

Butternut canker

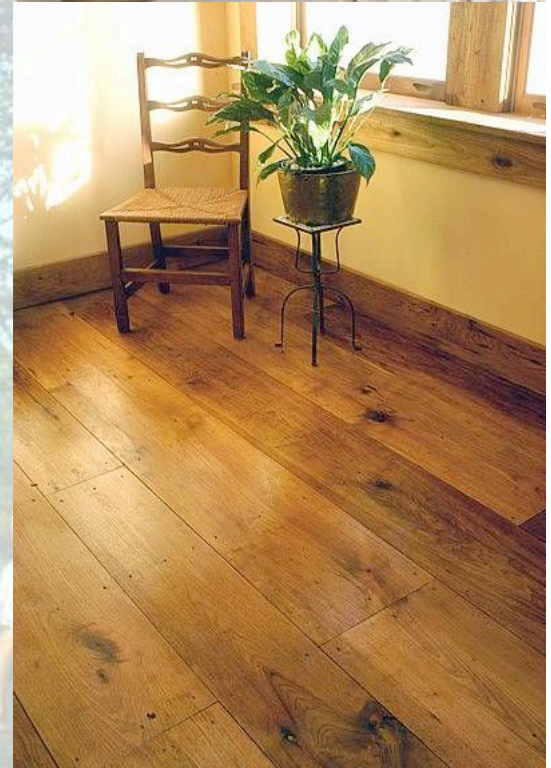
Emma Schultz

19 April 2010

Introduction

Butternut (*Juglans cinerea*)

- Uncommon tree species
- Many uses
- Has been in a state of decline across its range since the 1960s



Management Objectives

- Species diversity
- Encourage butternut persistence if healthy trees are found



Tree Adaptations: butternut

- Varied soil conditions
- Ave. min. -30° F; ave. max. 105° F
- Precip. 25 in. (MN) to 80 in. (s. Appalachia)



Rink 1990

UGA1480229

Tree Adaptations: butternut

- Seed bearing optimal in years 30 to 60
- 90 to 120 days of cold stratification (68° to 86° F)
- Intolerant, fast-growing seedlings
- Exudes juglone
- Vulnerable to fire, storm damage

Fungal disease complex: butternut canker



Ostry et al. 1996

Sirococcus clavignenti-juglandacearum

- No known sexual state
- Conidiospores introduced to existing openings in young twigs and older bark
- Cankers in 3 weeks or following spring
- Hyphae grow through medullary rays into sapwood

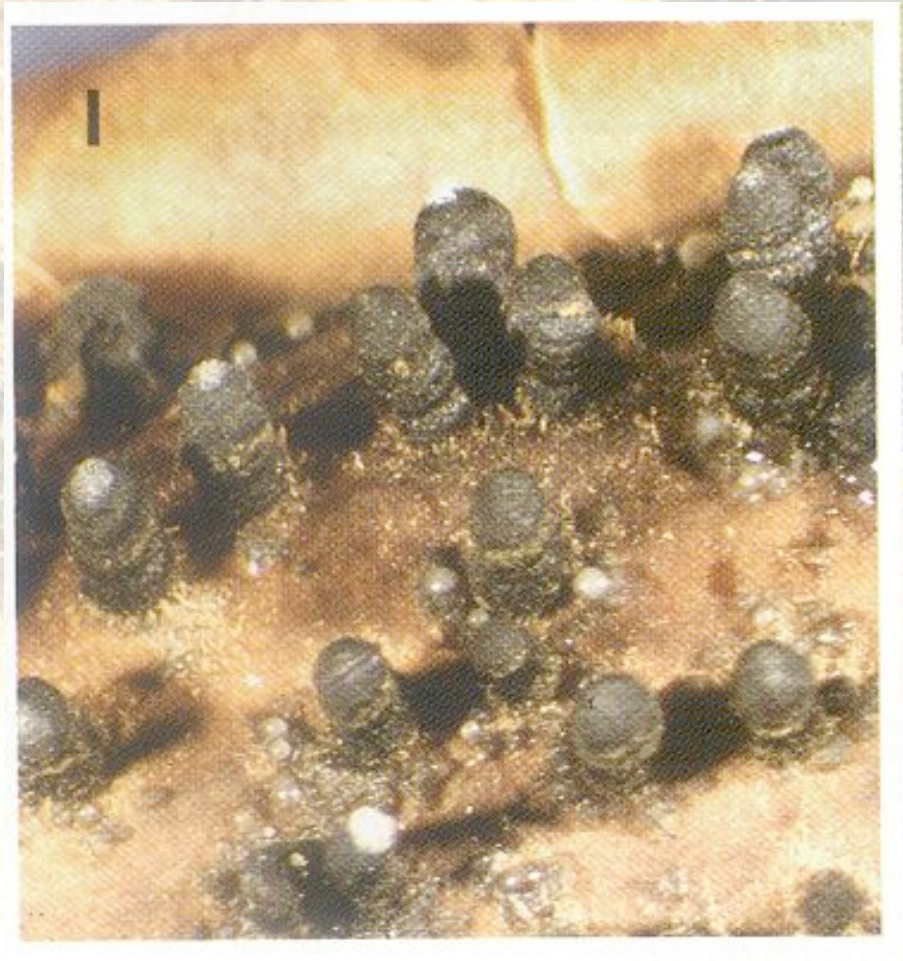


Ostry et al 1996

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Sirococcus clavignenti-juglandacearum

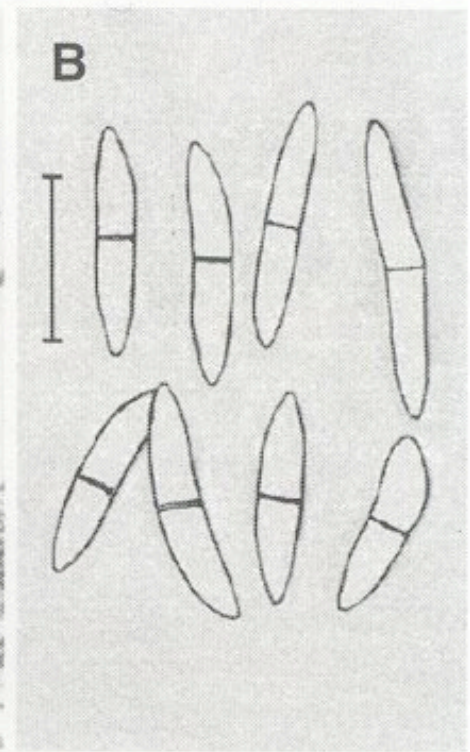
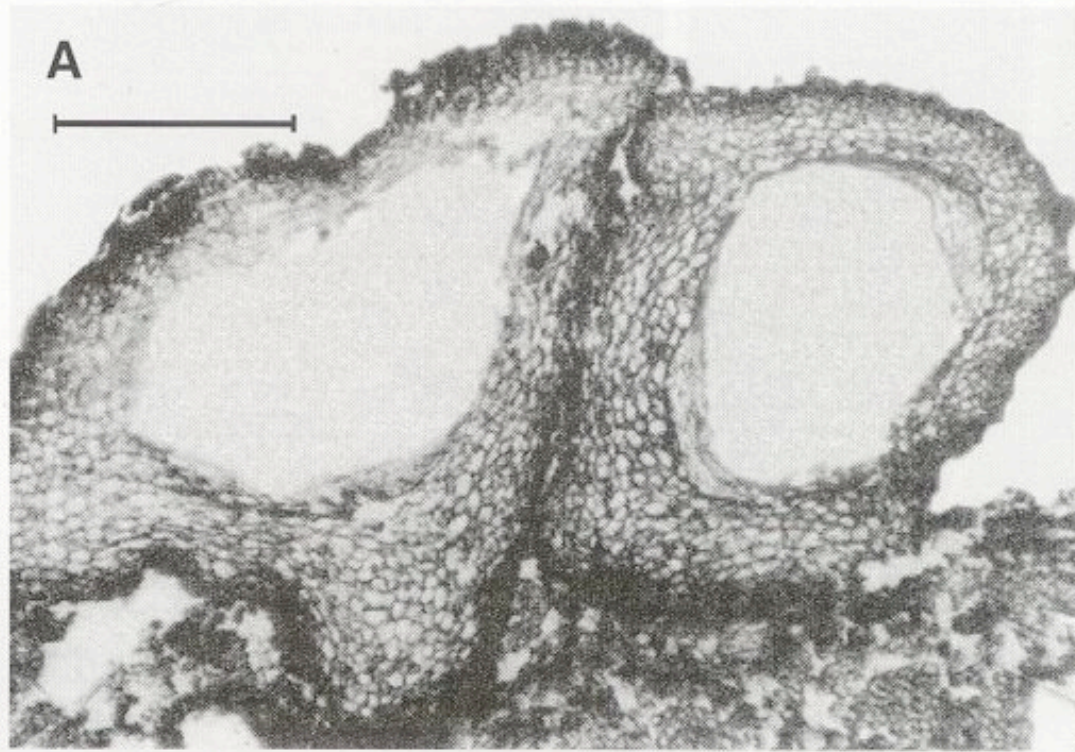
- Hyphal pegs differentiate
- Black globose to flat pycnidia on stroma and hyphal pegs
- Cirrhi early spring until mid-Autumn, conidia rain-, insect-dispersed



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Symptoms

- Sunken, elongated annual cankers at leaf scars and buds
- Black center and whitish margin
- Round to elliptic perennial cankers: bark and wood beneath dark brown to black



Diseased functions

- Canker: the tree's cambium is killed
- Over time, cankers girdle branches, twigs, buttress roots, stem



Predisposing factors

- Resistance - bark phenotype



Predisposing factors

- Insect vectors: at least 17 beetle species?
- The butternut curculio (*Conotrachelus juglandis*) creates feeding and egg-laying wounds in shoots



Tim Moyer 2008



Tom Murray 2008

Inciting factors

- The arrival of a fungal spore on a suitable infection site and subsequent germination
- Arrival by insect or water droplet



OMAFRA 2007



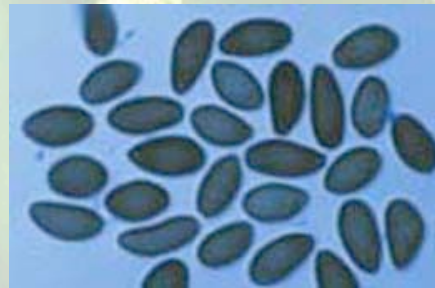
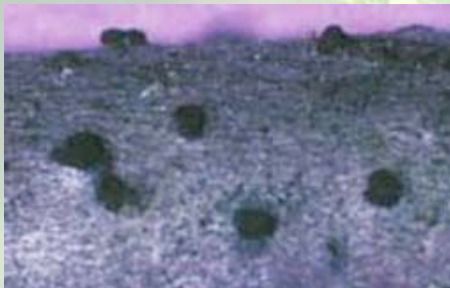
Steve Baskauf 2010



OMAFRA 2007

Contributing factors

- *Melanconis juglandis*, a secondary fungus, colonizes dead tissue
- Armillaria root rot associated with dying trees



UGA4215008

HMP recommendations



Barb Boysen UGA1479020

Pre-emptive strategies

- Can preemptively harvest
- Maintain and promote healthy butternut



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Pre-emptive strategies

- In selecting resistant trees, Ostry et al. (1994) propose several guidelines:
 - 1) Focus on apparently healthy trees within 100 feet of a diseased tree
 - 2) Choose trees at least 10 inches in dbh, absent of cankers or with overgrown cankers
 - 3) Landowners must grant permission to collect seed for multiple years of study



Barb Boysen

Monitoring and surveying

- Survey annually to determine presence, spread of butternut canker across the landscape
- Monitor “resistant” trees over time



Canadian Forest Service 2001



The Ottawa Citizen 2010

Reactive strategies

- Follow the 70-20-50 rules for tree retention, as described by Ostry et al. (1994):
 - 1) Keep trees with $>70\%$ live crown, and $<20\%$ bole/root flare surface affected by cankers
 - 2) Keep trees with at least 50% live crown when no cankers on bole/root flare surface
 - 3) All other butternut, including dead butternut and trees of poor vigor, should be cut



MOBOT 2010

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Conclusion

- Similar to chestnut blight: super pathogen?
- Promote regeneration
- Seek resistance
- Monitoring of especial importance

