Macaranga tanarius

Parasol leaf tree
Euphorbiaceae

Forest Starr, Kim Starr, and Lloyd Loope
United States Geological Survey--Biological Resources Division
Haleakala Field Station, Maui, Hawai'i

January, 2003

OVERVIEW

Macaranga tanarius, native to Malaysia, is a medium size tree that is cultivated for ornament and reforestation in Hawai'i and other tropical regions of the world. In Hawai'i, *M. tanarius* is naturalized in disturbed mesic valleys on Kaua'i, O'ahu, and Maui (Oppenheimer et al. 1999, Wagner et al. 1999). On Maui, *M. tanarius* is widely naturalized in the Waikapu area of West Maui where it forms dense thickets in mesic valleys and streams from near sea level up to about 4,400 ft (1,341 m) elevation. On East Maui, only a single cultivated tree is currently known from a residential planting in Ha'iku. On West Maui, the infestation may not be feasible to control due to the vast area that it covers in steep and difficult terrain. On East Maui, there will always be the potential of re-invasion from the west side of the island, but control of the lone tree now may prevent a large infestation from occurring in the future.

TAXONOMY

Family: Euphorbiaceae (spurge family) (Wagner et al. 1999).
Latin name: *Macaranga tanarius* (L.) Mull. Arg. (Wagner et al. 1999).
Synonyms: *Ricinus tanarius* L. (Wagner et al. 1999), *Macaranga molliuscula* Kurz, *Macaranga tomentosa* Druce, *Mappa tanarius* Blume (World Agroforestry Centre 2002).
Common names: Parasol leaf tree (Randall 2002), *Macaranga* (Neal 1965).
Taxonomic notes: The genus, *Macaranga*, is made up of 250-280 species from tropical Africa, Madagascar, and Malesia to Australia and some parts of the Pacific, though none are native to Hawai'i (Wagner et al. 1999).
Nomenclature: The name refers to the native Madagascar name for these plants (Wagner et al. 1999).
Related species in Hawai'i: Another species also known from Hawai'i is *Macaranga mappa* (L.) Mull. Arg. and is distinguished by it's larger leaves (60-100 cm) and bracts and calyx pink (Wagner et al. 1999).

DESCRIPTION

"Dioecious trees 4-10(-20) m tall. Leaves peltate, ovate to oblong-ovate, 8-30 cm long, petioles 6-25 cm long, stipules oblong to narrowly ovate, 1-3 cm long, quickly deciduous. Staminate flowers in open panicles 13-35 cm long, bracts and calyx pale green to yellowish green, stamens (3)4-6(-10), anthers tetrathecal; pistillate flowers in panicles 8-30 cm long, ovary 2-3 celled, styles 5-8 mm long. Capsules 2-3-valved, 10-12 mm long, covered with pale waxy glands and soft, scattered, elongate, spine-like processes." (Wagner et al. 1999).

BIOLOGY & ECOLOGY

Cultivation: *Macaranga tanarius* is cultivated for a variety of uses. This small tree is grown as an ornamental tree in landscaping and for reforestation projects in Hawai'i and other warm tropical regions of the world. The following uses for *M. tanarius* are listed by World Agroforestry Centre (2002). In Sumatra, the fruit of *M. tanarius* are added to palm juice and boiled to produce sugar for use in foods. In Indonesia and the Philippines, the gum from the bark is used as a glue. *M. tanarius* is used for firewood, it's fibers can be used to make particle boards, it is also grown for timber, and promoted as a shade tree for other crops. Other uses include dyes made from it's leaves and fermented drinks made from the leaves and bark.

Invasiveness: *M. tanarius* is naturalized in Hawai'i in disturbed mesic valleys, 0-220 m (721 ft) on Kaua'i and O'ahu (Wagner et al. 1999), and also on Maui (Oppenheimer et al. 1999), where it is found from near sea level to over 4,400 ft (1,341 m) (Fern Duvall pers comm.). *M. tanarius* is naturalized on West Maui in the Waikapu area where it forms dense thickets in streams, valleys, and moist areas. These dense thickets crowd out desirable vegetation and can form deep shade in streams and valleys. This prolific tree also invades roadsides, fencelines, and disturbed areas nearby major infestation sites.

Pollination: *M. tanarius* is wind pollinated with flowering and fruiting occurring several times a year (World Agroforestry Centre 2002).

Propagation: *M. tanarius* is propagated from seeds, with an average germination rate of 50% if the pulp is left on the seeds (World Agroforestry Centre 2002).

Dispersal: Uncertain, *M. tanarius* is possibly dispersed by wind, water, and birds. The plant on East Maui was cultivated in a yard and did not appear that it had dispersed from West Maui, but was more likely planted by the homeowner or came as a contaminant in soil. Trees on West Maui do germinate some distance away from the original infestation (less than 5 miles) but so far long distance spread further than that has not been documented.

Pests and Diseases: Unknown.

DISTRIBUTION

Native range: *M. tanarius* is native to the following regions: Australia, Brunei, Cambodia, China, Indonesia, Japan, Laos, Malaysia, Myanmar, Papua New Guinea, Philippines, Taiwan, Province of China, Thailand, and Vietnam (World Agroforestry Centre 2002). Average annual rainfalls in these areas varies from 40-over 80 in (100-over 200 cm) with average temperatures ranging from 50-over 68 F (10-over 20 C) in January to over 86 F (over 30 C) in July (Hammond 1986). In these regions, *M. tanarius* grows up to an elevation of 1,500 m (4,921 ft) and is common in secondary forests, especially in logging areas and also is found in thickets, brushwood, village groves, and beach vegetation (World Agroforestry Centre 2002). *M. tanarius* grows in a variety of

soil types including clay, loam, and sand and is usually found in the lowlands (World Agroforestry Centre 2002).

Global distribution: *M. tanarius* is cultivated in tropical regions throughout the world.

State of Hawai'i distribution: In Hawai'i, forestry records for *M. tanarius* report that in Lihue-Koloa, Kaua'i a total of 30 trees were planted in 1927, in Honolulu, O'ahu a total of 6 trees were planted in 1926, and in Hilo, Hawai'i a total of 237 trees were planted in 1926 (Skolmen 1960). *M. tanarius* is now naturalized in Hawai'i in disturbed mesic valleys, 0-220 m (721 ft) on Kaua'i and O'ahu (Wagner et al. 1999), and also on Maui (Oppenheimer et al. 1999), where it is found from near sea level to over 4,400 ft (1,341 m) (Fern Duvall pers comm.). The current status of the Hilo, Hawai'i planting is uncertain and needs further investigation.

Island of Maui distribution: On Maui, the major *M. tanarius* infestation occurs on West Maui, in the Waikapu area. Here, *M. tanarius* fill valleys, streams, and disturbed areas up to an elevation of 4,426 ft (1,349 m), the summit of Kapilau. Average annual rainfall in these areas ranges from about 15 in (38 cm) near the dry coastal areas and up to 100 in (254 cm) at higher elevations on West Maui (Juvik and Juvik 1998). Trees become less dense away from the main infestation, but can be found to the south along the Mokulele Highway towards Kihei germinating in roadside hedges, along irrigation lines, and cane roads. The infestation is large and would probably require vast resources and time to control. In addition, much of the terrain is inaccessible sheer cliffs, further complicating control and mapping. On East Maui, only a single specimen was located during island wide surveys in 2000. The tree appeared to be cultivated at a residence in Ulumalu, Ha'iku. The elevation here is about 1,000 ft (305 m) with an average annual rainfall about 100 in (254 cm) (Juvik and Juvik 1998).

CONTROL METHODS

Control methodology for *M. tanarius* has yet to be refined for Hawai'i. It is uncertain whether cutting at the base would completely control this tree or if application of herbicides are necessary. Further testing is necessary to be sure.

Physical control: Most likely, seedlings and small plants can be dug up. In ornamental situations if the stand is of a reasonable size, digging the plant up may be the preferred method.

Chemical control: In large wild stands, perhaps a cut stump or basal bark herbicide method would be effective. Foliar spray on this tall tree may not be effective and is not advised in areas where non-target plants were present.

Biological control: None known.

Cultural control: The public could be discouraged from planting *M. tanarius*, especially near natural areas or wet areas.

Noxious weed acts: None known.

MANAGEMENT RECOMMENDATIONS

On West Maui, the infested areas were not mapped in full accuracy due to inaccessible terrain. This species may be best mapped from a helicopter to refine the current boundaries of the infestation. The infestation here seems too large and difficult to eradicate. Perhaps containment would be the best strategy. The single specimen on East Maui should be controlled to prevent a larger infestation in the future. Monitoring should continue on both East and West Maui to detect new locations and these could be controlled if deemed appropriate and feasible.

REFERENCES

Hammond Incorporated. 1986. *Hammond Citation World Atlas*. Hammond Incorporated, Maplewood, NJ.

Juvik, S.P and J.O. Juvik. 1998. *Atlas of Hawai'i.* 3rd ed. Department of Geography, University of Hawai'i press, Honolulu, HI.

Neal, M.C. 1965. *In Gardens of Hawai'i.* Bernice P. Bishop Museum Special Publication 40, Bishop Museum Press, Honolulu, HI.

Oppenheimer, H.L., J.S. Meidell, and R.T. Bartlett. 1999. New plant records for Maui and Moloka'i. *Bishop Museum Occasional Papers* 59(2): 7-11.

Randall, R. 2002. Global Compendium of Weeds. Department of Agriculture - Western Australia. Available: http://www.hear.org/gcw (Accessed: August 22, 2002).

Skolmen, R.G. 1960. *Plantings on the Forest Reserves of Hawai'i: 1910-1960.* Institute of Pacific Islands Forestry, Pacific Southwest Forest and Range Experiment Station, United States Forest Service, Honolulu, HI.

Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1999. *Manual of the Flowering Plants of Hawai'i.* 2 vols. Bishop Museum Special Publication 83, University of Hawai'i and Bishop Museum Press, Honolulu, HI.

World Agroforestry Centre. 2002. Botanic Nomenclature to Agroforestry trees: *Macaranga tanarius*. World Agroforestry Centre. Available: http://www.worldagroforestrycentre.org (Accessed: August 22, 2002).