Is brown-spot needle blight going to be the next threat to plantation forestry?

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Highlights

- Brown-spot needle blight (BSNB), *Lecanosticta acicola*, is a primary pathogen causing loblolly pine needle defoliation and tree mortality in Alabama, USA
- *Sydowia polypora* and *Rhizosphaera kalkhoffii* were found associated with BSNB at each cases where stand prevalence was more than 60%
- Pairs of healthy and unhealthy trees were repeatedly found chlorotic and defoliated from 2019 to 2020
- High infection trees produce significantly shorter needles and shoots than low infection trees

Materials & Methods

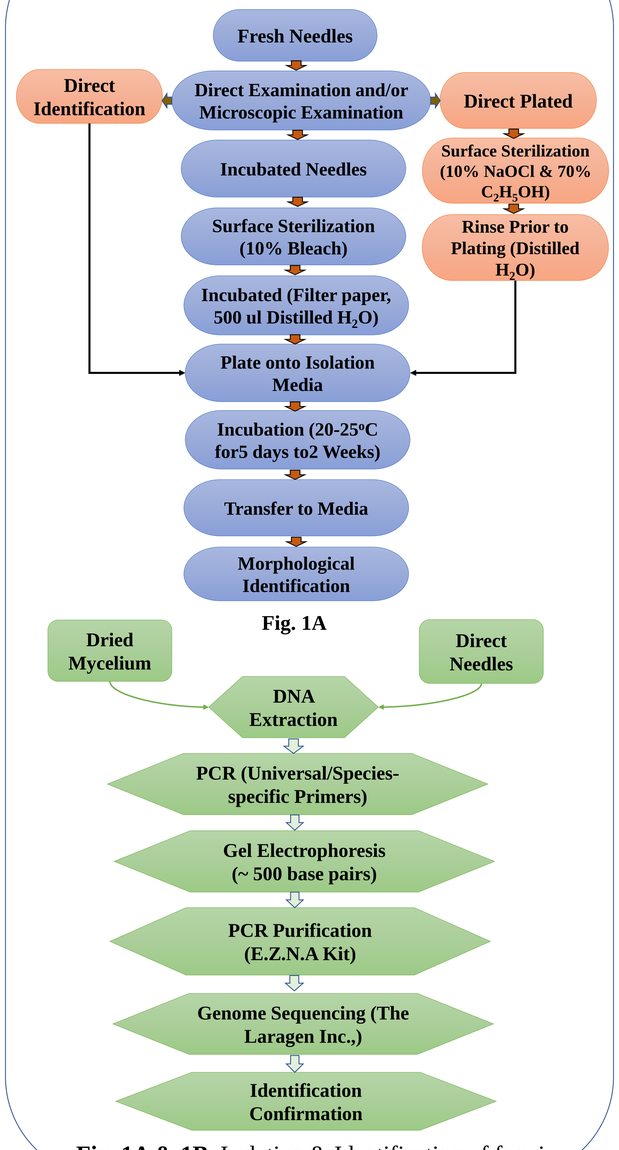

Fig. 1A & 1B. Isolation & Identification of fungi

Results

Morphological characteristics

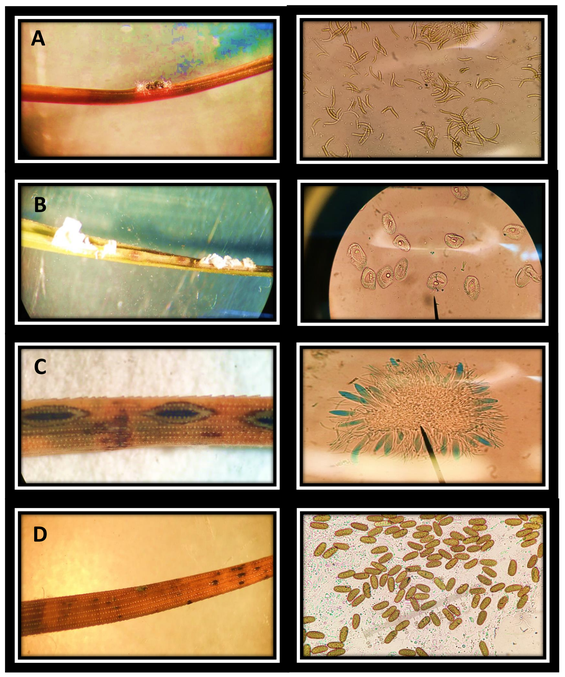

Fig. 2. Disease symptoms & reproductive structures of (A) *Lecanosticta acicola* (B) *Coleosporium* sp. (C) *Lophodermium sp.* (D) *Diplodia sapinea* on loblolly pine

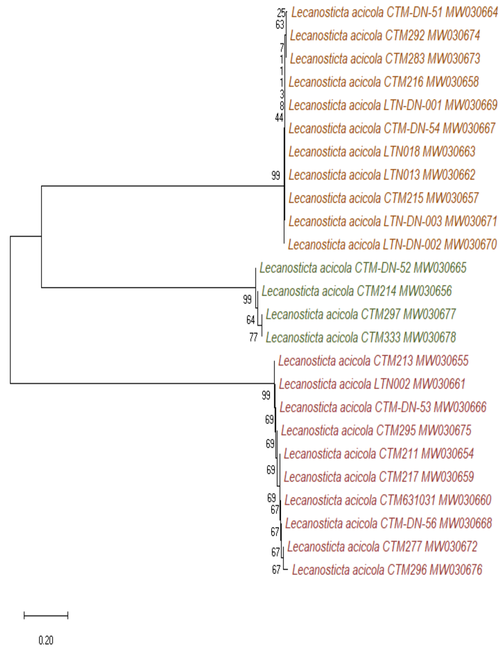

Fig. 3. Maximum likelihood (ML) tree representing *Lecanosticta acicola* and three lineages

Genetic diversity associated with LPND

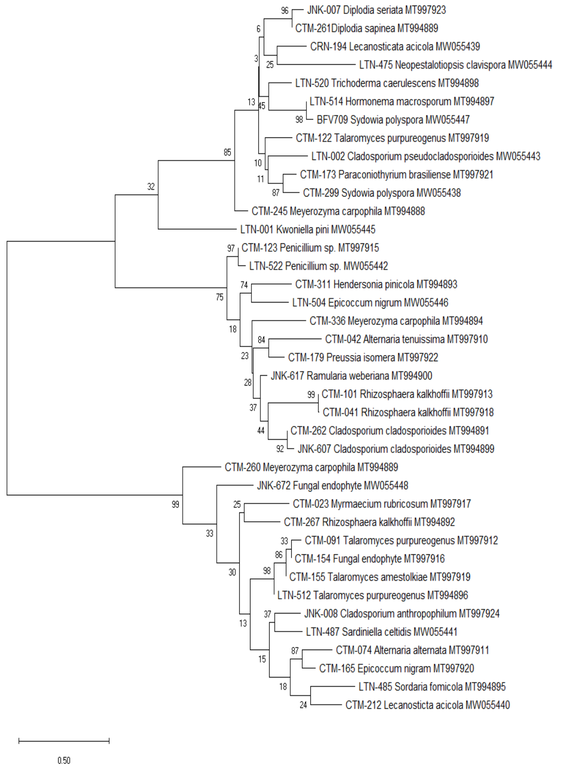

Fig. 4. Neighbor-joining (NJ) tree representing pathogenic & endophytic fungi recovered in the unhealthy needles

Tree response due to the effects of BSNB

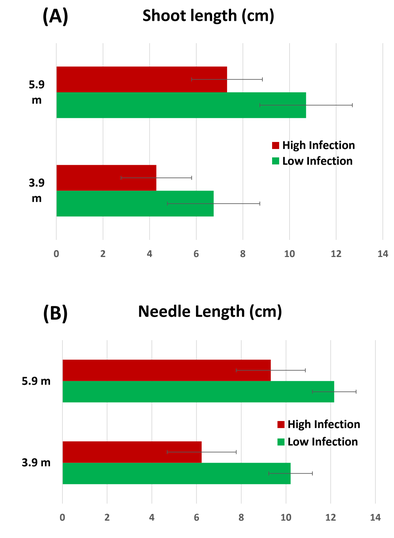

Fig. 5. Restricted Maximum Likelihood (REML) analysis showing significantly reduced (A) shoot length (B) needle length with respect to whorl height and infection level

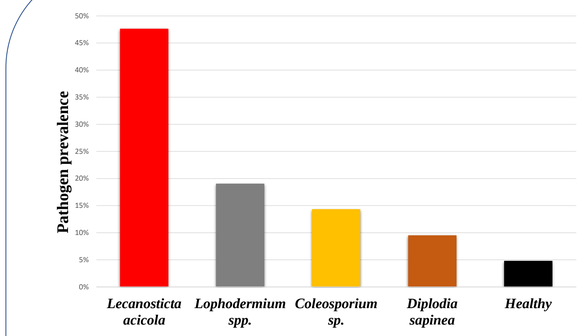

Fig. 6. Pathogen prevalence of *Lecanosticta acicola*, *Lophodermium* spp., *Coleosporium* sp., *Diplodina sapinae*, and healthy sites

Conclusion

- *Lecanosticta acicola* and *Lophodermium* spp. are the species most frequently recovered from unhealthy loblolly pine needles
- Stands infected by the brown-spot pathogen are mostly situated in the moist areas. Stand prevalence on those sites was ranging from 55% to 99%. Site conditions could be the possible reason explains why stands are experiencing worse conditions on these sites.

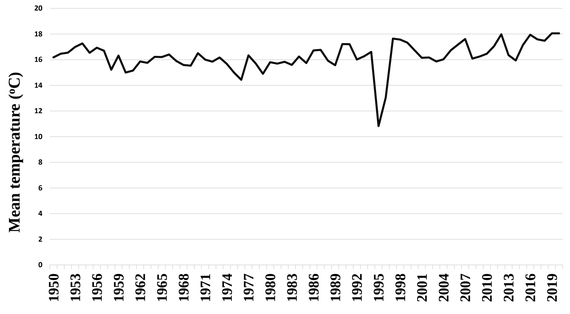

Figure 7: Mean temperature around 22 affected loblolly plantations in the southeastern USA

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