

PESTICIDAL PLANT LEAFLET

Tithonia diversifolia (Hemsley) A. Gray



Taxonomy and nomenclature

Family: Asteraceae

Synonym: *Mirasolia diversifolia* Hemsl.

Vernacular/ common names:

(English): Mexican sunflower, tithonia, tree marigold

(Kisii): Amaua maroro

(Kikuyu): Maruru

(Kamba): Ilaa

(Luo): Maua makech, akech, maua madungo

(Luhya): Maua amalulu

Distribution and habitat

It is a common shrub on field boundaries, grasslands and disturbed lands in East Africa. Initially introduced into Kenya from Central America as an ornamental plant, it is now found in Western and Central provinces, in coastal regions and parts of Rift Valley. It grows in regions of 550-1950 m altitude and mean annual temperature of 15-31 C and mean annual rainfall of 100-2000 mm.

Uses

Pesticidal - *Tithonia* spp. are well known for sesquiterpene lactones and diterpenoids – some of which have biological activities against insects. Most bioassays have been conducted using extracts so are not specific about which compounds are responsible for effects. In Uganda, farmers use it in field and storage pest management although there is no published work to report evidence for these effects.

Medicinal - Infusion suitable for constipation, stomach pains, indigestion, sore throat, liver pains and to treat malaria. Also reported activities as anti-inflammatory, analgesic, antimalarial, antiviral, antidiabetic, anti-diarrhoeal, antimicrobial, antispasmodic, vasorelaxant and cancer-chemopreventive.

Fodder - Leaves, soft branches, flowers. Have high nutritive-quality index.

Fuel - Firewood to farmers.



Botanical description

T. diversifolia is a woody herb or succulent shrub, 1.2-3 m tall. Opposite leaves (3-5), attenuate base, acute apex, crenate margin. Leaf size is 5-17 x 5-12 cm, densely pubescent beneath, palmate venation. Occasionally upper leaves are unloaded.

Flowers are yellow, their ray size is 306 cm x 5-18 mm. The flower heads are solitary on a peduncle 6-13 cm long. Each mature stem may bear several flowers at the top of branches.

The plant flowers and produces seeds throughout the year. The light weight seeds can be dispersed by wind, water and animals.

Note: Always verify your plant specimen and deposit a voucher in a verified herbarium.

Seed description

The 'seeds' (achenes) are 4-8 mm long and topped with a ring (pappus) of scales and two awns (about 5 mm long). These 'seeds' are covered in close-lying hairs (they are appressed pubescent), blackish in colour, and are somewhat four-angled.

Flowering and fruiting habit

T. diversifolia flowers and produces seeds throughout the year and at different times in its separate habitats and mainly during the rainy seasons in east Africa. *Tithonia diversifolia* is a prolific seeder which retains its seeds until the plant dries in the dry season when the seeds disperse and are spread by wind, water and the movement of people, livestock and vehicles.

Propagation and cultivation

T. diversifolia can be propagated from seeds and cuttings. Seeds germinate readily when sown fresh, without treatment, all year round. Seeds are sprinkled directly on soil or only just cover with soil. Stem cuttings of 20 to 40 cm length establish readily, regardless of the angle at which they are inserted into the soil. Cuttings buried horizontally in the soil will sprout, but they are less effective than cuttings inserted either upright or at an angle into soil. The cuttings should be planted into moist soil immediately after collection and not allowed to sun dry.

Safety measure

Always use gloves, protective clothing and caution when handling and applying plant materials to field crops or stored commodities and minimise exposure of consumers. Avoid contact with the skin. In case of accidental contact, immediately wash the affected area with clean running water.

Caution: This plant is invasive.

Selected readings

Adayo, F., Mukalama, J.B., Enyola, M. (1997). Using *Tithonia* concoctions for termite control. ILEIA Newsletter, 13. (4), p.24.

Gachengo, C.N., Palm, C.A., Jama, B. and Othieno, C. (1999). *Tithonia* and senna green manures and inorganic fertilizers as phosphorus sources for maize in Western Kenya. *Agroforestry Systems*, 44, 21-36.

Chagas-Paula, D.A., Oliveira, R.B., Rocha, B.A., Da Costa, F.B. (2012). Ethnobotany, Chemistry, and Biological Activities of the Genus *Tithonia* (Asteraceae). *Chemistry & Biodiversity*, 9, 210-235.

Ambrosio, S.R., Arakawa, N.S. *et al.*, (2008). Constituents of glandular trichomes of *Tithonia diversifolia*: Relationships to herbivory and antifeedant activity *Phytochemistry*, 69, 2052-2060.

Mwine J., Van Damne P., Kamoga G., Kadumba, Nasuuna M., Jumba F. (2011). Ethnobotanical survey of pesticidal plant used in South Uganda. Case study of Masaka district. *Journal of Medicinal Plants research*. 5(7), 1155-1163.

Oyewole, I. O., Ibidapo, C. A., Moronkola, D. O., Oduola, A. O., Adeoye, G. O., Anyasor, G. N. & Obansa, J. A. (2008). Anti-malarial and repellent activities of *Tithonia diversifolia* (Hemsl.) leaf extracts. *Journal of Medicinal Plants Research* 2(8), 171-175.

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Pesticidal plant leaflets are a series of species wise extension leaflets on botanical pesticides. Leaflets are compiled from existing literature and research available at the time of writing. In order to currently improve recommendations, ICRAF, MSBP and the University of Greenwich encourage feedback from users and researchers who have experience with the species. Comments, corrections, improvements and amendments will be incorporated into future edited leaflets.

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