Progress made in the development of IPM for Powdery Mildew in Ornamentals.

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INTRODUCTION

Powdery mildew caused by *Oidium* spp. (*Erysiphe* (Sect. *Microsphaera) pulchra*) is one of the most serious diseases affecting flowering dogwood (*Cornus florida)* throughout the Southeast (Hagan *et al.* 1995, Hagan and Mullen 1995, McRitchie 1994, Ranney *et al.* 1994). Powdery mildew has a direct impact on the value of the crop, it reduces growth especially in young plants, causes leaf browning, early leaf senescence and reduced intensity of fall color. Most of the commercial cultivars are susceptible and fungicide application has become a routine practice in dogwood production resulting in a large number of fungicide applications. This practice has increased production costs and the amounts of pesticides being introduced into the environment. The objective of this study was to develop an integrated disease management (IDM) system for Powdery mildew in ornamentals using dogwood as a model crop. Specific objectives were to identify IDM components including host resistance, biopesticides and biological agents and reduce the amount of conventional pesticides used in powdery mildew control

Host resistance as a component of powdery mildew IDM:

Evaluation of commercial cultivars for powdery mildew resistance showed that most cultivars of Japanese dogwood (*C. kousa*) and *C. Kousa* X *Cornus florida* interspecific hybrid are resistant, but only two *C. florida* cultivars, 'Cherokee Brave' and 'Fragrant Cloud' were resistant (Mmbaga & Sauve, 2004). Additional resistant plants were identified in genetically diverse flowering dogwood populations grown from natural open pollination. The resistant selections have been evaluated at multiple locations and characterized morphologically and genotypically (Figs 1 & 2). Like 'Cherokee Brave' and 'Fragrant Cloud" , none of the plants are immune to infections and fungicide applications are still needed.

Fig. 1 Individual plant selections for powdery mildew resistance

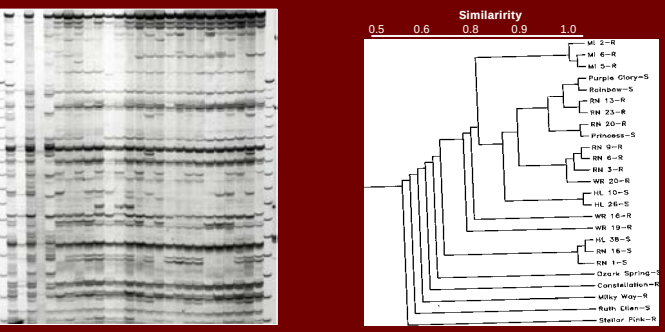


Fig. 2. AFLP data analysis and association of 25 dogwood accessions based on AFLP data analysis: R = resistant; S = Susceptible; RN = selectios from Dekalb county, TN; WR & HL = from different locations in Warren County, TN; and MI = from Coffee County, TN. *C. florida* 'Cherokee Princess' ('Princess'), 'Ozark Springs',

Biopesticides as a component of Powdery mildew IDM .

Biopesticides are compounds derived from natural materials like plants, micoorganisms, and certain minerals and are efficacious in controlling insect and/or disease problems (U.S. EPA 2005). Biopesticides have a number of advantages over conventional pesticides, are relatively harmless to the environment, inherently lower toxicity, less detrimental effect on non-target organisms, often effective in small quantities, decompose quickly, and have the potential to reduce reliance on conventional pesticides (Regnault-Roger et al. 2002; U.S. EPA 2005). Household soaps (Ajax® and Equate®) were effective in controlling powdery mildew of dogwood (Mmbaga and Sheng 2002). Applications of potassium bicarbonate or soaps individually at 7 d intervals or in fungicide rotations at 14 d intervals were as effective as the traditional fungicides propiconizole, thiophanate-methyl, and copper sulfate pentahydrate and reduced fungicide use by at least 50% (Mmbaga and Sauve 2004 b). The use of household soaps (Ajax® or Equate®) or insecticidal soap (M-Pede®) as surfactants for bicarbonate salt, Armicarb™ had a synergistic effect and the combination was as effective as traditional fungicides with no toxicity.

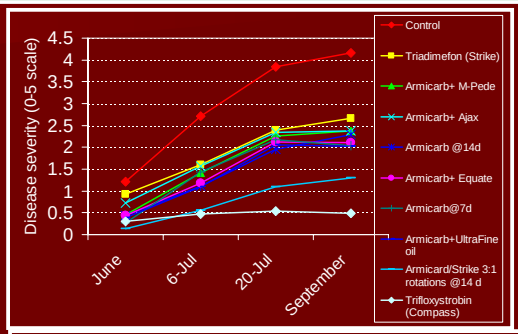
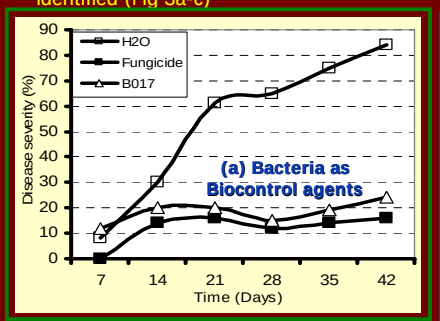
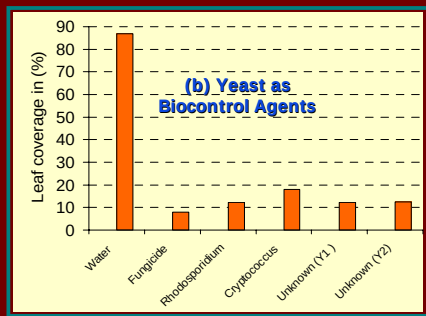


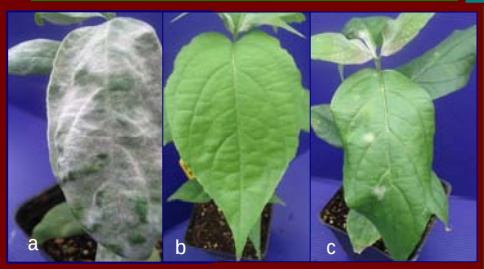
Fig. 3. Using Biopesticides in controlling powdery mildew in flowering dogwood.

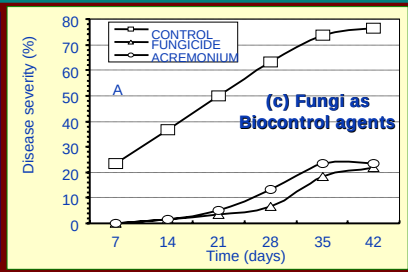
Armicarb™ is labeled for use on ornamental plants and the improved efficacy will likely enhance its adoption as an alternative to fungicides. The Armicarb/soap combination was also evaluated in fungicide rotations and was as effective as the fungicide propiconazole and reduced fungicide use by 50-66%. Nursery growers like the assurance of traditional fungicides, an IPM system that incorporates a few fungicide applications is likely to be better adopted. Identification of biological agents for powdery mildew management have also been identified as additional IPM components.

Bacteria,yeast and Fungi effective in reducing powdery mildew symptoms have been identified (Fig 3a-c)









Figs 4. Powdery mildew disease severity on (a) non-treated control, (b) effective fungicide and, (c) biological agent treatment

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