

Flemingia macrophylla

warrus tree, waras tree

(Willd.) Kuntze

Fabaceae - Papilionoideae

LOCAL NAMES

Chinese (niudexun, jia'yanpiguo, da'yeqianjinba, qianjinhong); English (large leaf flemingia); Filipino (gewawini, malabalatong, laclay-guinan); Hindi (samnaskahat, bhalia); Indonesian (apa-apa, hahapaan, pok-kepokan); Javanese (apa-apa); Lao (Sino-Tibetan) (thwàx h'è: h'üad, h'öm sa:m müang, thwàx h'üad); Malay (serengan jantan, beringan); Nepali (batwasi, kamatteri); Thai (khamin-nang, mahae-nok, khamin-ling); Trade name (warrus tree, waras tree); Vietnamese (cây dau ma, cai duoi chon, c[aa]y dau ma, tốp mo' láto, tosp mow lasto)

BOTANIC DESCRIPTION

Flemingia macrophylla is a woody, deep-rooting, tussock-forming shrub, 1-4 m tall. Young branches greenish, ribbed, triangular in section and silky. Old stems brown, almost round in section.

Leaves digitately trifoliate; stipules lanceolate, 1-1.5 cm long, covered with silky hairs, early caducous; petiole up to 10 cm long, narrowly channelled, slightly winged; leaflets elliptical-lanceolate, 6-16 x 4-7 cm, papery, dark green, base rounded, veins covered with silky hairs, apex rounded to acuminate.

Inflorescence a dense axillary raceme, sub-spiciform, sessile, 2.5-10 cm long, pale velutinous, green, with 5 lanceolate lobes; corolla with greenish elliptical standard and distinct parallel red veins, wings narrow and much shorter than the keel, light purple at the apex.

Pod oblong, inflated, 8-15 x 5 mm, covered with fine glandular hairs, dehiscent, dark brown, 2-seeded. Seed globular, 2-3 mm in diameter, shiny black.

The specific name, 'macrophylla', means large leaved; from the Greek 'makros' (large) and 'phylon' (leaf).

BIOLOGY

In southern Yunnan in China, the buds and new leaves sprout from February to April, and flowering extends from June-August. The pods ripen from September to November.



Flemingia macrophylla showing foliage and flowers. (Tropical Forage Legumes, FAO, 1988) (www.ecoport.org)



Flemingia macrophylla at Baptist Rural Life Center in Mindanao, Philippines (Shelton H.M.)



Flemingia macrophylla alley cropping system in Baptist Rural Life Center Mindanao, Philippines (Shelton H.M.)

Flemingia macrophylla

(Willd.) Kuntze

Fabaceae - Papilionoideae

warrus tree, waras tree

ECOLOGY

F. macrophylla can tolerate fairly long dry spells and is capable of surviving on poorly drained soils with waterlogging. The species is found naturally growing along watercourses in secondary forest, as well as under drier conditions such as in fields infested with *Imperata cylindrica*. It is tolerant of light shade and is moderately able to survive fires.

BIOPHYSICAL LIMITS

Altitude: 0-2 000 m, Mean annual rainfall: 1 100-2 850 mm

Soil type: Found naturally on both on clay and lateritic soils. The species has an outstanding adaptation to acid (pH 4.6) and infertile soils with high soluble aluminium (80% saturation).

DOCUMENTED SPECIES DISTRIBUTION

Native: Brunei, Cambodia, China, India, Indonesia, Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Taiwan, Province of China, Thailand, Vietnam

Exotic: Argentina, Benin, Bolivia, Botswana, Brazil, Burkina Faso, Cameroon, Central African Republic, Chad, Chile, Colombia, Congo, Costa Rica, Cote d'Ivoire, Democratic Republic of Congo, Ecuador, French Guiana, Gabon, Gambia, Ghana, Guatemala, Guinea, Guyana, Honduras, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mauritania, Mexico, Namibia, Nicaragua, Niger, Nigeria, Panama, Papua New Guinea, Paraguay, Peru, Senegal, Sierra Leone, South Africa, Surinam, Swaziland, Tanzania, Togo, Uganda, Uruguay, Venezuela



The map above shows countries where the species has been planted. It does neither suggest that the species can be planted in every ecological zone within that country, nor that the species can not be planted in other countries than those depicted. Since some tree species are invasive, you need to follow biosafety procedures that apply to your planting site.

Flemingia macrophylla

(Willd.) Kuntze

Fabaceae - Papilionoideae

warrus tree, waras tree

PRODUCTS

Fodder: In some areas, such as Ghana, *F. macrophylla* remains green throughout the year and retains most of its leaf during the dry season, making it suitable as a dry-season browse species. Palatability of immature herbage is considerably better than that of old mature herbage.

Fuel: Fuelwood is a valuable byproduct. A 2-year-old stand with a spacing of 0.5 x 4 m can produce about 6.8 t of dry woody stems/ha.

Tannin or dyestuff: One of the sources of the Arab dye called 'waras' or 'warrus'. It is a coarse purple or orange-brown powder consisting of the glandular hairs rubbed from dry *Flemingia* fruit; capable of dyeing silk but not wool or cotton, the active component is called flemingin.

Medicine: In Indonesia and Malaysia, the leaves are used medicinally. In China, a decoction is used to bathe sores and swellings, while in Taiwan it is an antipyretic for treating postpartum fever and is used to treat paralysis and pain in the joints.

Other products: *Flemingia indica* is a minor host of the Indian and Chinese lac insects.

SERVICES

Erosion control: Grown on terraces to control soil erosion.

Shade or shelter: A cover and shade crop in young plantations of cocoa, sisal, coffee, banana, plantain, oil palm and rubber; also acts as a good windbreak. In Madagascar, it is planted as a windbreak in tea plantations at Lac Alaotra.

Nitrogen fixing: *F. macrophylla* forms root nodules and fixes atmospheric nitrogen in symbiosis with *Bradyrhizobium* strains. Root nodules are often difficult to locate, partly because they are very small.

Soil improver: Provides mulch for associated food crops. Owing to the slow decomposition of the leaves, the mulch has long-term effects in weed control, moisture conservation and reduction of soil temperature. *Flemingia* mulch forms a relatively solid layer that effectively prevents germination of weed seeds or stunts their early development for 100 days.

Boundary or barrier or support: Grown in hedges; promising when used as a live fence. In Malaysia, it is a useful bush to plant with creeping legumes, as it provides support for them to climb on and is deep rooting.

Intercropping: Grown in alley-cropping systems, used in Cote d'Ivoire in pineapple plantations to control nematode infestation. Grown as an understorey for the Honduras pine (*Pinus caribaea* var. *hondurensis*). Useful as a cover crop in perennial plantations.

Flemingia macrophylla

(Willd.) Kuntze

Fabaceae - Papilionoideae

warrus tree, waras tree

TREE MANAGEMENT

Good weed control is required during the 1st 6 months of sowing since the plants are relatively slow to establish; once established, they require little attention. Mulching at a rate of 3 t/ha effectively controls the germination of weed seeds for about 3 months. Under tropical, humid, lowland conditions in Cote d'Ivoire, with 10 000 plants/ha and 9 regrowth cycles of 3 months each, an average annual production of 12 t/ha of leaf dry matter has been achieved, although typical yields in Southeast Asia may be closer to 8 t/ha. Plants can be cut more frequently than every 3 months, but preferably not at intervals of less than 40 days. With an excellent coppicing capacity, the shrub will survive under this cutting regime for many years.

GERMPLASM MANAGEMENT

Seed storage behaviour is orthodox. There are 45 000-97 000 seeds/kg.

PESTS AND DISEASES

Insect pests such as the fly *Agromyza* spp. reduce seed production by laying eggs in green pods. *F. macrophylla* is an off-season host for the pod fly *Melanagromyza obtusa*, an important pest of pigeonpea, especially in central and northern India.

Flemingia macrophylla

(Willd.) Kuntze

Fabaceae - Papilionoideae

warrus tree, waras tree

FURTHER READING

Faridah Hanum I, van der Maesen LJG (eds.). 1997. Plant Resources of South-East Asia No 11. Auxillary Plants. Backhuys Publishers, Leiden, the Netherlands.

Gutteridge RC and Shelton HM (eds.). 1994. Forage Tree Legumes in Tropical Agriculture. CAB International, Wallingford, UK.

Hong TD, Linington S, Ellis RH. 1996. Seed storage behaviour: a compendium. Handbooks for Genebanks: No. 4. IPGRI.

ICRAF. 1992. A selection of useful trees and shrubs for Kenya: Notes on their identification, propagation and management for use by farming and pastoral communities. ICRAF.

Mbuya LP et al. 1994. Useful trees and shrubs for Tanzania: Identification, Propagation and Management for Agricultural and Pastoral Communities. Regional Soil Conservation Unit (RSCU), Swedish International Development Authority (SIDA).

NFTA. 1989. *Flemingia macrophylla* - a valuable species in soil conservation. NFTA 89-04. Waimanalo, Hawaii

Perry LM. 1980. Medicinal plants of East and South East Asia : attributed properties and uses. MIT Press. South East Asia.

Roshetko JM and Evans DO. 1997. Domestication of Agroforestry trees in Southeast Asia. Yogyakarta, Indonesia.

t Mannelje L, Jones RM. 1992. Plant Resources of South-East Asia. No. 4: Forages. Pudoc Scientific Publishers, Wageningen.

SUGGESTED CITATION

Orwa C, Mutua A , Kindt R , Jamnadass R, Simons A. 2009. Agroforestry Database:a tree reference and selection guide version 4.0 (<http://www.worldagroforestry.org/af/treedb/>)