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DISEASE RESISTANCE OF BUNCH GRAPES IN NORTH FLORIDA

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Abstract. **Pierce's disease (PD, *Xylella fastidiosa* W), anthracnose (*Elsinoe ampelina* [de Barry] Shear), black rot (*Guignardia bidwellii* [Ellis] Viala and Ravaz), and downy mildew (*Plasmopara viticola* [Berk and Curt] Berl and de Tony) are common grape (*Vitis* spp.) diseases in North Florida. In 1996, we evaluated the disease-resistance and performance of 13 cultivars/ breeding lines of bunch grapes growing in Tallahassee, Florida, at the end of a six year period of growth. Results indicate that 'Mid South', 'Suwannee', 'Blanc du Bois', and 'Orlando Seedless' were significantly more resistant or tolerant to common diseases than other cultivars/breeding lines.**

Florida grape industry has been limited by fungal and bacterial diseases, and by the warm temperature and high humidity climate that favor disease development (Mortensen, 1992). Bunch grape growers in the southeastern United States have been plagued by short-lived vines (Stojanovic et al., 1980). Commercial production of bunch grapes (*Vitis* spp and their hybrids) in Florida requires cultivars that are resistant to diseases such as Pierce's disease (PD, *Xylella fastidiosa*), anthracnose (*Elsinoe ampelina*), black rot (*Guignardia bidwellii*), and downy mildew (*Plasmopara viticola*). In particular, PD has been the primary cause of early death of vines. So far, disease resistance is the only means for PD control.

Despite of economic importance, there has been little research on bunch grape diseases in the southeast (Bertrand, 1992). Over the years, several bunch grape cultivars have been released from University of Florida and Mississippi State University. These cultivars are considered to be vigorous and long-lived varieties in Central Florida and Mississippi (Mortensen, 1983; Mortensen, 1987; Mortensen and Gray, 1986; Overcash et al., 1981). The performance of these cultivars in North Florida has not been evaluated. Local bunch grape growers are in need of current information on improving cultivar selection for future plantings. Therefore, in this study we evaluated 13 cultivars/breeding lines of bunch grapes on their disease resistance. Data from this study may be helpful in the recommendation of cultivars to grape growers and the development of a disease resistance breeding program in north Florida.

Materials and Methods

Bunch grape cultivars/breeding lines. Thirteen cultivars/ breeding lines (Table 1) were planted on a vineyard at the Center for Viticulture Science and Small Farm Development at Florida A&M University, Tallahassee in 1990. The vines were planted in a randomized block design, four blocks per cultivar/breeding line with triplicates per block. All vines were subjected to the same cultural practices and environmental conditions.

Disease evaluation. Disease evaluation was done on 27 August 1996. Evaluations were made on overall performance and disease resistance to four diseases: PD, anthracnose, black rot, and downy mildew. A standard rating scale of 0 to 3 was used to evaluate each vine. The overall performance of each cultivar/breeding line was evaluated by making observations on their survival conditions. A score of 3 was given for high vigor and normal growth, 2 for low vigor and no obvious die-back, 1 for obvious die-back, and 0 for dead vines. Evaluations of disease resistance were made based on the severity of leaf symptoms. A score of 3 was given for symptoms in all leaves, 2 for about 50% leaves showing symptoms, 1 for light symptoms, and 0 for no obvious symptoms. Dead vines were excluded from disease evaluation. Means were calculated and used to represent overall performance and disease severity of each cultivar/breeding line.

Data Analysis. Duncan's multiple range test was used to rank all the cultivars/breeding lines based on their means of rating values with the significant level of 0.05. All statistical analyses were performed with a SAS package.

Results and Discussion

Means of overall performance were in a range of 2.60 to 0 and the means of disease severity varied from 3.00 to 0 (Table 1). As expected, all the cultivars performed better than the breeding lines. Among the breeding lines, all the vines of CA13-11, AR1400, and AN8-58 were dead, indicating that these breeding lines were highly susceptible to diseases in north Florida. In contrast, 'MidSouth', 'Suwannee', 'Blanc du Bois', and 'Orlando Seedless' were significantly better than other cultivars/breeding lines in their overall performance of disease resistance.

'Mid South', 'Suwannee', and 'Blanc du Bois' were significantly more resistant to PD than other cultivars/breeding lines. This was surprising because 'Orlando Seedless' was considered to be PD resistance when it was first released

Table 1. Evaluation of resistance of bunch grape cultivars to Pierce's disease, anthracnose, black rot, and downy mildew.

Cultivar/ Breeding lines	Overall performance	Pierce disease	Anthracnose	Black rot	Downy mildew
MidSouth	2.575a[z]	0.250c	1.175b	1.000b	0.000c
Suwannee	2.000ab	1.250b	1.250b	1.000b	0.000c
Blanc du Bois	1.500bc	1.675b	1.600ab	1.425ab	0.000c
Orlando Seedless	0.925bc	3.000a	2.000a	1.750a	0.000c
Lake Emerald	0.825cd	2.575a	1.000b	1.000b	2.000a
DC1-56	1.400cde	2.575a	1.500ab	1.500ab	0.000c
DN3-43	0.425def	2.775a	1.000b	1.000b	0.675bc
CA11-17	0.500def	3.000a	2.000a	1.675a	1.000b
CN10-62	0.150def	—	—	—	—
RN2-65	0.075ef	—	—	—	—
AN8-58	0.000f	—	—	—	—
AR1400	0.000f	—	—	—	—
CA13-11	0.000f	—	—	—	—

[z]Means with the same letters are not significantly different from each other based on Duncan's multiple range test at the significant level of 0.05.
— indicates cultivars that were not evaluated for disease resistance due to poor or no survival.

(Mortensen and Gray, 1986). However, the high anthracnose susceptibility of 'Orlando Seedless' might have obscured the PD evaluation (Table 1). When compared to other breeding lines, 'Orlando Seedless' appeared to have a stronger PD survivability or tolerance.

'MidSouth', 'Suwannee', 'Lake Emerald', and 'DN3-43' were *significantly more* resistant to anthracnose disease than other cultivars/breeding lines. A similar trend was observed in black rot resistance. 'MidSouth', 'Suwannee', 'DC1-56', 'Orlando seedless', and 'Blanc du Bois' were significantly more resistant to downy mildew than other cultivars and breeding lines. It should, however, be noted that the evaluations of diseases in this study were late in the season. The evaluation time in this study was appropriate for PD but may not for anthracnose, black rot and downy mildew.

In summary, this study evaluated the resistance of four diseases of bunch grapes in north Florida on six year old vines. Our results showed that 'Mid South', 'Suwannee' 'Blanc du Bois', and 'Orlando Seedless' have relatively high overall disease resistance.

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FOLIAR APPLIED PHOSPHORUS FERTILIZERS INHIBIT PEACH GUMMOSIS[1]

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Abstract. **Foliar applications of K_2HPO_3 and K_2HPO_4 reduced the amount of peach gummosis (*Botryosphaeria dothidea* (Moug. ex Fr.) Ces & de Not.) occurring in 1996 and 1997 in peach trees at Gainesville.**

Peach tree gummosis was first observed in the Ft. Valley, Georgia area in 1970 and by 1974 Weaver (1974) reproduced the disease symptoms by inoculating healthy trees with mycelia of *Botryosphaeria dothidea* (*B. ribis*). In the spring of 1981 Reilly and Oke (1982) surveyed and found the pathogen in 25 counties in Georgia and other locations in Alabama, Florida and Louisiana. While three species are involved (Britton and Hendrix, 1982), *B. dothidea* is thought to be the main one. *B. dothidea* is almost ubiquitous in the south and is pathogenic on many native woody trees and shrubs in Georgia including pecan, blueberry, cassia, and cotton. Infection is thought to occur through lenticels, pruning wounds and other mechanical injuries, and in some instances, the peach fruit. Little is know regarding the spread and distribution of *B. dothidea* in Florida. All peach varieties appear to be susceptible with some more so than others. Chemical control programs for Florida are lacking and some recommendations made for other peach production areas in other states are not cost effective. Currently, only orchard sanitation by removal of prunings or chopping them with a flail mower is recommended for control.

In the early 1980's research workers in South Africa and Australia began evaluating phosphoric acid and salts thereof as a means of controlling certain phycomycete fungi i.e, *Phytophthora, Pythium,* and *Plasmopra.* Coffey and Joseph (1985) soon afterwards confirmed the effectiveness of phosphoric acid. The mode of action is thought to be two fold; it has a direct fungicidal effect against the pathogen as an HPO_3^{-1} anion (also HPO_3^{-2}) and, probably more importantly, it elicits for phytoalexin production, which enhances the phytoimmune system (Mucharromah and Kue, 1991). Concurrent with phosphonate research in South Africa, Reuveni et al., 1993 in Israel began evaluating various forms of phosphates as biocompatible fungicides for control of various pathogens in the Ascomycetes and Basidiomycetes.

This paper describes experiments to test the effect offoliar sprays of K_2HPO_3 and K_2HPO_4 as a treatment against peach gummosis in north Florida. Two years of field evaluations in peach are presented.

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