Characterization of *Colletotrichum* Isolates From Apple in New Hampshire

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Oct. 23 2012

Bitter rot

- Increased frequency in 2011 & 2012
- Climate plays an important in role in disease development
- Where is the inoculum coming from?
  - Infected leaves?
  - Latent infections?
  - Other orchards
  - Other crops (strawberry, cherry, blueberry, etc)

Colletotrichum

- *C. gloeosporioides. C. acutatum*, and *Glomerella cingulata* associated with bitter rot
- *C. gloeosporiodies* and *C. acutatum* known to be quite diverse and likely species complexes

available online at www.studiesinmycology.org

STUDIES IN MYCOLOGY 73: 37–113.

The *Colletotrichum acutatum* species complex

U. Damm[1*], P.F. Cannon[2], J.H.C. Woudenberg[1] and P.W. Crous[1,3,4]

available online at www.studiesinmycology.org

STUDIES IN MYCOLOGY 73: 115–180.

The *Colletotrichum gloeosporioides* species complex

B.S. Weir[1*], P.R. Johnston[1], and U. Damm[2]

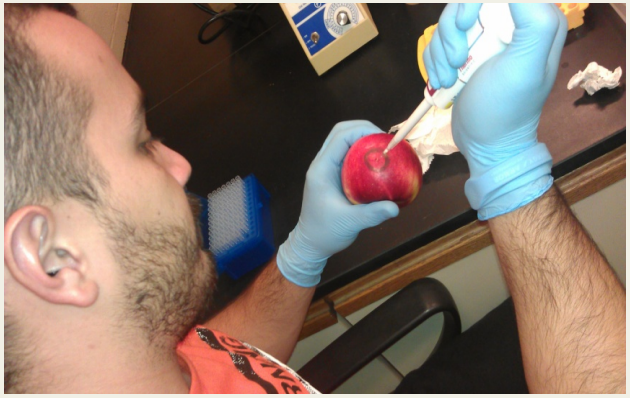
Objectives

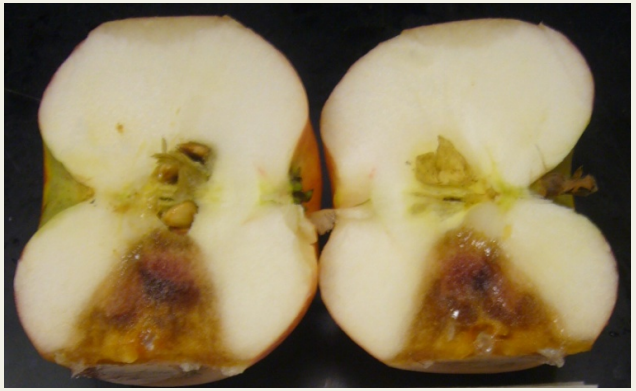
- The objective of this study was to evaluate the virulence and genetic diversity of isolates of *Colletotrichum* from apple leaves and fruit.

Materials and Methods

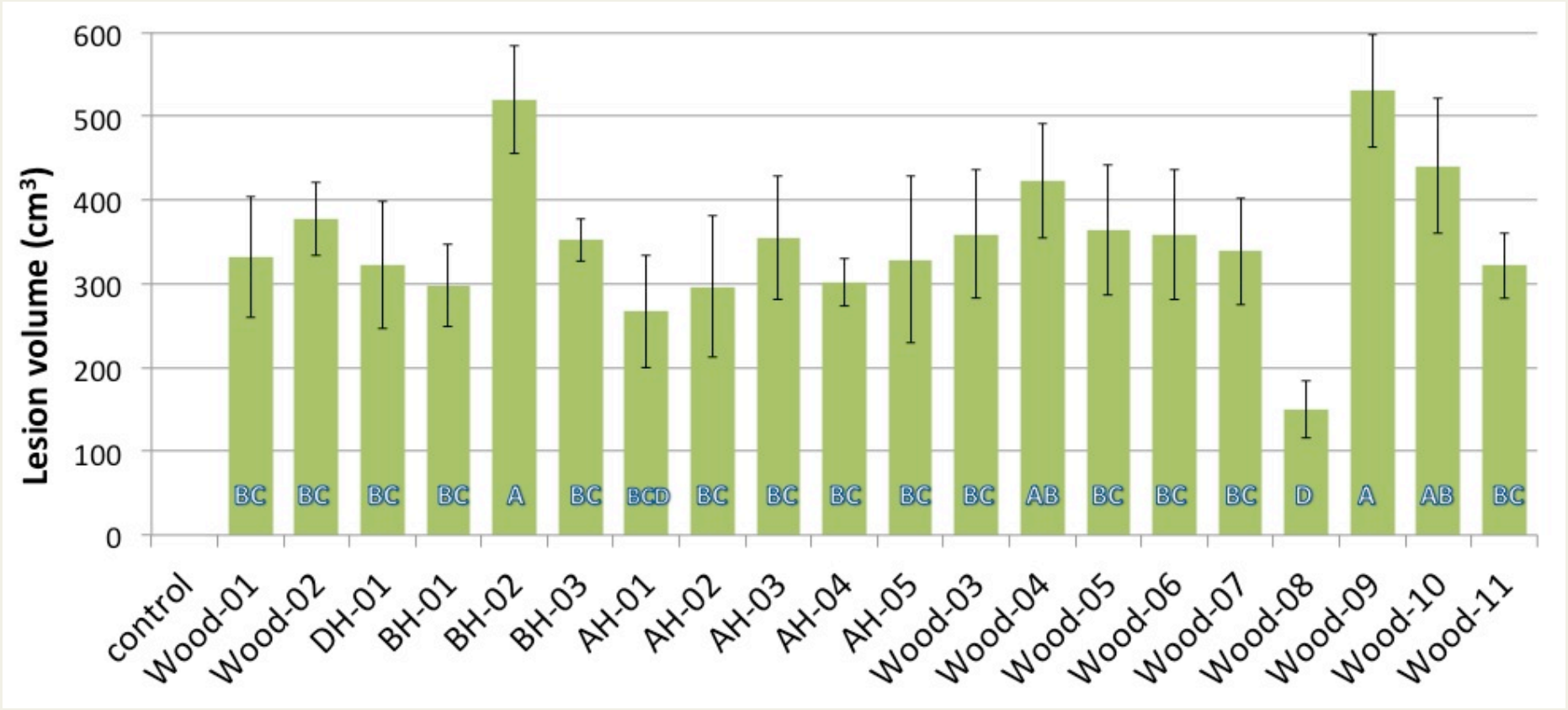
- Isolation of monosporic isolates
- Sequenced 5 genes for multi-gene phylogeny
- Virulence test
  - 20 isolates
  - 8 cultivars

Inoculations

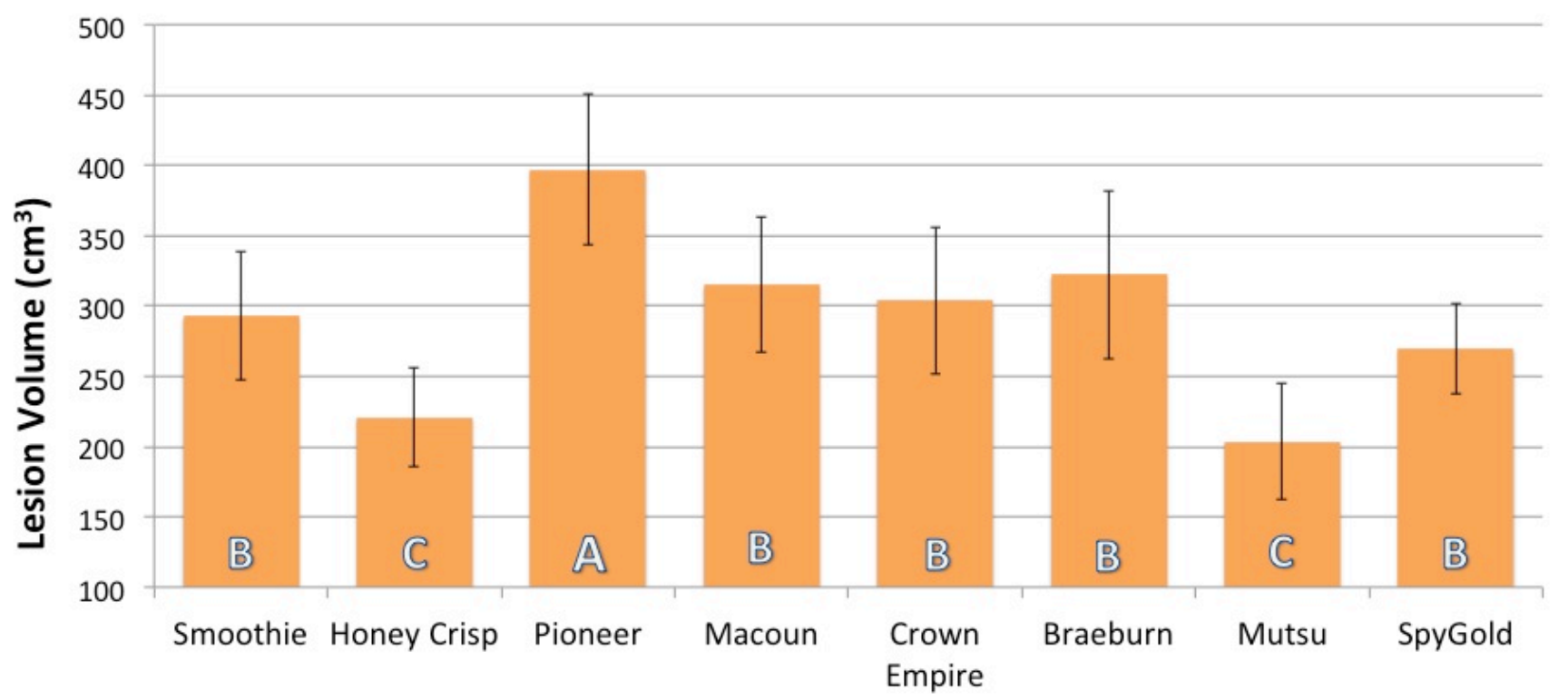




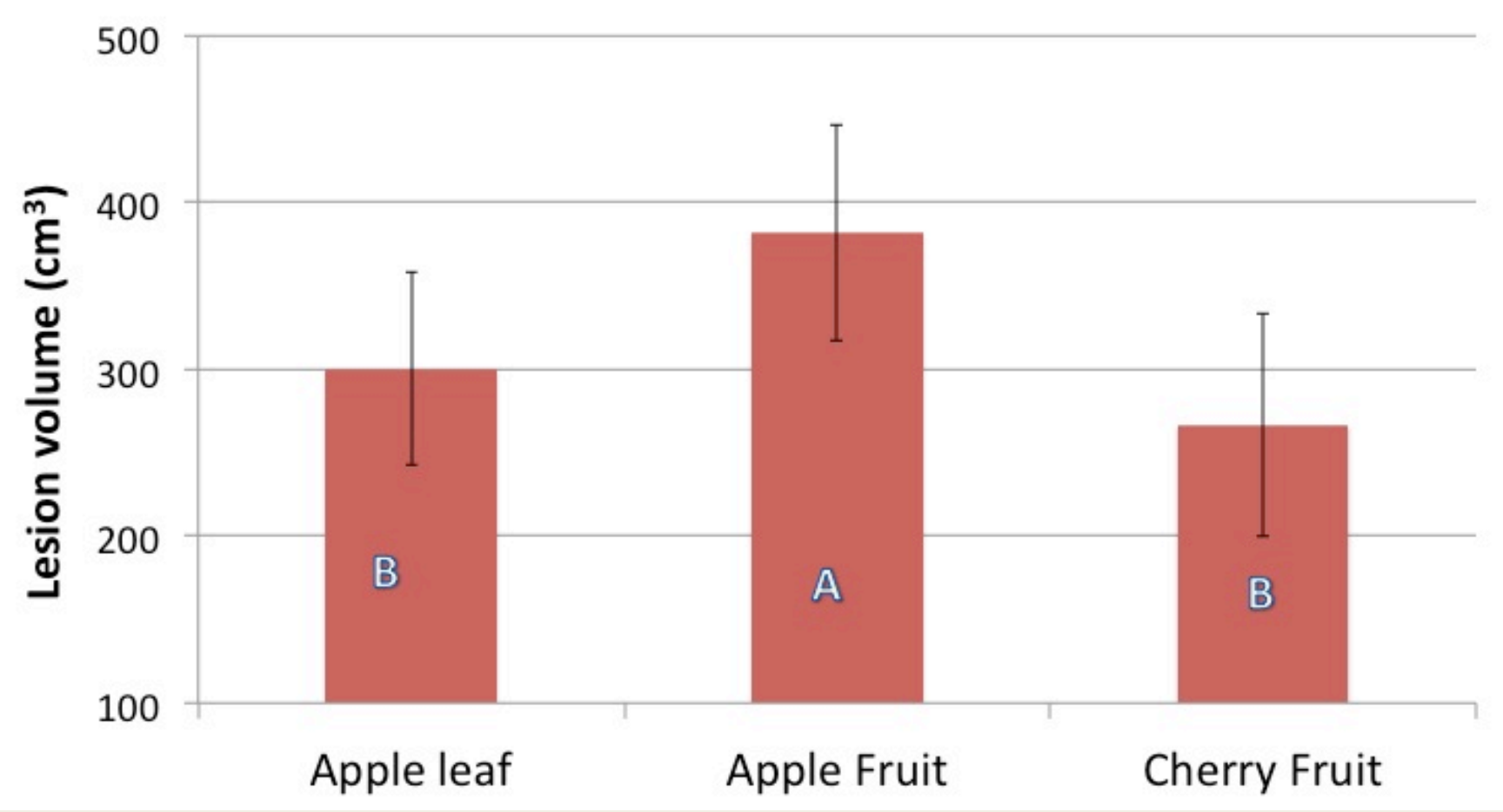
Isolate Virulence



Cultivar Susceptibility



Virulence of Isolate by Origin



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The *Colletotrichum acutatum* species complex

U. Damm[1*], P.F. Cannon[2], J.H.C. Woudenberg[1] and P.W. Crous[1,3,4]

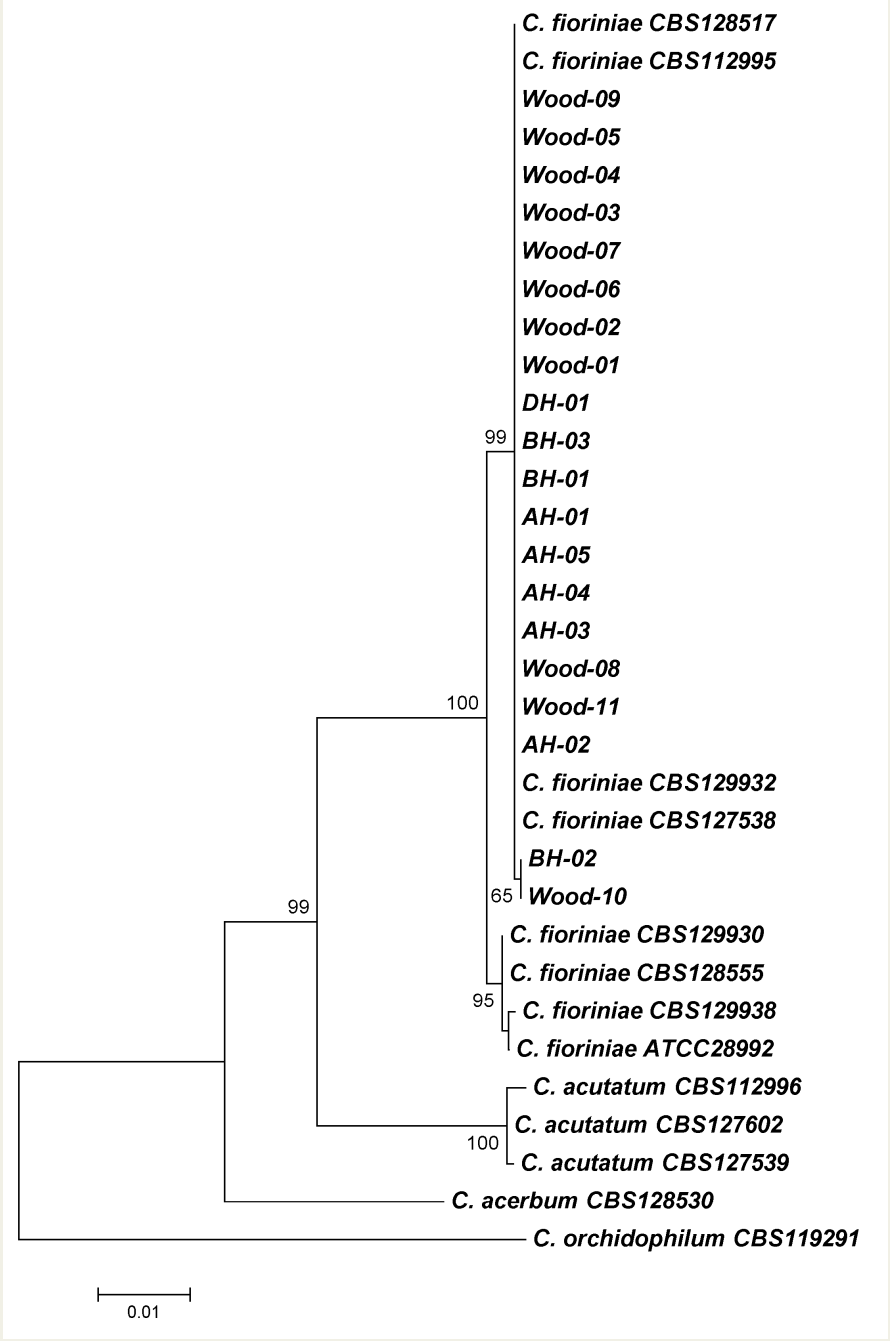
- 332 strains previously identified as *C. acutatum* including type material located at CBS
- Used a 6-gene phylogeny
- *C. acutatum* sensu latu is comprised of 29 subclades that represent distinct species
- So how many species infect apple and cause bitter rot?
  - Likely 6+

More importantly, how many and which species infect apple in the NE?

- In our study all 20 isolates were *C. fioriniae*
  - Intraspecies variability correlates with virulence
- Most isolates from Southern states belong to *C. gloeosporioides* complex (*C. siamense*)
  - Associated with many tropic fruit species
- Most isolates from NZ are *C. acerbum* and *C. fioriniae*

Phylogenetic analysis of *Colletotrichum* from apple in New Hampshire

- All 20 isolates were C. fioriniae
- BH-02 and Wood-10 composed a distinct genotype within *C. fioriniae*
- BH-02 and Wood-10 were also the most virulent across all apple varieties



Colletotrichum fioriniae

- Type culture from *Fiorinia externa* (hemlock scale) in New York
- Associated with fruit rot of cranberry, peach, blueberry, strawberry, and apple in northern USA and British Columbia
- Likely has an endophytic phase.
- Also found on *Malus* in New Zealand, Netherland, Italy and blueberries in NA and USA

Implications

- What we knew about *C. acutatum* and *C. gloeosporioides* may not hold true for *C. fioriniae*
- What is the distribution of *C. fioriniae* in NE & NA?
- Is *C. fioriniae* the dominant species in NE?
- Is there variability in virulence?
- Do endophytic strains also cause bitter rot symptoms?
- What climatic conditions induce infection/ Symptom development?

Post-infection Fungicide Trial

- Objectives:
  - Quantify infection and colonization by *V. inaequalis* and the production of primary inoculum (ascospores) from symptomless leaves treated with post-infection fungicides.
- Compounds evaluated in 2012
  - 3 strobilurins
  - 3 triazoles

Acknowledgements

- Carlos Peralta – visiting scholar from Universidad de Tolima, Colombia
- Matt Wallhead - UNH

- Funding from NH Agriculture Experiment Station