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RARE NATURALIZATION OF AN ORNAMENTAL TILLANDSIA, *TILLANDSIA IONANTHA* IN SOUTHERN FLORIDA

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ABSTRACT. Reported here is the naturalization of a Mesoamerican bromeliad, *Tillandsia ionantha,* in Broward County, southeast Florida. This species is a popular ornamental bromeliad. A total of 63 clusters of plants were found on 31 Australian pine trees adjacent to a mangrove forest at Anne Koeb Nature Center in Dania Beach, Florida. The presence of flowers and germinating seeds indicate that the population is reproducing sexually. No pollination agent(s) is known for this pollinator-dependent species at this location. This is only the second reported case of naturalization of *Tillandsia* world-wide.

Key words: Bromeliaceae, exotic species, Florida, naturalization, *Tillandsia ionantha*

DISCUSSION

A small population of the Mesoamerican bromeliad *Tillandsia ionantha* Planchon has been found in Broward County in southeastern Florida. Rosette clusters and seedlings of plants of *T. ionantha* are growing on the trunks of Australian pine trees (*Casuarina esquisetifolia* L.) at Anne Koeb Nature Center in Dania Beach, adjacent to Hollywood, Florida at 26°02′32″N and 80°07′09″W (FIGURE 1). The plants occur in clusters of 3 to 51 rosettes, with a median of 8 rosettes. Sixty-three clusters of plants were found on trunks of 31 trees in an area of 40 m^2. These clusters of plants are from 0.4 to 3.5 m above the ground with a median height of 1.27 m on the Australian pine trees. The sizes of the host trees range from 2 to 13 cm, with a median of 4.5 cm in dbh (diameter at breast height at 1.4 m height). The plants are growing on both living and dead trees, but the majority (81.6%) of the host trees are living. Eleven (17.5%) clusters consist of only juvenile plants (<2 cm rosette width), while the other 52 clusters of plants are presumably of reproductive size. Seedlings were also noted on 13 trees, but more intensive search would almost certainly reveal more seedlings. Nine rosette clusters (13.2%) were either in flower and/or had seedlings with associated seed filaments still attached during our May 19, 2007 assessment of the population. The natural vegetation at Anne Koeb Nature Center and the adjacent West Lake Park is comprised mostly of mangrove forest (*Conocarpus erectus* L., *Laguncularia racemosa* (L.) C.F.Gaertn., and *Rhizophora mangle* L.). This forest occurs within 10 meters down slope from the Australian pine trees colonized by *T. ionantha.* Searches along the edges of the mangrove forest and inside mangrove accessed by boardwalks failed to find additional *T. ionantha* plants in the park. Searches in other stands of Australian pine and other native plant or horticultural plantings in the park also failed to locate other *T. ionantha.* Discussions with park personnel responsible for horticultural plantings indicated that no *Tillandsia* species have been planted in the park.

Tillandsia ionantha is native to Mexico from Sinaloa in the northwest south to Costa Rica (Bailey & Bailey 1976, H. Luther pers. comm.). It is and has been grown on a commercial scale and is one of the more commonly available bromeliads. It is often one of the first bromeliads acquired by novice growers because of its small size, hardiness, and ease of cultivation (Staples & Herbst 2005). Tillandsia International, a wholesale nursery based in Coarsegold, California, lists 16 named cultivars and varieties and 4 hybrids of *T. ionantha,* more than any other species in its extensive sales list (www.airplant.com). It is commonly sold in Florida, and has been grown commercially within the same county where the naturalized population occurs. The now defunct Salter family nursery, which operated in Plantation in Broward County, specialized in *T. ionantha* and produced them in very large numbers (H. Luther, D. McLean pers. comm.).

The plants grow in dense clusters of rosettes, probably by the production of offsets. Individual

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FIGURE 1. *Tillandsia ionantha* plants growing on Australian pine trees (*Causurina equistifolia*) in a naturalized population of this escaped ornamental bromeliad in Dania Beach in southeast Florida.

rosettes are vase-shaped, taller than wide, and 5–10 cm high. Plants have stiff, erect, narrowly triangular leaves with a long-tapering apex. The leaves are green with scattered or dense ash grey scales, except during flowering, when the inner leaves are pink to red. The flowers are tubular, blue with a white base, have exserted stamens and style, arise from the rosette center, and extend just beyond the rosette tips. The pink to red leaves in the center of the grey-green rosettes gives this species a distinctive appearance, which has led to its horticulture common, name "blushing-bride." The dense clusters of small rosettes with red coloration in flowering plants readily separates it from Florida's 12 native *Tillandsia* species (Wunderlin & Hansen 2003), some of which are common in the southeastern part of the state. Voucher specimens of the naturalized *T. ionantha* plants are deposited in herbaria of the Fairchild Tropical Botanical Garden in Miami, Florida and the University of South Florida, Tampa, Florida.

Although *Tillandsia* species are popular horticultural subjects in the tropics and subtropics, few have naturalized worldwide. The only report found is that of *T. caput-medusae* C.J.Morren, recently reported to have escaped cultivation and naturalized on the island of Maui in Hawaii (Oppenheimer 2006). The requirement for pollination in most *Tillandsia* species (inferred by Benzing et al. 2000) and the absence of suitable pollinators probably accounts for the rarity of naturalization of *Tillandsia* species. The *Tillandsia* native to Florida are mostly autogamous (Benzing et al. 2000). Autogamy in these outlying populations of neotropical *Tillandsia* may reflect depauperate faunas (of pollinators) and/or founder effects by autogamous colonizers (Benzing et al. 2000). Autogamy also occurs in some native Florida orchids of tropical American origin, whose seed blew to Florida, leaving the plants' pollinators behind (van der Pijl & Dodson 1966).

Genetic studies have shown *T. ionantha* to be an outcrossing species (Soltis et al. 1987), and plants kept in a greenhouse isolated from pollinators do not produce fruit (D. Benzing pers. comm.). As indicated earlier, some of the plants bore flowers in March to May 2007, when the population was found and evaluated. Clusters of germinating seedlings enmeshed in the seed filaments were found atop and within the rosettes

FIGURE 2. Seedlings of *Tillandsia ionantha* enmeshed in the seed filaments attached to the rosette which bore the fruit generating the seed. This seed production indicates that sexual reproduction in this obligate, outcrossing species is occurring in the naturalized population.

of some plants (FIGURE 2), indicating that sexual reproduction is occurring in the population. We observed pollen on the stigma of a flower at the site, compared it to pollen from the anthers of the flower, and determined that it was conspecific pollen. The agent(s) responsible for *T. ionantha*'s pollination and subsequent fruit production in southern Florida have yet to be determined. Most *Tillandsia* subg. *Tillandsia,* to which *T. ionantha* belongs, are thought to be pollinated mostly by hummingbirds, and to lesser extent by bees and Lepidoptera (Benzing et al. 2000), but the pollination ecology of most species is unknown (H. Luther pers. comm.). *Tillandsia ionantha*'s red inner leaves, which appear at flowering, and its exserted flower parts suggest hummingbird pollination (Benzing et al. 2000). Although hummingbirds occur in southern Florida, they are not reliable pollinators. This has led to autogamy in the red-flowered terrestrial orchid *Sacoila lanceolata* (Aublet) Garay, which is hummingbird-pollinated in tropical America (Catling 1987). Pollination success is probably among the most important factors for *T. ionantha*'s expansion.

It is difficult to predict what the potential geographic range of *T. ionantha* will be in Florida, based on its currently known limited occurrence in the state. The plant has a large and ecologically diverse native range, which suggests broad environmental tolerance within tropical climate areas. It is intolerant of freezing temperature, which will probably limit it to southern Florida and central Florida along the coasts. Selby Botanical Gardens in Sarasota had outdoor planting of *T. ionantha* that included large clumps of plants, all of which were killed during the 1989 freeze when the low temperature reached −4.4°C (H. Luther pers. comm.). Coastal southeastern Florida, where the naturalization has occurred, experiences fewer freeze events than does Sarasota, but both native and ornamental plants were also seriously affected by the same 1989 freeze when the temperature dropped to −1.1°C in Ft. Lauderdale (www.weather.gov). Weather records have been kept for Ft. Lauderdale since 1912 and temperatures below −1.1°C have occurred on five occasions: −1.7°C in 1985 and 1934, −2.2°C in 1917 and 1977, and −5°C in 1943 (www.weather.gov). This suggests that long-term survival of naturalized tropical plants such as *T. ionantha* may be limited by relatively rare freeze events. Although global warming appears to be increasing Florida temperatures, it seems unlikely to eliminate rare freeze events. Australian pine, the host tree for the naturalized *T. ionantha* plants, is an invasive pest tree that is being removed from parks and preserves in

southern Florida. The naturalized plants of *T. ionantha* will probably not persist if the host trees are removed, unless plants or seeds spread beyond the site.

The introduced Mexican bromeliad weevil, *Metamasius callizona* (Chevrolat), was first collected in Florida on *T. ionantha* plants in a Ft. Lauderdale nursery (www. Creatures.ifas.edu). This weevil, which threatens some of Florida's native *Tillandsia* species is not likely to be a population regulatory agent of *T. ionantha.* The adults feed on *T. ionantha,* but because they do not lay eggs on the plant; it will escape damage from the larvae that feed within rosettes.

Currently about one-third of Florida's flora consists of naturalized plants, many of which are escapees from cultivation (RWP, assessed from Wunderlin & Hansen 2003). *Tillandsia ionantha*'s naturalization appears to be innocuous but it adds to the ever-increasing proportion of aliens in the state's flora.

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