Invasive Pest Fact Sheet

Asia - Pacific Forest Invasive Species Network

Lantana camara

Scientific name: *Lantana camara* L.

Synonyms: *Camara vulgaris, Lantana scabrida*

Common names: Sleeper weed, lantana, wild sage.

Taxonomic position: Division: Magnoliophyta
Class: Magnoliopsida, Order: Lamiales
Family: Verbenaceae.

Distribution: Naturalized in approximately 60 countries or island groups between 35^0 N and 35^0 S latitudes. Occurs widely in the Asia-Pacific region, Australia, New Zealand, Central and South America, West Indies and Africa. The plant is still widening its range.

Habit: *Lantana camara* is a low, erect or subscandent, vigorous shrub which can grow to 2 - 4 meters in height. The leaf is ovate or ovate oblong, 2 - 10 cm long and 2 - 6 cm wide, arranged in opposite pairs. Leaves are bright green, rough, finely hairy, with serrate margins and emit a pungent odour when crushed. The stem in cultivated varieties is often non- thorny and in weedy varieties with recurved prickles. It is woody, square in cross section, hairy when young, cylindrical and up to 15 cm thick as it grows older. Lantana is able to climb to 15 m with the support of other vegetation. Flower heads contain 20 - 40 flowers, usually 2.5 cm across; the colour varies from white, cream or yellow to orange pink, purple and red. Flowering occurs between August and March, or all year round if adequate moisture and light are available. Pollinators include lepidopteran species and thrips. The fruit is a greenish blue-black colour, 5 - 7 mm in diameter, drupaceous, shining, with two nutlets; seed setting takes place between September to May with 1 - 20 seeds on each flower head. Mature plants produce up to 12,000 seeds annually. Seed germination occurs when sufficient moisture is present; germination is reduced by low light conditions. The root system is very strong with a main taproot and a mat of many shallow side roots.

Seed dispersal: Fruit dispersal is through frugivorous birds, fox and rodents. Germination rate of fresh seed is generally low, but the germinability gets improved when the seed passes through the digestive system of birds and animals. High light intensity and soil temperature will stimulate germination of seeds which means that clearing of forest areas, inappropriate burning and other disturbances will help spread of the weed. Seeds are capable of surviving the hottest fires.

Habitat: The diverse and broad geographic distribution of Lantana is a reflection of its wide ecological tolerance. It occurs in diverse habitats and on a variety of soil types. Lantana generally grows best in open, un-shaded conditions such as wastelands, the edges of rain forests, on beachfronts, in agricultural areas, grasslands, riparian zones, scrub/shrub lands, urban areas, wetlands and forests recovering from fire or logging. Roadsides, railway tracks and canal banks are favored by the species. It doesn't grow at ambient temperatures below 5^o C. The plant is found at altitudes from sea level to 2,000 m and can thrive very well under rainfall ranging from 750 to 5000 mm per annum. Lantana does not invade intact rain forests, but is found on their margins. Where natural forests have been disturbed through logging creating gaps, Lantana encroaches in the gaps.

The Asia-Pacific Forest Invasive Species Network (APFISN) has been established as a response to the immense costs and dangers posed by invasive species to the sustainable management of forests in the Asia-Pacific region. APFISN is a cooperative alliance of the 33 member countries in the Asia-Pacific Forestry Commission (APFC) - a statutory body of the Food and Agricultural Organization of the United Nations (FAO). The network focuses on inter-country cooperation that helps to detect, prevent, monitor, eradicate and/or control forest invasive species in the Asia-Pacific region. Specific objectives of the network are: 1) raise awareness of invasive species throughout the Asia-Pacific region; 2) define and develop organizational structures; 3) build capacity within member countries and 4) develop and share databases and information.

Prickles on Lantana stem

Fruits of Lantana

Birds aid seed dispersal

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Further logging aggravates the condition and allows Lantana to spread or become thicker in its growth. It cannot survive under dense, intact canopies of taller native forest species. The plant is susceptible to frosts and low temperatures, saline soils, boggy or hydromorphic soils, low rainfall, coralline soils with poor water-holding capacities and high incidence of tropical hurricanes.

Lantana infestation on vacant lands

Mode of infestation: Lantana grows impenetrable thickets that can suppress the growth of native species. The plant can also grow individually in clumps or as dense thickets, crowding out more desirable species. In disturbed native forests it can become the dominant understorey species, disrupting succession and decreasing biodiversity. As the density of Lantana in natural forest areas increases, species richness decreases. Layering is a form of vegetative reproduction in Lantana where the stem send roots into soil, allowing it to quickly form very dense stands and spread short distances.

Uses: Lantana is mainly used as a herbal medicine and in some areas as firewood and mulch. In some countries it is planted as a hedge to contain or keep out livestock. Leaf extracts of Lantana exhibit antimicrobial, fungicidal, insecticidal and nematicidal properties. Verbascoside, which possesses antimicrobial, immunosuppressive and antitumor activities, has been isolated from Lantana. Lantana oil is sometimes used for the treatment of skin itches, as an antiseptic for wounds and externally for leprosy and scabies. Also, the plant extracts are used in folk medicine for the treatment of cancers, chicken pox, measles, asthma, ulcers, swellings, eczema, tumors, high blood pressure, bilious fevers, catarrhal infections, tetanus, rheumatism and malaria.

The stems of Lantana, if treated by the sulphate process, can be used to produce writing and printing paper. Its other uses include, making baskets and temporary shelters and fuel for cooking and heating. In some areas, Lantana may provide shelter and vital winter food for many native birds. A number of endangered bird species utilize Lantana thickets when their natural habitat is unavailable. In Australia, the vulnerable black-breasted buttonquail, *Turnix melanogaster*, feeds and roosts in Lantana thickets adjacent to vine forest, which is its more favoured habitat. While buttonquails prefer intact vine forest, Lantana provides an important temporary refuge for them between forest remnants. In central Kenya, where natural riverine thickets have been almost completely cleared, the endangered bird *Turdoides hindei*, has become dependent on Lantana thickets, and unless sufficient suitable natural habitat can be restored the survival of this species depends on the retention of Lantana bushes. Apart from benefiting some bird species, Lantana is a major nectar source for many species of butterflies and moths. The plant can prevent soil compaction and erosion and is a source of organic matter for pasture renovation. In Australia, ornamental Lantana is an excellent source of income in the nursery sector.

Threat and damage: Lantana threatens natural habitats and native flora and fauna. In Australia, nineteen endangered and threatened species are under threat due to the weed. It infests pastures, grazing lands, orchards and crops like, tea, coffee, oil palm, coconut and cotton, and reduces the economic viability of the crops. The allelopathic qualities of Lantana reduce the vigour of native plant species and limits their productivity. Lantana infestations can sometimes be so persistent that they can completely stall the regeneration of rain forests for several years. In the Galapagos Archipelago, Lantana competition has caused extinction of the shrub *Linum cratericola* (Linaceae), and it is also a major threat to other endangered plants. The replacement of native pastures by Lantana is threatening the habitat of the sable antelope in Kenya. Lantana can affect agriculture in a number of ways. In plantations in South-East Asia and the Pacific Islands, besides reducing the productivity of crops, Lantana also interferes with harvesting. In Queensland, Australia, loss of pasture is the greatest single cost of Lantana invasion in grazing areas. Lantana has also been identified as a potential threat to more than 60 plant and animal species of conservation significance in Queensland, Australia.

The rust *Prospodium tuberculatum* being sprinkled onto Lantana leaves.

Leaf infection by *Prospodium tuberculatum*

In dense stands of Lantana, the capacity of the soil to absorb rain is lower than under good grass cover. This could potentially increase the amount of run-off and the subsequent risk of soil erosion in areas infested with the weed. Lantana has been implicated in poisoning of a number of animals including cattle, buffalo, sheep and goats since its leaves and seeds contain the toxic triterpenoids, Lantadene A and Lantadene B. Ingestion of the plant parts can cause pink nose disease, jaundice and muzzle in cattle. Heavy outbreaks of Lantana poisoning occur during drought. The plant has many secondary impacts, especially in tropical countries where it can harbour several serious pests. Malarial mosquitoes in India and tsetse flies in Rwanda, Tanzania, Uganda and Kenya shelter in Lantana bushes and cause serious health problems.

Leaf infection by *Puccinia lantanae*

Basket made using Lantana stem

Control:

Mechanical control: Stickraking, bulldozing, ploughing and grubbing (medium sized plants) are the main methods of control. Hand cutting using brush cutters, hand pulling, chain pulling and flame weeding are also used. Re-growth will be imminent if the rootstock is not removed while weeding. In India, use of elephants to uproot Lantana was practiced. However, mechanical control is suitable only for small areas and is not recommended in areas susceptible to erosion. Fire is often used prior to mechanical or herbicidal control to improve their effectiveness or as a follow-up to such methods. Fire itself can provide some control when used under the right conditions, especially if the fires are hot and the Lantana is actively growing. But, while using fire as a management tool, the risk to people and property must be avoided. Burning is not recommended in natural forest areas and vine thickets for various reasons. Re-vegetation of a treated site by planting trees or encouraging naturally occurring seedlings is a key component of a Lantana management program. Another possibility of revegetation is sowing a pasture that outcompetes with and smothers Lantana. Preventing grazing for the first six months to one year will assist the growth of the pasture.

Manual weeding of Lantana

Chemical: During the active growing period, use of Fluroxypyr @ 0.5 to 1 liter / 100 l water, Glyphosate @ 1l / 100 l water, Triclopyr @ 1l / 60 l of water and Grazon DS (300 g/l Triclopyr + 100 g/l Picloram) @ of 350 ml/100 l water per ha is recommended. Post emergence application of Glyphosate (2 kg ha^{-1}) may provide good control. Applications are to be done when there is good soil moisture and during the active growing period, either in the morning or late in the afternoon.

Control of Lantana using fire

Teleonemia scrupulosa

Biological: None of the over 40 biocontrol agents released in 32 countries have been successful in controlling the weed effectively. However, of the species that have become established, some have had a major impact on the weed, including the sap-sucking bug, *Teleonemia scrupulosa* (Hemiptera), leaf mining beetles, *Octotoma scabripennis* (Coleoptera) and *Uroplata girardi* (Coleoptera) and the seed-feeding fly, *Ophiomyia lantanae* (Diptera). Apart from these agents, a sap-sucking bug, *Leptobyrsa decora*, a mealybug, *Phenacoccus parvus*, and a rust fungus, *Prospodium tuberculatum* are used in Australia for the biocontrol of Lantana. Many of the leaf feeding insects are unable to maintain high enough populations to cause significant damage to Lantana, since it drops leaves to withstand extended periods of drought. *Puccinia lantanae*, a rust of tropical origin, is pathogenic to a wider range of weedy cultivars of Lantana than *P. tuberculatum*. In inoculation trials with this fungus, successful infection has been obtained with ten biotypes to date: two from Australia, three from South Africa, two from Madagascar and one each from Thailand, India and Hawaii. Further studies are underway. Release of a Lantana leaf feeding mirid, *Falconia intermedia* in South Africa and Australia was frustrated by winter leaf loss in Lantana and failure in persistence of the insect. Several other candidate agents are undergoing host specificity and potential impact studies.

Chemical control of Lantana

Biological control, in itself, has not been effective in controlling Lantana infestation wherever it has been attempted, the main reasons being the extreme variability of the plants, the extensive climatic range it invades and the high level of parasitism on the natural enemies. On the other hand, mechanical and cultural methods are expensive and most often ineffective. Chemical methods are effective in the short-term, but the chemicals are environmentally damaging and cannot be used on a long-term basis. In this situation, biological, mechanical, chemical and cultural methods will have to be used in an integrated way to control Lantana infestation in our ecosystems.

Strategies to avoid further spread: Preventing the spread of Lantana is the most cost-effective management tool. This would require the restriction of further importation of Lantana into your country, restriction of sale and use of Lantana in gardens and strategically controlling infestations wherever it currently occurs.