

**NATURALIZED POPULATIONS OF DOTTED WILD COFFEE
(*PSYCHOTRIA PUNCTATA*)
IN BROWARD AND PALM BEACH COUNTIES, FLORIDA**

JAMES K. WETTERER
Wilkes Honors College
Florida Atlantic University
5353 Parkside Drive
Jupiter, Florida 33458
wetterer@fau.edu

ABSTRACT

Dotted wild coffee, *Psychotria punctata* (Rubiaceae), is a shrub native to tropical Africa. The leaves of this species are dotted with nodules that harbor mutualist bacteria. Outside its native range, naturalized populations of *P. punctata* are known from Florida in Miami-Dade County and the Florida Keys. Here, I document naturalized populations of *P. punctata* growing outside cultivation at two reserves in Florida, Hugh Taylor Birch State Park in Broward County and Pine Jog Environmental Education Center in Palm Beach County. At both sites, the plants appeared vigorous and produced fruit. In some areas at Pine Jog, *P. punctata* was the most common understory shrub. Nonetheless, it seems unlikely that *P. punctata* will become a problem invasive in Florida. In fact, the vigorous populations of *P. punctata* could provide useful study sites for examining the obligate mutualism between *P. punctata* and its species-specific endosymbiotic bacteria.

Wild coffee, *Psychotria* spp. (Rubiaceae, Rubioideae), gets its common name from the similar appearance of its small red fruit to those of its distant relative, true coffee, *Coffea* spp. (Rubiaceae, Ixoroideae). Dotted wild coffee, *Psychotria punctata* Vatke, is a shrub native to tropical Africa. The distinctive leaves of this species are dotted with nodules that harbor mutualist bacteria (Fig. 1), which produce secondary metabolites used by the plants (Schindler et al. 2021). The bacteria are transmitted from parent to offspring through the seeds (Sinnesael et al. 2018).

Outside tropical Africa, *Psychotria punctata* has been introduced to southern Florida, where the earliest known herbarium specimens were recorded in 1936 as growing at the Kampong, the estate of the botanist David Grandison Fairchild in Coconut Grove, Miami-Dade County, which is now the site of the National Tropical Botanical Garden (25.715N, 80.251W). Fairchild has been credited with introducing thousands of non-native plant species into the USA (Williams & Epstein 1963), so presumably he is responsible for the introduction of *P. punctata* into Florida. There have been only a few field-collected specimen records of this species in Florida, all from Miami and Key West (plantatlas.usf.edu). Long and Lakela (1971) wrote that *P. punctata* (as its junior synonym *Psychotria bacteriophylla* Vatke) grows in "disturbed sites locally and cultivated grounds, Key West, Fla. Keys, Miami, naturalized from Africa." Long and Lakela (1971) considered a species part of the naturalized Florida flora if "there is at least some evidence that they are established as self-reproducing outside of cultivation."

Burch et al. (1975) wrote that *Psychotria punctata* "is sparingly cultivated as an ornamental in South Florida," but rejected *P. punctata* as having naturalized status in Florida. Burch et al. (1975) wrote that "other than volunteer seedlings in one portion of the Fairchild Garden, it does not appear to be known to escape from cultivation. Plants in natural surroundings in Matheson Hammock and Simpson Park, Dade County, are probable horticultural introductions, and all available herbarium materials are from cultivated plants."

The Floristic Inventory of South Florida database (Gann et al. 2022), however, lists *Psychotria punctata* as naturalized at three conservation areas in Miami-Dade County: Enchanted Forest Park, Matheson Hammock Park, and Simpson Park, and as cultivated at one site in Broward Co.: Hugh Taylor Birch State Park. In addition, Gann et al. (2022) mapped records of *P. punctata* at Key West Tropical Forest and Botanical Garden and Fort Zachary Taylor State Historic Site, both in Key West.

In February 2022, I discovered a large population of *Psychotria punctata* growing on the grounds of Pine Jog Environmental Education Center in West Palm Beach. These are the first and only records of *P. punctata* from Palm Beach County. In the present study, I aimed to document naturalized populations of *P. punctata* in Broward and Palm Beach counties.

METHODS

In February-March 2022, I searched for *Psychotria punctata* plants growing in natural and semi-natural areas at Hugh Taylor Birch State Park (Birch SP) and Pine Jog Environmental Education Center (Pine Jog). I documented the distribution of *P. punctata* using geo-coordinate tagged photographs, which I posted to iNaturalist.

Birch SP is a 0.7 km² reserve in Broward County. It is part of the former estate of Hugh Taylor Birch, who donated the land to the Florida State Park Board upon his death in 1943. The Fort Lauderdale Garden Club cultivates two species of wild coffee that are native to Florida within the grounds of the park: the velvet-leaved wild coffee (*Psychotria tenuifolia* Sw.) and the Bahama wild coffee (*Psychotria ligustrifolia* (Northr.) Millsp.) (A. Gallo, pers. comm.).

Pine Jog is an education center in West Palm Beach, set on a 0.6 km² property that includes an elementary school, a Florida Atlantic University research and teaching lab, and a nature preserve. Pine Jog is the former estate of Mr. and Mrs. Alfred G. Kay, who purchased the land in 1946 and named it Pine Jog Plantation. The Kays, "after numerous discussions with John Storer, David Fairchild, Marston Bates, and others, decided to provide the area with an environmental center" (Austin 1976).

RESULTS

I documented *Psychotria punctata* at a cluster of sites in Birch SP (Fig. 2). Three sets of photos of *P. punctata* in Birch SP were posted on iNaturalist. These all came from a 40 m stretch near the loop road on the east side of the park (26.146N, 80.104W). Two photos include flowers (22-Sep-2020; abastias; [inaturalist.org/observations/60451182](https://www.inaturalist.org/observations/60451182)), one photo includes fruit (19-Jan-2019; E. Fonseca; [inaturalist.org/observations/19730968](https://www.inaturalist.org/observations/19730968)), and one includes only leaves (4-Jan-2019; A. Pitcher; [inaturalist.org/observations/21565278](https://www.inaturalist.org/observations/21565278)). On 19 March 2022, I confirmed the persistence of this naturalized population of *P. punctata* at Birch SP. I found dozens of *P. punctata* plants 10–20 m north and west of the earlier sites; only one plant was directly next to the road. I photographed plants at three sites; none of these plants had flowers or fruit. Most *P. punctata* plants I saw were mixed in with native shiny-leaved wild coffee plants (*Psychotria nervosa* Sw.), which are the main understory shrubs in much of the park.

From 22 February to 29 March 2022, I documented the distribution of *Psychotria punctata* plants at Pine Jog, with photographs at 50 sites (Fig. 3). I found the population spanned more than 400 m near the north border of the preserve (26.6705N, 80.1433W to 26.6703N, 80.1387W). The population consisted of many thousands of plants, ranging from seedlings to 4 m tall shrubs. The north edge of Pine Jog property is bounded by a canal, with a berm that runs 5–10 m south of the canal. A large number of *P. punctata* were growing under canopy trees on the berm, as well as in shaded areas up to 60 m south of the berm. Many plants bore fruit, even plants only 10 cm tall. None had flowers. The plants grew almost exclusively in areas shaded by trees. The plants most heavily laden with fruit were on the edges of shaded areas, receiving direct sun in part of the day.

DISCUSSION

I found dotted wild coffee, *Psychotria punctata*, growing outside of cultivation at two reserves in Broward and Palm Beach counties. The plants appeared vigorous and produced fruit. In some areas at Pine Jog, *P. punctata* was the most common understory shrub. The very high concentration of plants over a relatively limited area suggests primarily short-distance dispersal of seeds. It seems most likely that *P. punctata* was originally brought to the Birch and Kay estates as cultivated ornamental plants, but the species spread on these properties and became naturalized, i.e., established self-reproducing populations outside of cultivation. *Psychotria punctata* may be less successful at spreading in Birch SP in part due to competition with the abundant *P. nervosa*, which is rare at the north end of Pine Jog. In addition, land managers at Birch SP may be actively exterminating *P. punctata*. When I inquired at the park about whether there was any cultivation of *P. punctata*, I was told no. But then they were eager to know where I found them. They said that there are workers whose full-time job in the park is to eliminate exotic species.

It would be useful to search neighboring natural and semi-natural areas for the presence of *Psychotria punctata*. *Psychotria ligustrifolia*, a native species which co-occurs with *P. punctata* at Matheson Hammock Park and Pine Jog, is considered endangered in Florida (Ward et al. 2003). Though perhaps unlikely, if *P. punctata* is able to hybridize with *P. ligustrifolia*, this could threaten the survival of this endangered native species.

Psychotria punctata has shown very limited spread over the course of its 85+ years in Florida, and thus appears unlikely to become a problem invasive. The vigorous population of *P. punctata* at Pine Jog, however, could provide a useful study specimen source for researchers examining the obligate mutualism between *P. punctata* and its species-specific endosymbiotic bacterium.

ACKNOWLEDGMENTS

I thank M. Wetterer and S. Wetterer for comments on this manuscript. I thank Florida Atlantic University for financial support.

LITERATURE CITED

- Austin, D. 1976. Vegetation of southeastern Florida - I. Pine Jog. *Florida Scientist* 39: 230–235.
- Burch, D., R.P. Wunderlin, and D.B. Ward. 1975. Contributions to the flora of Florida: 9, *Psychotria* (Rubiaceae). *Castanea* 40: 273–279.
- Gann, G.D., C.S. Stocking, and collaborators. 2022. *Psychotria punctata* Vatke, Dotted wild coffee. In The Floristic Inventory of South Florida Database Online. The Institute for Regional Conservation, Delray Beach, Florida. <<https://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Psycpunc>> Accessed 29 Mar 2022.
- Long, R.W. and O. Lakela. 1971. A Flora of Tropical Florida. A Manual of the Seed Plants and Ferns of Southern Peninsular Florida. Univ. of Miami Press, Coral Gables, Florida.
- Schindler, F., L. Fragner, J.B. Herpell, A. Berger, M. Brenner, S. Tischler, A. Bellaire, J. Schönenberger, W. Li, X. Sun, J. Schinnerl, L. Brecker, and W. Weckwerth. 2021. Dissecting metabolism of leaf nodules in *Ardisia crenata* and *Psychotria punctata*. *Front. Mol. Biosci.* 8:683671. doi: 10.3389/fmolb.2021.683671
- Sinnesael, A., S. Eeckhout, S.B. Janssens, E. Smets, B. Panis, O. Leroux, and B. Verstraete. 2018. Detection of *Burkholderia* in the seeds of *Psychotria punctata* (Rubiaceae) – Microscopic evidence for vertical transmission in the leaf nodule symbiosis. *PLoS ONE* 13(12): e0209091. <<https://doi.org/10.1371/journal.pone.0209091>>
- Ward D.B., D.F. Austin, and N.C. Coile. 2003. Endangered and threatened plants of Florida, ranked in order of rarity. *Castanea* 68: 160–174.
- Williams, B. and S. Epstein. 1963. *Plant Explorer*. Julian Messner, New York.



Figure 1. Dotted wild coffee growing at Pine Jog Environmental Education Center. Photo 29 March 2022.



Figure 2. Distribution of photographed records of dotted wild coffee on the grounds of Hugh Taylor Birch State Park. Map made using carto.com.



Figure 3. Distribution of photographed records of dotted wild coffee on the grounds of Pine Jog Environmental Education Center. Map made using carto.com.