapsheptsut



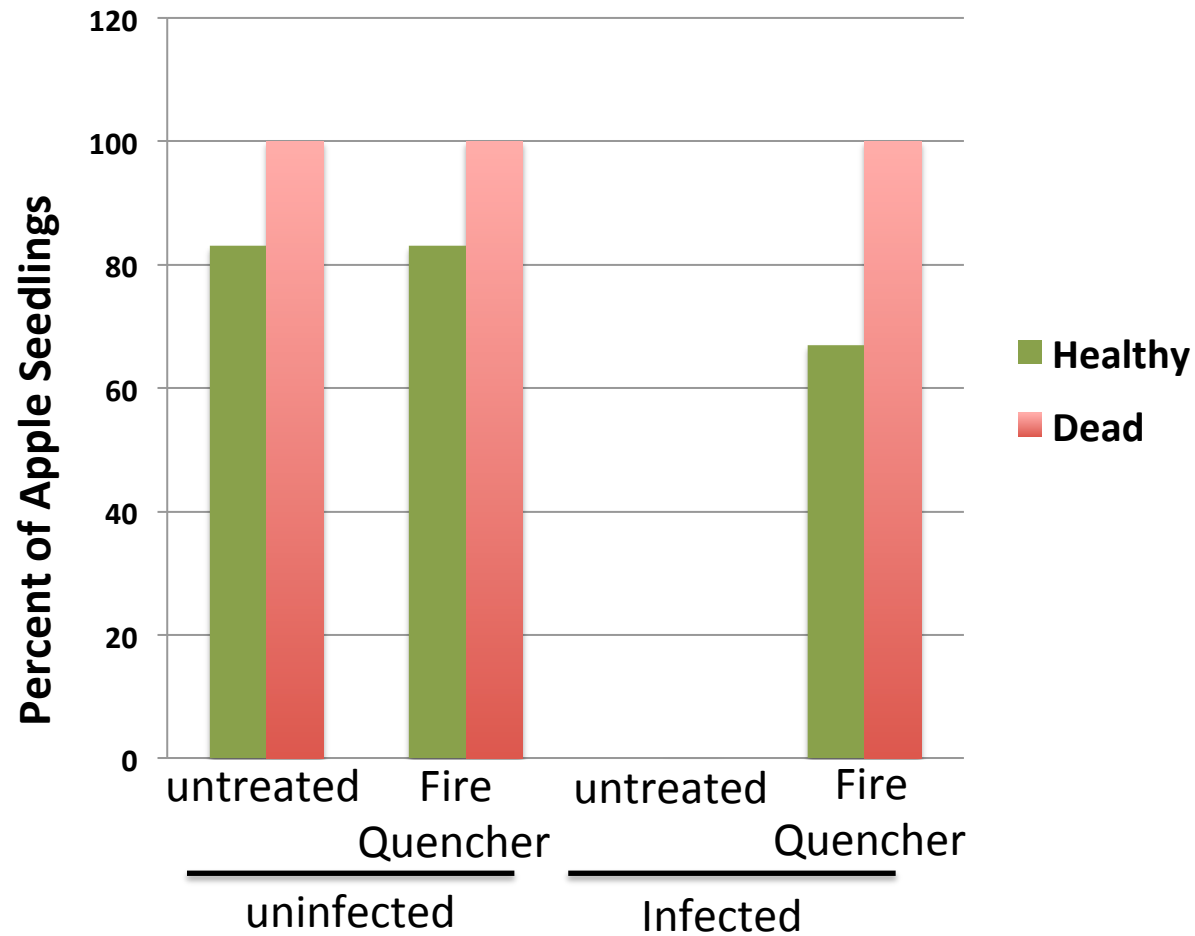
Phage Phobos



# Apple Seedling *Erwinia* Infection Model



# Fire Quencher Appears Effective in Laboratory Trials



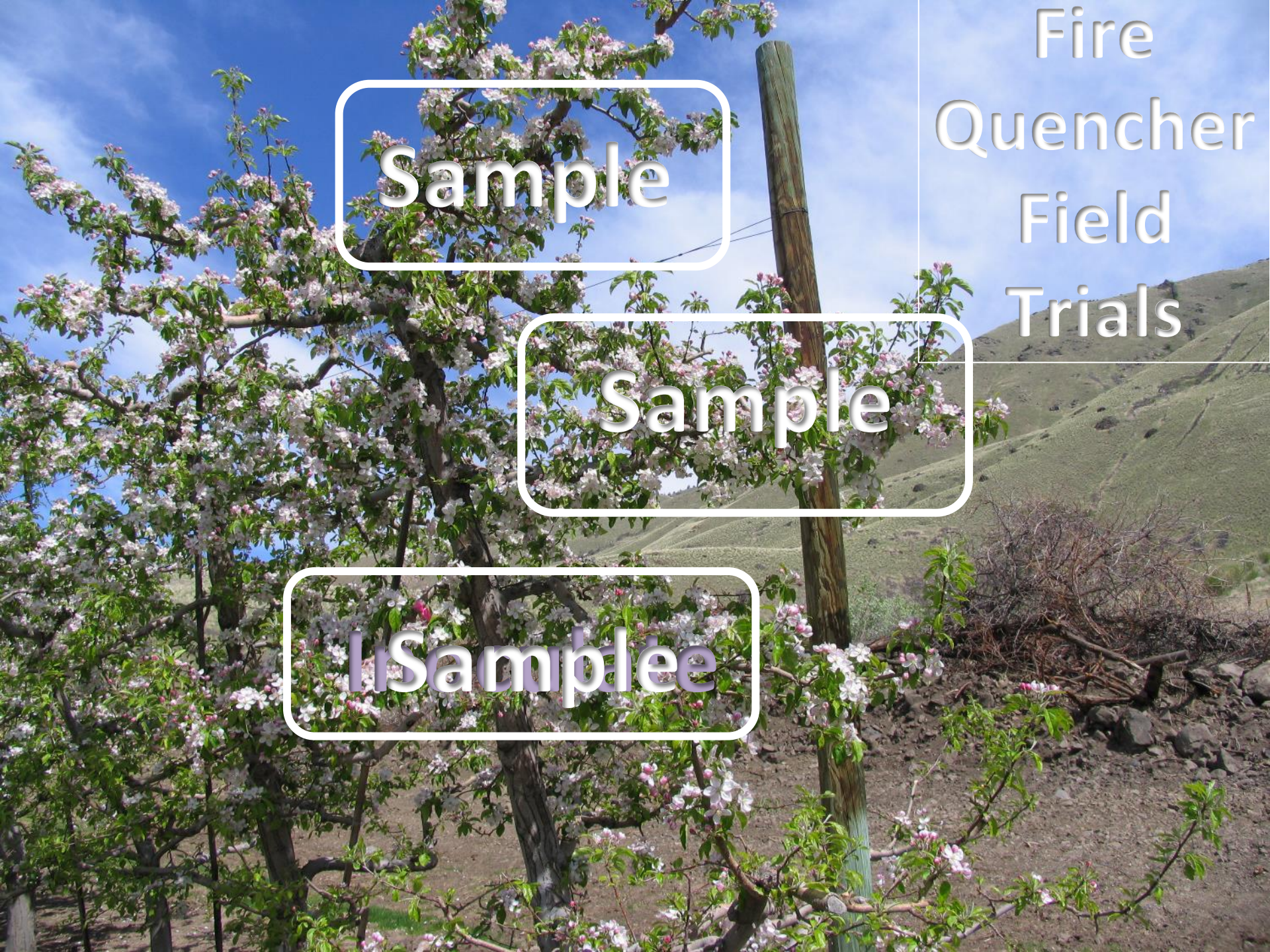
**Our phage protected seedlings for 8 days, controls were dead after 4 days**

Fire  
Quencher  
Field  
Trials

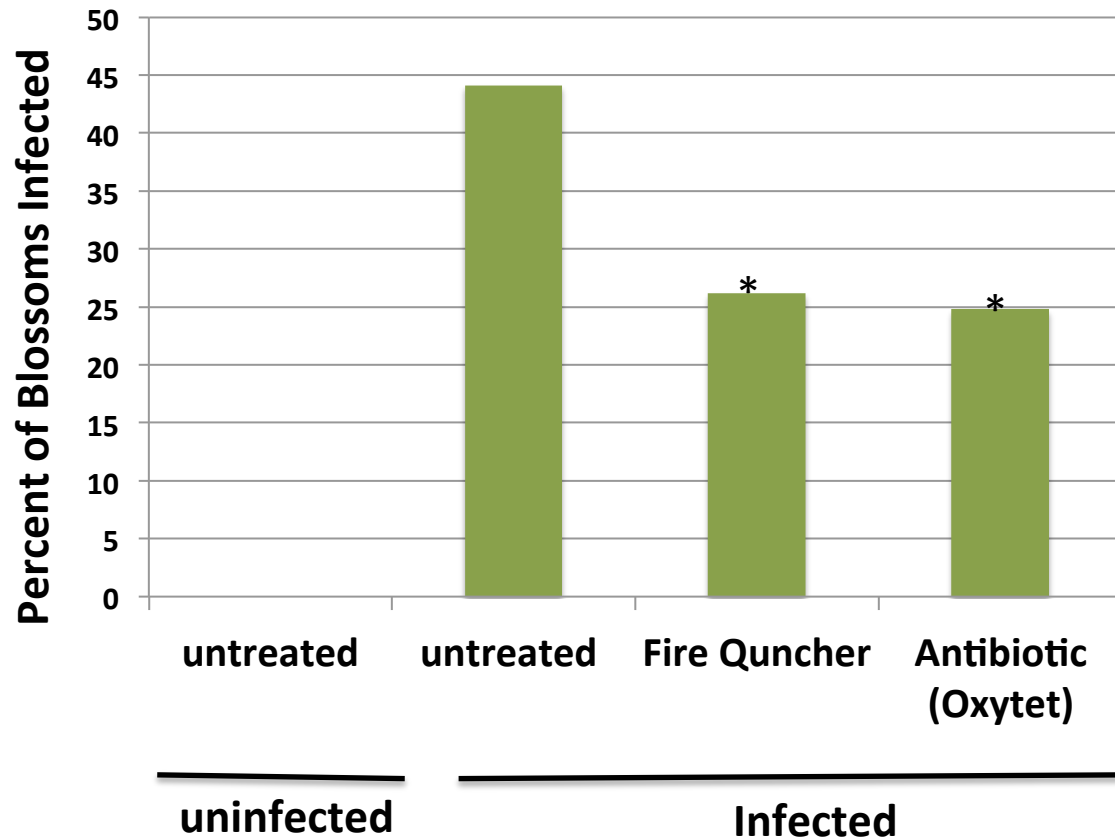
Sample

Sample

Sample



# Fire Quencher Appears Effective in Field Trials



# Acknowledgements

## Faculty

### **BYU**

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