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ABSTRACT

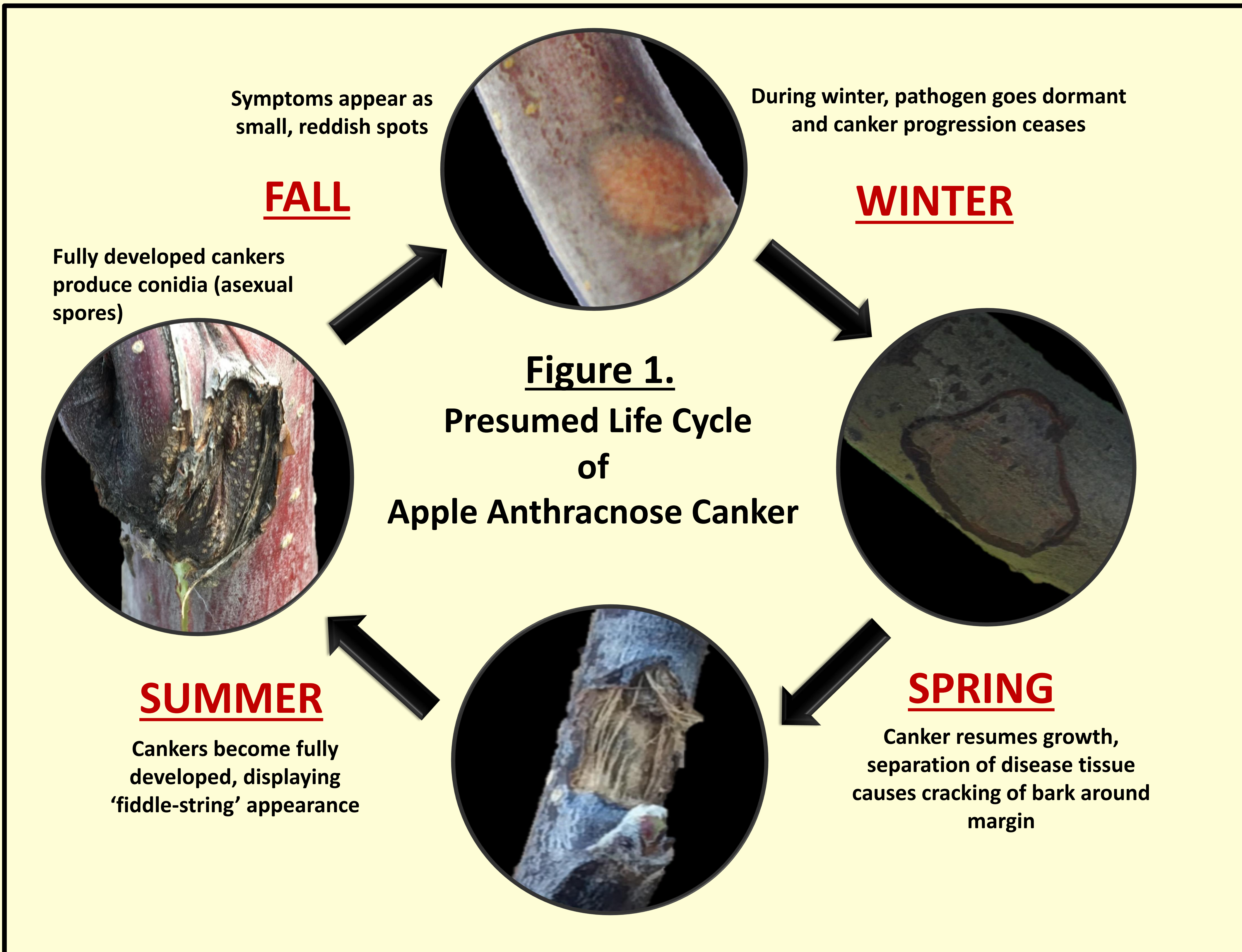
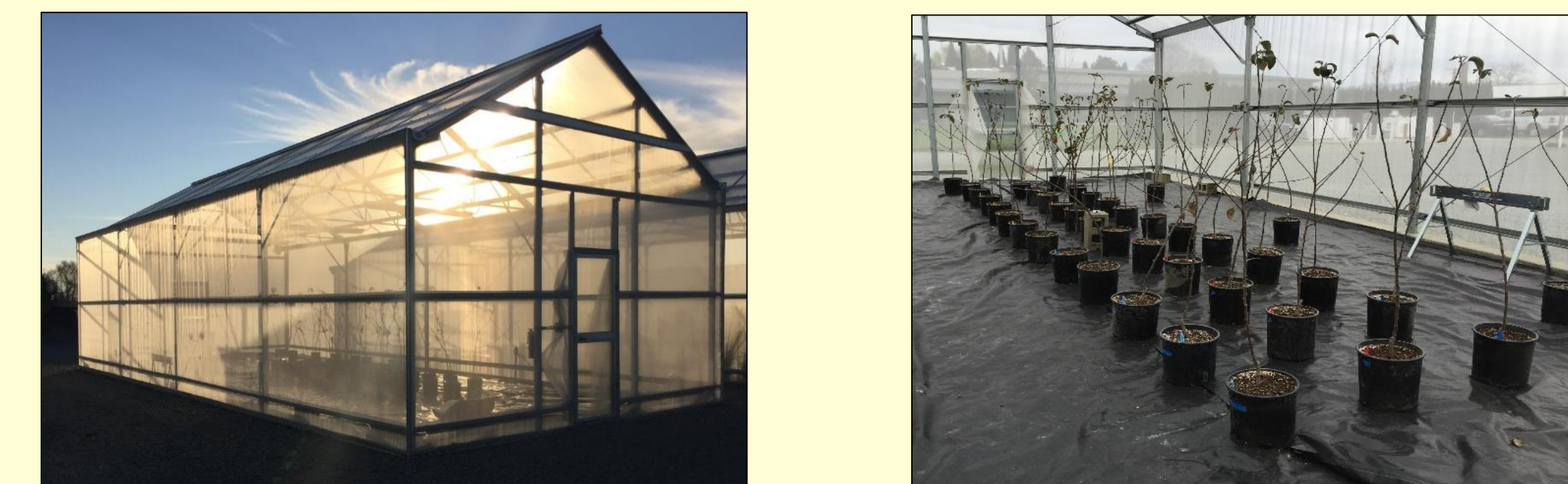
Apple anthracnose [*Neofabraea malicorticis* (H.S. Jacks) anamorph *Cryptosporiopsis curvispora* (Peck)] produces cankers on trees and 'Bull's-eye rot' on fruit. Growers in western Washington have reported removing 2-5% of trees and in some cases entire orchard blocks due to apple anthracnose canker. A controlled inoculation study was conducted in a screen house at WSU Mount Vernon NWREC, WA to better understand canker development and to create an effective management plan. The five treatments were designed to elucidate the necessity of wounding for infection and if Bordeaux mix [copper sulfate (CuSO₄) and calcium hydroxide (Ca (OH)₂)] can prevent infection with or without wounding. Inoculations was on 25 Nov. 2015 and a canker was first observed 9 weeks later on 27 Jan. 2016, in treatments 1 and 2; and 13 weeks after inoculation a canker appeared in all treatments excluding the control. Canker area size ranged from 0.02 to 0.24 cm² and infection occurred regardless of wounding and Bordeaux mix application. Small streaks of diseased tissue expanding from the wounded/inoculated area were observed only in treatment 3, suggesting that Bordeaux mix may prevent disease progression when wounding occurs.

INTRODUCTION

In the maritime Pacific Northwest, apple production is limited by apple anthracnose canker caused by *Neofabraea malicorticis* (H.S. Jacks), anamorph *Cryptosporiopsis curvispora* (Peck). Although apple anthracnose is present in many regions of the world, in this region cankers cause severe damage to trees, can kill newly planted trees, and is the primary limiting factor for long-term orchard productivity.



Research on apple anthracnose is limited because it is not a severe problem in other regions, and current apple anthracnose management recommendations are for Bull's-eye rot on the fruit, not for the canker stage of the disease on trees. To better understand canker development (Fig. 1) and the elements of an effective management plan, a controlled inoculation study was conducted in a screen house at WSU Mount Vernon NWREC, WA.



METHODS

- Trees placed in a screen house with 0 – 15° C and RH 50 – 98% (similar to outdoor conditions)
- Trees inoculated with *N. malicorticis* (Fig. 2) and bandage kept in place for 21 days
- Applied Bordeaux mix with a hand sprayer prior to inoculation
- Each treatment (Table 1) applied to 1 tree and replicated 7 times

Table 1. Five treatments applied Nov. 2015 to 2 year-old 'Tompkins King' apple trees.

Treatments	Description
1	Bordeaux mix + wounding + inoculation
2	Bordeaux mix + no wound + inoculation
3	Wounding + inoculation
4	Inoculation only
5	Control (no treatment)

INOCULATION PROCESS

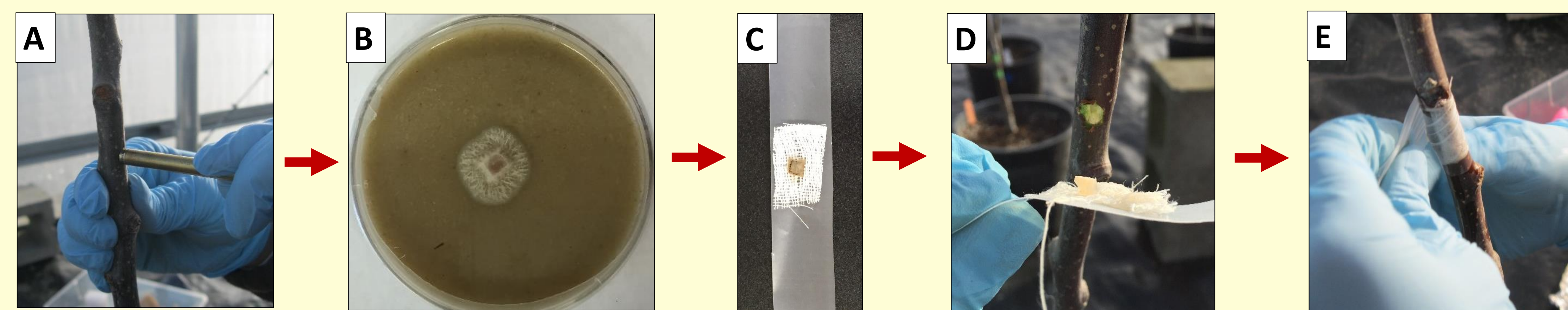
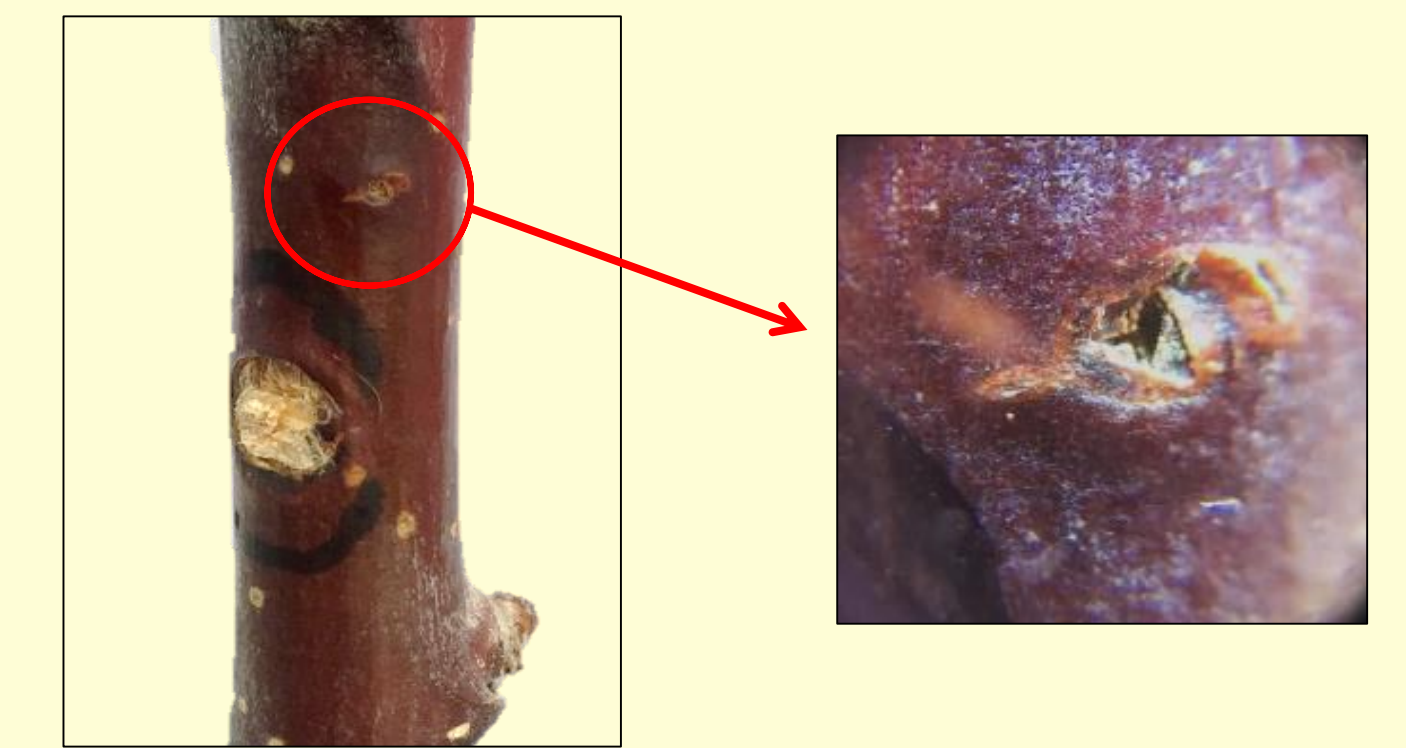


Figure 2. (A) Wound bark tissue with cork borer; (B) Excise and collect mycelium from culture; (C) Place mycelium plug onto bandage: sterilized, moist cheesecloth and parafilm; (D) Place inoculation bandage onto wounded area or non-wounded bark; (E) Secure bandage tightly for 21 days.

RESULTS

- A canker first appeared 9 wks after inoculation in:
 - Trt. 1 (Bordeaux mix + wounding + inoculation)
 - Trt. 2 (Bordeaux mix + no wound + inoculation)



- A canker appeared in all treatments 13 wks after inoculation (excluding control)
- Canker area size ranged from 0.02 – 0.24 cm²
- Small streaks of diseased tissue expanded from the inoculated/wounded area only in:
 - Trt. 3 (Wounding + inoculation)

Table 2. Number and size of apple anthracnose cankers 27 Jan. and 27 Feb. 2016.

Treatments	27 Jan.		27 Feb.	
	No. cankers	Size (cm ²)	No. cankers	Size (cm ²)
1	1	0.01	1	0.02
2	1	0.19	1	0.24
3	0	-	1	0.24
4	0	-	1	0.05

DISCUSSION

- Canker lesions first appeared as small, oval, reddish lesions above and below inoculated area
- Infection occurred regardless of wounding and Bordeaux mix application
- Wounding appears to enhance disease severity
- Bordeaux mix may prevent disease progression when wounding occurs
- Study to be repeated in September 2016

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