

## RELATIVE COMPETITION AND WEED POTENTIAL OF *LEUCAENA LEUCOCEPHALA*<sup>1</sup>

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**Abstract.** An experimental plantation of *Leucaena leucocephala* (Lam.) deWit. at a planting density of 10,000/ha., was established near Pompano Beach, Florida and maintained for a 2-yr period, after which the average tree height exceeded 5 m. Concern over weed potential of this fast-growing introduced species led to a series of quadrat evaluations within the plantation. Early grassy and herbaceous weed incidence was replaced by woody plant invasion as the plantation matured. The most dominant woody plant species at the end of the second year were: strangler fig (*Ficus aurea* Nutt.), Brazilian pepper tree (*Schinus terebinthifolius* Raddi), and groundsel tree (*Baccharis halimifolia* L.). A planting of earleaf acacia (*Acacia auriculiformis* A. Cunn. ex Benth.) adjacent to the leucaena plantations had the same general patterns of woody plant invasion but a planting of buttonwood (*Conocarpus erectus* L.) did not; in the buttonwood planting the only woody species found was Brazilian pepper tree.

Evaluation of new plant material consists of many different kinds of processes and requires many types of information, such as the plant's cultural requirements, growth habits, uses, and other factors. One of the most serious concerns, particularly in Florida, is the plant's weed potential. There are numerous examples of introduced plants becoming serious weedy pests due to little or no evaluation of the species' weed potential. Three good examples of horticultural introductions in Florida that became troublesome pests are the melaleuca (*Melaleuca quinquenervia* S. T. Blake), Australian pine (*Casuarina equisetifolia* J. R. Forst. & G. Forst.) and Brazilian pepper tree (*Schinus terebinthifolius* Raddi) (1, 2). It is important to note that these plants were regarded as having positive horticultural properties when they were first introduced. Plants are considered weeds only when they interfere with human activity or welfare, usually by growing where they are not wanted (5). The necessity of evaluating the weed potential of any new introduction, along with other factors related to its culture, is therefore an important part of the complete evaluation process.

*Leucaena* (*Leucaena leucocephala* (Lam.) de Wit.) is native to parts of Mexico, Central America, and the extreme southern portions of Texas (6). It is very fast-growing, and is capable of reaching heights of 15 m in less than 5 yr (4, 6). Due to its ability to grow rapidly, it has been proposed as a possible biomass energy crop, and experimental plantations were established in Broward County, Florida, in 1982 to

assess this species' capability to be developed into a biomass crop for southern Florida. Although the controlled experimental planting of leucaena as an energy crop is a relatively recent development, it had been naturalized in parts of Florida and the Bahamas earlier, where it is known by the common name of jumbay (3).

The purpose of this research was to determine, through examination of quadrats in the experimental plantations, the weed potential of leucaena relative to other native or naturalized woody species.

### Materials and Methods

A field site near Pompano Beach, Florida, on the property of the Broward County Tree Nursery was prepared for planting during February and March, 1982. A layer of sewage sludge compost, 0.5 m thick, was added to the planting area as an artificial topsoil. Small container-grown seedlings of leucaena and earleaf acacia and small container-grown rooted cuttings of buttonwood were planted on 1 m x 1 m centers (equivalent to 10,000/ha), in randomly selected plots 2 m x 4 m, 8 trees per plot. Two cultivars of leucaena, K8 ('Hawaiian Giant') and K28 ('El Salvador') were grown from seeds provided by the U.S. Department of Agriculture Plant Introduction Station at Experiment, Georgia. The acacia and buttonwood were acquired from local sources. In all, 3 plots of each leucaena cultivar and 3 plots each of earleaf acacia and buttonwood were established. The soil in all plots was inoculated shortly after planting with a *Rhizobium* culture supplied by the Nitragin Company, Milwaukee, Wisconsin.

During the first 6 months after planting, March through September, 1982, plots were subjected to occasional weed control, mostly by hand removal of herbaceous or grassy species.

Two years after planting, in April 1984, the plots were examined for woody species incidence. The buttonwood and acacia trees had grown to greater than 3 m and the leucaena cultivars had grown to average heights in excess of 5 m (yield and biomass data from this work will be published separately) with crown development sufficient to discourage most grassy or herbaceous weed species. Each plot was examined and all woody plants greater than 25 cm in height were identified and recorded. Data from the different plots were grouped according to species or cultivar and mean incidence of each of woody species was determined.

### Results and Discussion

In all of the plots in which the 2 leucaena cultivars were grown, as well as the plots in which earleaf acacia and buttonwood were grown, only 4 woody plant species were noted: 1) strangler fig, 2) Brazilian pepper tree, 3) groundsel tree, and 4) volunteer leucaena. Volunteer leucaena did not occur at all in the K8 cultivar leucaena plots, nor did it occur in the buttonwood plots (Table 1). Moreover, strangler fig and groundsel tree did not occur at all in the buttonwood plots. Of the 4 woody species encountered, just one, the Brazilian pepper tree, occurred in all of the test species plots. In fact Brazilian pepper tree incidence was higher, on the average, in all plots except the K28 leucaena cultivar, making it the most abundant of the 4 weed species (Table 1).

It is of interest that 2 of the 4 weed species, strangler fig and groundsel tree, are both native to Florida. Although

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Table 1. Incidence of woody plant species within 2-yr-old plantations of *Leucaena leucocephala*, *Conocarpus erectus*, and *Acacia auriculiformis*.

Tree species	Mean no. of invasive woody plants/8 m <sup>2</sup> quadrat (SD) <sup>z</sup>			
	<i>Ficus aurea</i>	<i>Schinus terebinthifolius</i>	<i>Baccharis halimifolia</i>	volunteer <i>Leucaena leucocephala</i>
<i>L. leucocephala</i> K8 cultivar	4.0 (4.4)	9.0 (1.7)	0.3 (0.6)	0.0
<i>L. leucocephala</i> K28 cultivar	6.3 (2.9)	2.7 (0.6)	1.3 (0.6)	1.3 (1.5)
<i>A. auriculiformis</i>	3.7 (2.3)	6.7 (5.0)	1.0 (1.0)	1.0 (1.0)
<i>C. erectus</i>	0.0	1.3 (2.3)	0.0	0.0

<sup>z</sup>Each value is the mean of 3 quadrats, 8 m<sup>2</sup> each in area. Values in parentheses are standard deviations.

native, both are aggressive and are found commonly in disturbed areas, underscoring the fluidity of the term "weed." It is also noteworthy that the relative abundance of volunteer leucaena, where encountered, was numerically very close to the groundsel tree and that neither volunteer leucaena nor groundsel tree were as abundant as strangler fig or Brazilian pepper tree under these experimental conditions (Table 1).

Although the data generated in this study clearly show very little weed potential for leucaena, it should be stressed that both the K8 and K28 cultivars are relatively "domesticated" forms of leucaena. It would not be reasonable to expect similar results from "wild" forms of leucaena and it is also quite possible that different cultural conditions than those used in the current study might have yielded different

results. Nevertheless, the results of this work indicate very low weed potential for the K8 and K28 cultivars of leucaena when grown under biomass cultivation conditions.

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## NOBODY LOVES THE BISCHOFIA ANYMORE

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**Abstract.** The bishopwood tree (*Bischofia javanica* Blume) was introduced and promoted by E. N. Reasoner and Dr. Henry Nehrling who greatly admired a large specimen at Reasoner's Royal Palm Nurseries, Oneco. Dr. Charles Torrey Simpson spoke well of the tree in 1914 but in his book, Ornamental Gardening in Florida (1926), he wrote: "It seems to be an excellent host for a smutty scale and now I am trying to destroy it by girdling but it refuses to die." Despite this warning, the tree was widely sold as an ornamental after WW II. Soon it became obvious that the tree becomes too big too soon; is not only subject to scale and leaf spot, but has aggressive surface roots; fruiting branches successively die back leaving holes in the crown; seedlings volunteer in cultivated and natural areas. Removal and disposal of overgrown trees is troublesome and costly, but the wood should be salvaged, being durable in water and excellent for docks and piling, and it is useful as firewood.

The bishopwood tree, *Bischofia javanica* Blume (syns. *B. trifolia* Hook.; *Andrachne trifoliata* Roxb.) is a member of the widespread and largely sinister family, Euphorbiaceae.

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Among its few alternate names in English are: Java cedar, red cedar, West Indian cedar and vinegar wood. In India, it is called paniala, kainjal, boke, joki and several other dialectal names. In Malaya, it is nira or thirippu; in Burma, tayokthe; in Samoa, oa; in Fiji, tongogongo, no-ghor or koka (1, 2, 4, 5, 9, 10).

#### Description

The tree is fast-growing, erect, to 60 ft, with cylindrical trunk to 12 ft in circumference. The bark is light-brown to grayish, shallowly and narrowly fissured, the surface readily flaking. Evergreen in humid climates, deciduous in areas of low rainfall, the alternate, spirally-set leaves have rather rubbery petioles up to 7 inches long, flattened on the upper-side, tinged with maroon at the base and apex, and the blade is divided into 3 (or sometimes 4-5), leathery, elliptic or obovate, pointed, recurved leaflets, to 6 inches long and 3 inches wide, irregularly saw-toothed, dark-green above, paler beneath, with conspicuous veins and midrib, the latter flat and white on the upper surface, tinged maroon beneath. Petiolules are more or less maroon-tinted, the lateral ones are very short and the terminal up to 3 inches long. Old leaflets turn orange before they fall.

Male and female flowers are borne on separate trees. The blooms are very small, 5-parted, pale-green or greenish-white, profuse, in loose axillary panicles or racemes. Fruits are round, to 3/8 inch wide, brown-scurfy, with juicy, greenish flesh, in pendent strands from 4 inches to 4 ft