Table 1. Effect of mycorrhizae on *Raphiolepis indica* growth.

Treatment	Average increase in height (cm)	Average final width (cm)	Average dry weight of roots (g)	Average dry weight of shoots (g)
Control	3.3 b	10.3 a	0.97 a	3.04 a
Glomus etunicatum	6.4 a	15.1 a	1.79 a	6.84 a

Mean of 9 values. Separation of means is by the Student-Newman-Keuls test of significance (5% level). Differing letters indicate significant differences within columns.

Table 2. Effect of mycorrhizae on *Acer rubrum* growth.

Treatment	Average increase in height (cm)	Average trunk caliper (cm)	Average dry weight of roots (g)	Average dry weight of shoots (g)
Fertilizer 14 grams				
Control	67 a	10.8 a	10.8 a	36.2 a
Glomus etunicatum	73 a	11.4 a	12.2 a	41.0 a
Fertilizer 19 grams				
Control	71 a	12.0 a	13.8 a	41.7 a
Glomus etunicatum	58 a	11.1 a	10.4 a	42.9 a

Mean of 12 values. Separation of means is by the Student-Newman-Keuls test of significance (5% level). Differing letters indicate significant differences within columns.

tested plant response to mycorrhizae under common nursery fertilization regimes, response to mycorrhizal inoculation may have been enhanced if the supply of P. in the fertilizer was reduced (Harley and Smith, 1983).

Literature Cited

Harley, J. L. and S. E. Smith. 1983. Mycorrhizal Symbiosis. Academic Press Inc. New York.

Verkade, Stephen D., 1991. Efficacy of six VAM Fungi with containerized *Acer platanoides*. Scientia Horticulturae 48:125-129.

Verkade, Stephen D., 1988. Use of colloidal silica solution in the isolation of spores of *Glomus mosseae*. Mycologia 80(1):109-110.

Watkins, John V. and Thomas J. Sheehan, 1975. Florida Landscape Plants. Revised Edition. The Presses of the University of Florida, Gainesville.

Proc. Fla. State Hort. Soc. 104:291-293. 1991.

VEGETATIVE PROPAGATION OF FLORIDA NATIVE PLANTS: VI. *PERSEA PALUSTRIS* (SWAMPBAY)

BIJAN DEHGAN, AND THOMAS J. SHEEHAN
Department of Environmental Horticulture, University of Florida, Gainesville, FL 32611

Additional index words. Persea borbonia, P. humilis, Rooting of cuttings.

Abstract. ***Persea palustris* (Raf.) Sarg. (Swampbay) is a small to medium size Florida native tree desirable for landscaping. Its propagation has been beset with considerable difficulty: the fruit and seed are usually infested with wasp larvae which results in an inviable embryo, and cutting propagation has been generally unsuccessful. In this study, however, cuttings taken once every six weeks, over three years, rooted successfully only during a narrow time period in July. At this time IBA dip had some positive effect on root quality but little influence in root initiation. The results of this and other studies indicate that many woody plant species root satisfactorily only before or after flowering and fruit set.**

Several species of Florida native plants have recently been reported to be seasonally specific for best root initiation. Hollies (*Ilex* spp.), for example, were shown to root best during the summer months and poorly during their flowering period in early spring (Dehgan et al., 1988a). In contrast, several species of Ericaceae [*Gaylussacia frondosa* var. *tomentosa* Gray (Dangleberry), *Leucothoe racemosa* (L.) Gray (Fetterbush), *Lyonia lucida* (Lam.) K. Koch (Shiny Lyonia), and *Rhododendron serrulatum* (Lam.) Millais (Swamp Honysuckle), etc.] rooted best in early spring, prior to flowering (Dehgan et al., 1989a). Rooting in oaks was species-de-

Florida Agricultural Experiment Station Journal Series No. R-01392. This project was in part supported by a grant from Florida Institute of Phosphate Research (Project No. 84-03-053R). We gratefully acknowledge technical assistance from Dr. M. E. Kane, F. Almira, M. Gooch, and B. Poole.

pendent; *Quercus nigra* L. (Water Oak) and *Q. geminata* Small (Sand Live Oak) rooted best when cuttings were taken in June and July respectively, whereas that of *Q. hemisphaerica* Bartr. (Laurel Oak) was in April (Dehgan et al., 1989b). Rooting of *Prunus* spp. cuttings were also subject to flowering and leaf expansion time. *Prunus serotina* Ehrh. (Black Cherry) rooted best in March, soon after leaf expansion and before flowering, whereas *P. umbellata* Ell. (Hog Plum) gave the best results after flowering and leaf expansion in April (Dehgan et al., 1991). However, various other species exhibited little or no seasonal specificity (Dehgan et al., 1988b, 1989a).

The three morphologically similar species of *Persea* reported from Florida are attractive and potentially useful landscape plants (Elias, 1980; Wunderlin, 1982; Clewell, 1985). One species, *P. borbonia* (L.) Spreng. (Red Bay) is occasionally used in the landscape. The other two taxa, *P. humilis* Nash. (Silk Bay) and *P. palustris* (Raf.) Sarg. (Swampbay), are quite handsome but have not been propagated commercially because the fruits and seeds are usually infested by wasp larvae, which result in poor development or destruction of the embryo. *Persea palustris* is an attractive but seldom used small to medium size evergreen tree characteristic of wetland hardwood hammocks of north and central Florida. It has coriaceous, broadly lanceolate to elliptic-oblong leaves, small inconspicuous flowers, and small, globose, shiny blue-black fruit (Fig. 1). Other than a recent publication by Kane et al. (1989) on *in vitro* propagation of this taxon, there has been no report of propagation of this or any of the related taxa to our knowledge, including *P. americana* (Avocado). The intent of this research therefore, was to determine a method of vegetative propagation that would facilitate reproduction and subsequent introduction of this species for landscape use.

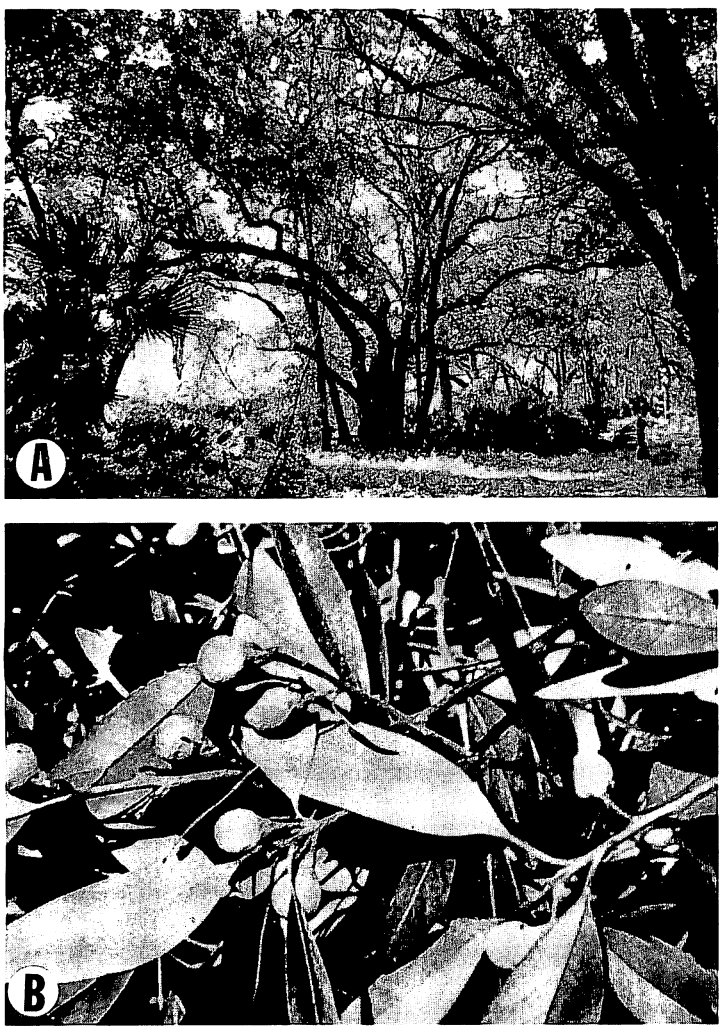

Fig. 1. *Persea palustris*. (A) Mature plant in an undisturbed old hammock at Four Corners Phosphate Mine, Mulberry, Florida. (B) Close up of leaves and fruit.

Materials and Methods

Semi-hardwood cuttings of *P. palustris* were collected at six week intervals (July 1985 to September 1987) from undisturbed natural habitats at the Occidental Chemical Company Mine at White Springs, Hamilton County, and W. C. Grace and Company in Four Corners Mine, Polk County, Florida. These were placed in plastic bags, moistened, and kept cool until the following day, when they were treated and inserted into the medium. Five replications of 15 cuttings each were used for each trial. These were uniformly treated with a 5-second dip of 0, 2500, and 5000 ppm Indolebutyric acid (IBA) in 50% EtOH. The medium consisted of 1:1 (v:v) mixture of perlite and vermiculite. The flats of cuttings were randomly placed under an intermittent mist of 5 sec/5 min. Temperature of the propagation greenhouse was maintained at 23 ± 5 C day/18 ± 2 C night. Cuttings were examined weekly for rooting and the final data were collected when it was evident that at least some cuttings had sufficient roots for transplanting. Those that had not rooted within 12 weeks were discarded. Root quality, in terms of relative length and number, was scored from 0 (unrooted) to 5 (excellent). Comparable data for approximate same collection dates and zero rooting dates are omitted.

Results and Discussion

Figure 2 indicates 39% rooting in January and scant rooting in the ensuing months, until July, when an impressive 94% of those treated with 5000 ppm IBA rooted. Although rooting percentage was somewhat improved with IBA treatment, there was no marked improvement over the untreated controls nor was the root quality notably affected by IBA treatments. The root quality estimates ranged from 3 to 4. At all other times, however, root quality was unacceptable (2 or below).

Unlike most other taxa noted above, species of *Persea* flower from mid- to late spring. Field observations confirm that there is a sudden burst of growth prior to flowering, and undoubtedly, considerable energy is spent during this period. Carbohydrates and probably endogenous auxins are restored only after leaves are fully expanded, in late spring and early summer (Gaspar and Hofinger, 1988). It is therefore reasonable for root initiation to occur at the highest levels of carbohydrate and endogenous auxin storage. Although adequate levels of carbohydrates for rooting of cuttings has not been determined, Veierskov (1988) suggests that carbohydrate content of the stock plants must be sufficient to supply the cuttings with energy reserves throughout the rooting period. Because of the warmer Florida climate, native evergreen woody plants should

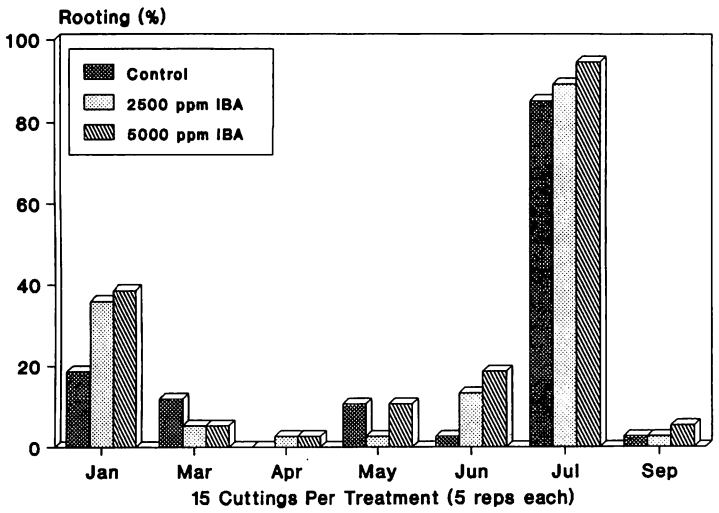

Fig. 2. Effect of IBA and time of year on rooting of *Persea palustris* (Swampbay) cuttings. Cuttings taken at six week intervals, 15 cuttings per treatment, 5 reps each. Collection dates with similar results and dates which cuttings did not root are omitted.

theoretically have sufficient carbohydrates for rooting throughout the year. It is more likely that poor root initiation is due to low levels of endogenous auxins and/or cofactors prior to and for some time after flowering and fruiting. This is substantiated by the 39% root initiation in January (Fig. 2) and the positive result of IBA treatment at this time.

Literature Cited

Clewell, A. F. 1985. Guide to the Vascular Plants of the Florida Panhandle. Florida State University Press, Tallahassee.

Dehgan, B., F. Almira, M. Gooch, and M. Kane. 1988a. Vegetative propagation of Florida native plants: I. Hollies (*Ilex* spp.). Proc. Fla. State Hort. Soc. 101:291-293.

Dehgan, B., M. Gooch, F. Almira, and B. Poole. 1988b. Vegetative propagation of Florida native plants. II. *Acer rubrum, Gordonia lasianthus, Magnolia virginiana,* and *Styrax americana.* Proc. Fla. State Hort. Soc. 101:293-296.

Dehgan, B., M. Gooch, F. Almira, and M. Kane. 1989a. Vegetative propagation of Florida native plants: III. Shrubs. Proc. Fla. State Hort. Soc. 102:254-260.

Dehgan, B., F. Almira, M. Gooch, and T. Sheehan. 1989b. Vegetative propagation of Florida native plants: IV. *Quercus* spp. (oaks). Proc. Fla. State Hort. Soc. 102:260-264.

Dehgan, B., T. J. Sheehan, M. E. Kane, and F. C. Almira. 1990. Vegetative propagation of Florida native plants: V. *Prunus* spp. Proc. Fla. State Hort. Soc. 103:172-174.

Elias, T. S. 1980. The Complete Trees of North America - Field Guide and Natural History. Van Nostrand Reinhold Company, New York.

Gaspar, T. and M. Hofinger. 1988. Auxin metabolism during adventitious rooting. *In* Adventitious Root Formation in Cuttings. pp. 117-131. T. D. Davis, B. E. Hassig, and N. Sankhla, eds. Dioscorides Press, Portland, Oregon.

Kane, M. E., T. J. Sheehan, B. Dehgan, and N. L. Philman. 1989. In vitro propagation of Florida native plants: *Styrax americana* and *Persea palustris.* Proc. Fla. State Hort. Soc. 102:264-268.

Veierskov, B. 1988. Relations between carbohydrates and adventitious root formation, p. 70-78. *In*: D. Davis, B. E. Hassig, and N. Sankhla, eds. Dioscorides Press, Portland, Oregon.

Wunderlin, R. P. 1982. Guide to Vascular Plants of Central Florida. A University of South Florida Book, Tampa.

Proc. Fla. State Hort. Soc. 104:293-296. 1991.

HERBICIDE USE BY FLORIDA'S WOODY ORNAMENTAL INDUSTRY

JEFFREY G. NORCINI AND DAVID J. ZIMET
University of Florida, IFAS
North Florida Research and Education Center
Monticello, FL 32344

JUDITH M. MCDOWELL
Florida A&M University
Division of Agricultural Sciences
Tallahassee, FL 32307

LINDA B. LANDRUM
University of Florida, IFAS
Cooperative Extension Service
3100 East State Road 44
Deland, FL 32724

Additional index words. economics, palms.

Abstract. **One thousand seventy-one growers of woody ornamentals (nontropical and tropical, including palms) in Florida were queried for information concerning their use of herbicides as well as other weed management practices. Fifty-six percent of the respondents used preemergent herbicides while 71% used postemergent herbicides; nearly half of the respondents used both types. Oxadiazon (Ronstar®) and glyphosate (Roundup®) were the most frequently used pre- and postemergent herbicides, respectively. Growers with smaller acreages were less likely to use herbicides. However, weed management practices were relatively homogenous throughout Florida despite differences in product line.**

Florida Agricultural Experiment Station Journal Series No. N-00478.
This project was partially supported by a grant solicited from Dow-Elanco.

Introduction

Herbicides comprise a major portion of pesticide purchases for growers of woody ornamentals (nontropical and tropical woody plants, including palms) in Florida because weeds require year-round management. Proper use of herbicides is generally considered to be a cost-effective means of weed management for most nurseries. However, little published information is available concerning herbicide use and costs for Florida's woody ornamental industry.

The objectives of this study were to 1) determine the size of industry, and 2) assess the use and cost of herbicides by growers of nontropical and tropical woody ornamentals including palms.

Materials and Methods

Florida was divided into five regions based on the Division of Plant Industry (DPI) regional divisions: Northwest - west of the Apalachicola River; Big Bend - east of the Apalachicola River through Hamilton, Suwannee, Lafayette, and Dixie counties; North Florida - Big Bend