Ilex paraguariensis

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Aquifoliaceae

LOCAL NAMES
English (St. Bartholomew's tea,mate,Brazilian tea,Paraguay tea,Paraguay herb,yerba mate,jesuit's tea); French (thé du Paraguay,arbre à maté,thé des jé-suites); German (Mateteestrauch,Matebaum); Spanish (yerba mate,té de los jesuitas,yerva de palos,yerva mate)

Seeds (Tracey Slotta @ USDA-NRCS PLANTS Database)

BOTANIC DESCRIPTION
An evergreen dioecious shrub or tree up to 18 m tall in the wild, in cultivation pruned to a 3 – 6 m tall multi-stemmed and highly branched bush.

Leaves alternate, blade obovate, 10 – 12 cm by 5 – 6 cm, tapering towards the base, with serrate margin and obtuse apex, dark green, stiff and glabrous (leathery).

Inflorescence an axillary, corymboid fascicle with 3 – 11 male or 1 – 3 female flowers; flowers small, and simple pedicellate, with 4 white petals, ovary 4-locular with 1 – 2 ovules per cell.

Fruit small reddish to blackish, globular drupe, 0.5 – 0.8 cm in diameter, with four pyrenes (propagules), each containing one seed. The fruit resembles a pepper berry.

BIOLOGY
It flowers in the spring between the months of October and December, has entomophilous pollination (diptera, hymenoptera) and fruits are harvested between February – June in South America; dissemination is endozoic (birds). There is a rudimentary embryo in many externally ripe seeds which causes a long period of germination from the time of sowing.

ECOLOGY
Maté grows naturally in humid forests, preferably near streams, and on depressions of foot hills under subtropical conditions. It seems to grow well in sun and part-shade and will naturally occur in a climate that is hot and wet during summer, cold and dry during winter.

BIOPHYSICAL LIMITS
Altitude: 457- 610 m above sea level
Temperature: mean annual temperature 21 - 22°C; established trees tolerate temperatures as low as -6°C and also snow, and temperatures as high as 40°C or more.
Rainfall: at least 1200 mm of well distributed rainfall per year with 250 mm during the driest season.
Soil type: grows well on slightly acidic (pH 5.8 – 6.8), medium to fine textured oxisols. It does not tolerate lime-rich soils or water logging.

DOCUMENTED SPECIES DISTRIBUTION

Native: Argentina, Brazil, Paraguay, Uruguay
Exotic: India

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.

PRODUCTS
Food (beverage): the leaves of I. paraguariensis are the source of the well known beverage mate, obtained by infusing the dried leaves and twigs in hot water, just like tea. Like green and black tea (Camellia sinensis), maté is processed into both green and fermented forms. In much of South America it is used more commonly than coffee or tea as a daily stimulant. The beverage has a pleasant aroma and a slightly bitter taste. It is also used to flavour other products like liqueurs, ice-creams and desserts. There are also reports of non-traditional uses, e.g. as a source of edible oils.

Medicine: maté is used medicinally as a diuretic, depurative, and a general tonic to relieve mental depression, headaches and physical fatigue. In Europe, mate is used to achieve weight loss, as it reduces appetite. It also been used against allergies and sinusitis. It is known to cleanse blood, bowels, stimulate digestion and enhance immunity.

Cosmetics: it is also used in perfumery to introduce a pronounced greenness in floral bouquets.

TREE MANAGEMENT
In general three systems of mate cultivation can be distinguished i.e. collecting from the natural maté vegetation whereby few cultivation practices are involved and harvesting is manual and common in Brazil; enrichment planting which involves supplementing natural maté populations by interplanting and by replacing of dead maté trees - most commonly applied in Brazil and lastly, the establishment of maté plantations where young trees are pruned annually up to the third or fourth year to maintain a proper shape and height of 3 - 6 m.

Yields are improved by: planting following contours; the use of natural or introduced cover (rape, legumes, etc.); fertilization (NPK); weed control (mechanical and/or using herbicides); suitable phytosanitary treatments; and rational harvesting. Rising from a density of 1000 to 1500 plants per hectare to a density of 2500 or 4000 plants per hectare, production can increase from about 1000 to 1800 kg to 2100 to 3300 kg per hectare.

GERMPLASM MANAGEMENT
Ilex paraguariensis is at risk due to the gradual disappearance of its natural forest habitat in South America. Clonal gardens and seed propagated germplasm collections have been maintained since 1974 by the 'Instituto Nacional de Tecnologia Agropecuaria' (INTA) at Misiones, Argentina.

I. paraguariensis seeds have poor storability and low germination rates that may have restricted maté cultivation beyond the limits of its main areas of origin in South America. Stored at 5°C, they maintain a much reduced germinating capacity (1.7 to 6.6 percent) for a further 11 months. The relatively short period of viability together with the low germination rate (immature embryos, phytosanitary problems) have undoubtedly been the cause of the difficulties in its cultivation spreading to other continents in the past.

PESTS AND DISEASES
Damping-off disease caused by Fusarium, Rhizoctonia and Alternaria spp. is a serious problem in mate seedlings and can be prevented by the application of fungicides. In plantations mate can be severely damaged by a number of insect pests. The 'psilido' (Methaphalara spegazziniana) lay eggs inside the buds and causes deformation of the leaves. The 'acaro del bronceado' (Dichopelmus notus) induces abundant leaf fall. Other pests are the beetle Hedipathes betulinus, the moth Perigonia lusca and the wax scale Ceroplates grandis (Homoptera). Whenever economically feasible, chemical control methods are used. However, 'organic' mate cultivation has been successful at Misiones in northern Argentina.

FURTHER READNG

Bruneton J. 1995. Pharmacognosy, phytochemistry, medicinal plants. Technique & Documentation Lavoisier, Paris, France. p.298.

Budavari S, O'Neil MJ, Smith A, Heckelman PE (eds.). 1989. The Merck Index: An Encyclopedia of Chemicals, Drugs, and Biologicals, 11th ed. Merck & Co., Inc. Rahway, N.J.

Duke JA. 1985. Handbook of Medicinal Herbs. CRC Press, Boca Raton.

Goldberg A, Altaffer P, Altaffer M. (eds.). 1997. Brazilian Botanical Monographs, 1st ed. New World Enterprises, Inc. Oakland.

Grieve M. 1979. A Modern Herbal. Dover Publications, Inc. New York.

Karnick CR. 1994. Pharmacopoeial Standards of Herbal Plants, Vol. 1. Sri Satguru Publications, Delhi.

Lowen JC, Bartrina L, Clay RP, Tobias JA. 1995. Biological Surveys and Conservation Priorities in Eastern Paraguay. CSB Conservation Publications, ItabÛ, Paraguay:

Lust JB. 1974. The Herb Book. Benedict Lust Publications, Simi Valley, CA.

McGuffin M, Hobbs C, Upton R., Goldberg A. 1997. American Herbal Product Association's Botanical Safety Handbook. CRC Press, Boca Raton.

Newall CA, Anderson LA., Phillipson JD. 1996. Herbal Medicines: A Guide for Health-Care Professionals. The Pharmaceutical Press, London.

Reynolds JEF (ed.). 1993. Martindale: The Extra Pharmacopoeia, 30th ed. The Pharmaceutical Press, London.

van der Vossen HAM & Wessel M (edts.). 2000. Plant Resources of South East Asia No. 16. Stimulants. Backhuys Publishers, Leiden, the Netherlands.

Vera Garcia R, Basualdo I, Peralta I., Herebia de M, Caballero S. 1997. Minerals content of Paraguayan yerba maté (Ilex paraguariensis, S.H.). Arch Latinoam Nutr 47(1)

Wagner H, Bladt S, Zgainski EM. 1984. Plant Drug Analysis. Berlin-Heidelberg: Springer Verlag.

Wichtl M. & Bisset NG. (eds.). 1994. Herbal Drugs and Phytopharmaceuticals. Stuttgart: Medpharm Scientific Publishers.

SUGGESTED CITATION

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