

# Botryosphaeria disease and management



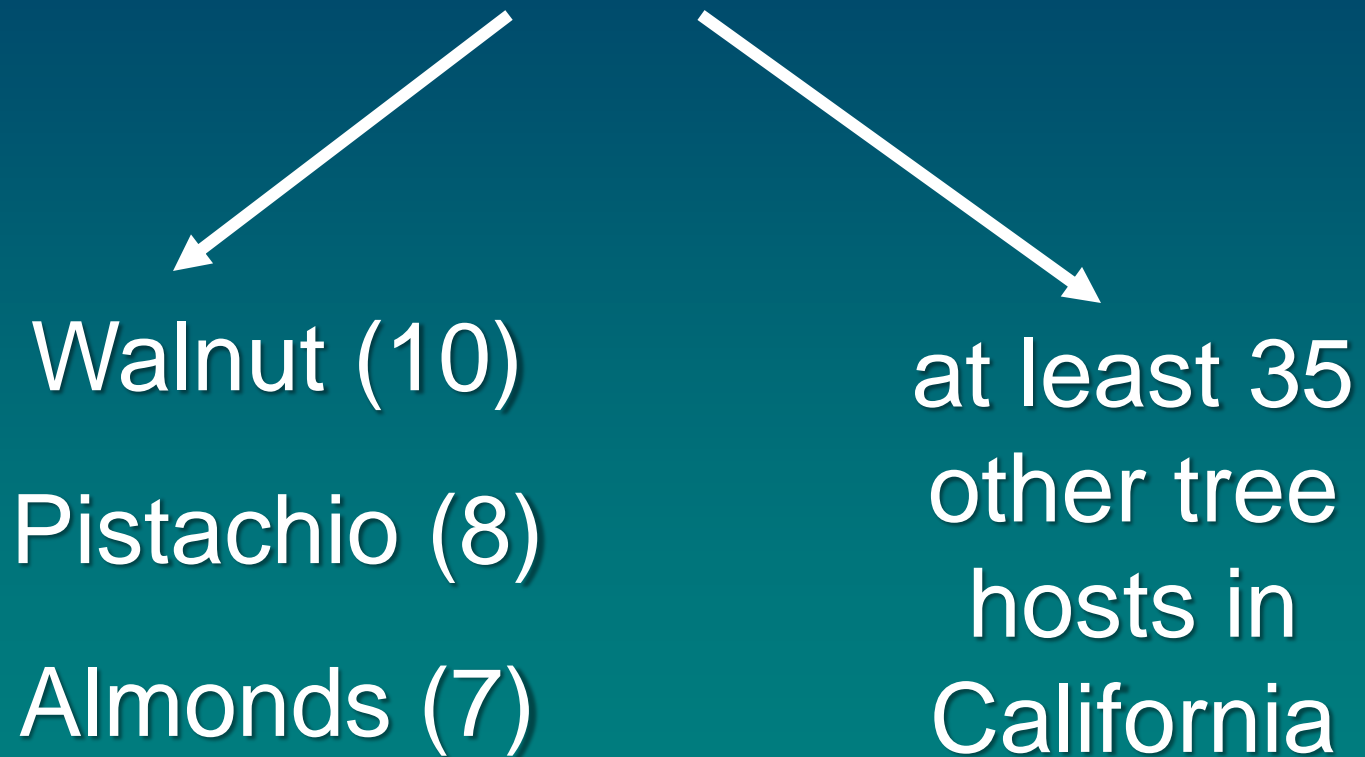
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# Bot has a very wide host range

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- it has at least 35 different hosts
- trees and bushes in many settings
- riparian, forest, and agricultural  
almond, pistachio, redbud, dogwood,  
beech, crabapple, pine, oak, rose,  
willow, elm, yew, azalea

# Bot and Phomopsis species





# Botryosphaeria panicle and shoot blight of pistachio

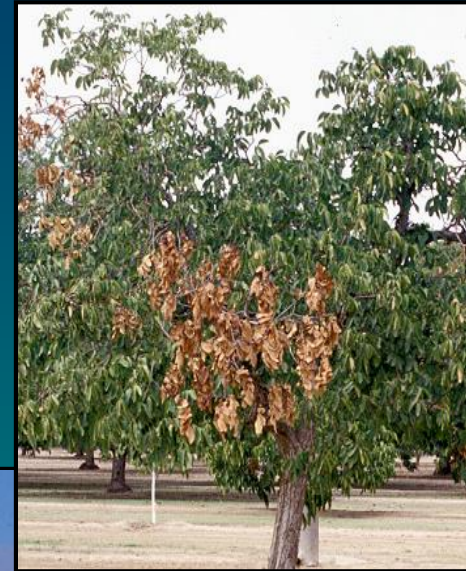




# Botryosphaeria panicle and shoot blight of pistachio



# symptoms on outer canopies





dead shoots in  
upper canopy  
... must be Bot





thin papery bark and “soot” on fingers



this is branch wilt ...

remove and burn wood

can kill trees by infecting through  
trunk wounds



# Bot infection

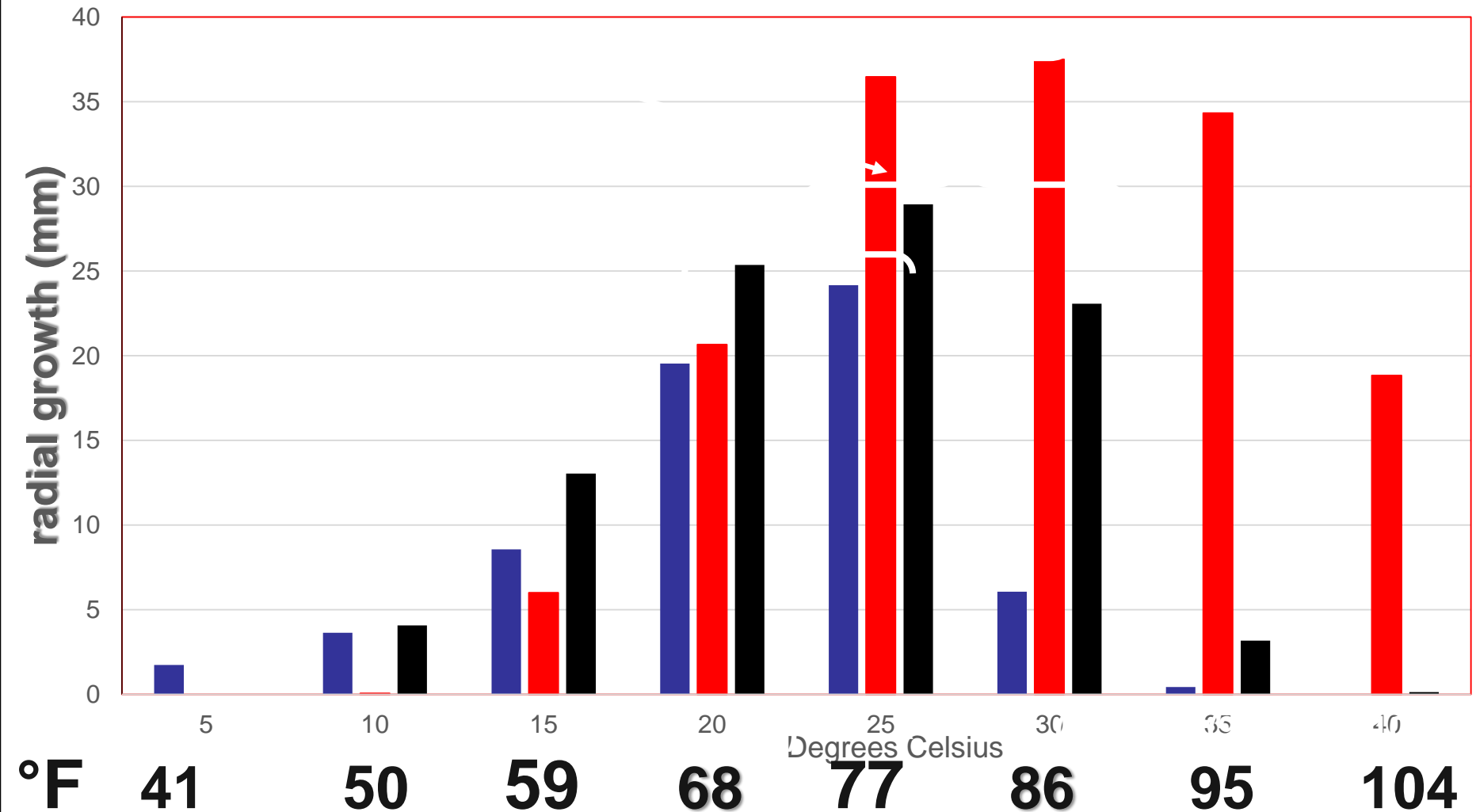
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- wet weather + fungal spores = Bot
- need several rain events of 1/8" - 1/4"
- warm temps: optimum is mid -70's
- spores germinate within 1.5 hours
- extremely difficult to control if it builds up

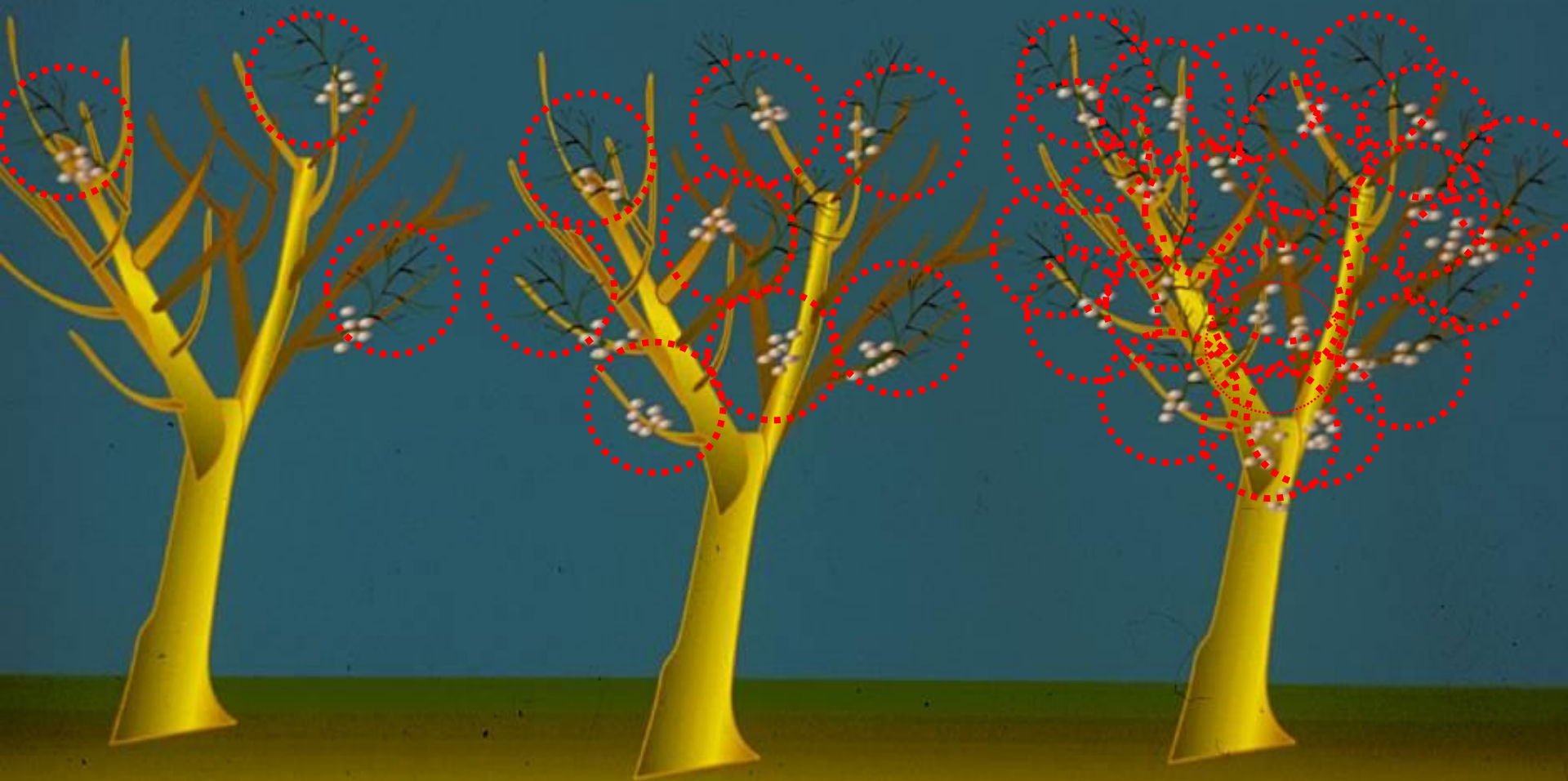


# growth temperatures (& optimum growth)

■ Phom      ■ Lasio      ■ N.par.



# Inoculum Build-up



# 6 types of symptoms seen in walnuts

1. blighted branches
2. active green tissue infections
3. cankers on spurs
4. walnut blight
5. pruning wood cankers
6. branch cankers and dieback



# 1. blighted branches



# ***Botryosphaeria dothidea***

**Wind-borne**



**Sexual stage**  
**perithecia**

**Water-borne**



**Asexual stage**  
**pycnidia**



pycnidia – small bumps on branches

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spores oozing from pycnidia

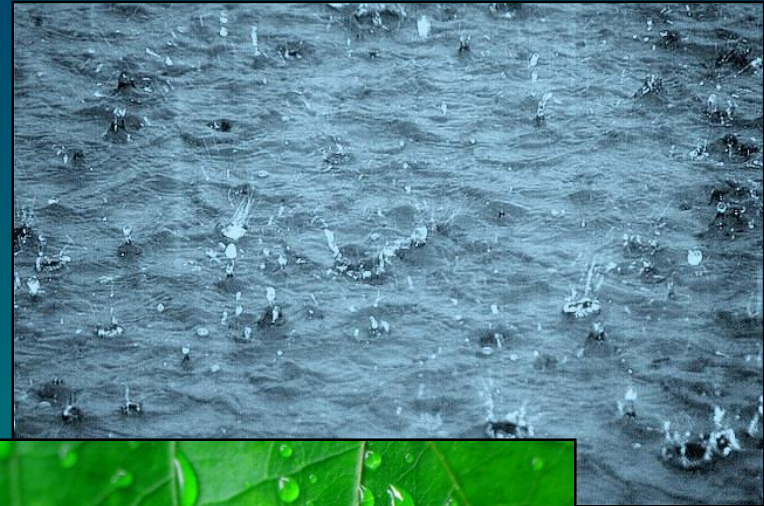
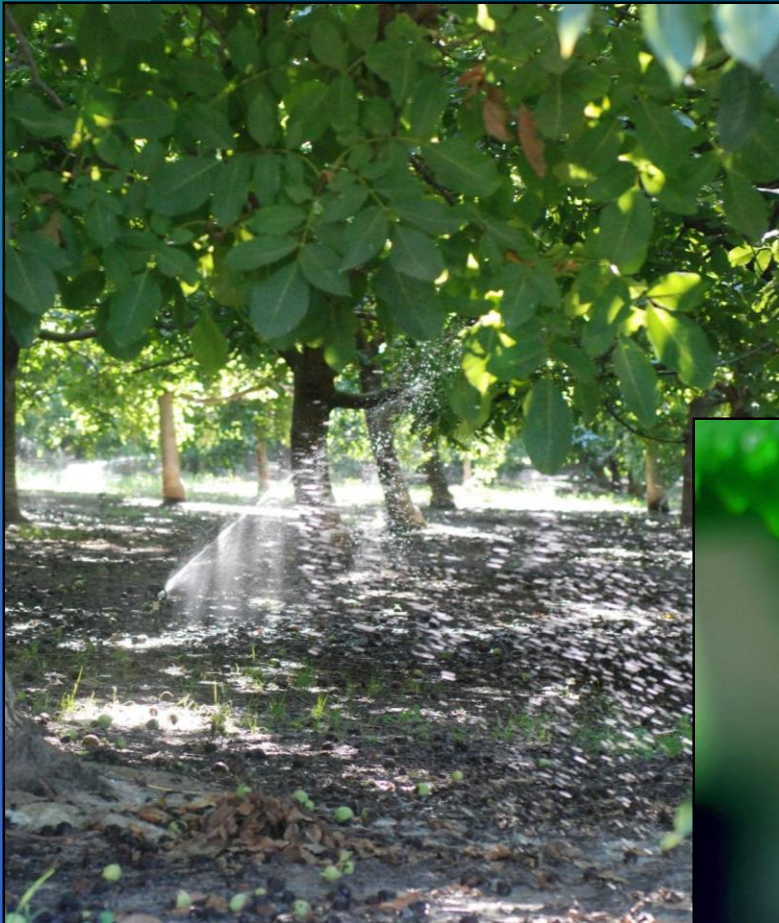


## 2. active green tissue infections





# Sprinklers, rain, heavy dew





# leaf, petiole, shoot, and spur infections





Bot nut blight: nut → peduncle → spur → shoot







Botryosphaeria nut blight: Notice **peduncles** attached!

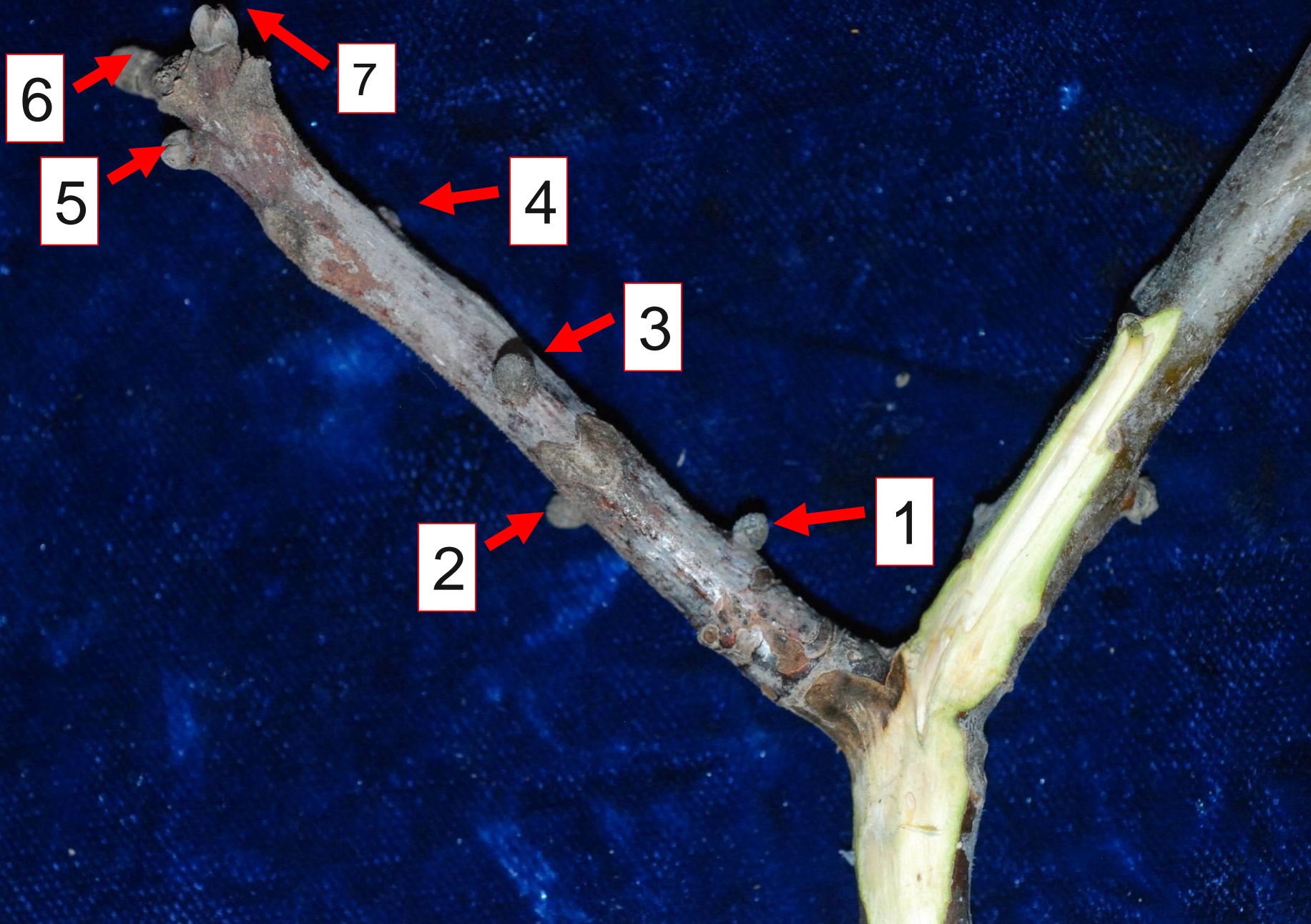


# black nuts (Bot not the only cause)





# Bot can also kill buds

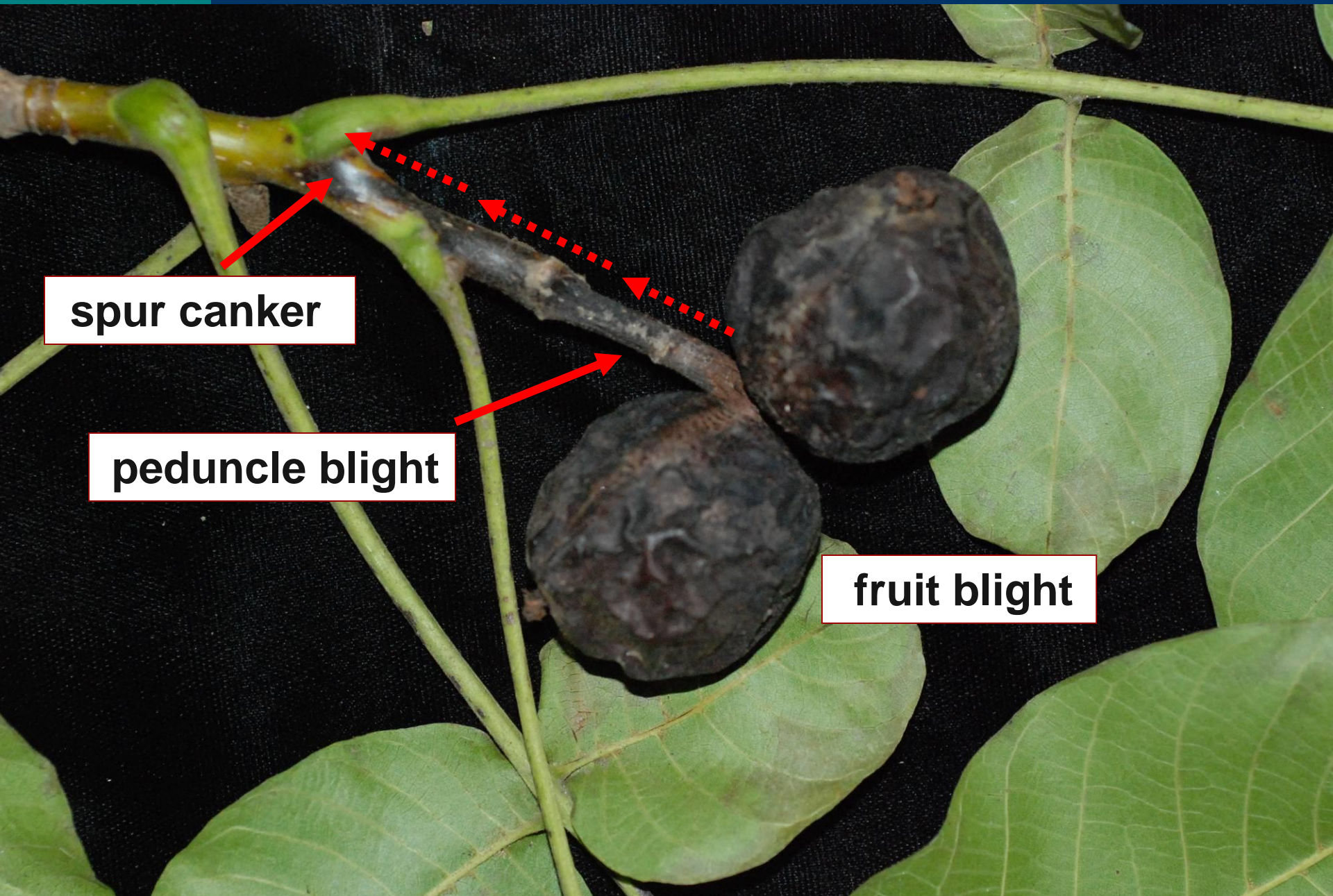




### 3. cankers in spurs







**spur canker**

**peduncle blight**

**fruit blight**

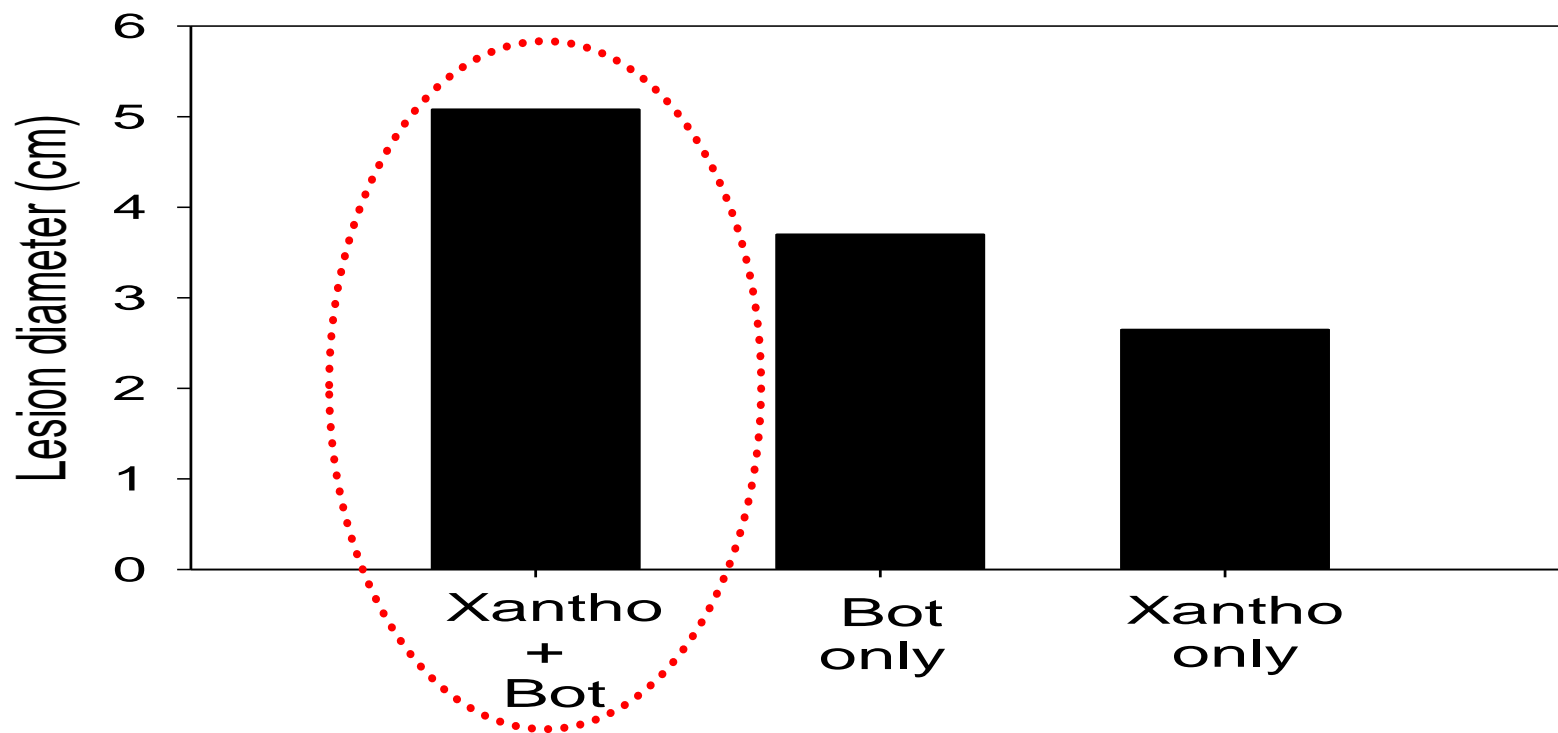
**growing season symptoms 2012 & 2013**



## 4. walnut blight and Bot



# effect of walnut blight on development of Bot







**walnut blight only**



**walnut blight + Bot**



**Bot only**



## 5. Bot and pruning wounds

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# Howard



- plenty of light
- no shade
- a lot of dead wood!

# canker symptoms in wood





# inoculated pruning wound results

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- 2 species of Bot
- inoculated right after pruning and 3, 7, 14, 21 and 28 days later
- Vina, Chandler and Tulare

# inoculated pruning wound results

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- 43% – 100% of wounds were infected
- no varietal differences
- no difference between the 2 Bot species
- remain susceptible for at least 4 weeks



## 6. branch canker and dieback



shade + walnut scale + Bot/Phomopsis

# Bot infects through natural openings and wounds

- leaf scars
- fruit scars
- peduncle scars
- mummy hulls
- scale damage
- walnut blight



# scale pests often have brown lesions underneath



over 50% of lesions infected with Bot





# results from inoculations on immature nuts

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- used 2 aggressive species of Bot
- favorable environmental conditions
- immature nuts can be infected with NO visible symptoms – latent infections
- can lead to nut blight later in season

## results from inoculations on immature nuts

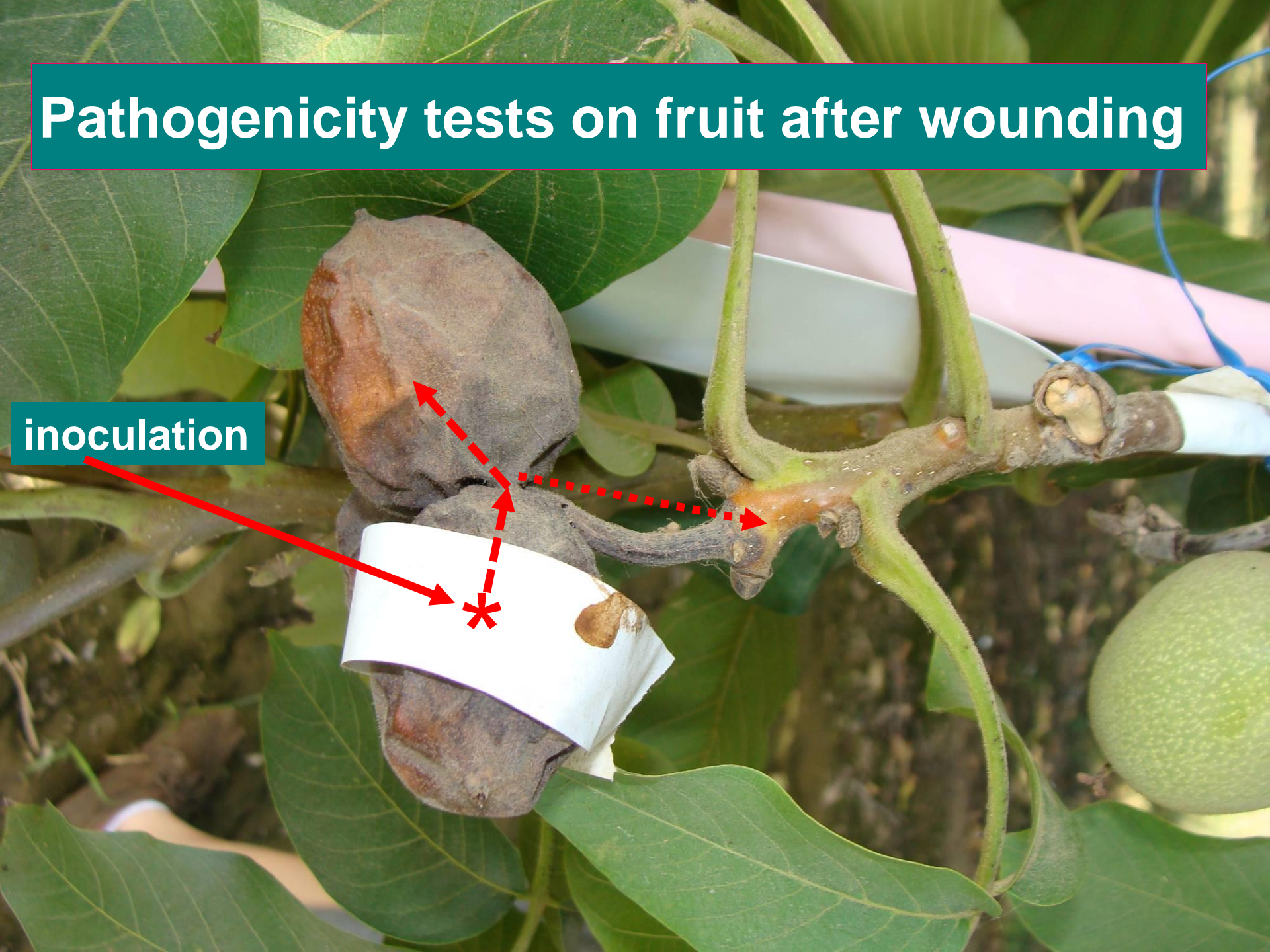
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- latent infections from May to early August remained low
- increased 3X in August and September
- infected and blighted fruit lead to spur cankers

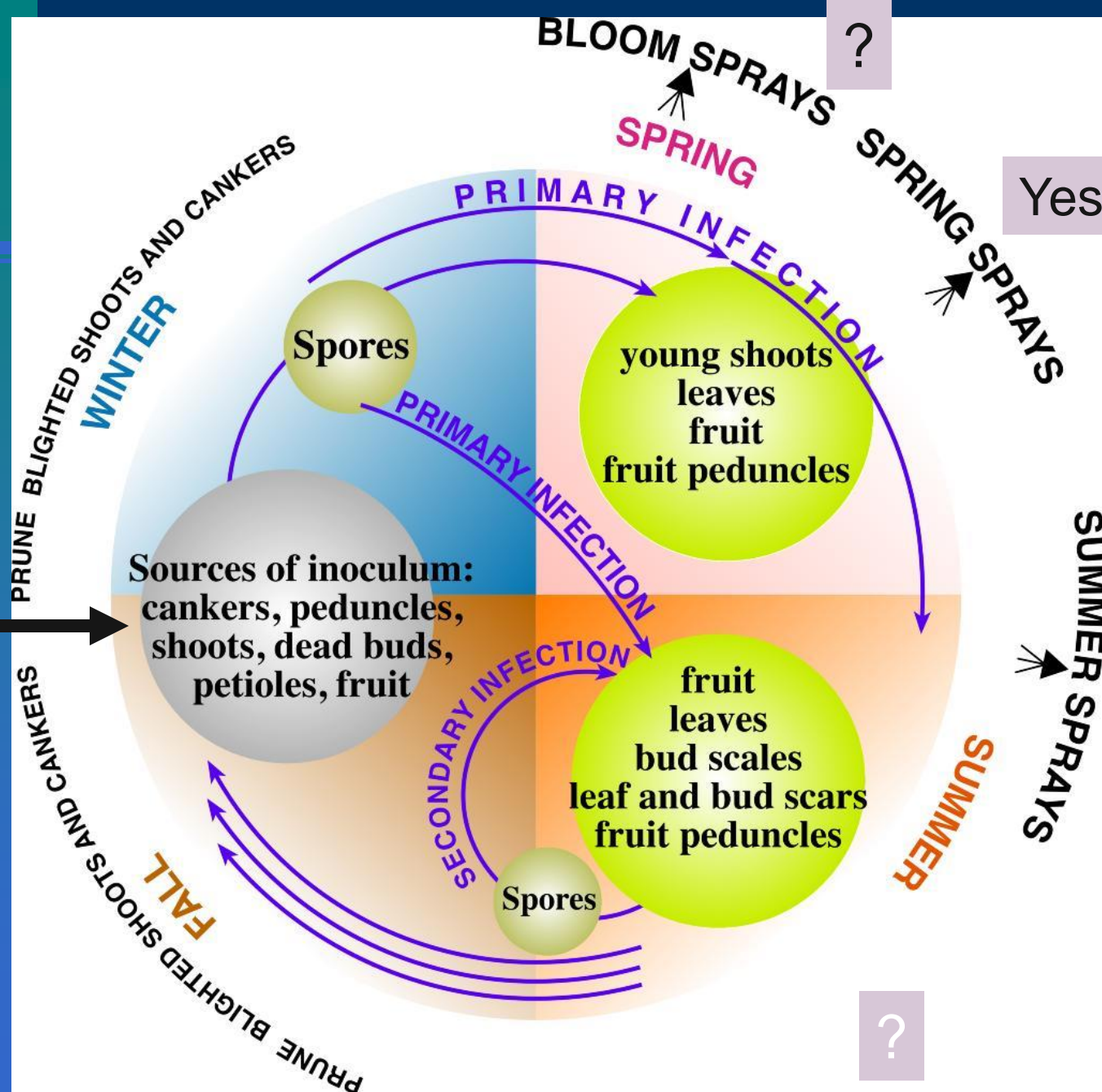


# Pathogenicity tests on fruit after wounding

inoculation



Start here



Botryosphaeria canker and blight disease cycle & management



# What to do with walnut prunings?

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mature orchards/heavy infections

- shred prunings and leave in orchard
- apply fungicide sprays every year

# What to do with walnut prunings?

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mature orchards/light-medium  
infections

- prune or hedge these orchards first then move into more heavily infected orchards
- remove prunings
- apply fungicide sprays every year



# What to do with walnut prunings?

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young orchards with no infections

- shred prunings and leave in orchard
- apply fungicide sprays every year

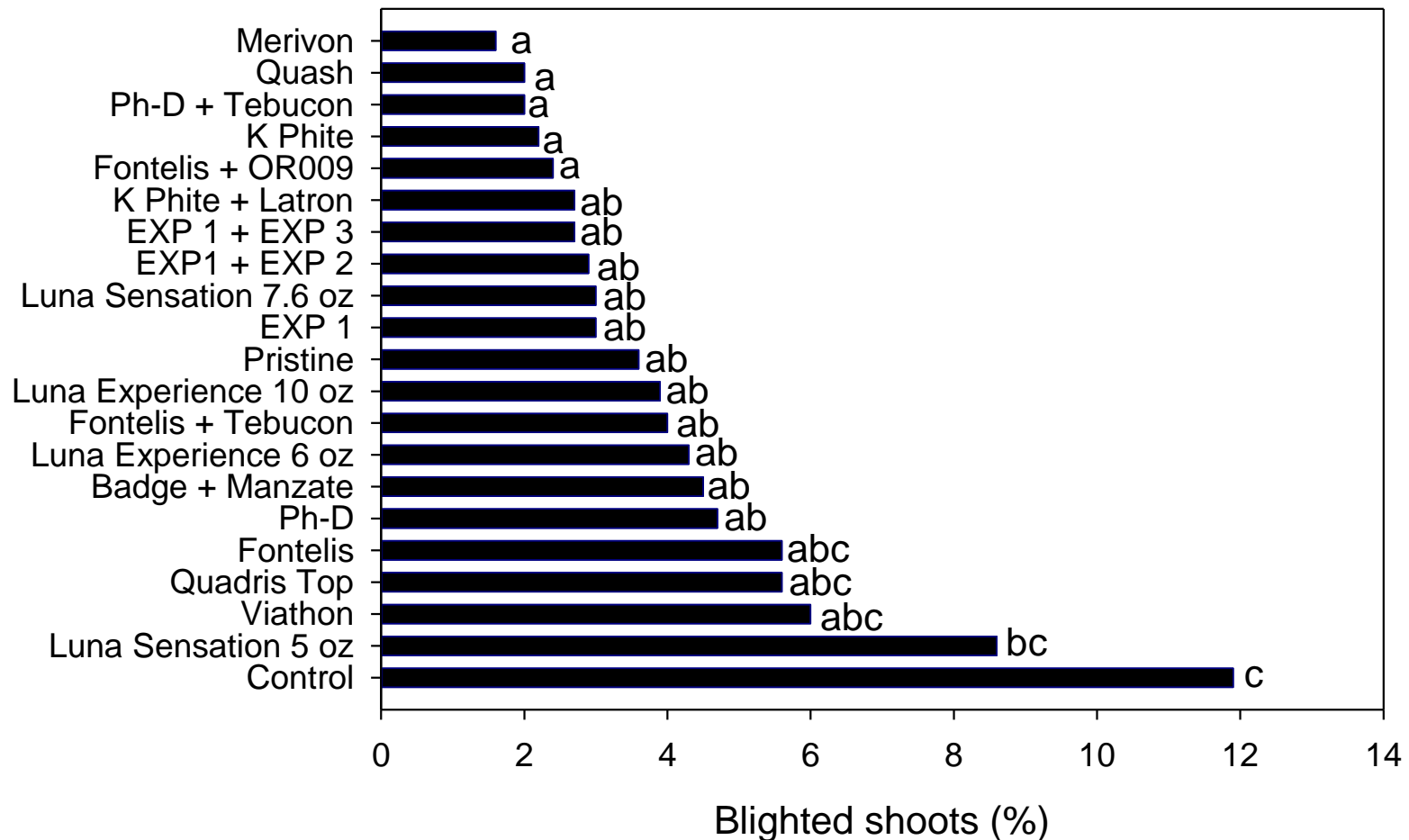
spray mid- May, mid-June,  
and mid-July

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- Merivon
- Abound 2EC
- Adamant 50WG
- Gem 500SC
- Luna Experience
- Luna Sensation
- Pristine
- others

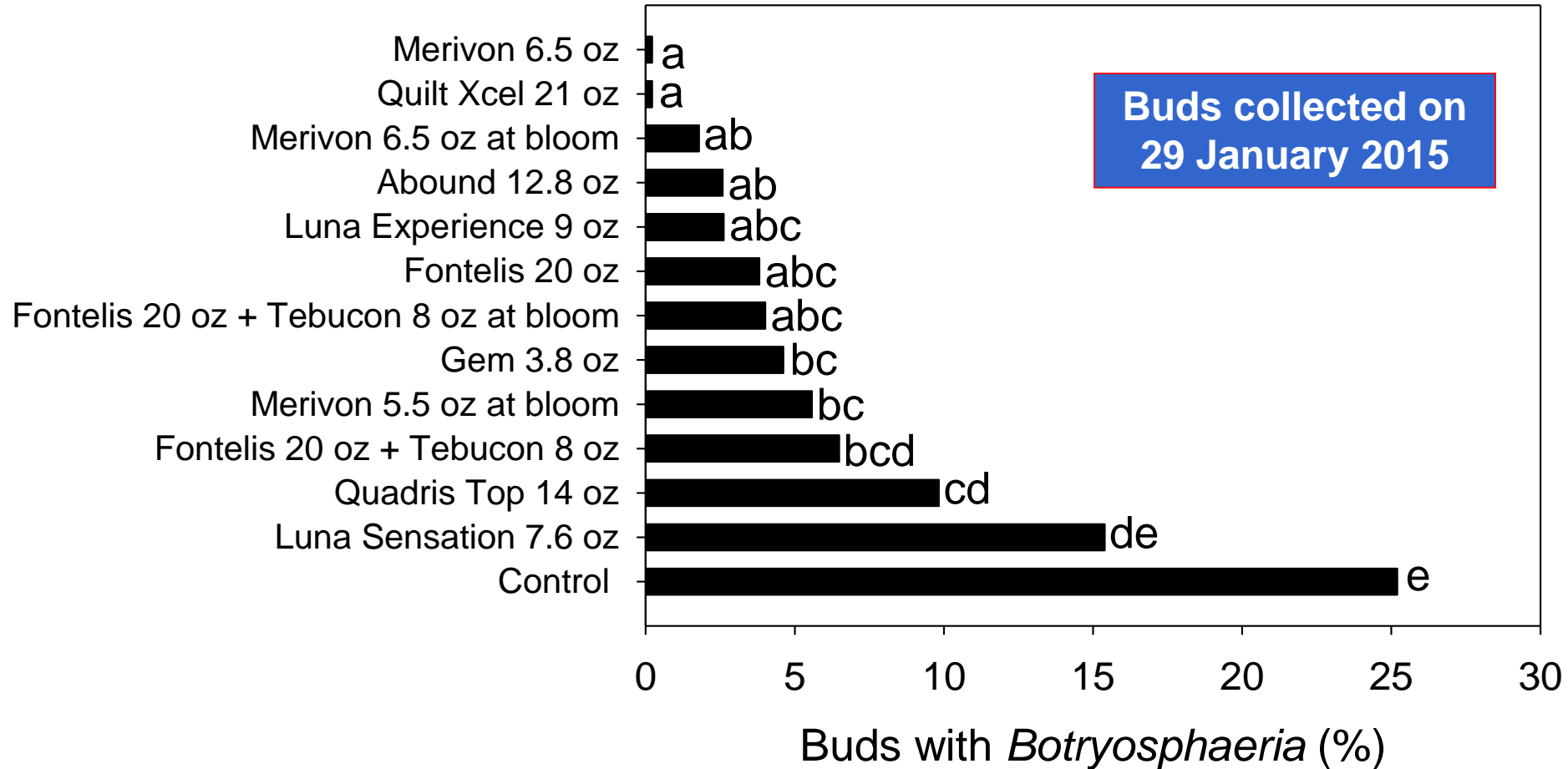


# effect of sprays on Bot spur/shoot infection (Chandler-Butte Co.) 2014



sprayed on 8 May, 12 June, 10 July 2014

# effects of sprays on Bot bud infections Chandler (Butte Co.)



sprayed on 8 May, 12 June, 10 July 2014



# Most efficacious fungicides?

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- results on walnuts are from 2014 only
- fairly dry spring and fall
- need more years of data
- a number effective on pistachio
- no resistance of fungicides with Bot

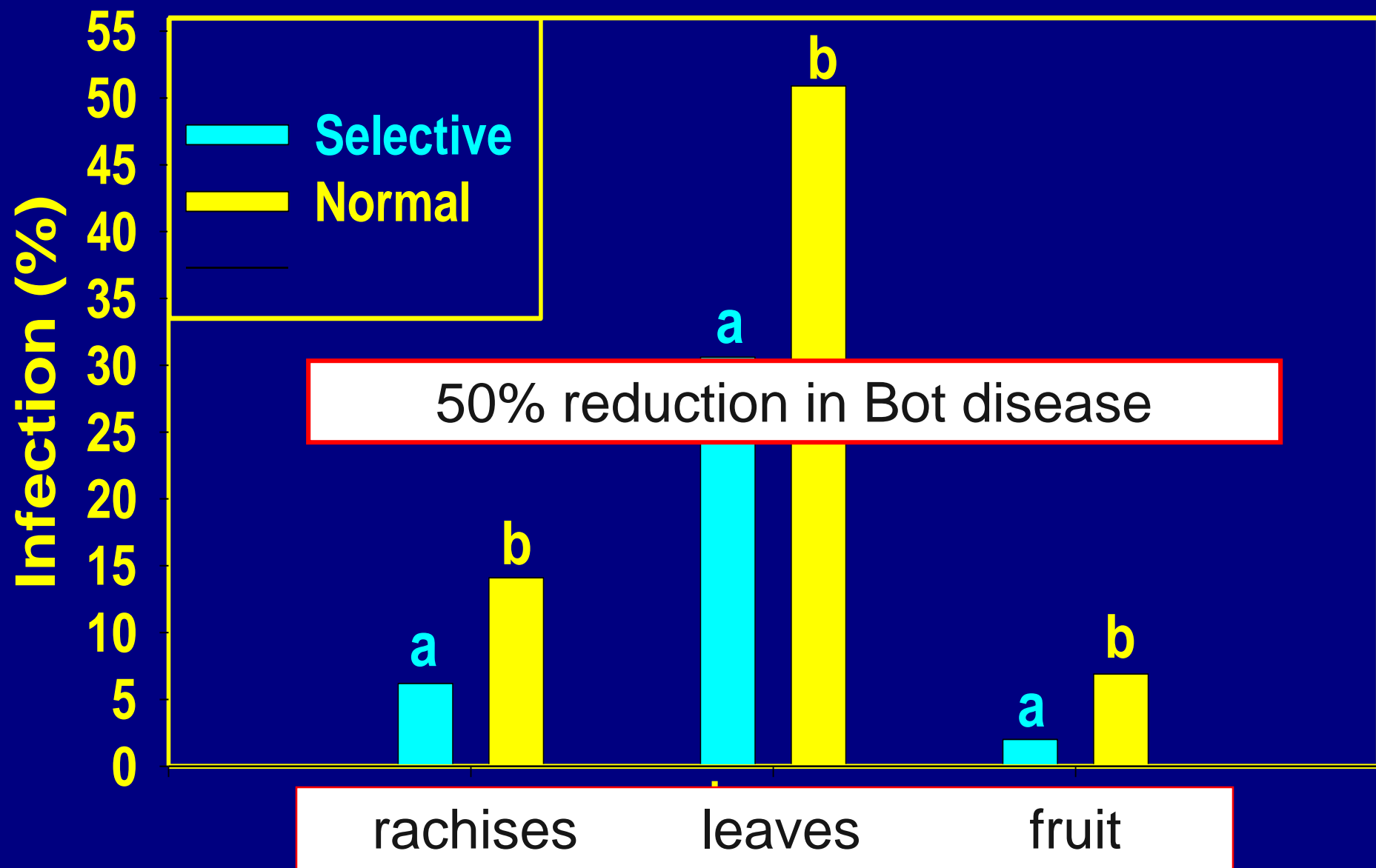
# Bot management

best results from combining cultural and chemical controls

- removal of dead branches and blighted shoots
- manage prunings
- chemical sprays
- avoid hitting canopy with sprinklers



# selective pruning



# conclusions

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- multiple species of Bot/ Phomopsis cause cankers and blights in walnuts
- 2 kinds of spores – spread by water and wind
- can infect through many natural openings and wounds



# conclusions

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- fungicides sprays in mid-May, mid-June and mid-July reduce Bot infections significantly
- effects of bloom and postharvest sprays are still unknown
- fungicide sprays in spring and summer have long-term effects in keeping buds clean

# conclusions

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- Bot can infect unwounded green fruit during the growing season with no symptoms – latent infections
- latent infections can cause nut blight later in the season
- pruning wounds are susceptible to infection for at least 4 weeks

# conclusions

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- selective pruning reduces disease
- cultural + chemical control together is most effective strategy