Strategies for diagnosis and management of blueberry diseases

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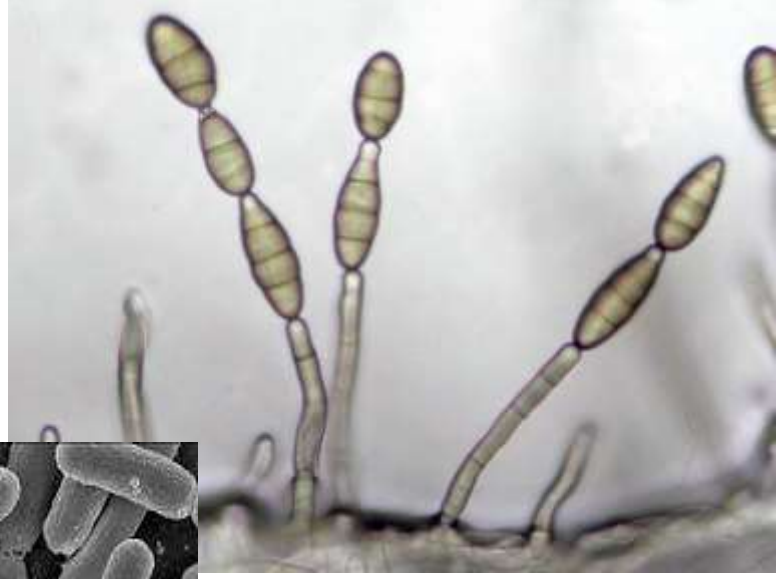
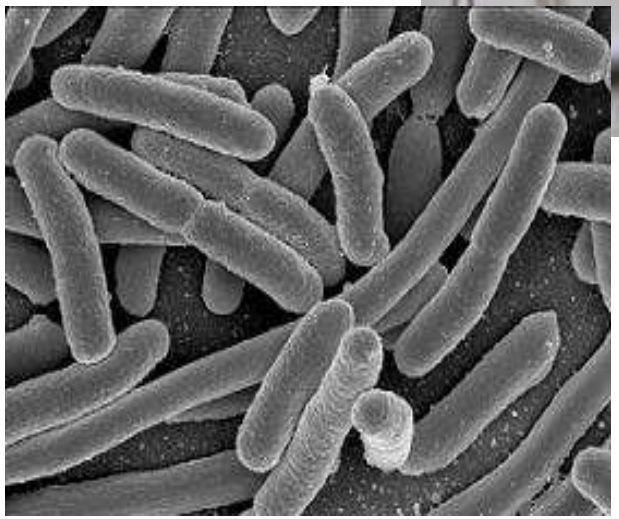
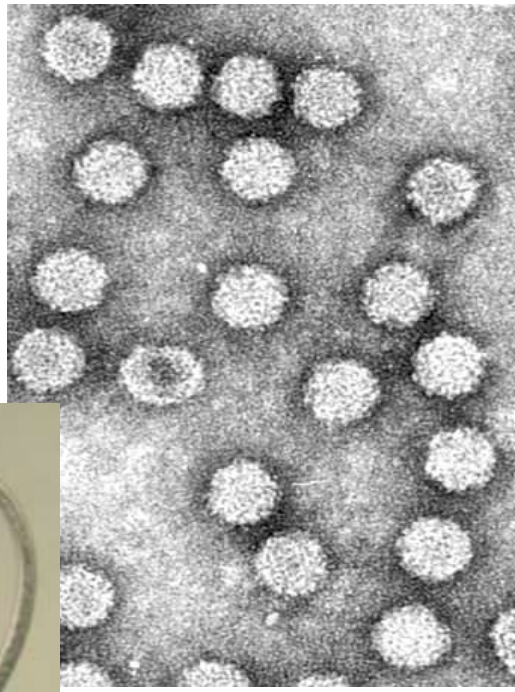
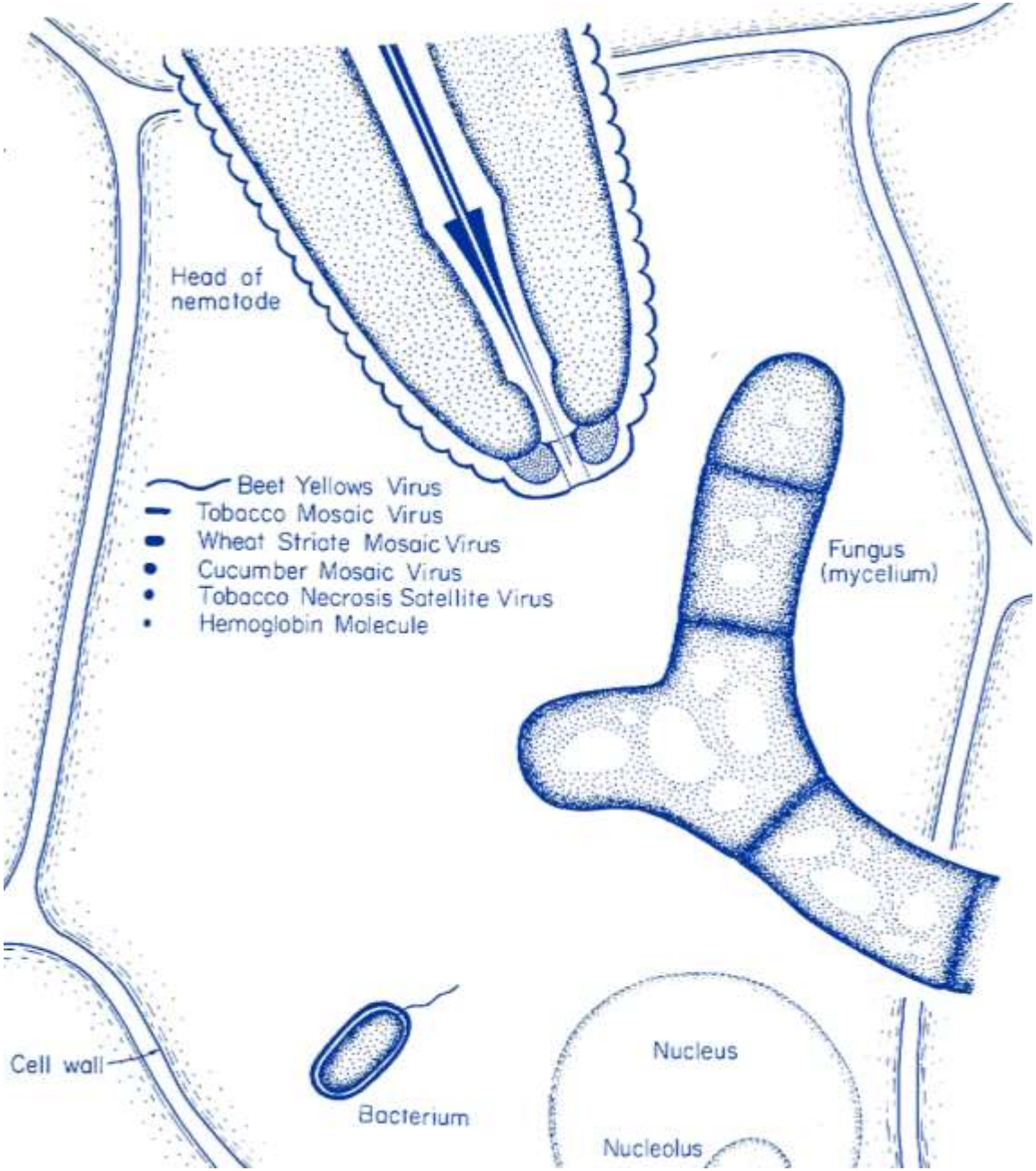
Plant pathogens

- Fungi
- Bacteria
- Viruses
- Nematodes







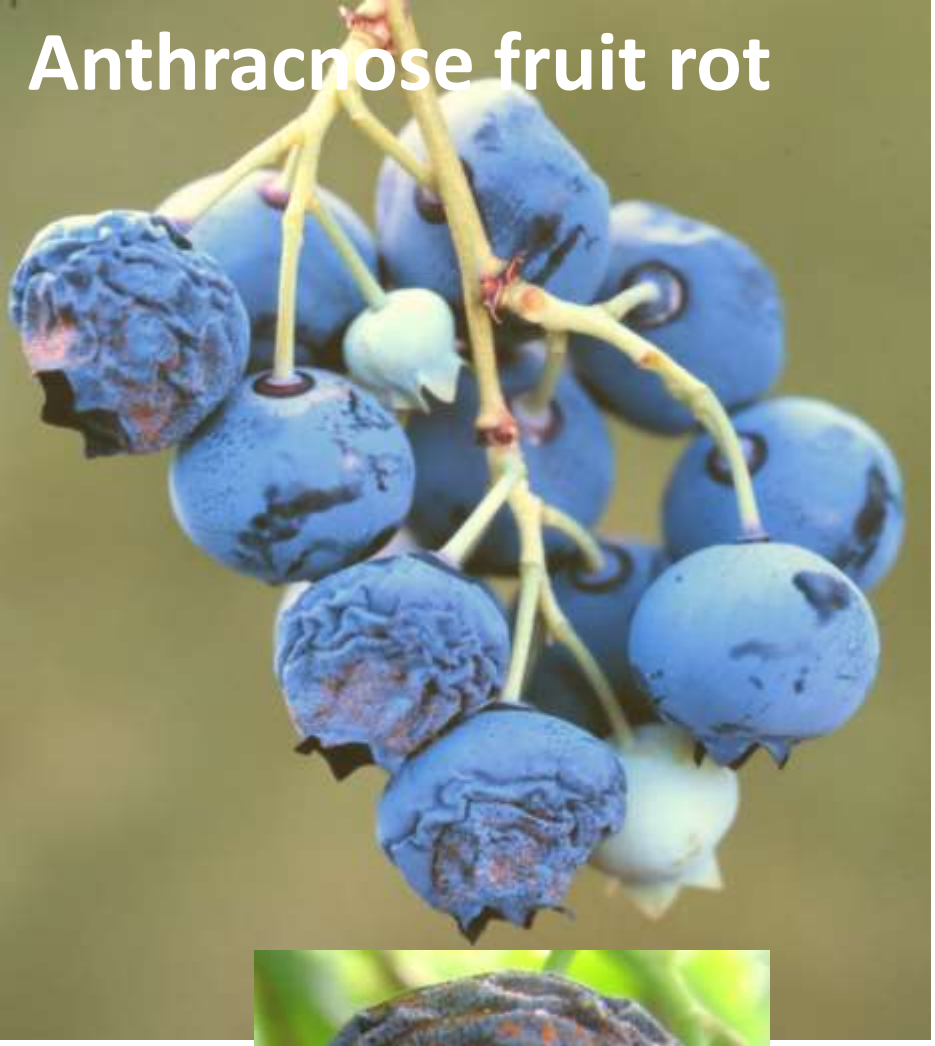


Comparative size of plant pathogens in relation to a plant cell

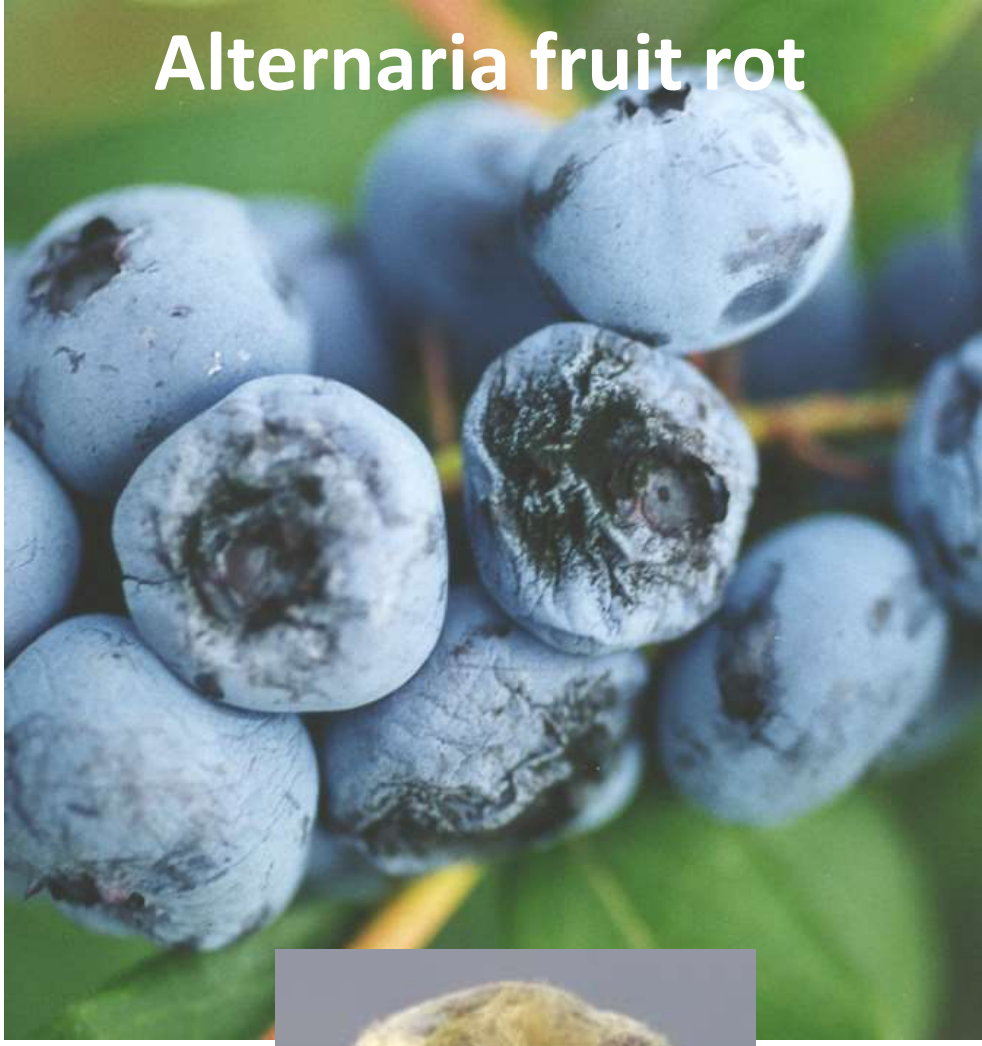

Mummy berry


Phomopsis

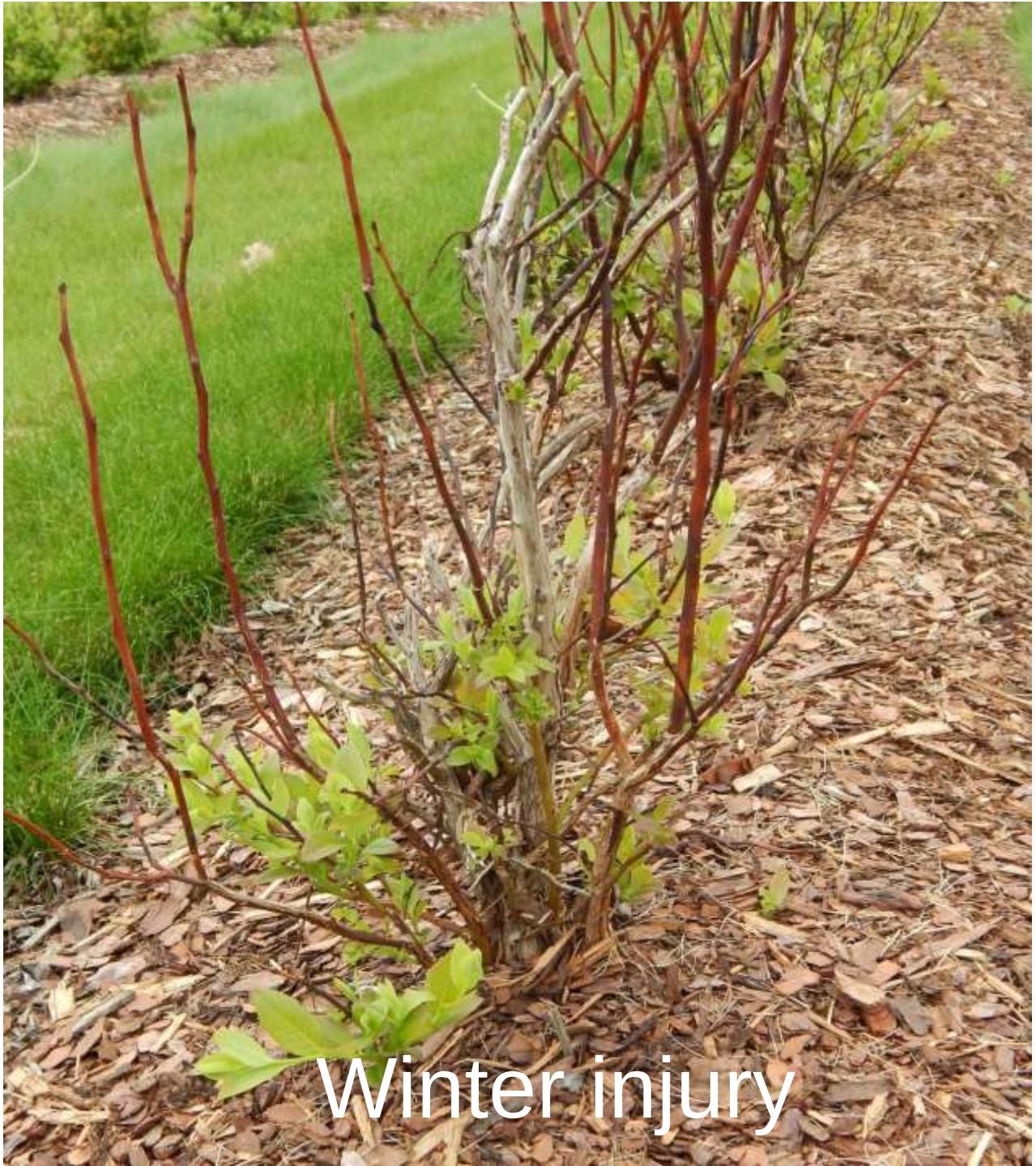
Anthracnose fruit rot



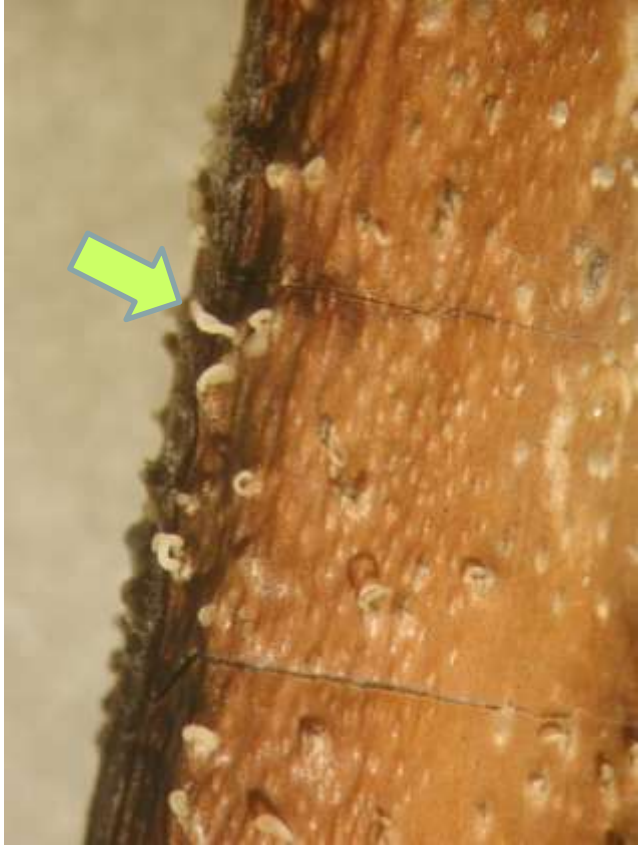
Alternaria fruit rot



Distinguishing blights and look-alike problems


Winter injury

Phomopsis



Bleached area with black pimples (fruiting structures)

Cane collapse in mid-summer

Canker

Blighted shoot

Phomopsis canker

Bacterial (Pseudomonas) blight *Pseudomonas syringae*

- After spring frosts
- Elliott and Draper
- Fungicides don’t work

Botrytis blossom blight

Blueberry scorch virus

Blueberry shock virus (similar to Blueberry scorch virus)

Blueberry scorch mild symptoms - depends on virus strain

Bluecrop in Michigan

Virus diseases

Tobacco ringspot virus &
Tomato ringspot virus

Red ringspot virus

How are viruses transmitted?

Planting material

Nematodes

Insects (e.g., aphids)

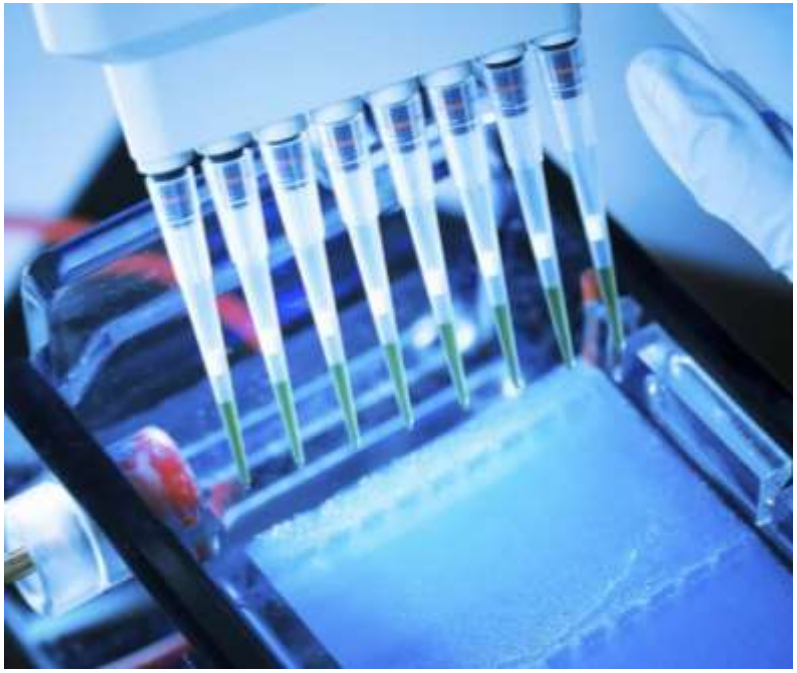
What does “virus tested” mean?

- Mother blocks in a nursery are randomly sampled and tested for known viruses and stunt phytoplasma (by ELISA and PCR) every 3 years and visually inspected every year

- Testing and inspections are done by the State Department of Agriculture

- If a virus is detected, plants are destroyed

- Shoot tip culture + heat treatment can be used to rid the plant material of virus



Start clean, stay clean!

Virus-tested blueberry nurseries

- DeGrandchamp Farms, South Haven, Michigan
- Hartmann’s Plant Company, Lacota, Michigan
- Fall Creek Farm and Nursery, Lowell, Oregon

Infection risk during the growing season

Mummy berry

Phomopsis, Fusicoccum

Botrytis blight/ fruit rot

Anthracnose fruit rot

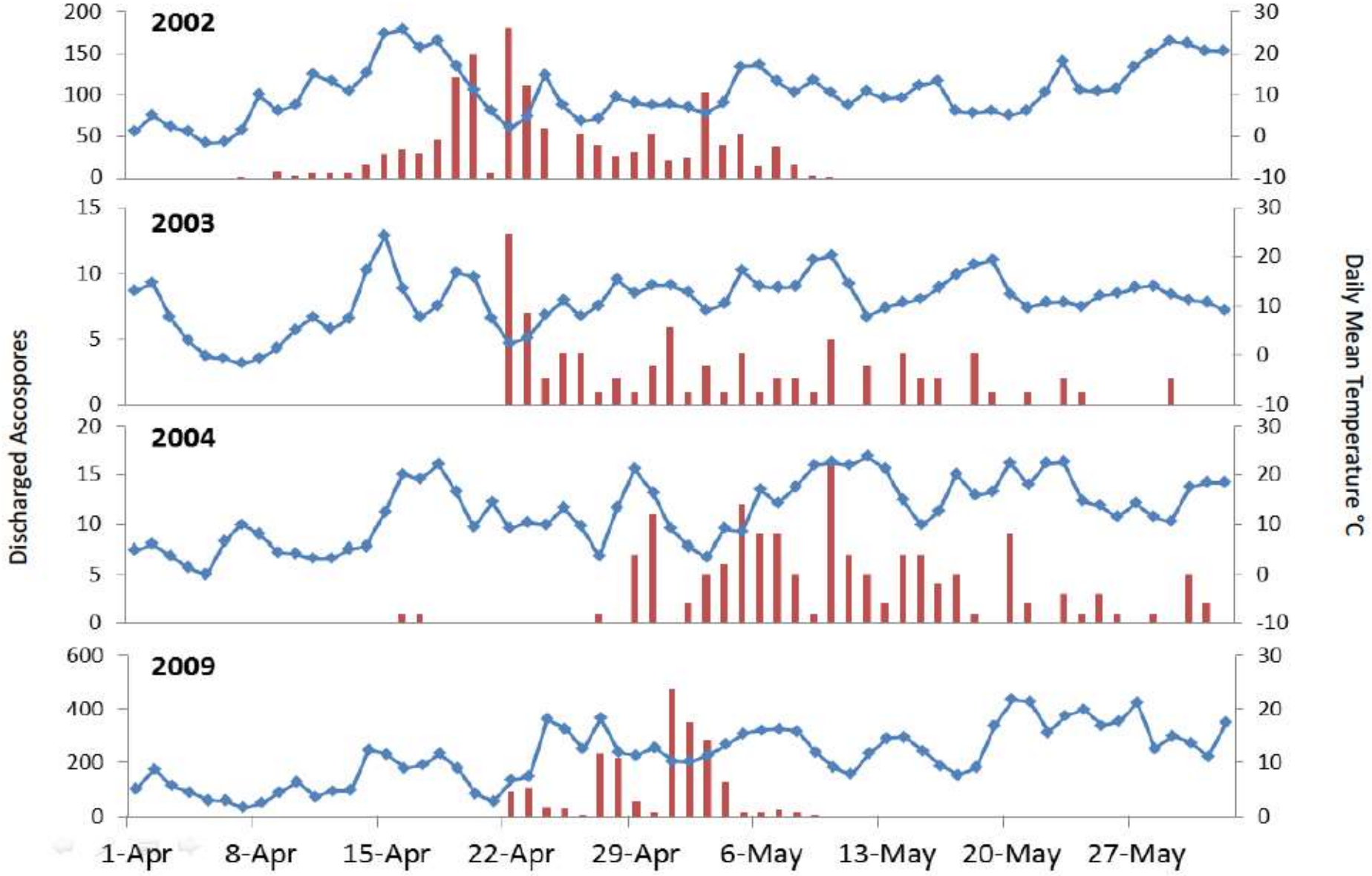
Alternaria fruit rot

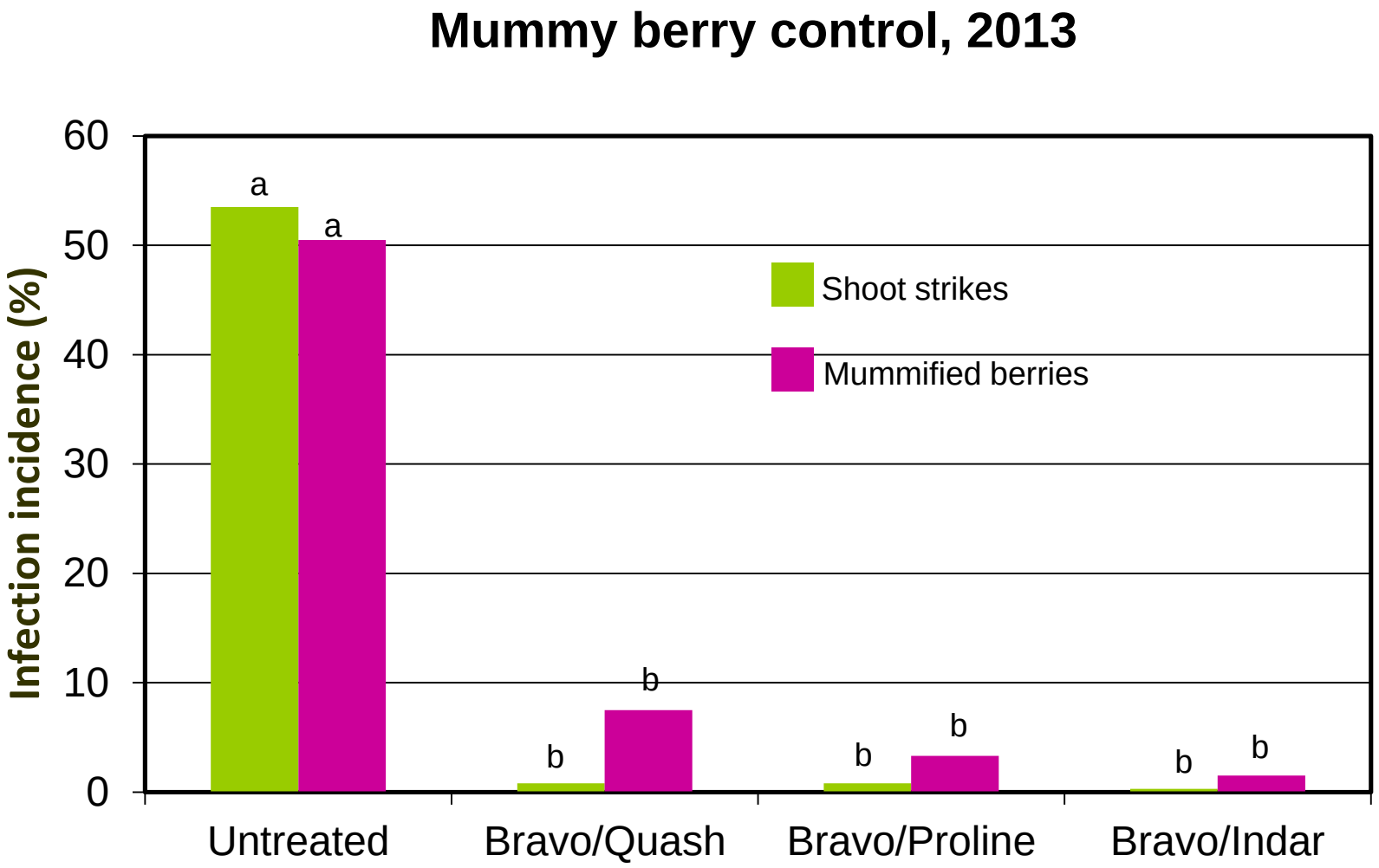
Leaf rust

Virus diseases and stunt

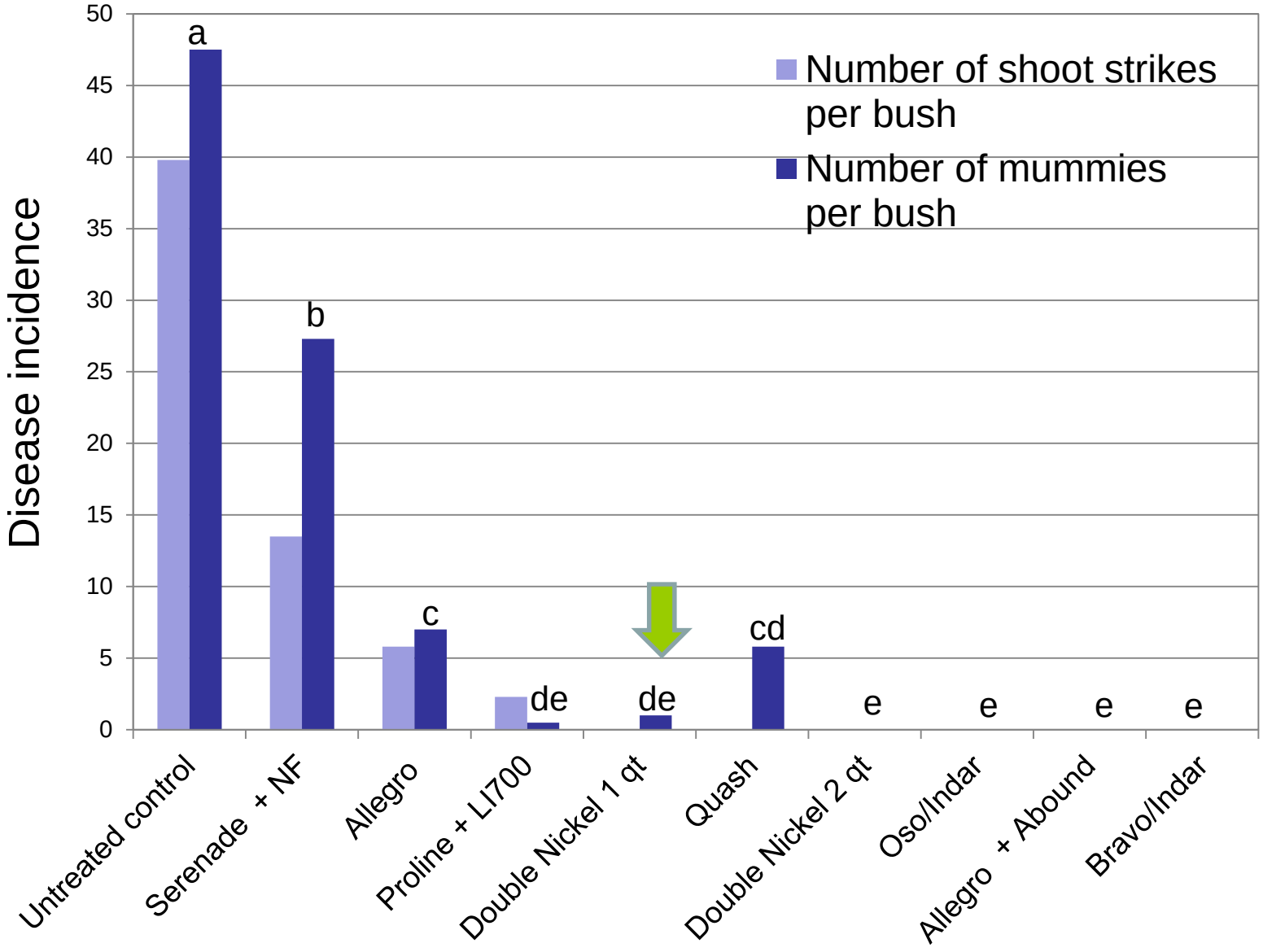

Pink bud
May 2, 2011
April 2, 2012
April 30, 2013

Seasonal mummy ascospore discharge



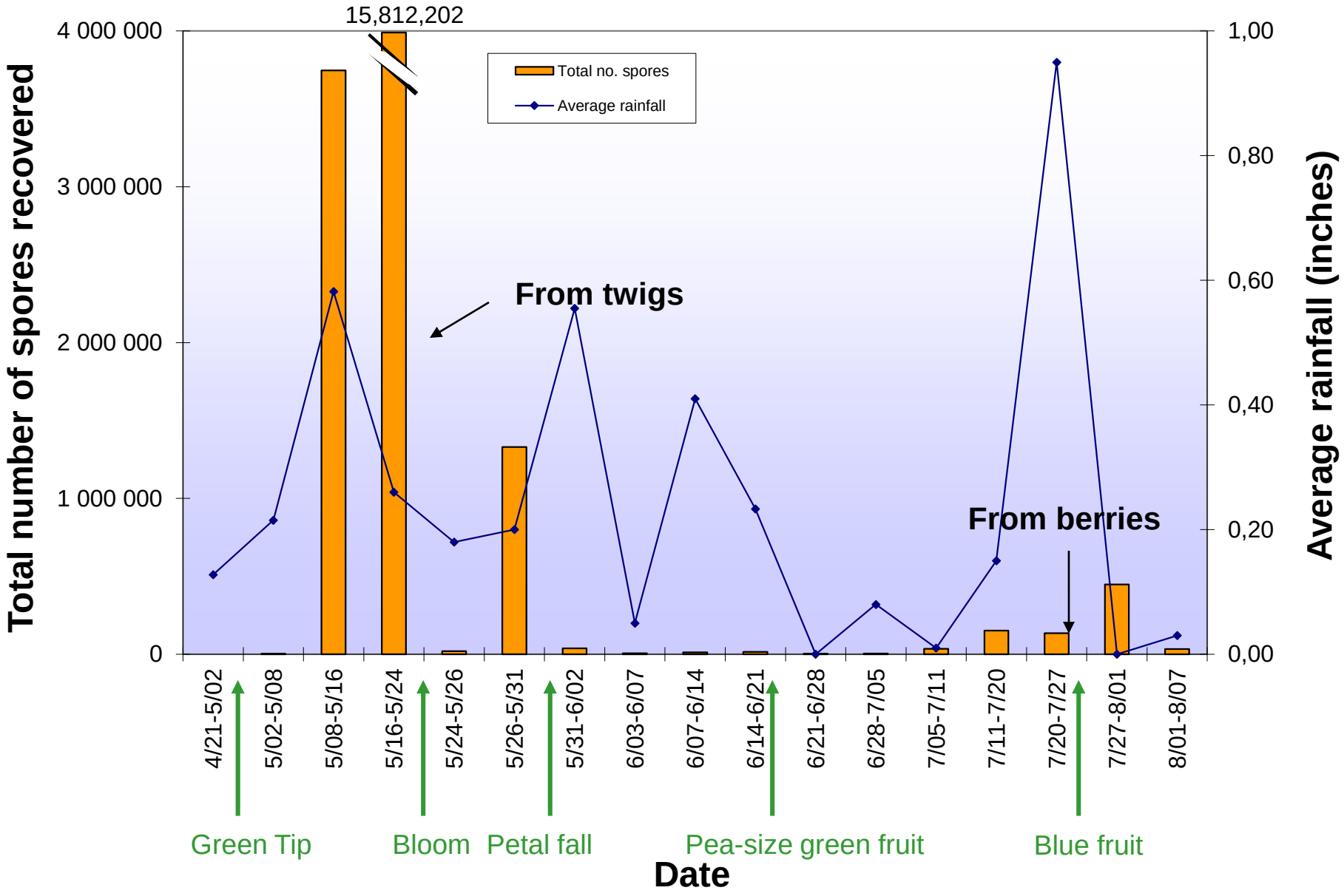

Mummy berry control, 2013
Infection incidence (%)
60
50
40
30
20
10
0
a
a
b
b
b
b
b
b
Shoot strikes
Mummified berries
Untreated
Bravo/Quash
Bravo/Proline
Bravo/Indar

Fungicide efficacy against mummy berry, 2014



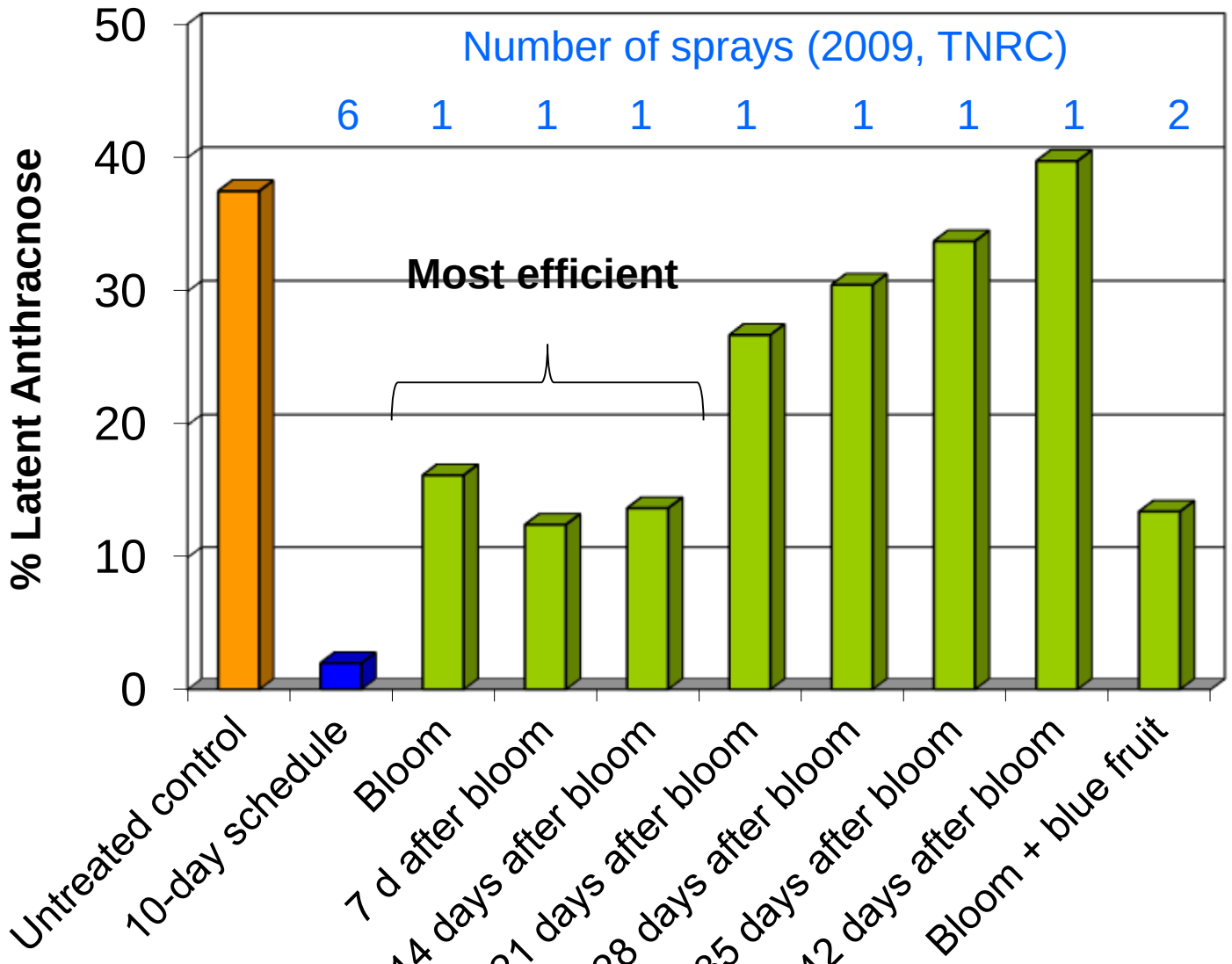
Anthracnose

Colletotrichum acutatum



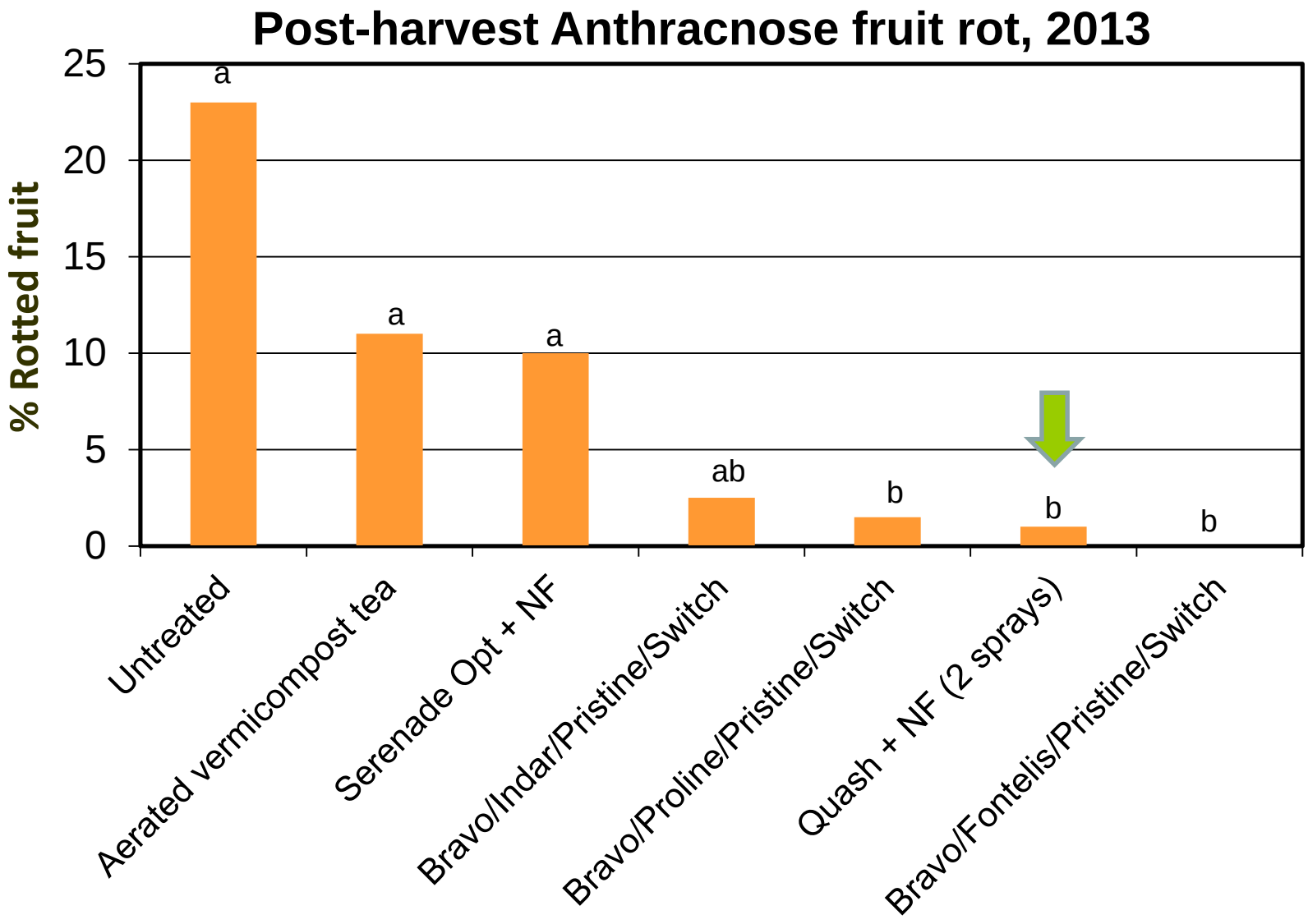
Anthracnose spore dispersal over the season

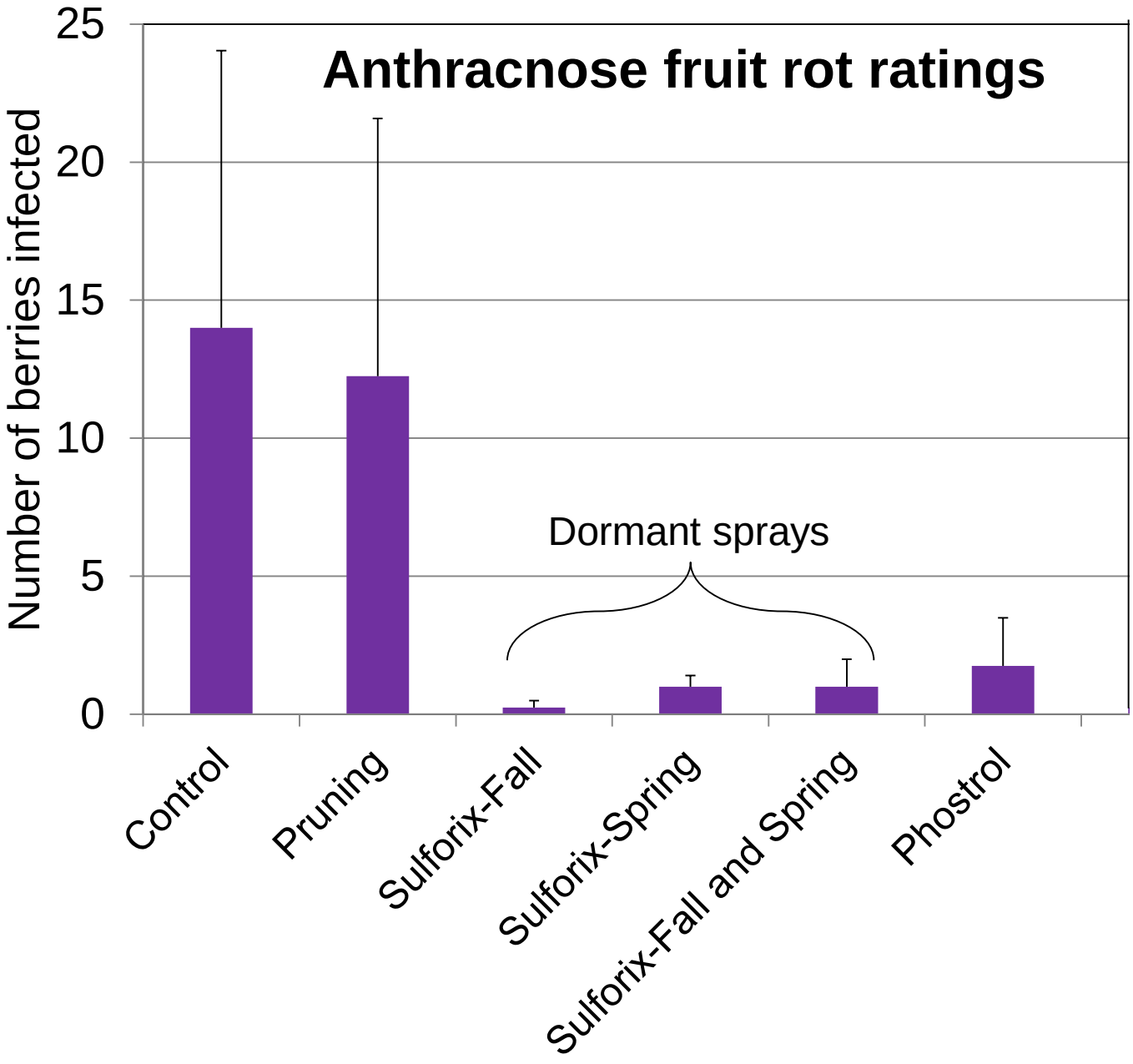
Efficacy of timing of fungicide sprays



Fungicide sensitivity

Colletotrichum isolates	Number isolates tested	% resistant to 10 ppm azoxystrobin
1999	10	0%
2014	14	86%


Post-harvest Anthracnose fruit rot, 2013
% Rotted fruit
25
20
15
10
5
0
a
a
a
ab
b
b
b
Untreated
Aerated vermicompost tea
Serenade Opt + NF
Bravo/Indar/Pristine/Switch
Bravo/Proline/Pristine/Switch
Quash + NF (2 sprays)
Bravo/Fontelis/Pristine/Switch


Anthracnose fruit rot ratings
Number of berries infected
25
20
15
10
5
0
Dormant sprays
Control
Pruning
Sulforix-Fall
Sulforix-Spring
Sulforix-Fall and Spring
Phostrol

Example of a disease control program*

Lime sulfur, sulfur

Indar, Quash, Tilt, Proline, Funginex, Allegro, Captan, Bravo

Quilt, Pristine, Quash

Phostrol, Captan, Allegro, Switch, Cabrio

Pristine, Switch

Pristine, Switch

Dor-mant sprays

Mummy berry

Phomopsis, Fusicoccum

Anthracnose Fruit Rot

Botrytis Blight and Fruit Rot

Alternaria Fruit Rot

Leaf rust

*Choose one fungicide per spray timing and alternate fungicide classes

Example of organic program*

Lime sulfur, copper

Actinovate, Serenade + Regalia

Actinovate, Serenade + Regalia

Botector, Timorex? Cueva?

Botector, Timorex? Cueva?

Regalia

Dor-mant sprays

Mummy berry

Phomopsis, Fusicoccum

Anthracnose Fruit Rot

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Leaf rust

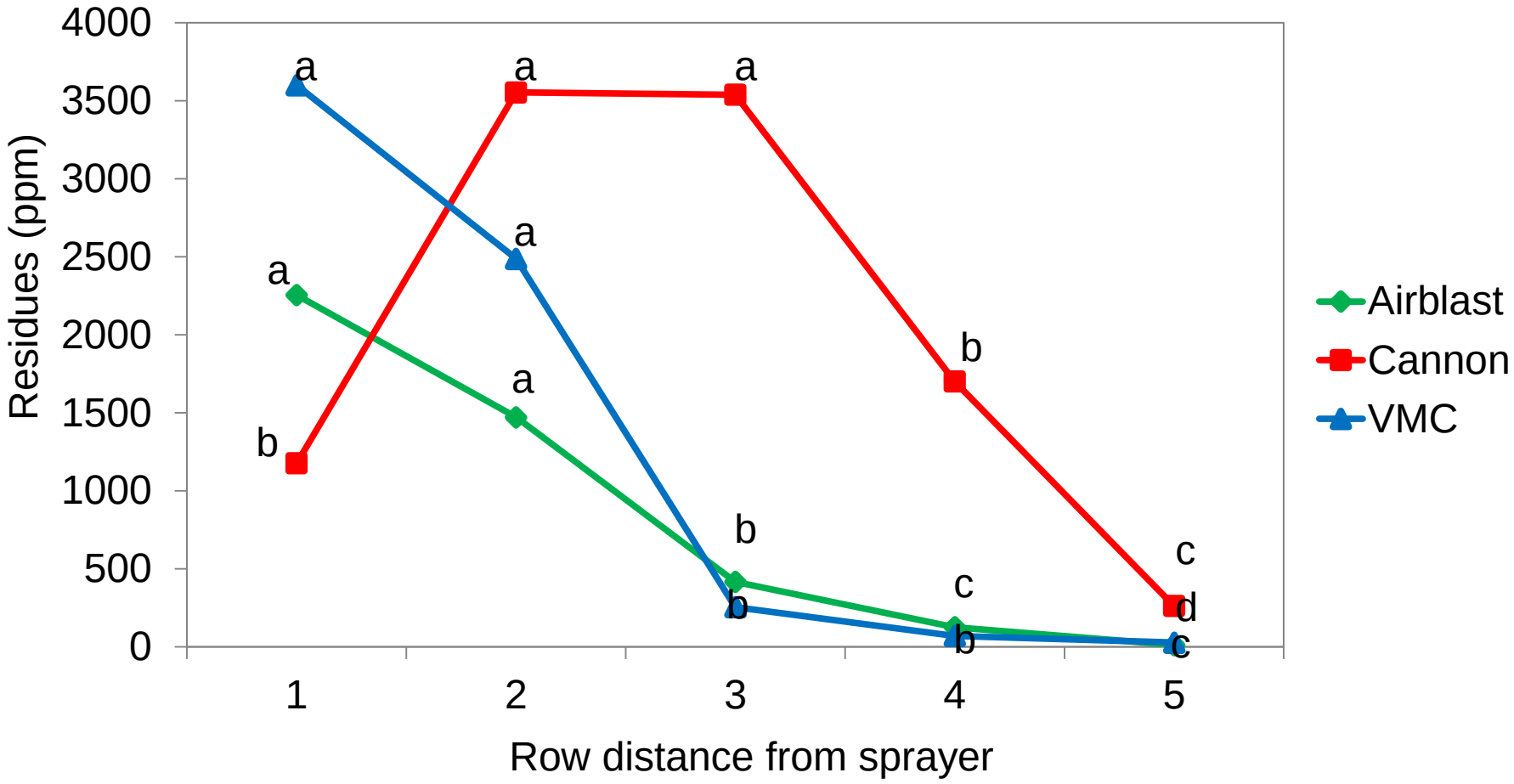
*Choose one fungicide per spray timing and alternate fungicide classes

Airblast sprayer

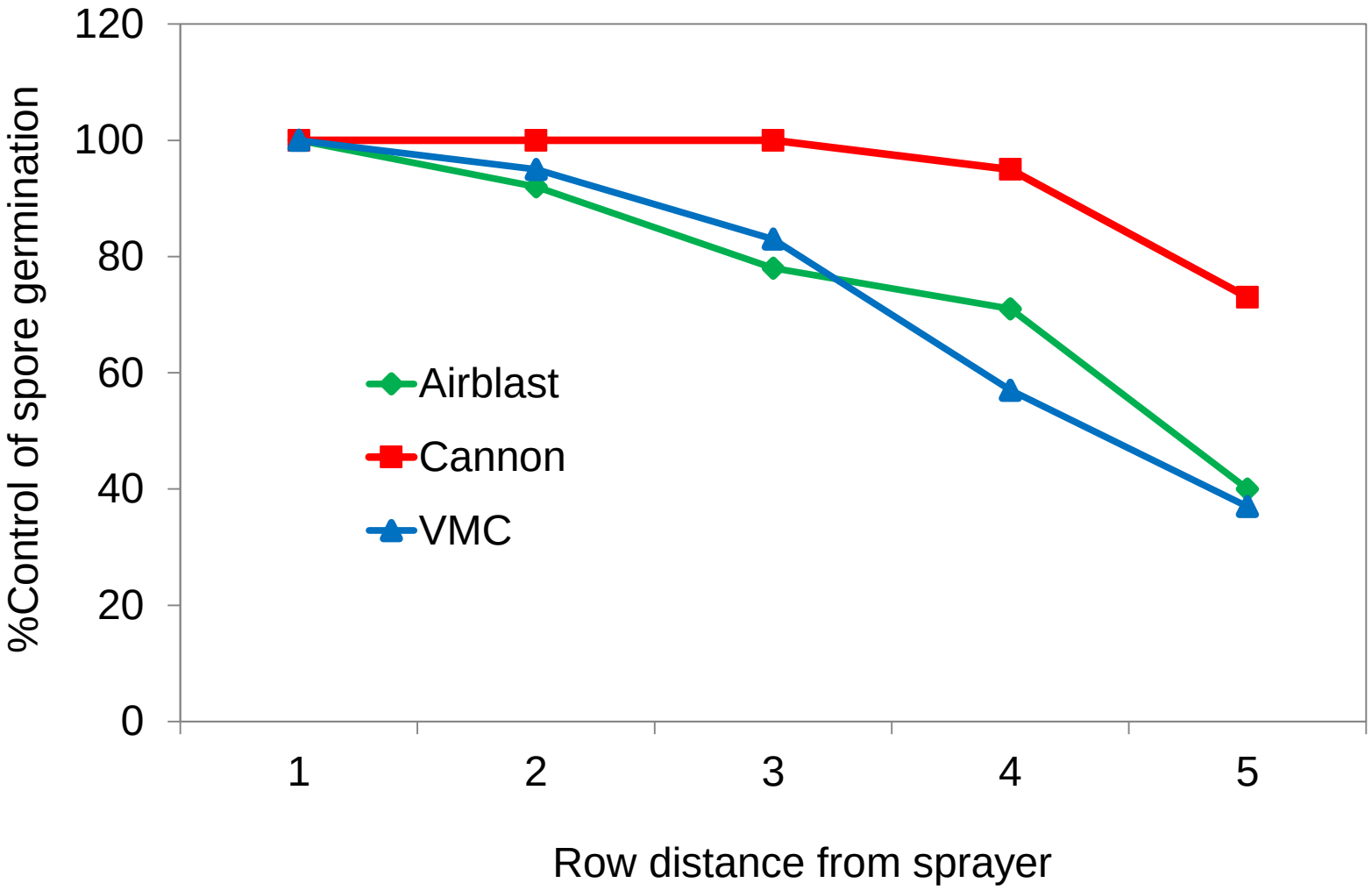
Cannon sprayer

VMC Tower sprayer.

Effect of sprayer on pattern of captan recovery



Effect of sprayer on control of Colletotrichum spore germination



Questions?