Disease and Disease Management for Prune Production

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Diseases affecting flowers and young developing fruit of prune

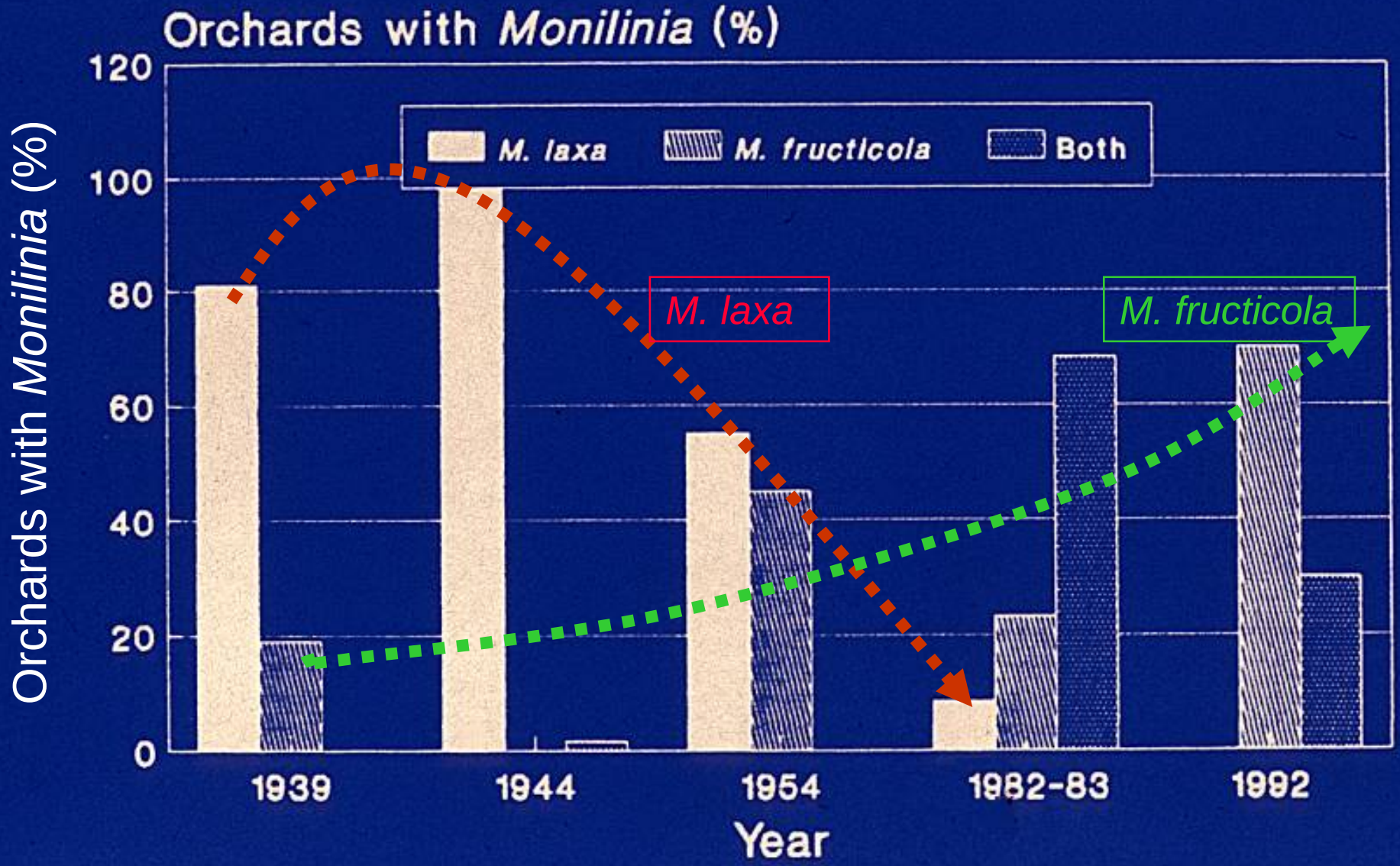
- Brown rot
- Jacket rot
- Blast
- Russet scab

Pathogens of brown rot

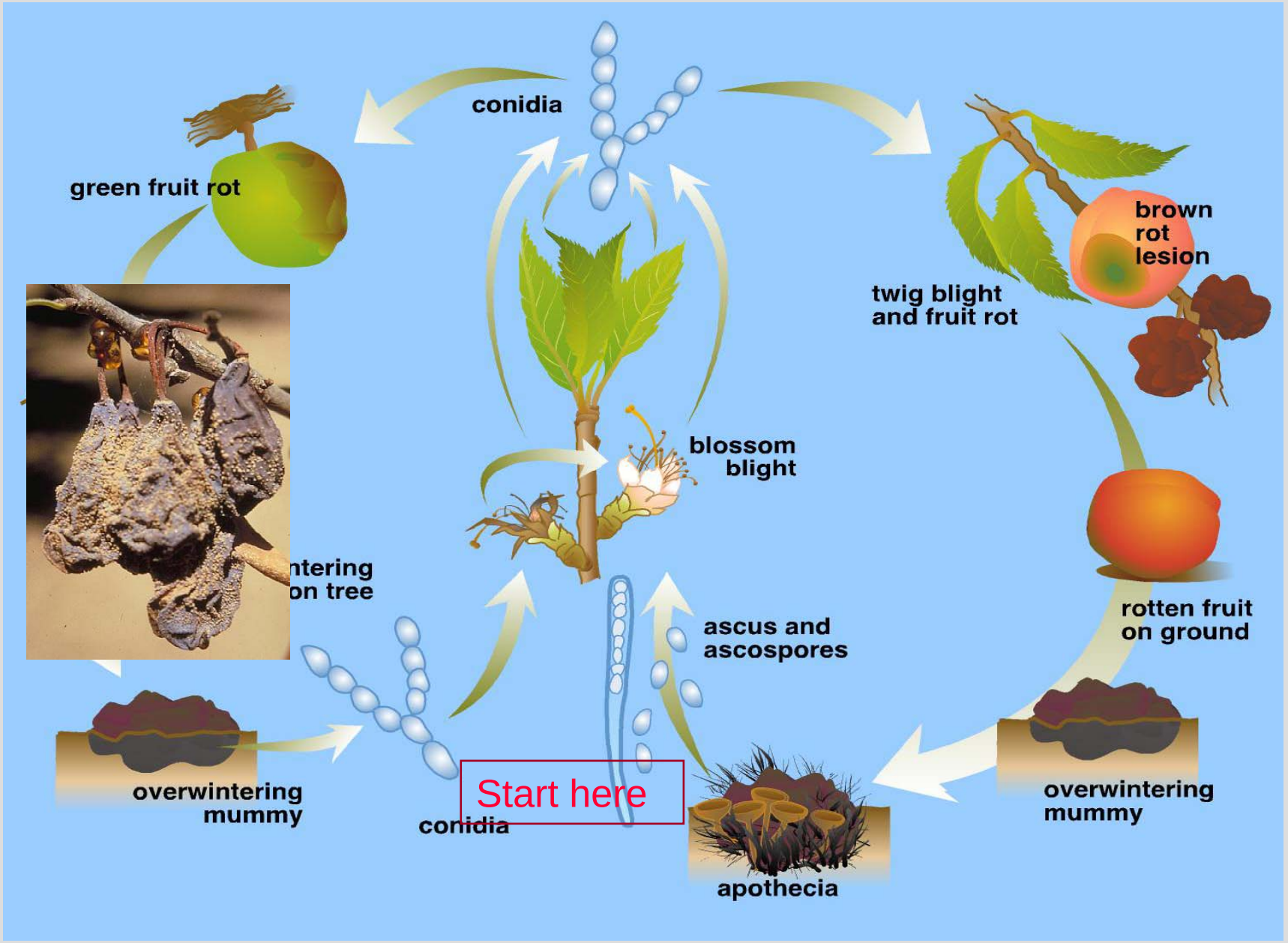
1. *Monilinia fructicola* ****

2. *Monilinia laxa**

Shift in the species of *Monilinia*



Cycle of Brown Rot in Stone Fruits



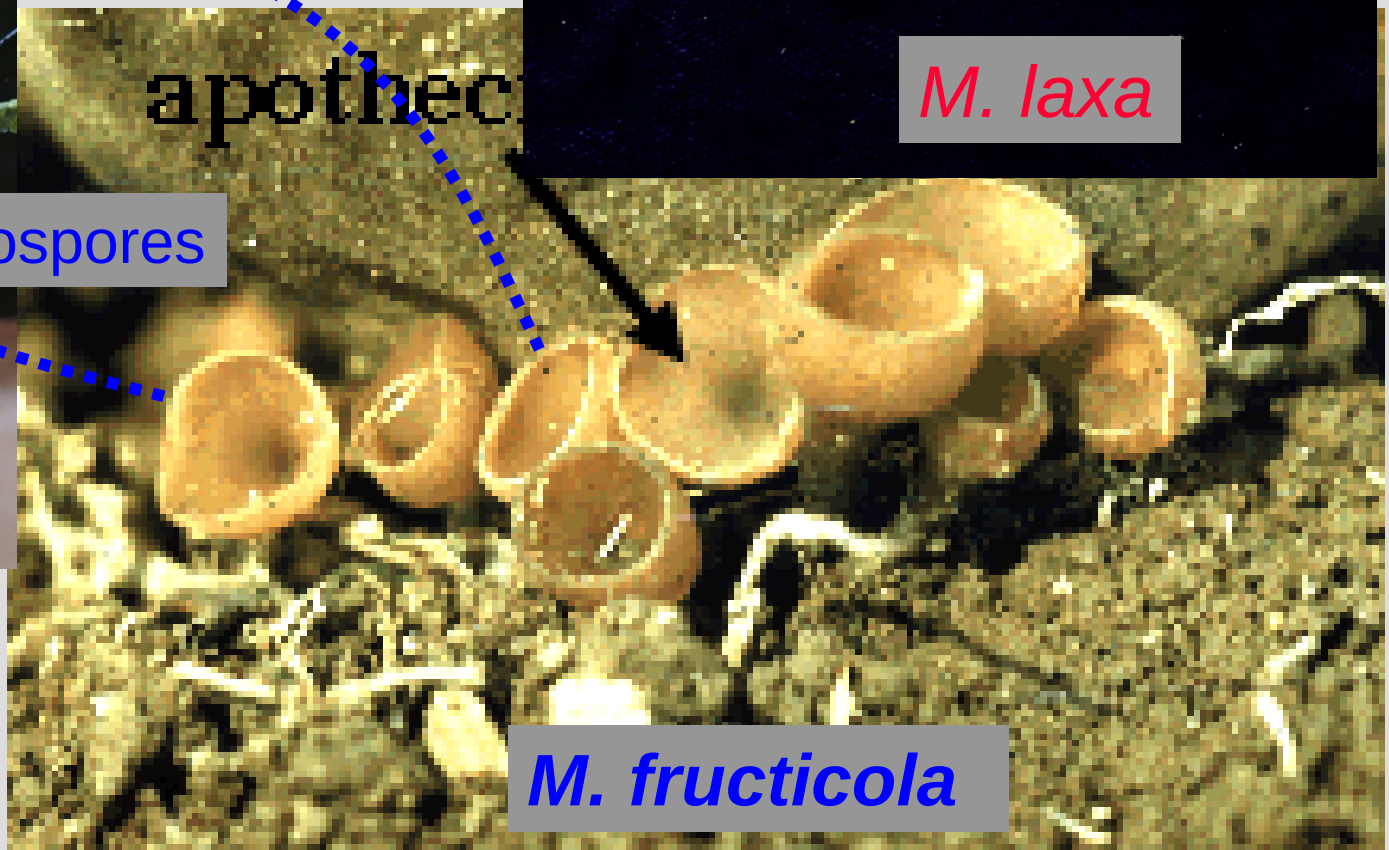

mummies


apothecia on prune mummies

Conidia from infected tissues

M. laxa

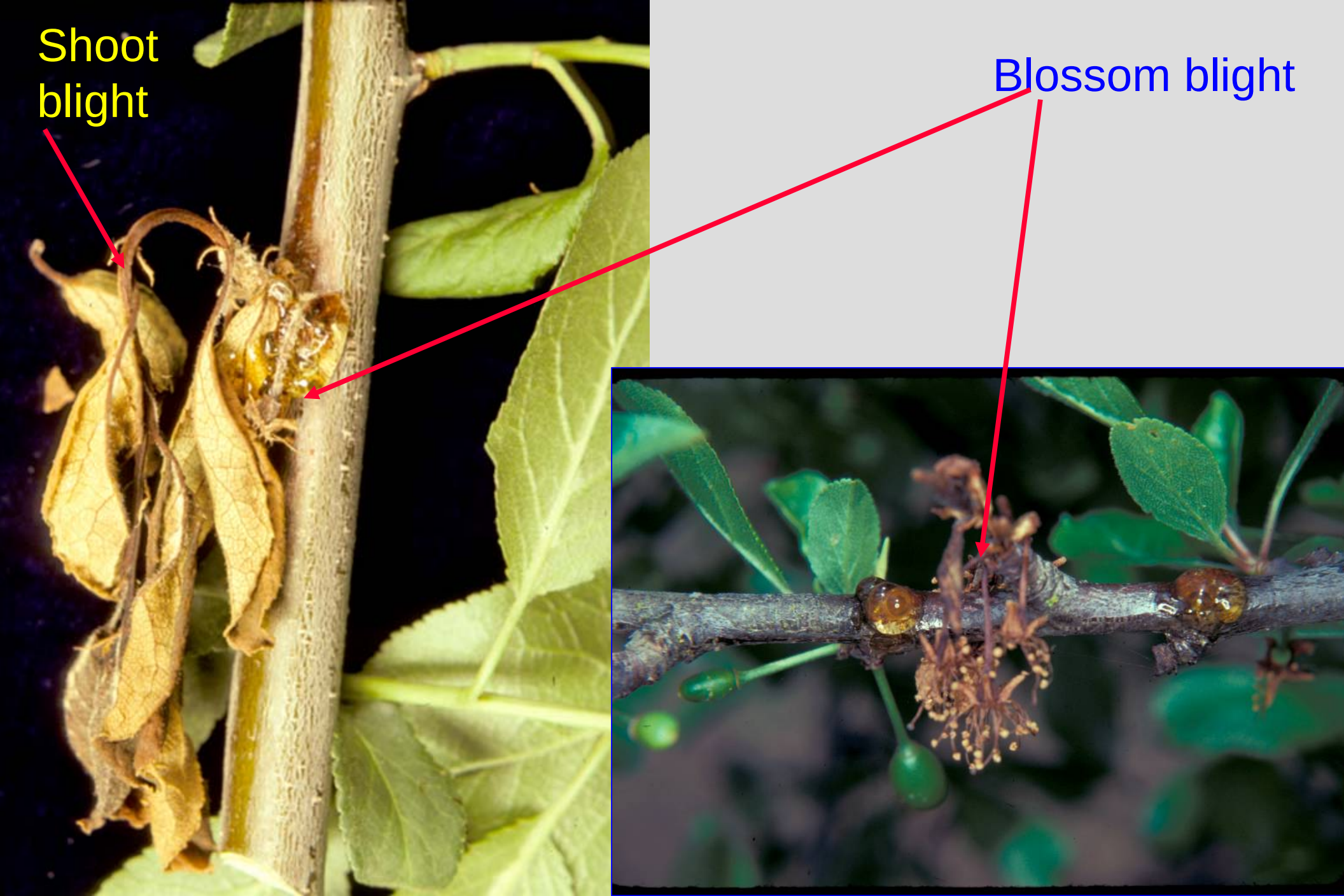
ascospores



apothec

M. fructicola

Each apothecium can discharge 2 to 5 million spores for 3 to 4 days


Shoot blight
Blossom blight


Blast
Caused by a bacterium

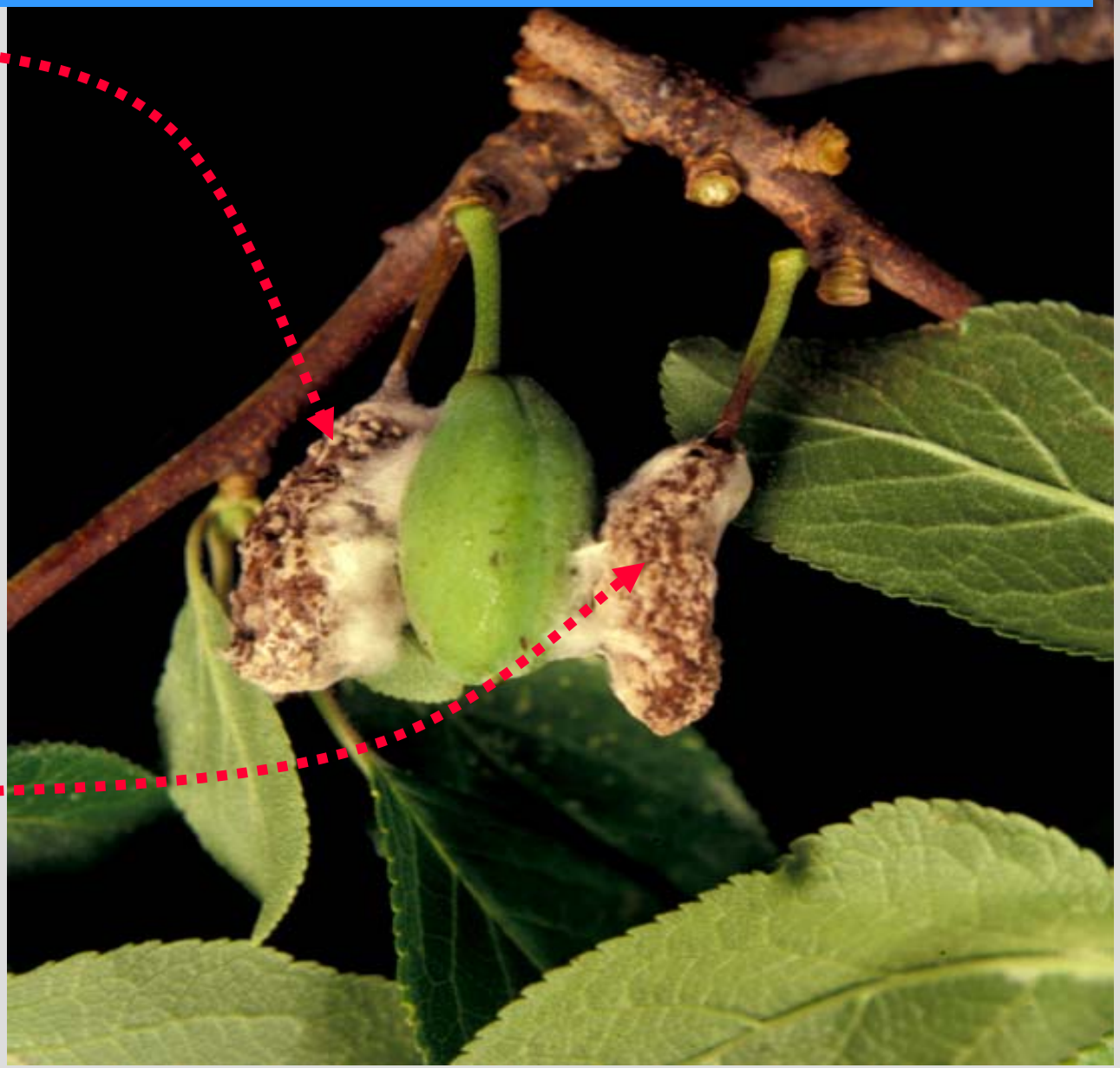
Latent infections

invisible infections; the prune and the brown rot fungus coexist for a period of time with no or minimal damage to prunes.

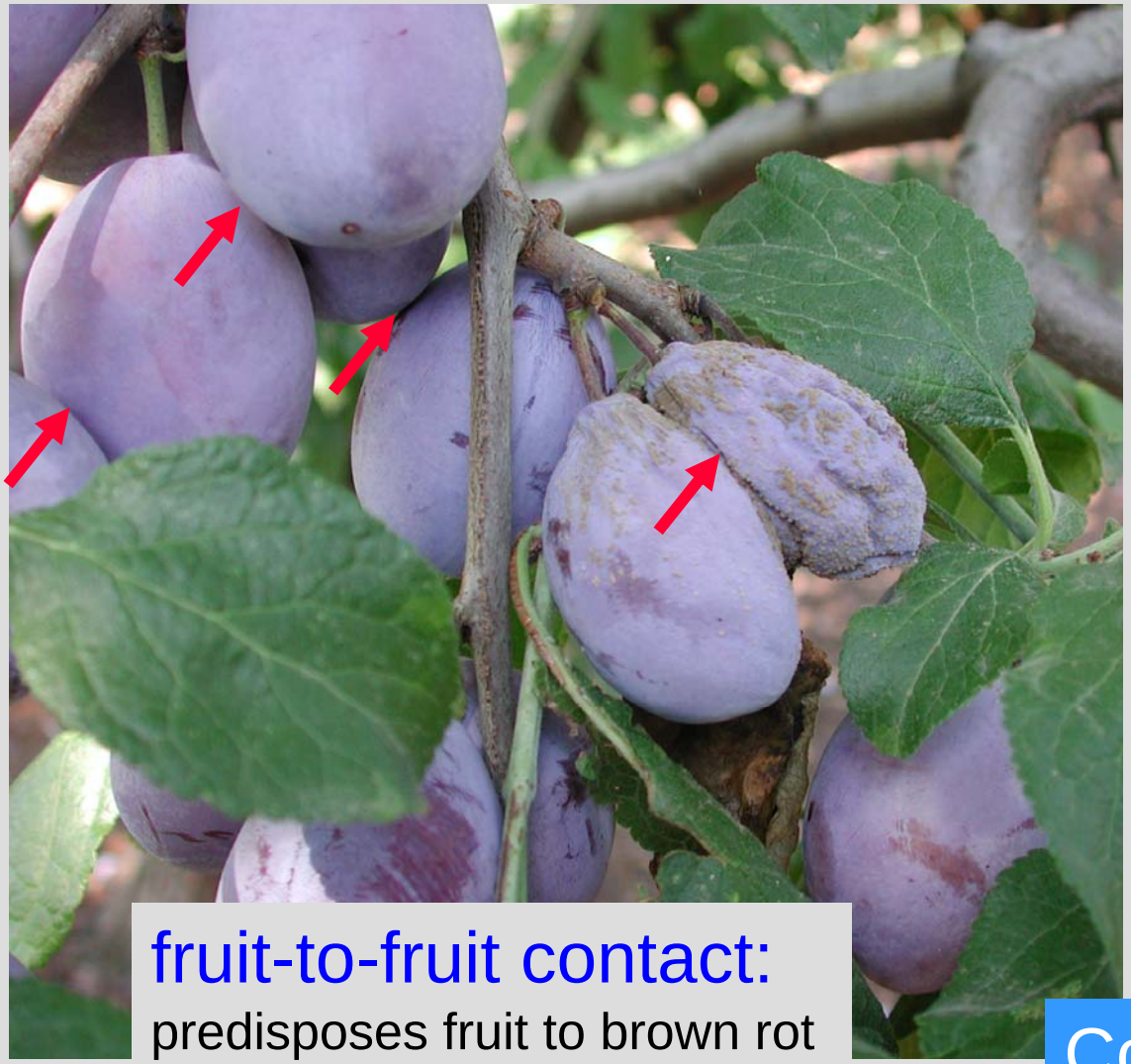
Incipient/quiescent infections

Visible infections; mycelial growth is arrested after infection of prunes.

Latent/quiescent infections → green fruit rot



Contact surfaces



fruit-to-fruit contact:
predisposes fruit to brown rot infection

- ✓Thinner cuticle/ skin
- ✓Micro-cracks
- ✓More stomates/lenticels
- ✓More microorganisms/spores

Cover fruit before they touch.

Prediction model for brown rot in prune

Dissected the disease in:

a) Potential of spore inoculum and sources.

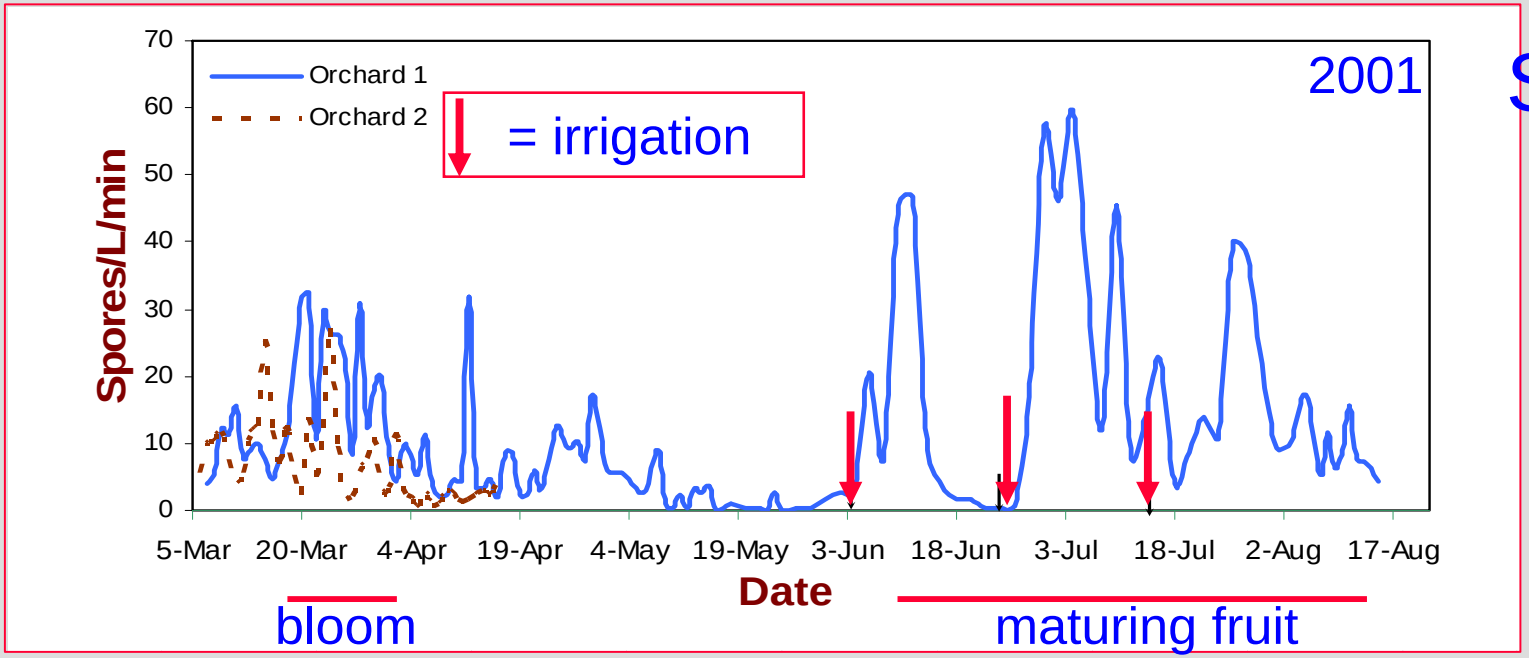
b) Blossom blight phase.

c) Latent infection of green fruit.

d) Relationships of latent infection and fruit rot.

e) Mummy development and survival of pathogen.

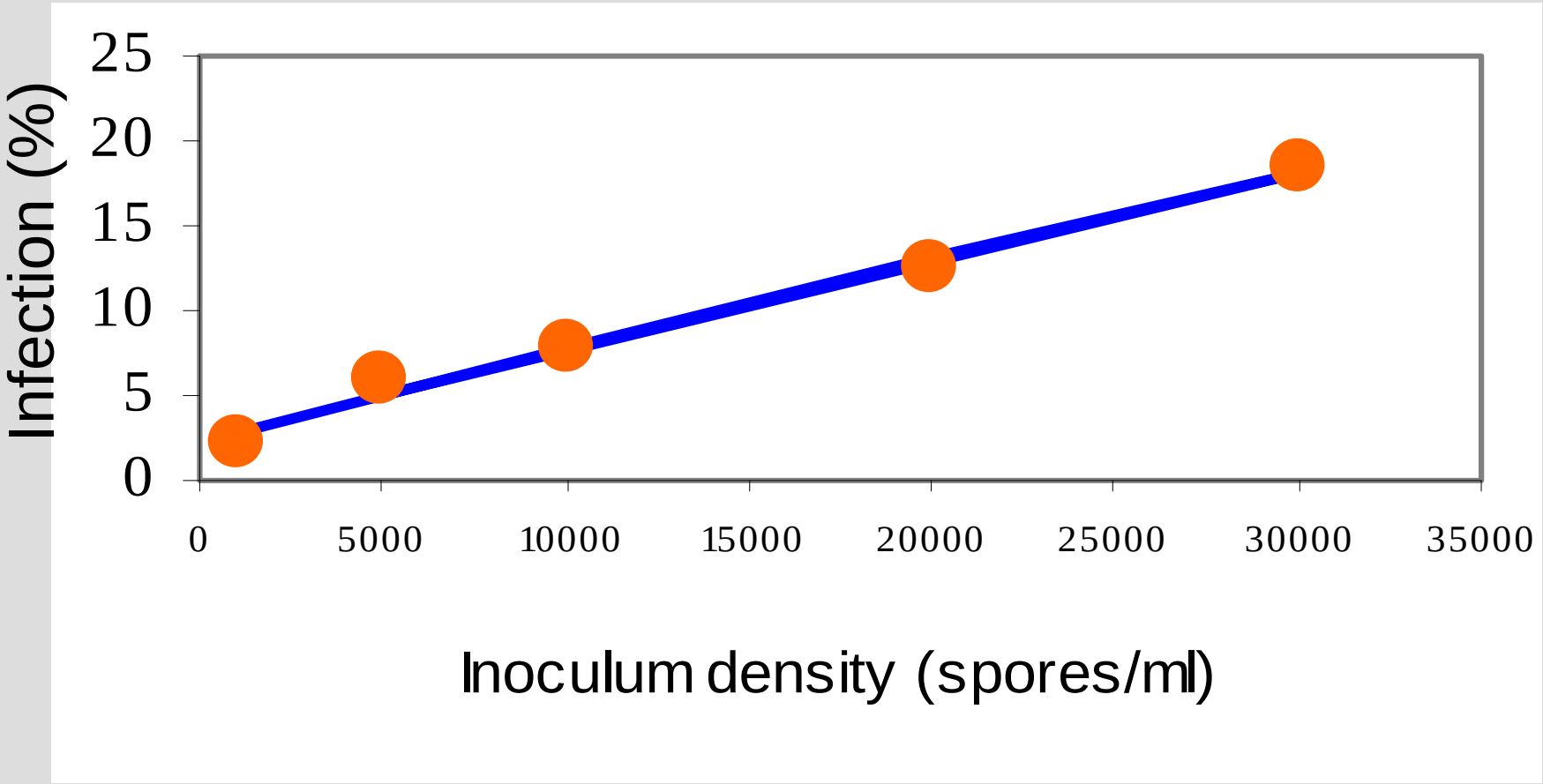
Spore trap in a prune orchard



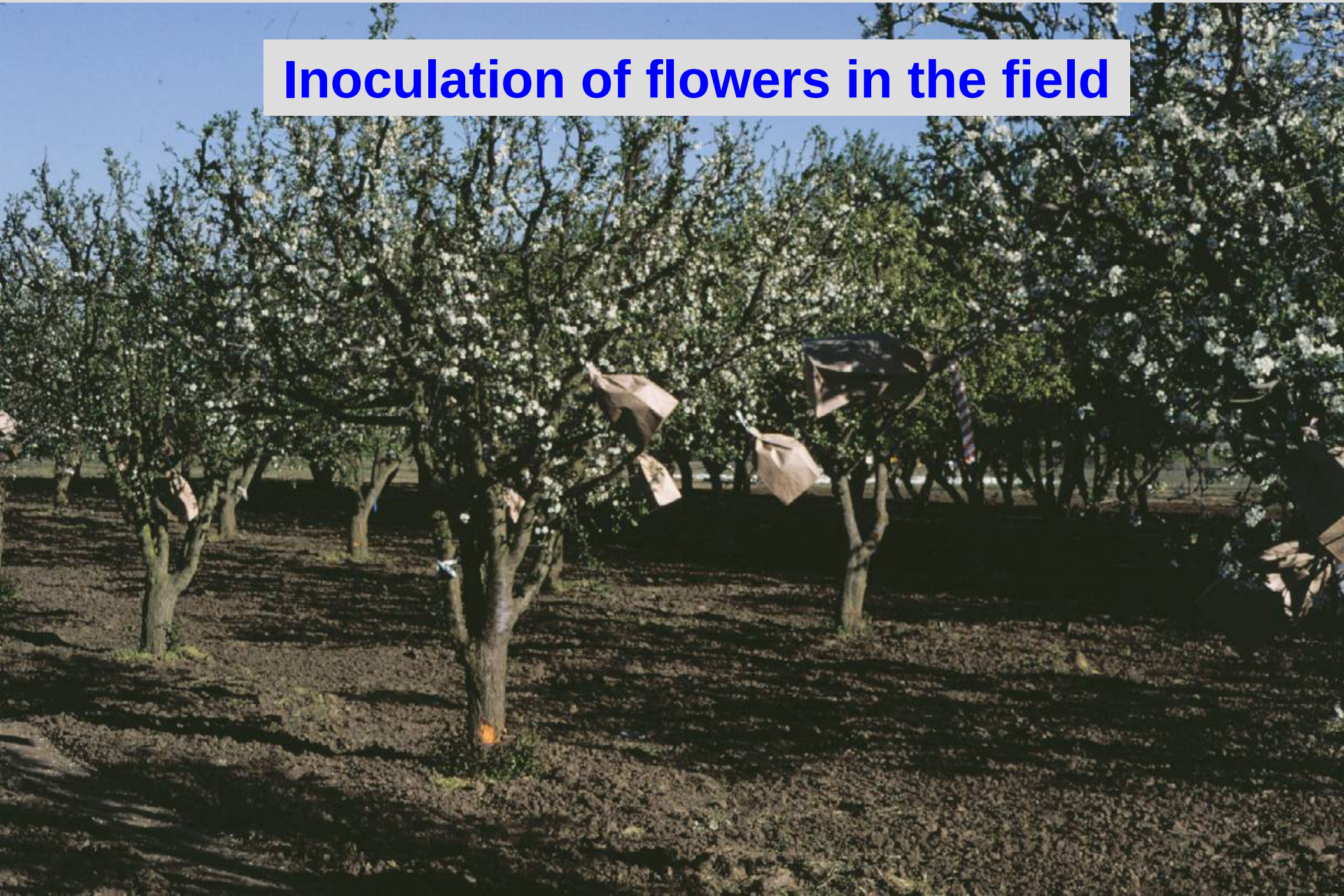
Spore dynamics in two prune orchards

Thinned fruit on the ground

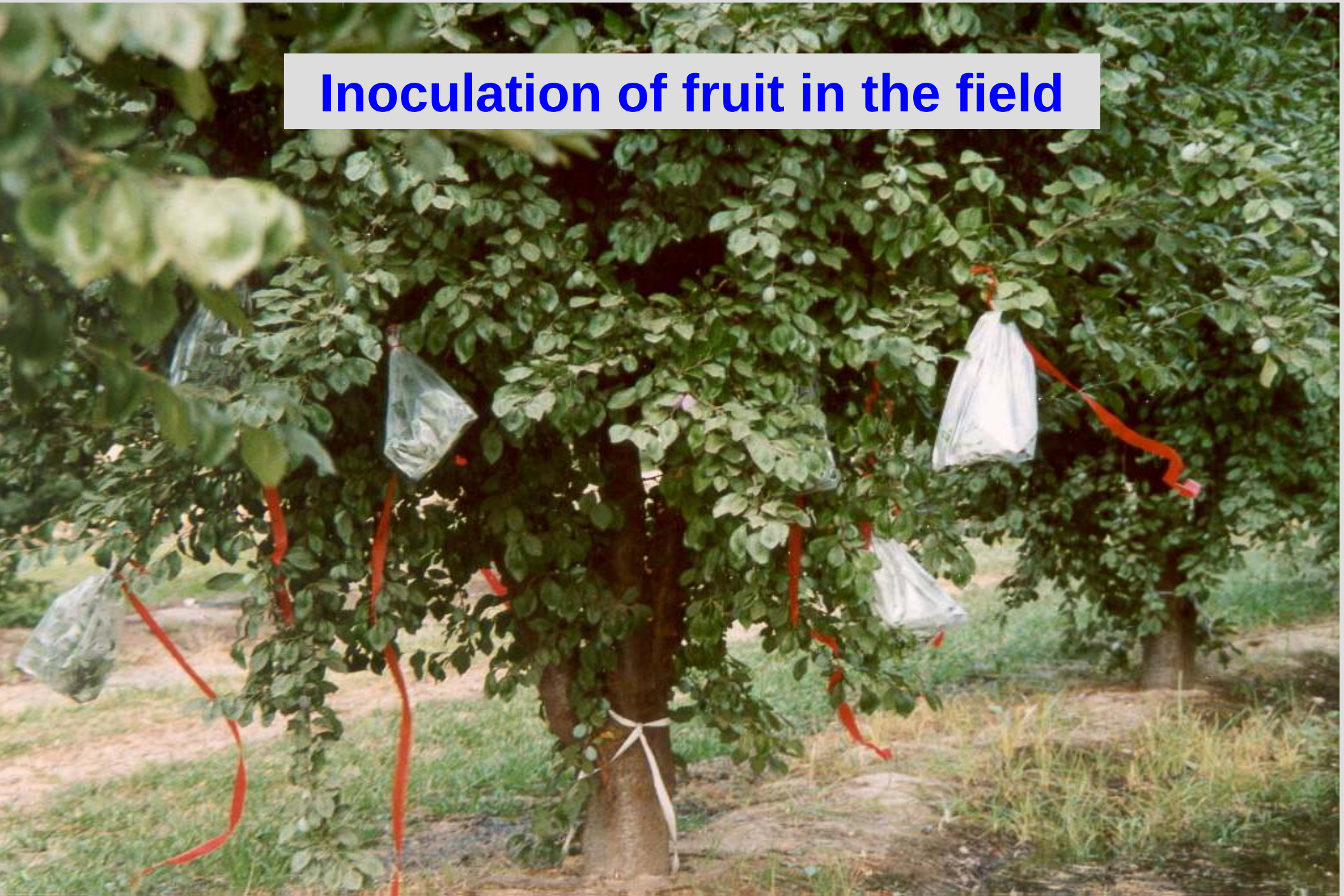
Relationship of inoculum and brown rot



Inoculation of flowers in the field



Inoculation of fruit in the field

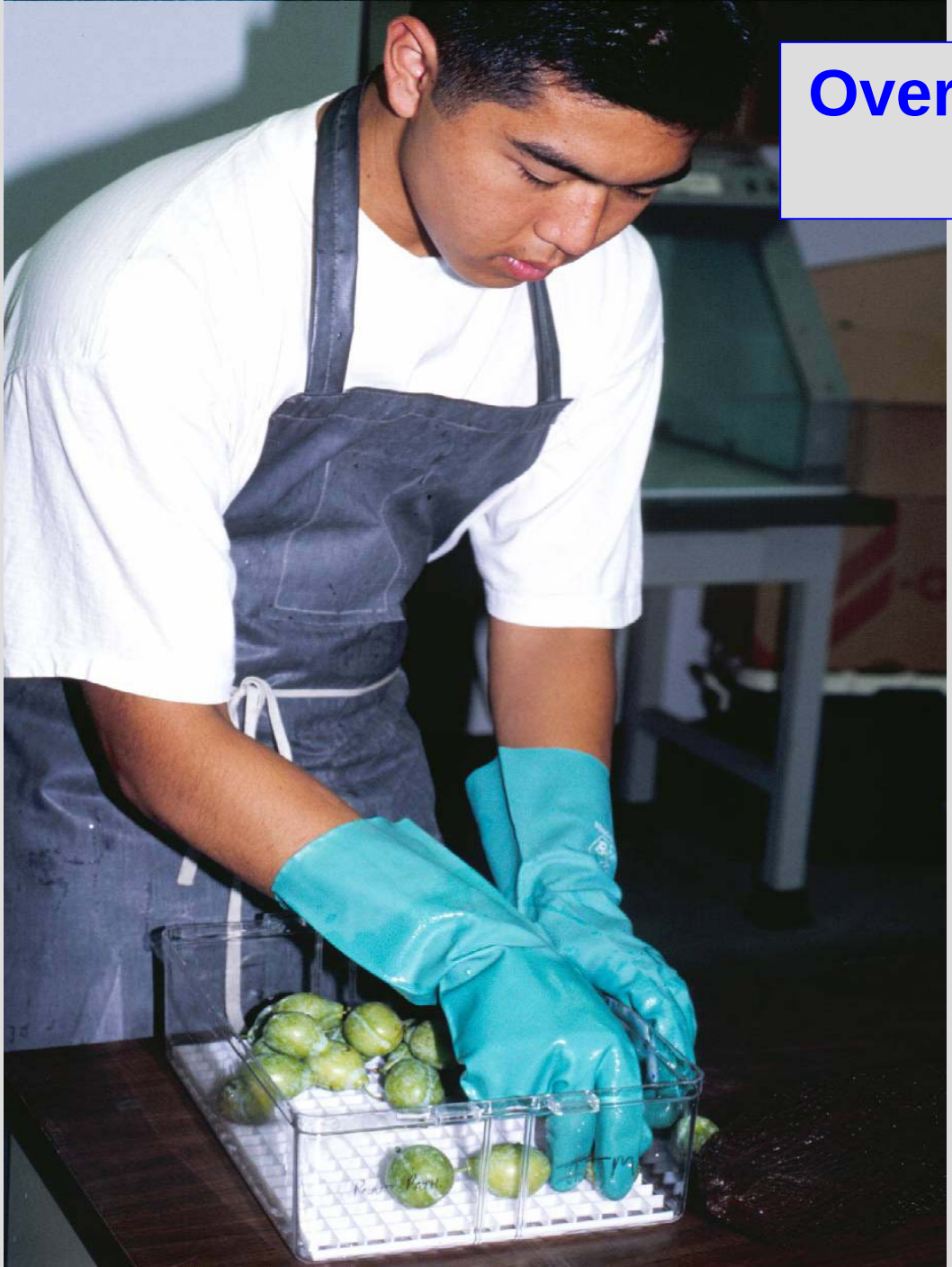


Overnight Freezing - Incubation Technique (ONFIT)

- **A method for detecting latent infections in green prune fruit.**
- **Simple and relatively quick to perform.**
- **Reliable technique.**

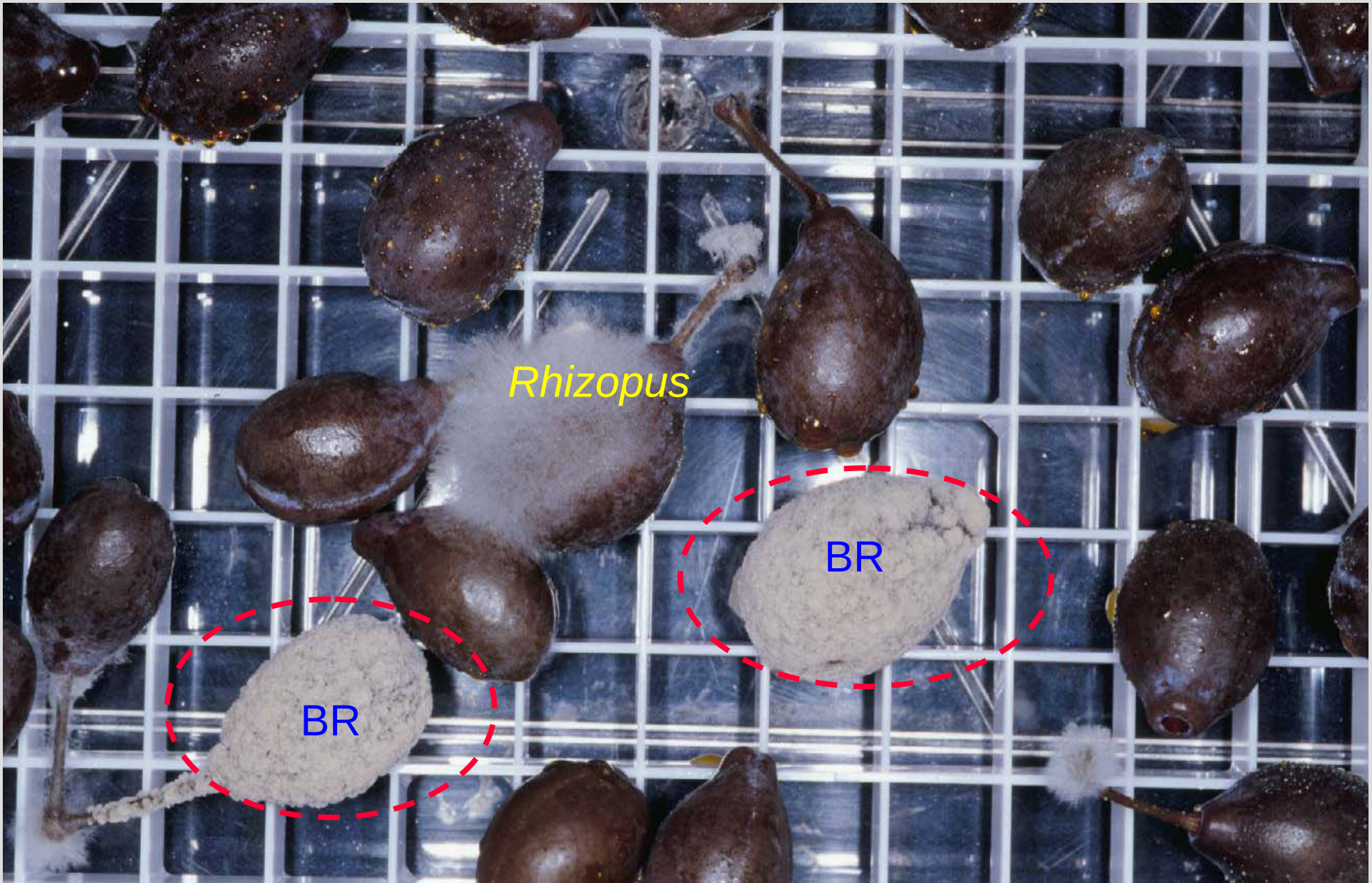
California Agriculture 59 (2):115-123 (2005)

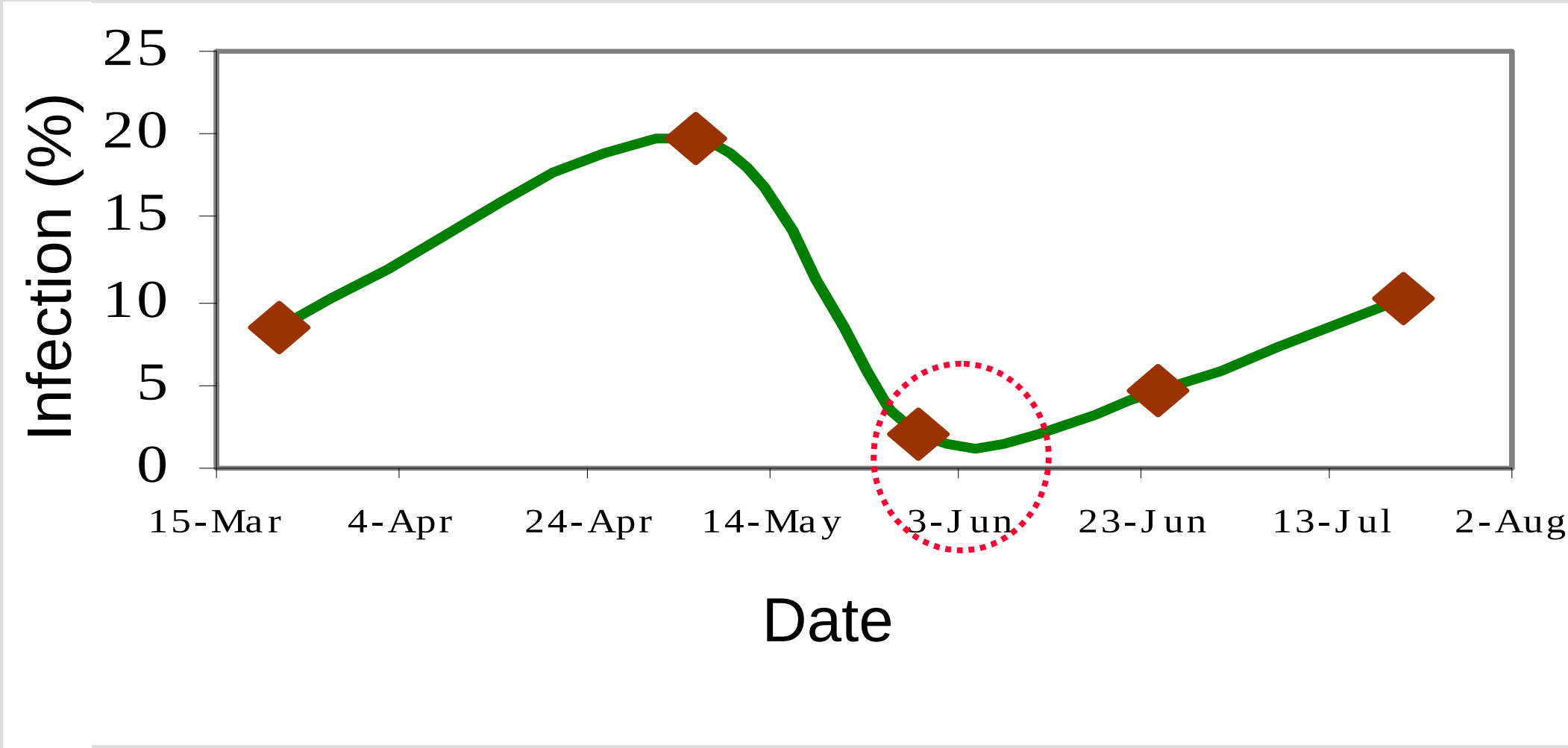
Overnight Freezing- Incubation Technique (ONFIT)



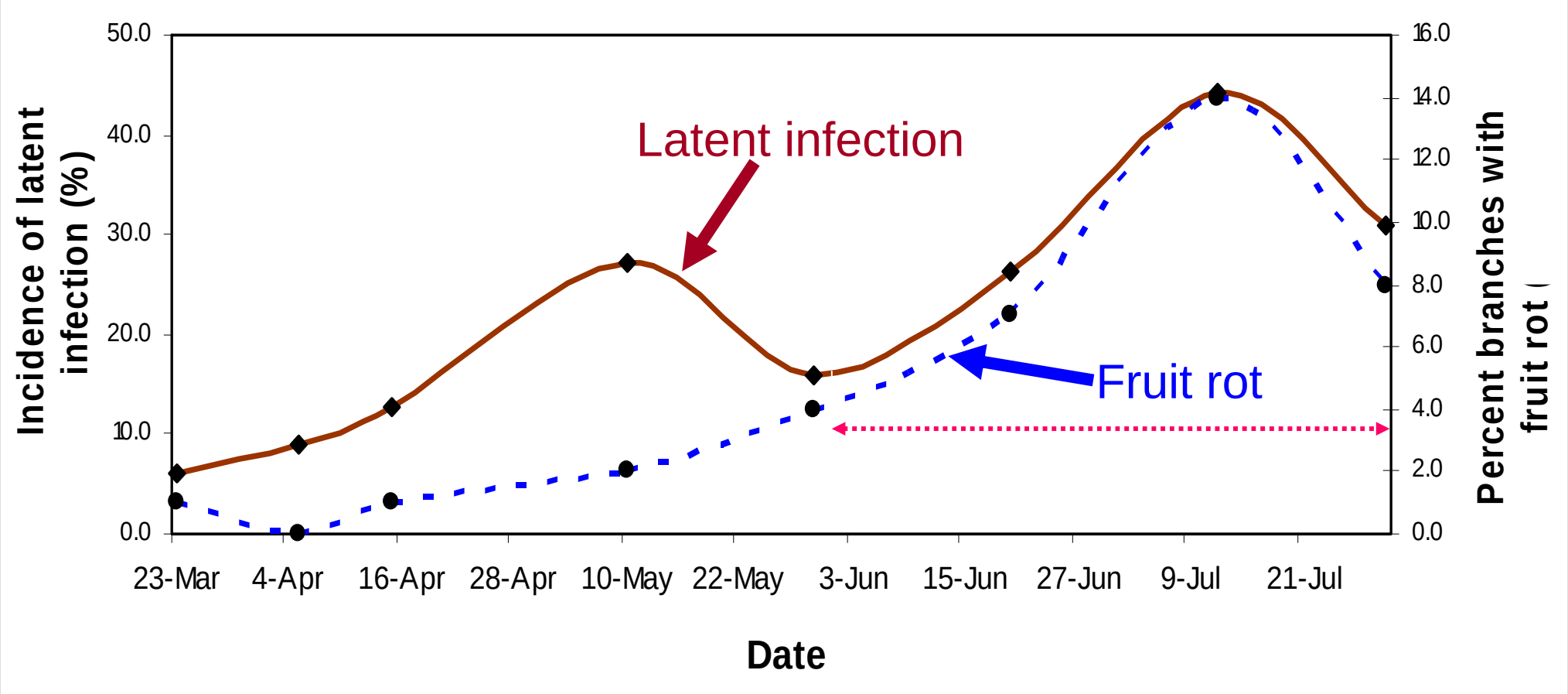
… after freezing and incubation for 5 to 7 days

Freezing triggers latent infection to develop fruit rot

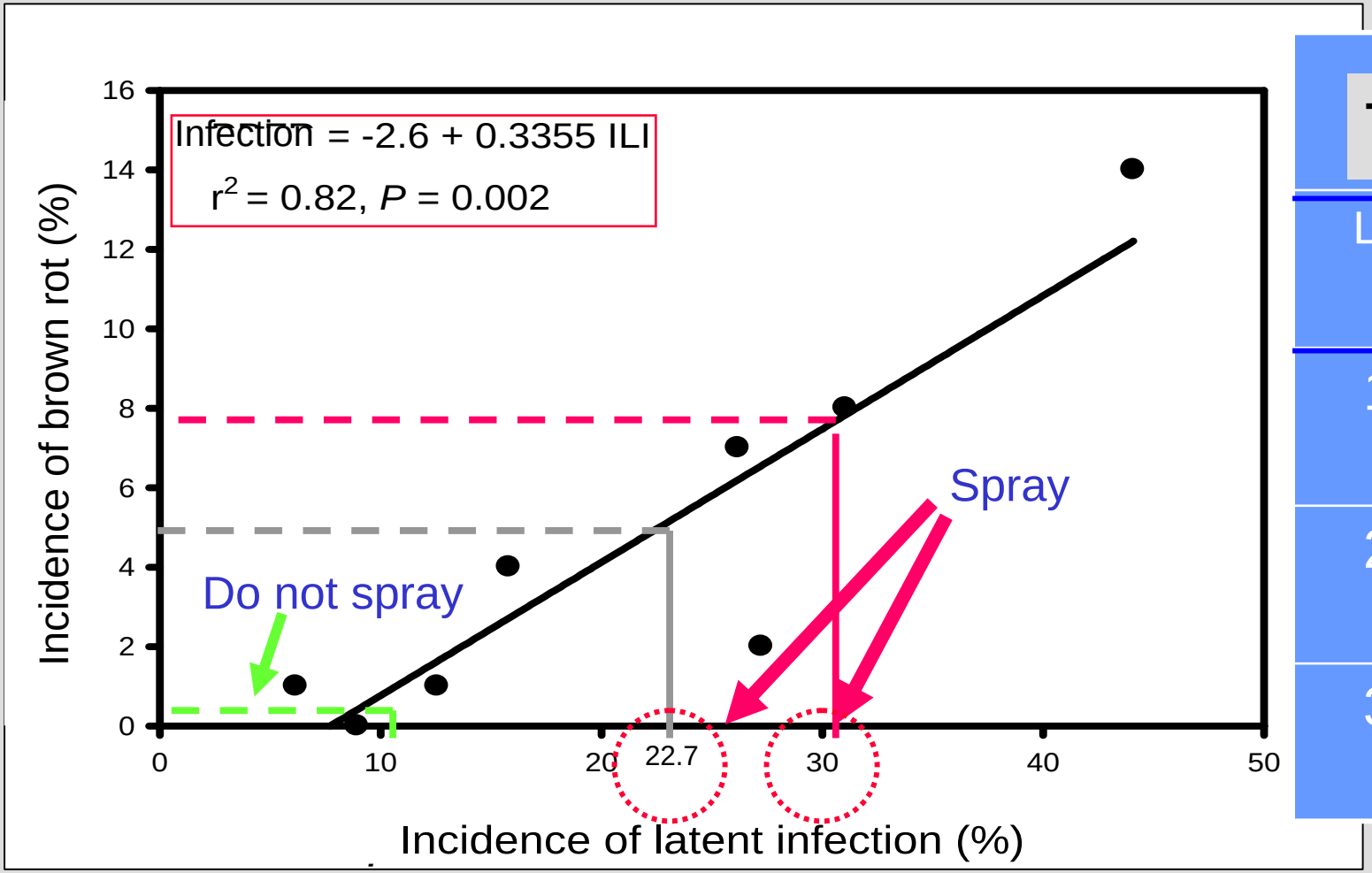



Infection (%)
25
20
15
10
5
0
15-Mar
4-Apr
24-Apr
14-May
3-Jun
23-Jun
13-Jul
2-Aug
Date

Parallel trends in latent infection and fruit rot (from June to August)



Correlation of fruit rot with incidence of latent infection



Thresholds

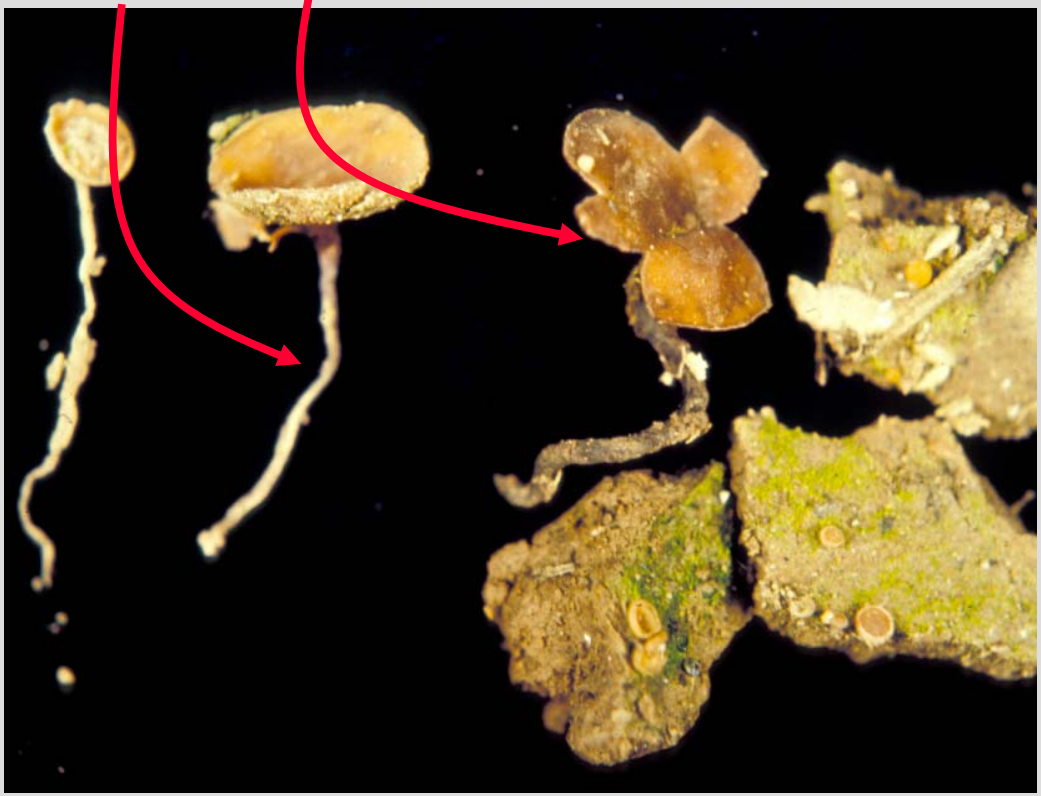
Latent (%)	Fruit rot (%)
10.7	1
22.7	5
37.6	10

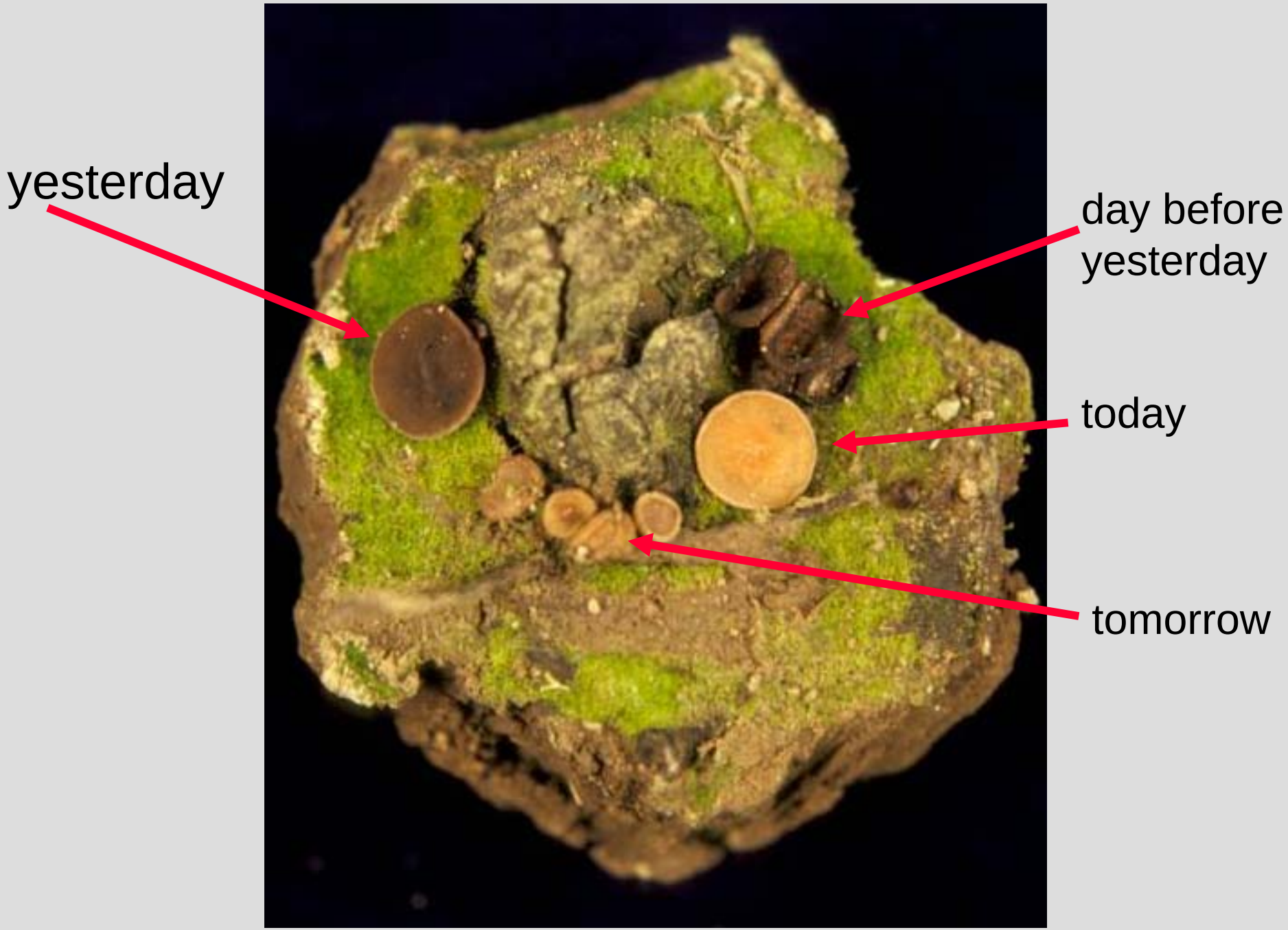
Management of brown rot:

Remove/destroy the mummies (sanitation):

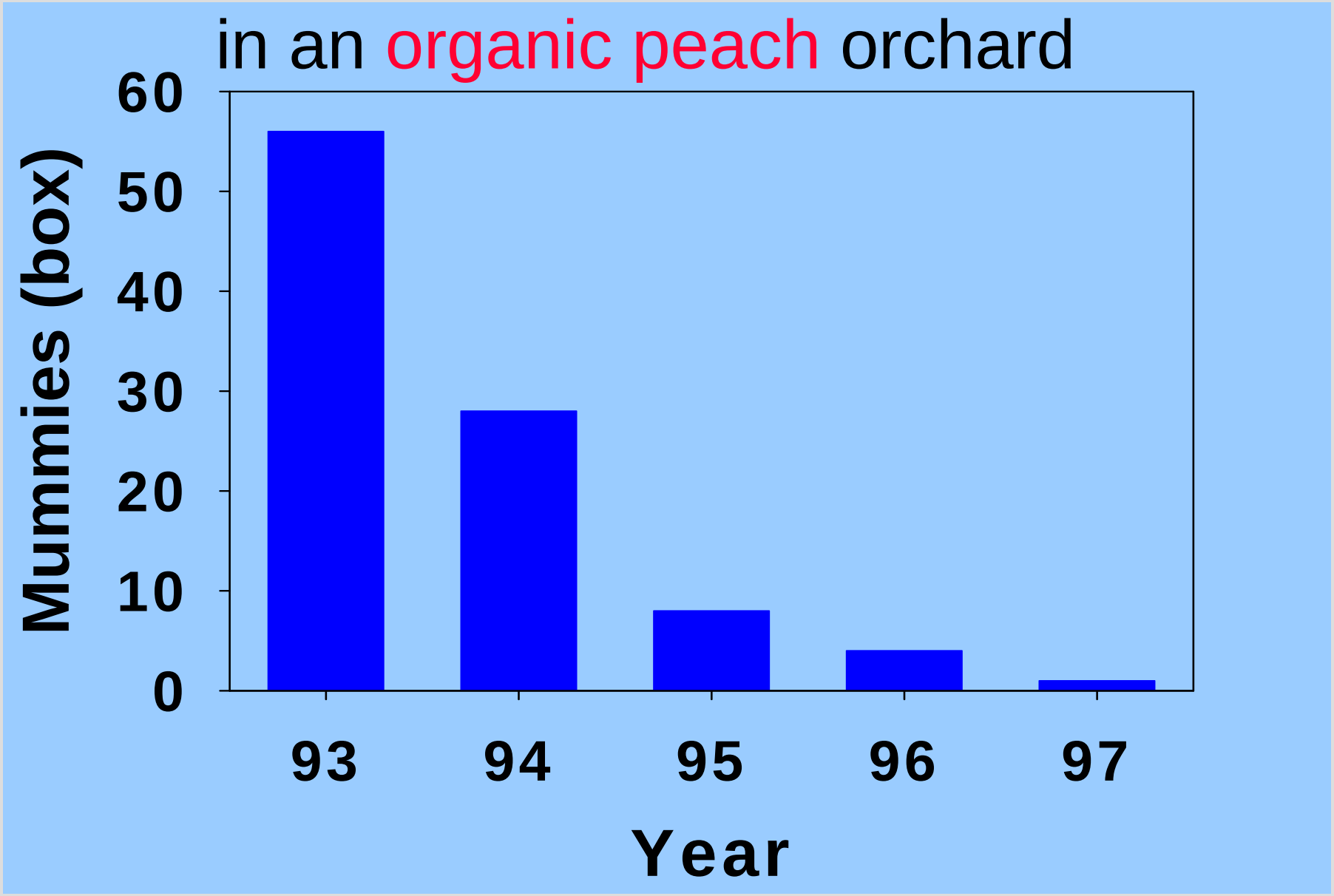
✓Mowing results in cutting the mummies which helps in their decay.

✓Burry mummies; however, some apothecia reach the soil surface.




yesterday
day before yesterday
today
tomorrow

Removal of mummies from 1993 to 1997



Management of brown rot:

Fertilization:

✓Too much nitrogen makes fruit more susceptible to brown rot (it has been shown in other stone fruit and may be true for prunes).

Irrigation:

✓It can increase conditions for infection (sprinkler irrigation: misting and wetness duration) → latent infection.

✓It can induce sporulation of *Monilinia* on thinned fruit → latent infection → fruit rot.

Fungicides with excellent efficacy in prunes

Fungicide	Resistance risk	Brown rot of blossoms	Brown rot of fruit
Pristine	medium	++++	++++
Orbit (Bumper)	high	++++	++++
Rovral + oil	low	++++	Not Registered
Topsin + oil	high	++++	++++
Vangard	high	++++	+++
Scala	high	++++	+++
Indar	high	++++	++++
Distinguish*	medium	++++	++

Source: **http://www.ipm.ucdavis.edu**

Oil in summer causes fruit to loose bloom and look red; but prunes dry to normal color.

Fungicides with good efficacy in prunes

Fungicide	Resistance risk	Brown rot of blossoms	Brown rot of fruit
Elevate	high	+++	+++
Rovral	low	+++	Not Registered
Topsin	high	+++	+/-

Source: http://www.ipm.ucdavis.edu

Fungicides with low efficacy in prunes

Fungicide	Resistance risk	Brown rot of blossoms	Brown rot of fruit
Abound	high	++	+
Botran	high	++	++
Bravo/Echo	Low	++	++
Captan	low	++	++
Rally	high	++	++
Sulfur	low	(+/-)	(+/-)

Source: http://www.ipm.ucdavis.edu

Fungicide timing for brown rot control in prunes

Green bud	White bud	Full bloom	May	June	July
+++	+++	+++	---	+	++

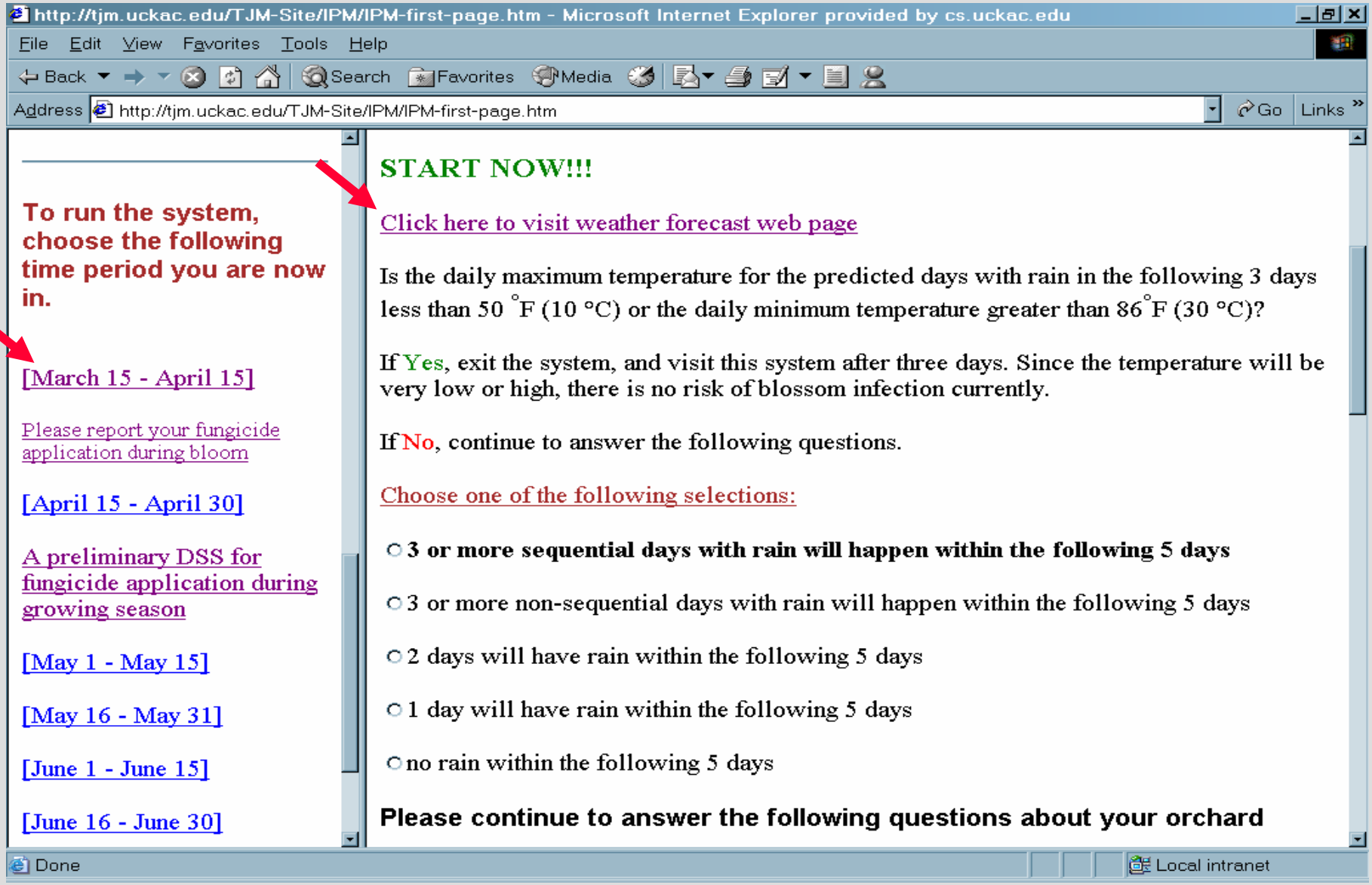
Time when blossoms are most susceptible

Time when fruit become susceptible

Source: http://www.ipm.ucdavis.edu

Web site: http://www.tjm.uckac.edu

… select the time period and link to weather forecast:



Jacket rot

- *Botrytis cinerea* (gray mold fungus)
- *Sclerotinia sclerotiorum*

Russet Scab

Russet scab is an environmentally induced disorder of the fruit.


Russet Scab

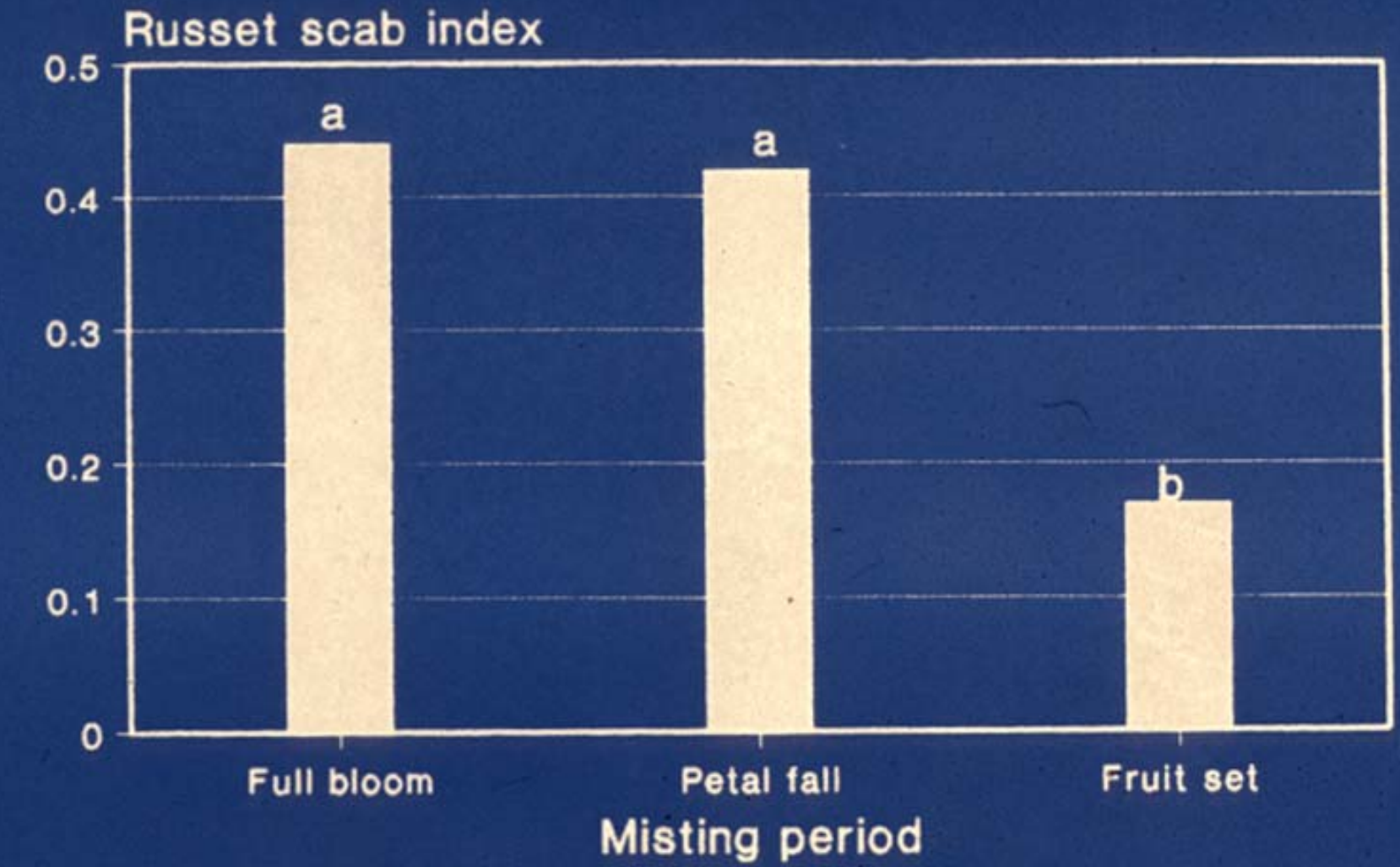

Russet Scab


Petal fall


Full bloom

0 1 2 3 4

Russet scab severity on dehydrated fruit after misting prunes at bloom time



Avg. of fourty-eight 100-fruit samples

Fungicide treatment timing in prune (or dried plum)

Disease	Green bud	White bud	Full bloom	May	June	July
Brown rot	+++	+++	+++	---	+	++
Russet scab	---	---	+++	---	---	---
Rust	---	---	---	+	++	+++

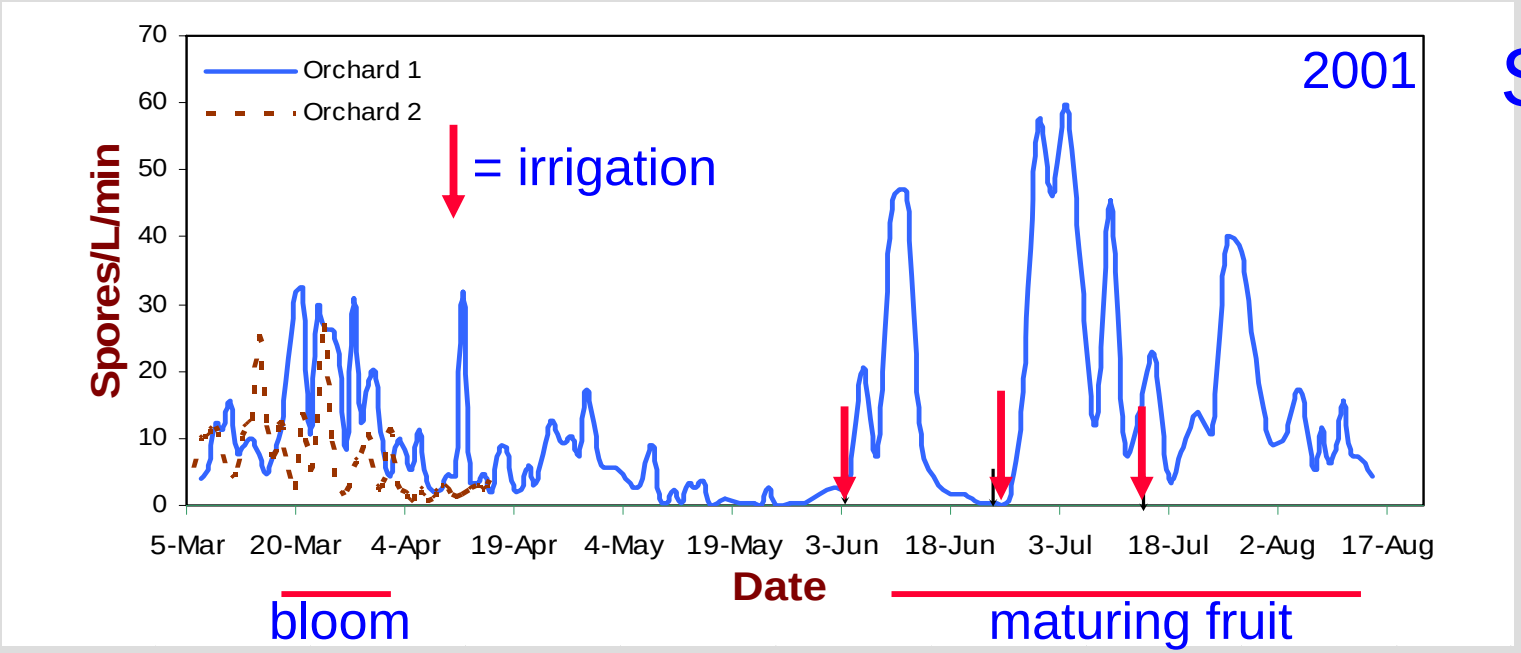
Source: http://www.ipm.ucdavis.edu

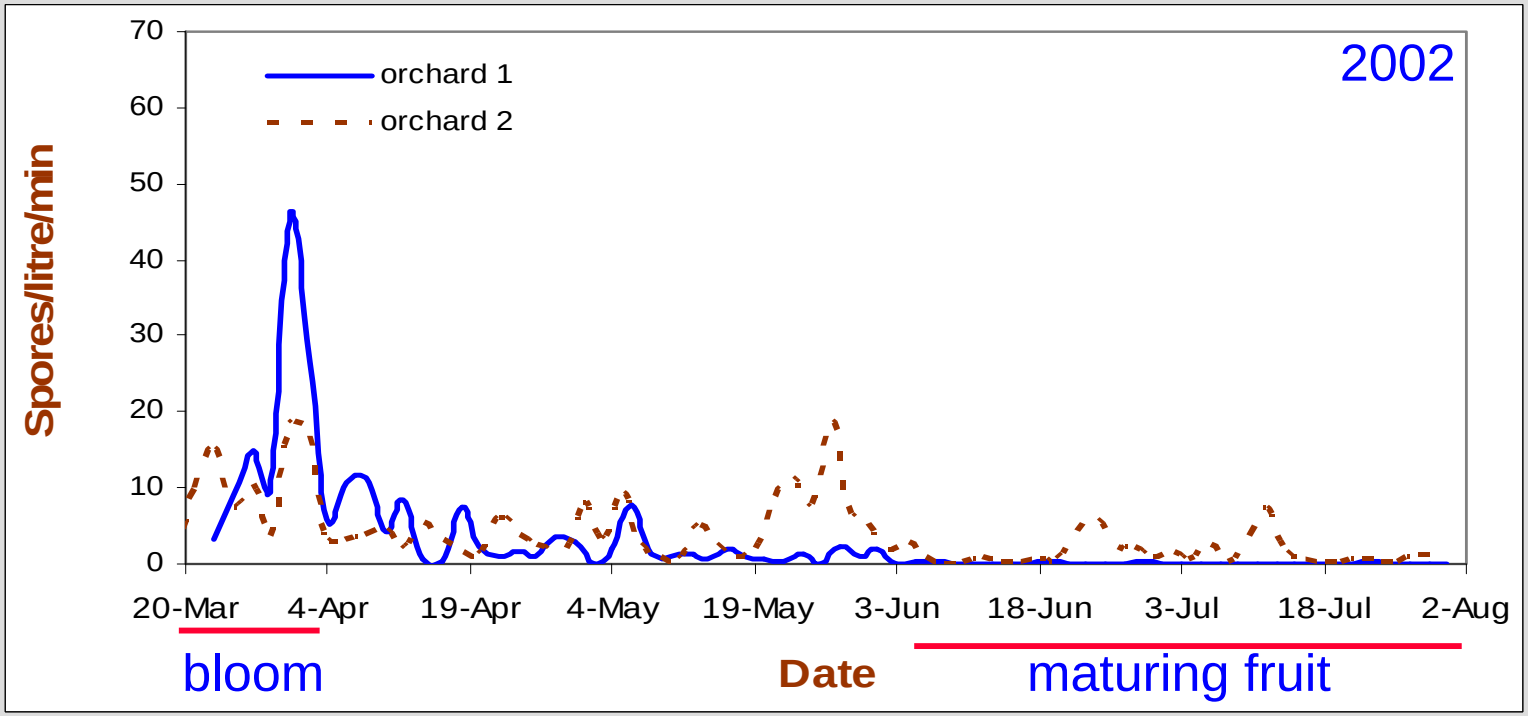
Conclusions

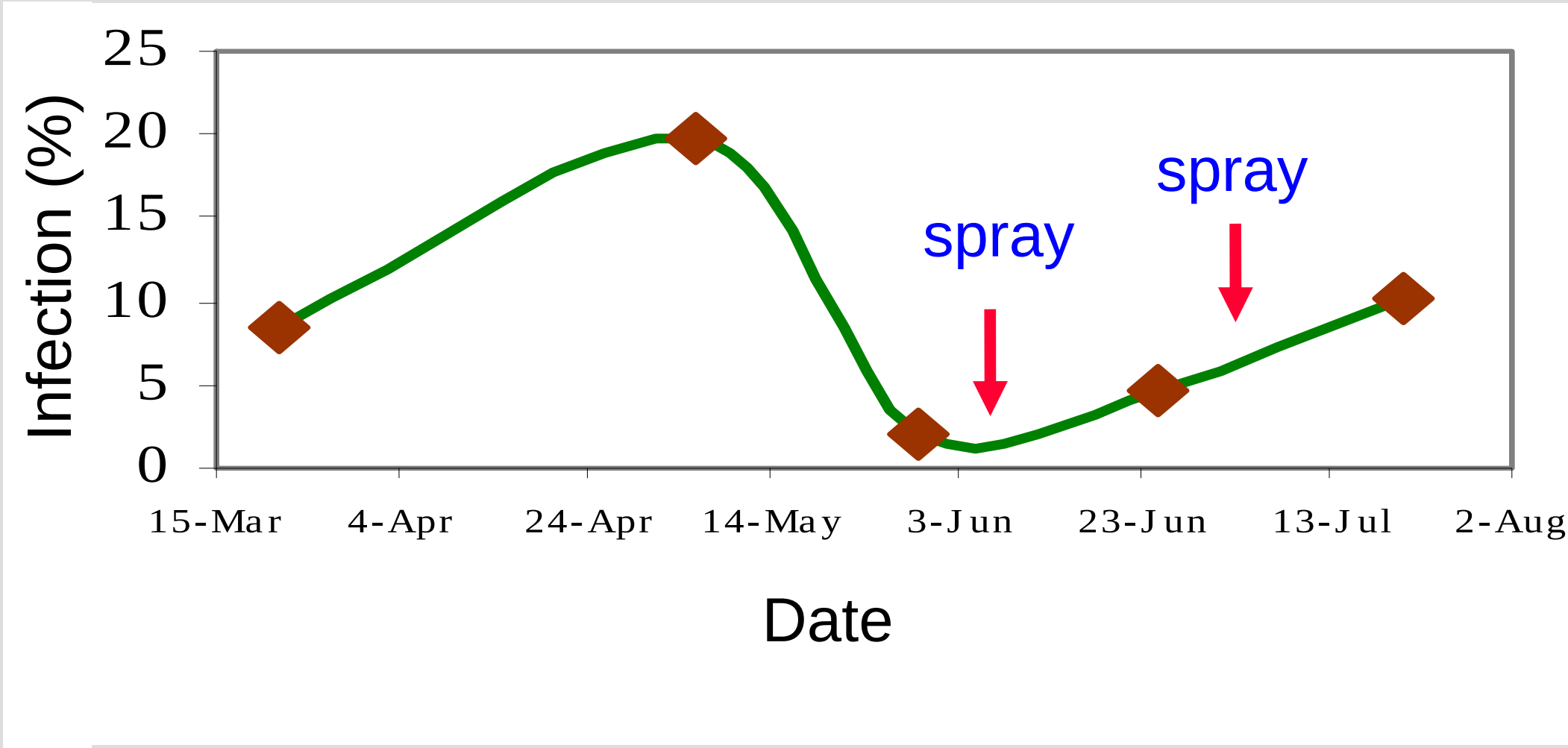
- A wide array of registered effective fungicides.
- Fungicides of different classes according to different mode of actions.
- Easy access to weather prognosis.
- Easy ONFIT tests for latent infection to determine risk of fruit rot.
- In general, good options available for control of brown rot.


Thank you

Spore dynamics in two prune orchards






Infection (%)
25
20
15
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0
spray
spray
15-Mar
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Date

Why it is important to detect latent infections?

This will help you make decisions on preharvest sprays to avoid severe brown rot at harvest.

Example in 2005: In Butte County:

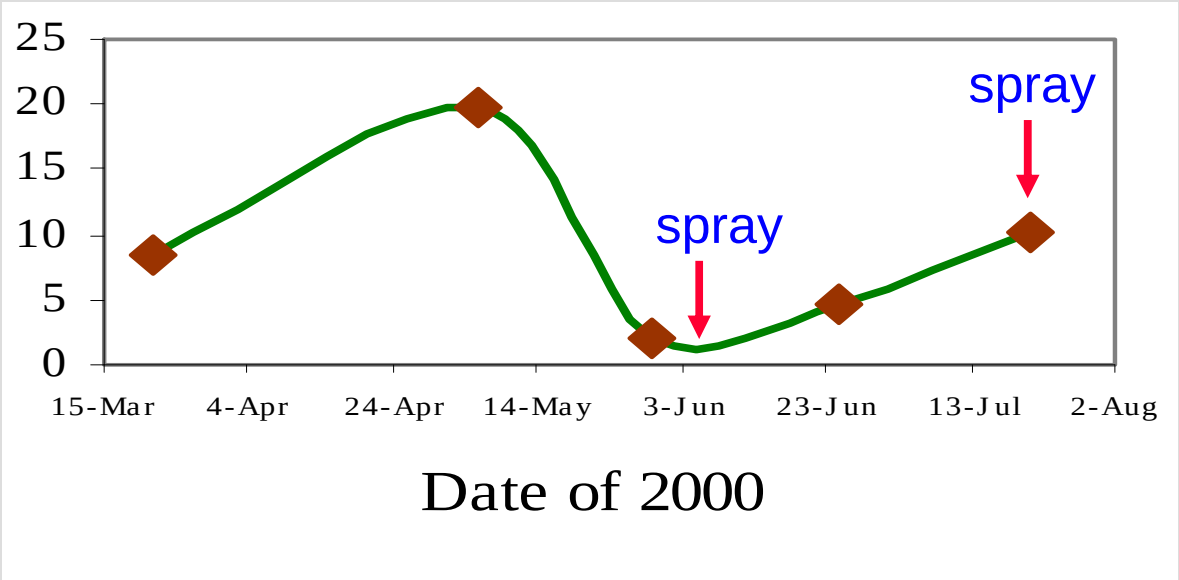
A grower applied Captan and Vangard at bloom.

Two Pristine and an Orbit sprays in late June early-July, but he had as much as 40% of the crop rotted by brown rot.

Thoughts:

1) probably an earlier spray: in June, before the fruit clusters close to protect the susceptible maturing fruit.

2) Also, a later spray: in mid to late July or early August (considering the PHI of specific fungicides).



Summary on brown rot management

Cultural Practices:

✓ Sanitation (mummies, cankers, blighted shoots)

✓ Fertilization (not excessive nitrogen fertilization).

✓ Irrigation (minimize misting, wetting tree canopy, caution when thinned fruit on the ground)

Fungicide sprays:

✓ Depending on weather, apply bloom sprays.

✓ Depending on the year (wet years), ONFIT results to determine latent infection.

✓ Depending on latent infection levels, fungicide sprays in early June, in July, and late July to reduce fruit rot.