If we had paid no more attention to our plants than we have to our children, we would now be living in a jungle of weed

Luther Burbank

KSBB Handbook No :

HANDBOOK ON
INVASIVE PLANTS OF KERALA

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Handbook on
Invasive Plants of Kerala

Biodiversity Handbook No.

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KV Sankaran
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Foreword

Preface

Introduction

This book, for the first time, brings out a concise list of invasive alien plant species recorded from the State of Kerala. Eighty two species of terrestrial and semi-aquatic plants are included here all of which call for urgent attention in terms of control and management. We have not dealt with invasive aquatic species in this compilation since they occupy a different ecological niche and need to be treated separately.

Invasive alien species are those which spread outside their normal distribution range and become invasive in their new locations. Their spread is aided by international trade and tourism especially import of goods and items such as seeds, grains, fruits, pets etc. At the new place, they escape the predator pressure, which kept their population in check in the native range, and thrive outcompeting and displacing native species. Kerala, with its longtime maritime history, has paved way for introduction of a large number of the such invasive plants. Intentional introductions were for specific purposes such as agriculture, forestry, ornamentals and the like- introduction of the rubber tree is a case in point. This book, however, does not list these alien species since left to themselves, they are seldom invasive and they do not spread unaided. There is an array of other species which have been intentionally or inadvertently brought to the State and have established here and are spreading fast. They impose huge costs in terms ecological destruction, economic damage and detrimental social effects including harm to human health. This book is about them.

The first step in trying to contain a biological invasion is to identify which alien species are invasive in nature. In the biodiversity rich tropics, this in itself is an onerous task. It may also be noted here that we have lost a lion's share of our native diversity to these invaders – the exact number, perhaps we will never know. However, since the State is having a rich taxonomic literature and we know what we have now, it was easy to differentiate between the native and the alien species. To collect information included in this book, we laid close to 4000 observation points across Kerala. Our objective was a qualitative appraisal of the invasive alien species scenario in the State. Each observation point was selected on the basis of visual observations on the presence of plants and their characteristic invasive behavior. All species thus listed were vetted against the checklist of the native flora of Kerala. Eighty two species remained, which were subjected to Invasive Species Risk Assessment based on internationally tested procedures.

As discussed earlier, this book satisfies only the very first task in the management of invasive species. Data collected for preparing the book shows that there are several species which have been recorded only from a few localities in the State. These species should be engaged with an early detection and rapid response approach so that their eradication should be possible. There are others which have established and started to spread reproducing vigorously, both sexually and vegetatively. In such cases, cultural operations useful in arresting the reproduction can help. A few species are in the process of establishing a satellite population and start off an invasion. These need be tackled using an approach which would involve monitoring, detection and elimination of satellite populations. However, there are a few 'hard nut to crack' cases such as *Lantana camara* and *Chromolaena odorata* which are already established and naturalized. Total control of these invasives might just remain a dream - management of the populations through integrated control measures may be the only option left.

The book is structured into individual leaflets which contain information such as name of each invasive plant, its country of origin, popular synonym, common name/s, local name and ecology and distribution. A detailed taxonomic description of the plant is also provided. A map of Kerala is included in each leaflet which show districts (marked in red) where the plant in question is recorded as an invasive species – it doesn't imply that the plant is absent in other districts. The probable impact risk due to each species is marked on the top of each page in red (high risk), brown (medium risk), blue (low risk) or green (insignificant) squares for raising an awareness of what is in store. All action plans need to be developed based on these early warning signs.

It would be gratifying if this book functions as a general guide on invasive alien plants in the State for all those who are interested– students, researchers, foresters, the policy makers and the general public.

List of invasive plants

Acacia mearnsii De Wild.

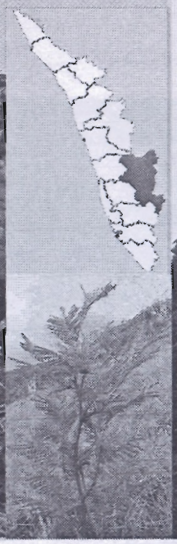
Native : South-east Australia

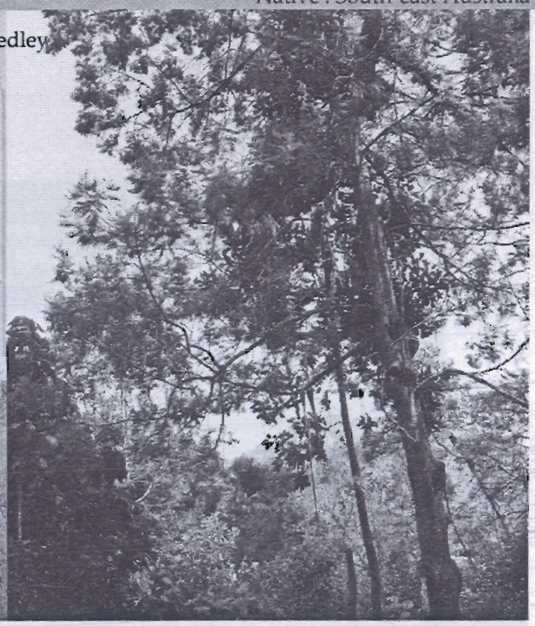
Synonym : *Racosperma mearnsii* (De Wild.) Pedley

Common name : Black wattle

Local name : Karuva

Family : Mimosaceae





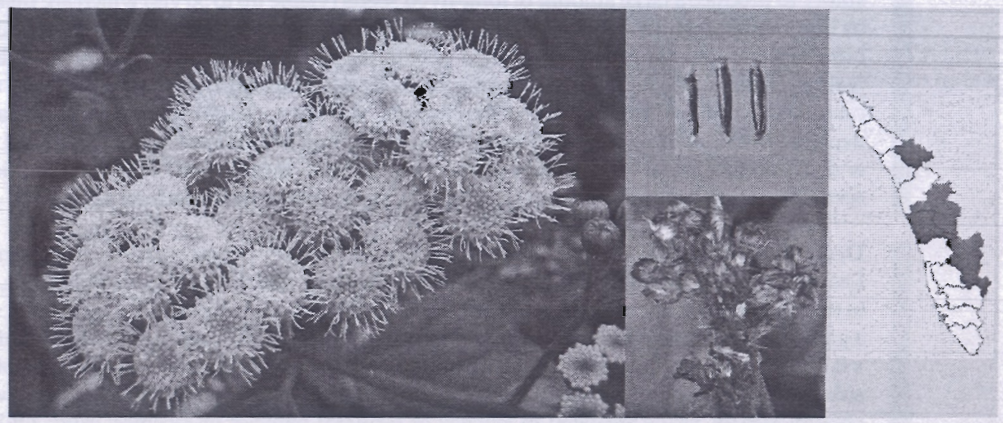
Ecology and distribution : *Acacia mearnsii* is a fast growing, evergreen, nitrogen fixing tree which has been introduced into several countries in the tropical and subtropical regions of the globe for various purposes including extraction of tannin. The tree was introduced into Kerala in the 1980's for afforesting grasslands in the higher altitudes. It can grow well even in disturbed habitats in a wide range of climates including warm temperate and moist tropical. The tree is an aggressive colonizer due its hardy nature and high competitive ability and is considered as one among 100 of the world's worst invasive species. The invasiveness of the tree is partly due to its ability to produce a large amount of long-lived seeds (viable up to 50 yrs) which are distributed by birds, animals and rodents. The seeds are triggered to germinate *en masse* by fire. Collection of branches and logs for firewood by local people may also aid in the dispersal of seeds. Black wattle competes and replaces indigenous vegetation including grass communities and reduces carrying capacity of the land. It also increases rainfall interception and transpiration causing a decrease in stream flow. Its invasion has resulted in loss of biodiversity, increased soil erosion and destabilization of riverbanks wherever it has been introduced. The tree is an invasive species in the high altitude areas in Idukki district posing threat to shola forests.

Description : Trees up to 15 m in height; young parts silky pubescent; branchlets semiterete. Leaves bipinnate, alternate, stipulate; rachis 4-12 cm long, slender, pulvinate, pubescent, a gland at the base of the rachis on the upper side; pinnae 8-21 pairs, subopposite, 1.5-6 cm long, slender, a gland between each pairs on the upper side; leaflets 36-90, subsessile, subopposite; lamina 1.5-4 x 0.5-1 mm, linear or linear-oblong, base obtuse, subacute or obliquely truncate, apex obtuse or subacute, margin entire, puberulent, membranous, veins obscure. Flowers bisexual, white or creamy, sessile, heads arranged in axillary or terminal panicles or racemes; calyx 2.5-3 x 2-2.8 mm, ochraceous puberulous; lobes 5, ca. 2 x 1 mm, oblong; corolla 3.5-4 mm long; lobes 5, 2.5-3.5 x 1-2 mm, triangular-oblong; stamens 4-5 mm long; ovary superior, 4.5-5 mm long; style 4-5 mm long. Fruit a pod, 3-10 x 0.5-1 cm, flat, narrow, straight to slightly curved, usually constricted between the seeds, tomentose, blackish-brown.

Ageratina adenophora (Spreng.) King & Robins. Native : Central America

Synonym : *Eupatorium adenophorum* Spreng.
Common name : Crofton weed
Local names : Neelagiri, Thravada
Family : Asteraceae

Ecology and distribution : *Ageratina adenophora* is a many stemmed subshrub which invades abandoned sites, roadsides and forest margins in high altitude areas. It grows luxuriantly on all types of soil and can tolerate salinity and infertility. Since Ageratina is a noxious and poisonous weed, farmers are often forced to abandon their landholdings invaded by it. The plant is known to displace native flora by competition and by forming monospecific stands. The rampant vegetative growth and the production of easily dispersible seeds are challenges to all control options. The allelochemicals in the plant affect regeneration of native plants. Ageratina has been recorded from Idukki, Palakkad, Thrissur and Wayanad districts.

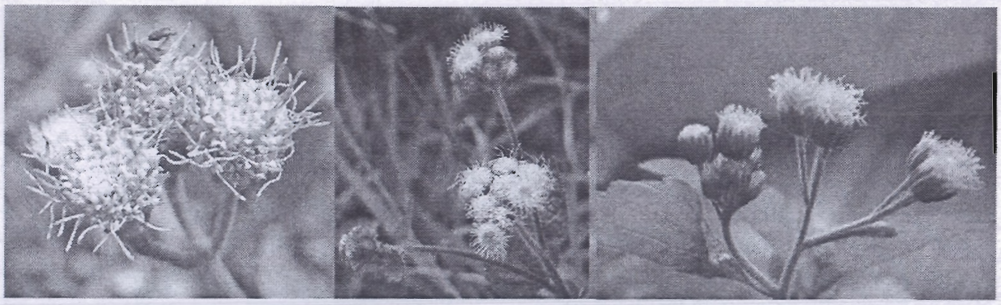


Description : Subshrubs, glandular hairy, stem violet-blue. Leaves 5-8 x 2-4 cm, ovate, apex acute, serrate; petiole 2 cm long. Heads 7 mm across, 5 mm long, packed, in terminal corymbose panicle; bracts 3-seriate, 4 x 1 mm, lanceolate, strongly 3-ribbed. Outer florets bisexual; corolla white, 5-lobed, hispid. Inner florets female. Achenes 2 mm long, curved, ellipsoid, 5-angled, brown, smooth; pappus 5-10, 4 mm long, white, barbed.

Ageratum conyzoides L.

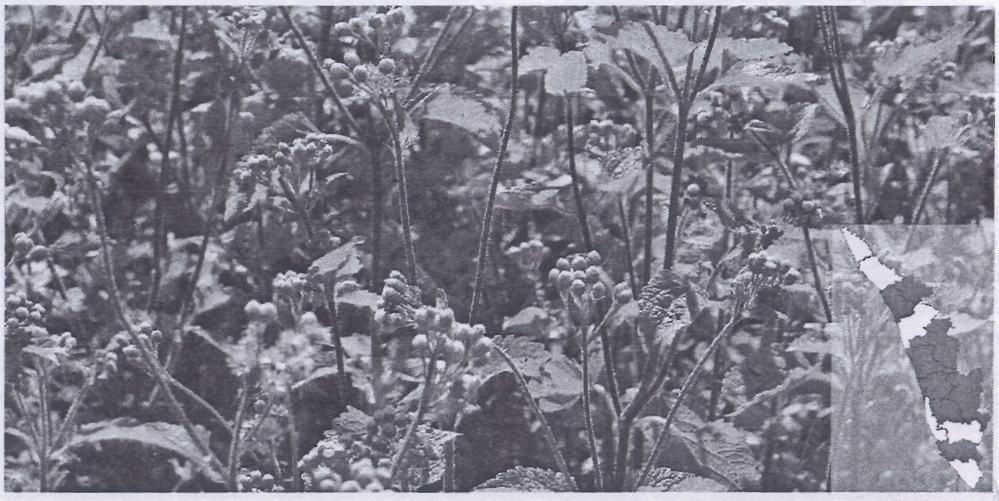
Native : Central America and the Caribbean

Synonym : *Ageratum album* Willd. ex Steud.
Common name : Goat weed
Local names : Appa, Murianpacha
Family : Asteraceae



Ecology and distribution : *Ageratum conyzoides* is an annual herb which exhibits high morphological variation. Although it can grow in a variety of soil types such as sandy, loamy and clayey and tolerate a range of pH levels, best growth is observed in rich and moist mineral soils. The plant can easily adapt to a wide variety of ecological conditions and is commonly seen in agricultural areas, pastures, plantations, orchards and along roadsides. It is shade tolerant but cannot grow well in dry and in-fertile soils. Ageratum can invade and spread fast in its preferred habitats preventing growth of native species. The plant is unpalatable to live stock. It is common in Ernakulam, Idukki, Kollam, Kottayam, Kozhikode, Palakkad, Thrissur and Wayanad districts.

Description : Herbs up to 80 cm in height, viscid hairy. Leaves 5-7 x 3-5 cm, ovate, apex acute, crenate, base rounded; petiole 1-3 cm long. Heads white, up to 7 mm across, in terminal corymbose panicle; bracts 1-3-seriate, 3-4 mm long, elliptic, toothed at apex, 3-ribbed. Flowers all similar, bisexual; corolla 2.5 mm long, tubular, white, glabrous, 5-lobed at apex; stamens 5, anthers linear. Achenes 2 mm long, linear, 5-angled, hirsute along the angles; pappus 3-4 mm long, many, setaceous.



Ageratum houstonianum Mill.

Native : Central America

Synonym : *Ageratum mexicanum* Sims

Common name : Floss flower

Local names : Kaliyamman-pathiri, Neela appa

Family : Asteraceae

Ecology and distribution : *Ageratum houstonianum* is an annual herb introduced and grown in gardens for its pretty flowers. Outside its natural range, it grows as an invasive plant threatening the native ecosystem. It is common along roadsides and vacant ground. Propagation is through seeds. The plant has been noticed to grow gregariously in Idukki district.

Description : Herbs, viscid hairy. Leaves up to 7 x 5 cm, ovate, base rounded, apex acute, margins crenate. Heads bluish-white, up to 7 mm across, in terminal corymbose panicle. Flowers all bisexual; corolla 2.5 mm long, tubular, white, glabrous, 5-lobed at apex. Achenes 2 mm long, linear, 5-angled, hirsute; pappus 3-4 mm long, setaceous.

Alternanthera bettzickiana (Regel) G.Nichols. Native : Tropical America

Synonym : *Telanthera betzickiana* Regel

Common name : Red calico plant

Local names : Cherucheera, Kattuponamkanni

Family : Amaranthaceae

Ecology and distribution : *Alternanthera bettzickiana* is a much branched, low growing herb which is very suitable for small borders and hedges. It can spread quickly in open areas overgrowing native plants. The plant is common in abandoned areas, agricultural systems, roadsides and vacant and waste lands. It was recorded from Alapuzha, Ernakulam, Idukki, Kasargod, Kollam, Kozhikode, Malappuram, Pathanamthitta, Thiruvananthapuram and Thrissur districts.

Description : Erect or ascending bushy perennial herbs, up to 45 cm in height; stem and branches villous when young but soon glabrescent. Leaves opposite, 1-3.5 x 0.5-2 cm, narrowly or more broadly elliptic to oblanceolate or rhomboid-ovate, acute or acuminate at the apex, long-attenuate into an indistinctly demarcated petiole below, often purple-suffused and rarely variegated. Heads axillary, sessile, usually solitary, globose or ovoid, 5-6 mm in diameter. Tepals white, lanceolate, acute, mucronate with the excurrent midrib, the outer 3 prominently 3-nerved below and darker in the nerved area, with a line of minutely barbellate white hairs along each side of this area, the hairs becoming denser towards the base of the tepal; inner 2 tepals slightly shorter, usually 1-2 nerved. Pseudo-staminodes as long as the filaments, laciniate at the apex.

Alternanthera brasiliana (L.) Kuntze

Native : Mexico to Brazil

Synonym : *Gomphrena brasiliana* L.

Common name : Joy weed

Local name : Choracheera

Family : Amaranthaceae

Ecology and distribution : *Alternanthera brasiliana* is a scandent subshrub introduced as an ornamental plant which escaped from gardens and got naturalized in open areas and uncultivated land. Propagation is mainly through seeds although discarded cuttings of the plant can sprout. It is capable of colonizing a specific area within a short span of time. It has been recorded from all districts in the State.

Description : Subshrubs, perennial, up to 60 cm in height. Stems erect, villous, glabrate. Leaves sessile; blade ovate to lanceolate, 1-7 x 0.7-1 cm, herbaceous, villous. Inflorescences terminal and axillary, pedunculate; heads white, globose, 0.7-1 cm diam.; bracts keeled, shorter than to equaling tepals. Flowers: tepals monomorphic, green to stramineous, lanceolate, 3-4 mm, apex acuminate, villous, hairs not barbed; stamens 5; pseudostaminodes ligulate, margins fimbriate. Utricles included within tepals, brown, ellipsoid, 2 mm, apex acute. Seeds ovoid-oblong, 1.4 mm.

Alternanthera philoxeroides (Mart.) Griseb.

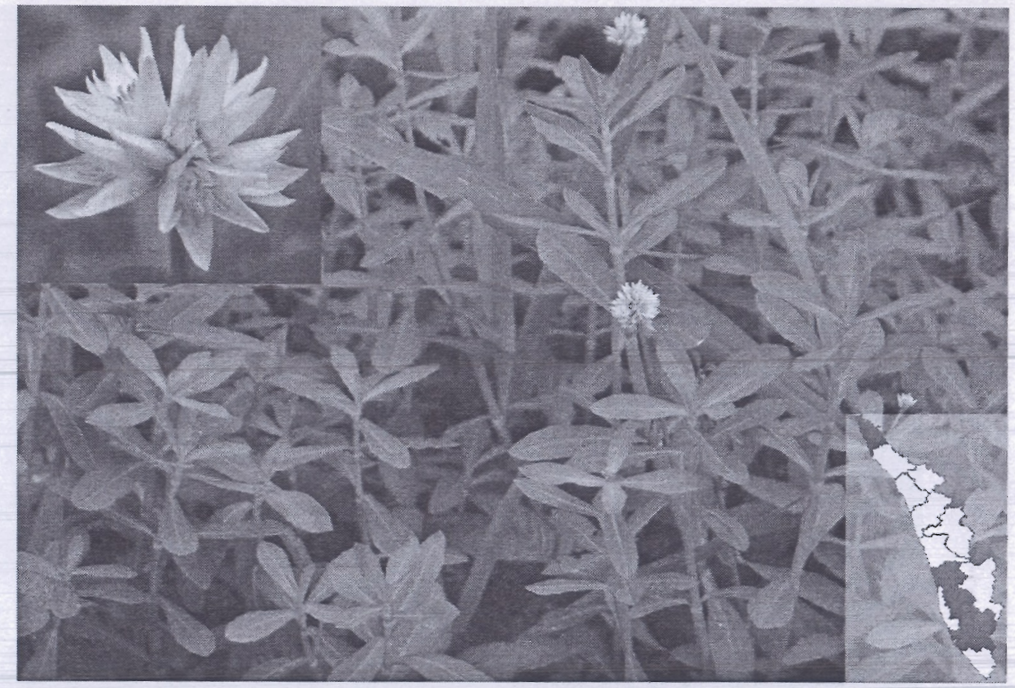
Native : South America

Synonym : *Bucholzia philoxeroides* Mart.

Common name : Alligator weed

Local name : Minnamkanni

Family : Amaranthaceae



Ecology and distribution : Alligator weed is a perennial stoloniferous herb found both in aquatic and terrestrial habitats. It is common in rivers, lakes, ponds and irrigation canals, wetlands and in some terrestrial habitats. The plant has the potential to disrupt the aquatic environment by blanketing the surface of water impeding penetration of light and gaseous exchange with adverse impact on flora and fauna. Also, mats formed by the weed impede water flow and lodge against structures thereby promoting sedimentation and flooding. It prevents access to and use of water and causes health problems by providing habitats for mosquitoes. Its terrestrial form is capable of growing into a dense mat with a massive underground rhizomatous root system. The canopy of the weed can shade out other herbaceous plant species and retard their growth. The weed has been recorded from Ernakulam, Kasargod, Kollam, Kottayam and Pathanamthitta districts.

Description : Perennial herbs with prostrate, fistular and striate stem which root at the nodes and eventually become erect and aerial, often much branched forming dense masses. Leaves opposite, 5-10 x 0.5-2.5 cm, elliptic to obovate-lanceolate with acute base, with midrib prominent on the lower surface; petiole 1-6 mm long. Inflorescence axillary (occasionally terminal), pedunculate (1-5 mm long) white, globose heads, 10-18 mm across; bracts ovate-lanceolate, glabrous, acute, 1-veined, faintly keeled. Perianth dorsally compressed, white glabrous; tepals 5, subequal oblong-lanceolate with mucronate tip 1-5 nerved. Fertile stamens 5, pseudo-staminodes longer than the filaments and lacerate at tips. Ovary shortly stalked, ovoid with slender style and capitate, densely papillose stigma.

Amaranthus spinosus L.

Native : South and Central America

Synonym : *Galliaria spinosa* (L.) Nieuwl.

Common name : Prickly amaranth

Local names : Kattumullenkeera, Mullancheera

Family : Amaranthaceae

Ecology and distribution : *Amaranthus spinosus* is an erect, branched, annual or perennial herb introduced to warmer parts of the world for its medicinal properties. It grows profusely in abandoned and disturbed areas, wastelands and along road sides. The plant can grow both in dry and wet habitats but water logging retards its growth. It is a noxious invader in certain countries where it displaces native vegetation. The thorns of the plant are harmful to human beings and animals. Amaranthus produces an enormous number of seeds which are dispersed by wind and water. The plant has been recorded from all districts in the State.

Description : Erect glabrous herbs up to 60 cm in height, profusely branched; branches grooved; spines divaricate, sharp, up to 1.2 cm long. Leaves 3-8 x 2-4 cm, ovate or elliptic-lanceolate, base attenuate, apex obtuse or subacute; petiole up to 4 cm long. Flowers in terminal panicled spikes or in axillary, sessile clusters. Bracts and bracteoles minute, ovate-lanceolate. Male flowers 1-2 mm across; tepals 5, calycine, unequal, ovate-lanceolate; stamens 5; anthers sagittate. Female flowers 1-2 mm across; tepals 5, oblong, acute at apex; ovary 1-celled; ovules solitary; stigmas 2-3. Utricle circumcissile. Seeds minute, discoid.

Antigonon leptopus Hook. & Arn.

Native : South America

Synonym : *Antigonon cinerascens* M.Martens & Galeotti
Common name : Coral vine
Local name : Thenpoovalli
Family : Polygonaceae

Ecology and distribution : *Antigonon leptopus* is a robust, evergreen, perennial vine widespread in the tropics. It invades disturbed areas, roadsides and forest edges smothering and outcompeting native vines and understory species. The rapid growth rate and thick luxuriant foliage makes the plant a good candidate for screening cutting faces, walls and similar structures. It tolerates drought by defoliation and re-grows strongly at the onset of rains. The beautiful flowers of the plant and their capacity to produce honey attract hordes of butterflies. Vegetative reproduction is through tubers and root suckers which are spread by movement of soil and nursery trade. The plant produces huge quantities of seeds which are viable for several years. Seeds float on water which helps transportation to new locations. Fruits are eaten by domestic and wild animals which provide another means of spread. The plant occurs in Alappuzha, Ernakulam, Kannur, Kasargod, Kollam, Kottayam, Kozhikode, Malappuram, Palakkad, Pathanamthitta, Thiruvananthapuram and Thrissur districts in the State.

Description : Woody climber, stem angular, glabrescent. Roots tuberous. Leaves alternate, blade 3-8 cm long, 1.5-5 cm broad, hastate-ovate, triangular or cordate-ovate, simple, hairy above, densely towards margin, glabrescent below; petiole 1-2 cm long. Inforescence a raceme ending into a branched tendril. Flowers showy; pedicel 3-8 mm long with sparsely spreading simple hairs. Perianth segments 5, bright pink, 6-15 mm long, 3-7 mm broad, very reticulately veined. Stamens 8, 3-7 mm long, sparsely hairy throughout; anthers oblong. Carpels 3; ovary ovoid, trigonous, glabrous, 3-4 mm long; styles 3 with capitate stigma. Nut c.5 mm long.

Argemone mexicana L.

Native : Mexico and West Indies

Synonym : *Argemone mexicana* subsp. *lutea* Kuntze

Common name : Mexican Poppy

Local names : Erumakalli, Ponnummam

Family : Papaveraceae

Ecology and distribution : *Argemone mexicana* is a coarse, erect, annual herb with milky sap and prickly stems and leaves. The plant has spread to several countries in the Asia-Pacific region and became naturalized in some of these. It is commonly seen near forest areas, agricultural fields, orchards and wastelands. Argemone prefers sandy and well drained soils and can grow in nutritionally poor soils and tolerate drought. Also, it can adapt to a wide range of habitats and climatic conditions. Propagation is through seeds. The plant was recorded from Palakkad district.

Description : Erect herbs, up to 70 cm in height, spiny, sap yellow. Leaves alternate, 12-30 x 4-10 cm, dissected, semi-amplexicaule, membranous, margins spiny, midrib thick. Flowers terminal, solitary, 4.5 cm across, yellow; sepals 2-3; petals 4-6; stamens many; ovary 1 celled, ovules many, stigma 5- lobed. Capsule 4 x 2 cm, oblong, spiny, dehiscing apically downwards; seeds rugose.

Aristea ecklonii Baker

Native : Southern Africa

Synonym : *Aristea dichotoma* Ecklon

Common name : Blue star

Family : Iridaceae

Ecology and distribution : *Aristea ecklonii* is a perennial rhizomatous herb commonly grown as a garden plant. It escaped from gardens and invaded roadsides, disturbed forests, shola grasslands and waterways in the introduced ranges. Propagation is through rhizomes, tubers and seeds. The plant has been recorded from Idukki district.

Description : Herbs up to 50 cm in height. Rootstock short, woody; roots fibrous. Leaves basal, linear, up to 60 x 1.2 cm, arching, base reddish, apex acute. Inflorescence paniculate; axes winged; branches subtended by foliaceous bracts. Flowers in clusters of 2-4, subtended by a bract. Perianth rotate, 2 cm wide, blue; tube very short; lobes 3 +3, emarginate; outer oblong, 10 x 5 mm, clearly veined; inner ovate, 15 x 9 mm. Stamens 3, exserted; filaments filiform, purple; anthers subsagittate. Ovary inferior, oblong, 3-celled and 3-angled; ovules numerous, superposed; style as long as stamens; stigma 3-lobed. Capsule 2.5 cm long, woody, sharply angled; seeds numerous.

Arundo donax L.

Native : Tropical Asia and the Mediterranean region

Synonym : *Aira bengalensis* (Retz.) J.F.Gmel.

Common name : Giant reed

Local name : Oodappullu

Family : Poaceae

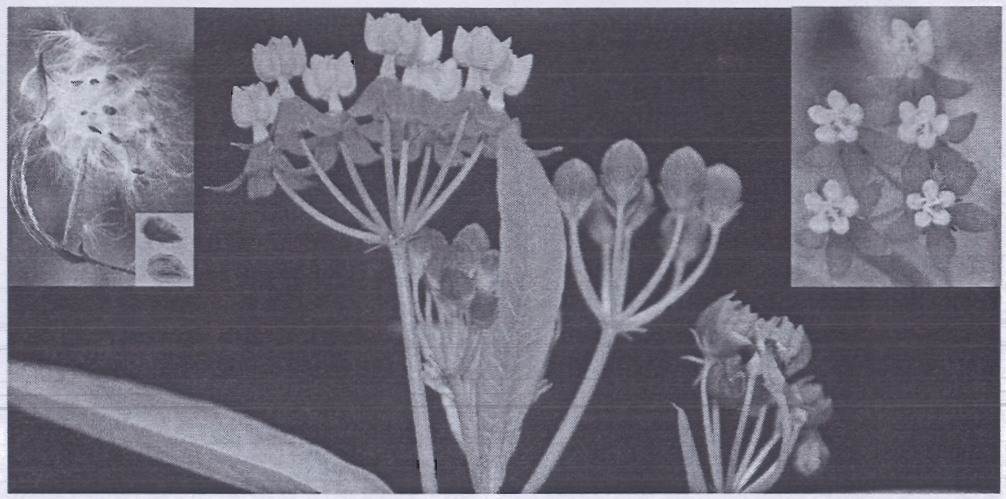
Ecology and distribution : *Arundo donax* is a tall, herbaceous grass native to tropical Asia and the Mediterranean region but now widespread and naturalized in about 23 countries across the globe. It is one of the fastest growing terrestrial plants in the world and is usually cultivated as a biofuel crop in many countries. Global invasive species database has identified it as one among 100 of the world's worst invaders. The plant is common in agricultural areas, coastland, deserts, natural forests, planted forests, range/grasslands and in moist areas such as ditches and riverbanks. The grass easily invades riparian zones and wetlands displacing native riparian vegetation and provides poor habitat for terrestrial insects and wildlife. It forms a thin canopy near stream habitats, which increases the water temperature resulting in decreased concentration of oxygen affecting the diversity of aquatic animals. The long, fibrous, interconnecting root mats of the plant can form a framework for debris accumulation which blocks stream flow and causes damage to bridges, culverts and other structures. Due to rapid growth rate and easy vegetative reproduction, it can quickly invade new areas and form pure stands outcompeting and suppressing native vegetation. Reproduction is mainly through rhizomes. The bulbous, creeping rootstocks form compact masses from which tough, fibrous roots emerge that penetrate deeply into the soil. The plant is dispersed through nursery trade, water currents and agricultural operations. In Kerala, Arundo occurs in the districts of Alappuzha, Idukki and Thrissur.

Description : Perennial woody grass with creeping woody rhizomes. Culms erect, up to 5 m in height. Leaf-blades conspicuously distichous, linear-lanceolate, rounded or cordate at the base, 30-60 cm long, 2.5-5 cm wide, glabrous, smooth, long-attenuate at the tip. Panicle 30 - 60 cm long and 5-8 cm wide. Spikelets 10-15 mm long; glumes subequal, lanceolate to narrowly lanceolate, 10-13 mm long, the lower a little shorter than the upper; lemmas lanceolate, 8.5-13 mm long, 3-5-nerved, 3 of the nerves produced as short aristae, hairy all over the back with hairs up to 7 mm long.

Asclepias curassavica L.

Native : Tropical America

Synonym : *Asclepias aurantiaca* Salisb.
Common name : Blood flower
Local names : Chemullichedi, Kammalchedi
Family : Asclepiadaceae



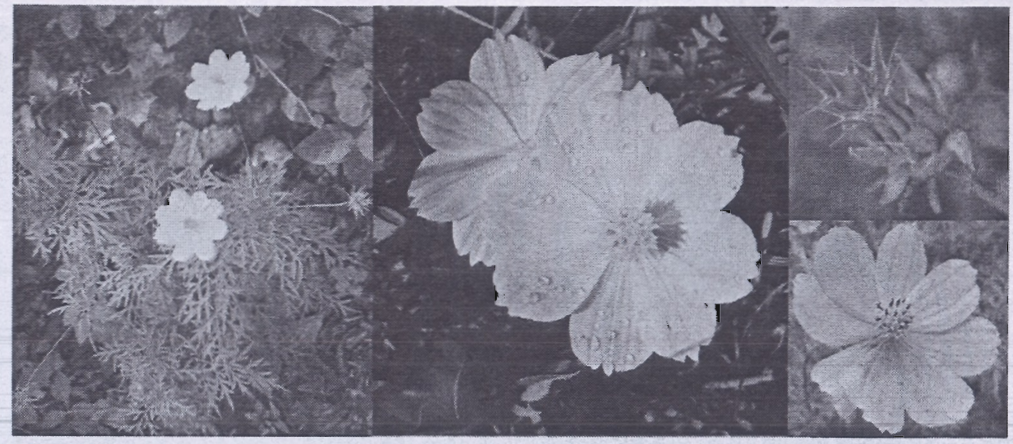
Ecology and distribution : *Asclepias curassavica* is an evergreen perennial ornamental plant with medicinal value. It grows well in sunny moist soil and successfully invades roadsides, vayal areas, vacant lands and abandoned places displacing native plants. The plant is poisonous if ingested and the milky sap is a skin irritant. Propagation is through seeds and cuttings. The plant is observed to grow wild in Idukki, Palakkad and Wayanad districts.

Description : Herbs up to 1 m in height, stem terete, glaucous. Leaves 7-10 x 3-4 cm, lanceolate to linear-lanceolate, glabrous, nerves 8-13 pairs, narrow; petiole 1 cm long. Flowers in axillary peduncled cyme; peduncle up to 5 cm long, solitary, erect, dichotomous; pedicels 6-15 together, 1.5-2 cm long, slender; sepals 2.5 mm long, ovate; corolla ca. 1.2 cm across, tube short, lobes oblong, yellow, deflexed; coronal lobes yellow, 7 mm long. Follicle up to 7 x 1.5 cm, terete or fusiform; seeds with pappus, many.

Bidens sulphurea (Cav.) Sch. Bip.

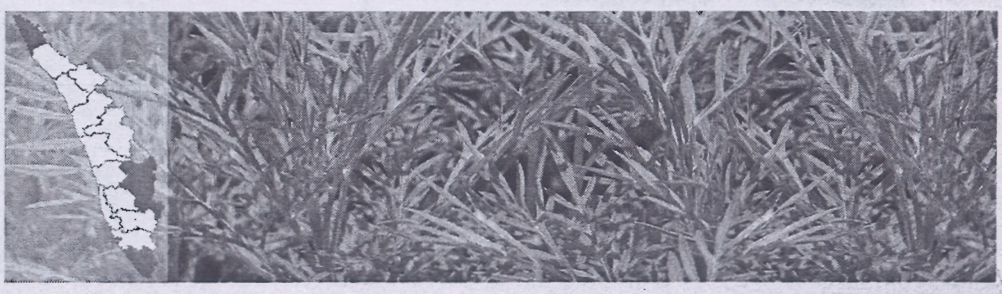
Native : North America and Africa

Synonym : *Cosmos sulphureus* Cav.
Common name : Sulphur cosmos
Family : Asteraceae



Ecology and distribution : *Bidens sulphurea* is an annual herb introduced widely as an ornamental plant for its beautiful flowers. It escaped from gardens and started growing wild along road sides, disturbed areas and wastelands wherever it has been introduced. It can flourish in a wide range of soil types and can tolerate drought. The plant was recorded from Idukki, Kasargod and Thiruvananthapuram districts.

Description : Herbs, erect, annual, branched, up to 1 m in height; stems slender, more or less quadrate with large, whitish hairs. Leaves 2-3 pinnatisect; segments acuminate and aristate-tipped, 10-15 cm long, glabrous or with scattered stout hairs; petioles slender, angled, hispid-ciliate at the expanded base. Heads orange, radiate arising at terminal nodes, solitary or few, showy, up to 6 cm across; peduncles slender, apically narrowed, up to 15 cm long with one or more leaf-like bracts. Involucral bracts in 2 series; outer herbaceous, 5-7 mm long; inner membranous, scarious, narrow but broader and longer than the outer bracts. Ray florets few; corolla yellow-orange, obovate, 15-30 mm long, 2-3 denticulate, sparingly pilose. Ovary not fertile. Disc florets many; corolla tubular-cylindrical, 7-12 mm long; apical lobes narrowly obtuse, ciliate on the innerside. Anthers yellow; filament flattened, densely ciliate. Ovary slightly expanded basally, angles with short hairs. Style branches yellow, pilose. Achenes black, compressed, up to 20 mm long, slender, slightly curved, sharply angled, the upper part narrowed into a linear, ascending strigose beak terminating in 2 stiff, retrorsely strigose bristles, 3 mm long.



Brugmansia arborea (L.) Steud.

Native : South America

Synonym : *Datura arborea* L.

Common name : White angel's-trumpet

Local name : Mara ummam

Family : Solanaceae

Ecology and distribution : *Datura arborea* is a garden plant cultivated widely for its large trumpet-shaped flowers color of which may vary from white to yellow, pink and pale purple. It grows well along roadsides, abandoned places and vacant lands. The fruit is a spiny capsule splitting open when ripe to release the numerous seeds. The seeds and flowers of the plant contain alkaloids such as scopolamine, hyoscyamine, and atropine which are highly toxic to human beings. It invades diverse ecosystems and displaces native species. The plant grows as an invasive species in Idukki district.

Description : Large shrubs up to 2.5 m in height. Leaves broadly elliptic-ovate, 15-18 by 8-11 cm, base obliquely rounded, apex acute. Flowers pendulous; calyx up to 12 cm long; slightly inflated; corolla white, up to 25 cm long. Capsule globose.

Brugmansia suaveolens (Humb. & Bonpl. ex Willd.) Bercht. & Presl

Synonym : *Datura suaveolens* Humb. & Bonpl. ex Willd. Native : Tropical and Subtropical America

Common name : Angel's-trumpet

Local name : Ummatha

Family : Solanaceae

Ecology and distribution : *Brugmansia suaveolens* is an ornamental shrub which easily invades vacant and abandoned areas. Though not a major weed, it has the ability to replace native vegetation wherever invaded. The plant can grow well on all soil types but prefers sunny areas. All parts of the plant especially seeds and leaves are toxic. The plant has been recorded from Idukki and Palakkad districts.

Description : Large shrubs or small trees up to 3-5 m in height, stems dense to sparsely pubescent. Leaves alternate, entire or shallowly lobed, up to 20 x 15 cm, ovate, acute or acuminate, basally rounded or obtuse; petiole up to 4-8 cm long. Flowers solitary, axillary, inclined or pendulous ; pedicel 2-5 cm long. Calyx tubular, 5-10 cm long, 5- lobed, lobes 1.5-2 cm long, acute or obtuse. Corolla pink,17-25 cm long, the tube long and slender, the limb strongly plicate in bud, the lobes 5, cuspidate or acuminate. Stamens 5, the filaments slender, inserted on distal part of corolla tube; the anthers linear, basifixed, 25-35 mm long, longitudinally dehiscent, cohering into a cylindrical tube. Ovary 2-locular, glabrous, ovules numerous; style slender, elongate, stigma 2-lobed. Fruit a 4-valved, indehiscent capsule, lanceolate-ellipsoid, unarmed; seeds numerous, 7-10 x 5-7 mm, compressed, obovoid-semicircular, coarsely rugose-tuberculate, comparatively large.

Caladium bicolor (Ait. ex Dryand.) Vent.

Native : South America

Synonym : *Arum bicolor* Ait. ex Dryand.

Common name : Heart of Jesus

Local name : Varnachembu

Family : Araceae

Ecology and distribution : *Caladium bicolor* is a tuberous perennial ornamental plant grown for its heart shaped, beautiful leaves marked in varying patterns of white, pink and red. It occupies plantations, roadsides and wastelands. Caladium prefers slightly acidic soil and part to full shade. Propagation is through tubers. All parts of the plant are poisonous. Although widespread in the State, its invasiveness is recorded from Kasargod, Kozhikode, Pathanamthitta and Thiruvananthapuram districts.

Description : Perennial tuberous herbs, up to 30 cm in height, petiole pruinose, shortly sheathing. Leaf-blade distinctly peltate, usually strikingly variegated with shades of green, white and red, glaucous beneath. Peduncle equalling the petioles. Spathe glaucous, blade twice as long as 'tube'. Sterile part of spadix equalling the pistillate, the staminate part twice as long as the pistillate.

Calopogonium mucunoides Desv.

Native : Tropical Asia

Synonym : *Calopogonium brachycarpum* Hemsl.
Common name : Calopo
Local name : Manja payar
Family : Fabaceae

Ecology and distribution : *Calopogonium mucunoides* is a vigorous, creeping or twining legume introduced widely in the tropics as a cover crop in plantations to improve soil fertility and control soil erosion. It is well adapted to a wide range of soils but prefers clay soils with a pH of 4.5-5.0. The plant grows best in humid-tropical low elevations but it has been recorded growing at 2000 m asl as well. It is moderately drought tolerant. The legume is capable of smothering native vegetation through vigorous growth and formation of dense mats over canopy. Propagation is through seeds which are dispersed by birds. It grows as a weed in Alappuzha, Idukki, Kasargod, Kollam, Kozhikode, Malappuram, Pathanamthitta, Thiruvananthapuram and Thrissur districts in the State.

Description : Slender creeping and climbing herbs, coarsely brown-tawny pubescent. Leaves alternate, 3-foliolate; leaflets 3-7 x 2-4 cm, elliptic-rhomboid, obtuse, base rounded or oblique, densely pubescent; lateral nerves 4 pairs; petioles 3-8 cm long; stipels 3 mm long, subulate. Flowers bluish, in axillary racemes; bracts and bracteoles small caducuos; pedicels up to 3 m long. Calyx lobes unequal, 4-6 mm long, upper 2 connate, other 3 lobes linear lanceolate. Standard petal obovate, appendaged with 2 inflexed auricles; keel petals shorter than wing petals. Stamens 9+1. Ovary densely villous, sessile; ovules many, style slender, stigma capitate. Pods coarsely pubescent, 2-3 cm long, compressed-convex, slightly constricted between the seeds; seeds 5-7.

Catharanthus roseus (L.) G. Don

Native : Madagascar

Synonym : *Vinca rosea* L.

Common name :Periwinkle

Local names : Nithyakallyani, Savakottappacha

Family : Apocynaceae

Ecology and distribution : *Catharanthus roseus* is a perennial herb cultivated throughout the tropics and subtropics as an ornamental plant and also for its medicinal properties. It is naturalized in most of these regions. There are three varieties: those with rose purple flowers, white flowers and white flowers with a rose purple spot in the centre. It prefers well drained light sandy soils rich in humus. The plant is found to invade roadsides, vacant lands and disturbed areas. Though not a major weed, it can negatively impact native flora and fauna. Propagation is through seeds or stem cutting. The plant contains more than 70 alkaloids mostly of the indole type. The anti cancer drugs namely Vincristine and Vinblastine are produced from it. Although widespread in the State, the plant is found invasive only in Kollam district.

Description : Perennial woody herbs up to 90 cm in height, young stems, leaves and calyx puberulous. Leavs 3 - 6 x 1.5-2.5 cm, elliptic-obovate, base cuneate, apex obtuse or rounded, glabrous, lateral veins c. 10 pairs, chartaceous; petiole up to 1.3 cm long. Flowers axillary, solitary or paired, shortly pedicellate. Calyx-lobes 5, subequal, 3-5 mm long, subulate. Corolla pink or white, tube 2-3 cm long, pubescent; lobes 5, 1.5 - 2 x c. 1.5 cm, triangular-obovate, obtuse. Stamens 5, included. Ovary c. 4 mm long; style up to 3 cm long. Follicles 2-3 x 0.2-0.3 cm, linear, puberulous. Seeds many, black.

Centratherum intermedium Less.

Native : South America

Synonym : *Centratherum punctatum* Cass.
Common name : Brazilian button flower
Family : Asteraceae

Ecology and distribution : Brazilian button flower is generally used as a ground cover and as an ornamental plant. It is well suited for a rock garden. It prefers a well-drained soil and a full sun to partial shade position in the landscape. The plant is drought tolerant but cannot withstand low temperature. Propagation is by cuttings. It can displace native flora and grow into monospecific stands. The plant is wide spread in the State.

Description : Erect herbs, up to 50 cm in height with pubescent stems. Leaves simple, alternate, blade ovate to spoon-shaped, 2.5 - 8 x 2.5 - 5 cm with a winged petiole, margins serrate. Flowers continuously through out the year after maturity; flowers in stalked terminal heads surrounded by two types of bracts, the outer larger and leaf-like, the inner small. Ray florets none. Disk florets many, light purple, mostly 9-14 mm long, the central ones distinctly shorter than the marginal ones. Fruit a pale linear achene covered with upward pointing bristles. Propagation by achenes.

Centrosema molle Benth.

Native : America

Synonym : *Centrosema pubescens* auct. non Benth
Common name : Butterfly-pea
Local names : Kattupayar, Poomattappayar
Family : Fabaceae

Ecology and distribution : *Centrosema molle* is a perennial trailing-climbing-twining herb introduced for green manure and as a nitrogen fixing ground cover in plantations. It is shade tolerant and grows well in well drained soils of medium to high fertility. It is common in agricultural systems, disturbed forests, plantations, roadsides and vacant lands. The plant is now naturalized in tropical Asia and Africa. Propagation is entirely through seeds which are produced in copious amounts. It is weedy in some ecosystems especially due to the twining and climbing habit. The plant is invasive in all districts except Wayanad.

Description : Pubescent twiners. Leaves 3-foliolate; leaflets 3-6.2 x 1.5-4 cm, ovate or elliptic, base rounded, apex acuminate, the terminal larger than the laterals, pubescent; petiole up to 5 cm long; stipules persistent. Racemes axillary, 5-8-flowered; peduncles 4-5 cm long. Flowers 2.5-3.2 cm long; pedicels 7-10 mm long; bracts connate, 5-8 mm long, ovate-lanceolate, deciduous; bracteoles 6-8 mm long, ovate. Calyx-tube 3-4 mm long, campanulate, 2-lipped, upper lip emarginate, adpressed tomentose. Corolla violet; standard c. 3 cm long, ovate-suborbicular, gibbous at the back above the claw, emarginate, pubescent without; wings falcate, the auricle curved back. Stamens 9+1. Style basally pubescent. Pods 7-12 x 0.4-0.6 cm, linear, compressed with 4-raised ribs near sutures, 15-18 seeded, apical horn up to 1 cm long. Seeds 4-6 mm long, oblong, brown with darker mottling.

Cestrum aurantiacum Lindl.

Native : Central America

Synonym : *Cestrum aurantiacum* var. *chaculanum* (Loes.) Francey

Common name : Yellow shrub jessamine

Family : Solanaceae

Ecology and distribution : *Cestrum aurantiacum* an evergreen scandent shrub, is introduced to many countries for ornamental purposes. It grows wild invading shola forests, scrub jungles and open areas. It is drought tolerant. The stem and leaves bruise easily and emit an unpleasant smell. On the other hand, the flowers have an overpowering citrus like smell, especially at night. The plant can outgrow and displace native vegetation. It is recorded as an invasive species in high altitude areas in Idukki district.

Description : Shrubs, up to 3 m in height, pubescent on young growth, glabrescent. Petiole 1-1.4 cm; leaf blade ovate or elliptic, 4-7 × 2-4 cm. Inflorescences erect, terminal or axillary racemose panicles; bracts deciduous, leaf like, up to 7 mm. Pedicel ca. 1 mm. Calyx campanulate, ca. 6 mm, sometimes with 5 prominent longitudinal ribs; teeth ca. 1 mm, often somewhat unequal. Corolla golden yellow, 1.4-2 cm, gradually expanded upwards, glabrous, lobes 3-4 mm. Filaments denticulate, pubescent at point of insertion. Berry white, ovoid, 7-11 mm, persistent, calyx often splitting. Seeds ca. 4

Chromolaena odorata (L.) King & H. Rob.

Native : Tropical America

Synonym : *Eupatorium odoratum* L.

Common name : Siam weed

Local names : Assam pacha, Communist pacha

Family : Asteraceae

Ecology and distribution : *Chromolaena* is a fast-growing, upright or scrambling perennial shrub. It is included as one among 100 of the world's worst invaders in the Global Invasive Species Database (GISD). The plant apparently reached south India in the 1940's from Assam along with the movement of people, equipment and materials during the Second World War. Chromolaena can grow on a wide range of soils and vegetation types such as natural forests, cultivated lands, wastelands, grasslands, plantations, nurseries, roadsides and riverbanks. Growth, development and yield of several native plants and crops are affected by chromolaena due to its aggressive growth, efficient root system, allelopathic effect, competition for light and water and capacity to grow and establish under a wide variety of agro-ecological conditions. It can form dense stands and smother plants up to a height of 20 m preventing their establishment. The plant can also cause serious health hazards to human beings and livestock in its introduced ranges. The weed is widespread in the State.

Description : Scandent shrubs up to 3 m in height, glandular hairy. Leaves 8-12 x 5-8 cm, ovate, apex acute, base cuneate, crenate, hispid; petiole 2-3 cm long, cylindrical-oblong. Heads up to 10 mm long, in terminal corymbose cymes; bracts 3-5-seriate, up to 8 mm long, ovate, obtuse; outer smaller, inner linear, acute, 3-ribbed. Flowers few to many, similar, bisexual; corolla 5 mm long, white, tubular, 5-lobed, pubescent at apex. Achenes 4 mm long, linear, 5-angled, scabrous, black; pappus many, 4-7 mm long, setaceous, yellowish.

Clidemia hirta (L.) D. Don

Native : Tropical Central and South America

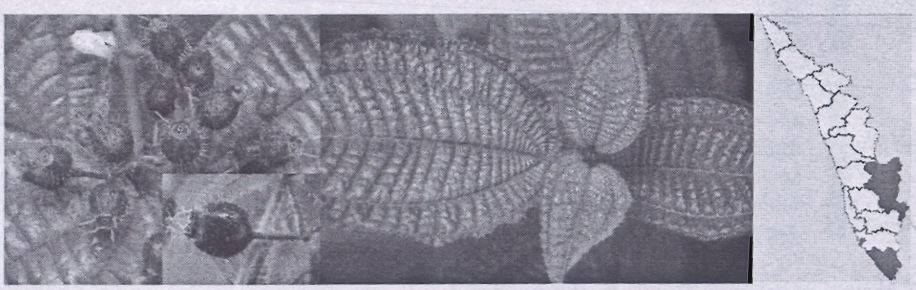
Synonym : *Melastoma hirtum* L.

Common name : Koster's curse

Family : Melastomataceae

Ecology and distribution : *Clidemia hirta* is an invasive perennial shrub. It is a problem in tropical forest understories as it invades forest gaps and adversely affects regeneration of native species. The plant easily colonizes disturbed open areas such as pastures, riversides, road sides and plantations. Global Invasive Species Database has included it as one among 100 of the world's worst invaders. The plant can tolerate a wide variety of environmental conditions. It disrupts grazing land and speedy growth of its thickets creates physical barrier to humans and animals. The plant grows as an invasive species in Idukki and Thiruvananthapuram districts.

Description : Subshrubs, 0.5-3 m tall; young branches rounded, hirsute. Leaves opposite, 5-16 x 3-8 cm, ovate to oblong-ovate, apex acute to short-acuminate, base rounded to subcordate, subentire to crenulate-denticulate, 5-nerved, upper surface sparsely strigose, lower surface finely bristly, margins ciliate; petioles 0.5-3 cm long. Pedicels 0.5-1 mm long in fruit; hypanthium 3-3.5 mm long, moderately to sparsely finely bristly, usually with a mixture of gland-tipped and stellulate hairs; receptacle bearing a conspicuous ring of fimbriate scales surrounding the style. Calyx lobes broadly ovate to truncate in fruit, ca. 0.5 mm long, the linear external teeth projecting 2-4 mm. Petals white, 8-11 mm long, 4-5 mm wide, glabrous. Staminal filaments ca. 2.5 mm long; anthers 3.5-4.5 mm long, dorsal spur at base ca. 0.25 mm long. Berries 6-9 mm long; seeds 0.5-0.75 mm long.



Croton bonplandianus Baill.

Native : South America

Synonym : *Croton sparsiflorus* Morong.
Common name : Croton
Family : Euphorbiaceae

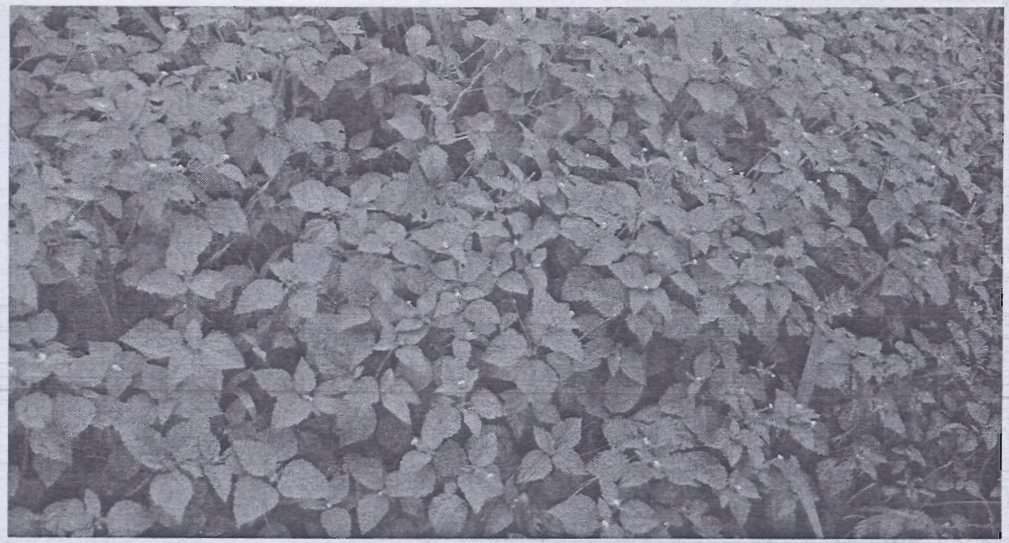
Ecology and distribution : *Croton bonplandianus* is an erect herb or sub-shrub common in wastelands, roadsides and orchards. It prefers sandy or sandy clay soils. The plant blooms and fruits the year round. Although not a major invasive species, it quickly spreads and colonizes wastelands. The weed is widespread in Kerala but its invasion is recorded only from Alappuzha, Thiruvananthapuram and Thrissur districts.

Description : Herbs or sub - shrubs up to 1.5 m in height, young parts stellate-pubescent and viscous glandular. Leaves 2-5 x 1-2 cm, ovate-lanceolate, base attenuate, margin faintly serrulate, apex gradually acute, densely stellate scaly on both sides when young, sparsely so below and glabrous above on ageing; petiole up to 1.5 cm long. Racemes up to 10 cm long; pedicels glandular on either side. Male flowers 3-4 mm across; perianth 2-seriate, greenish-white, outer c. 1 mm long, inner c. 2 mm long; stamens many. Female flowers few, towards base, 2.5-3 mm across; perianth 1-seriate, lobes 5; ovary subglobose, tomentose; style short; stigma 3, each forked to form 6 lobes. Capsule 5-6 mm across, ovoid, warty. Seeds 3, globose, caranculate.

Croton hirtus L'Herit.

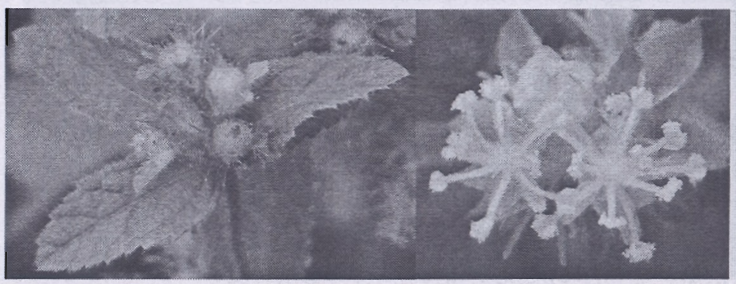
Native : Tropical America

Synonym : *Croton glandulosus* L.
Common name : Croton
Family : Euphorbiaceae



Ecology and distribution : *Croton hirtus* is an aromatic herb which grows as a weed in vacant lands, abandoned areas and along roadsides. It is capable of competing with native plants for water and nutrients and displacing them. The plant poses threat to native flora in Ernakulam, Malappuram, Thiruvananthapuram and Thrissur districts.

Description : Erect, dichotomously branched aromatic herbs up to 60 cm in height, branchlets with white to pale yellow strigose-stellate hairs. Leaves 2.4-9 x 1.5-7.8 cm, ovate to ovate-oblong, base truncate, broadly cuneate or oblique, margins irregularly serrate, apex acute, stellate white hairy on both sides, 3-5-nerved from base, 2-stalked gland present at the base of lamina; petiole 0.3-6.5 cm long, stellate hairy; stipules 2-5 mm long, linear, stellate hairy. Inflorescence terminal, upto 4 cm long with multibranched numerous glandular hairs, female flowers below, male flowers above; bracts 2-4 mm long, linear, glandular hairy. Male flowers white; pedicels c. 1 mm long, stellate hairy; tepals 10, 2-seriate, white, 1.5-2 x 0.5-1 mm, obovate or oblanceolate, obtuse or acute at apex, stellate hairy without. Stamens many. Female flowers green; tepals 5; longer ones 3, c. 3 mm long, obovate; shorter ones 2, 1-1.5 mm long. Ovary c. 1.5 mm long, ovoid, stellate hairy. Capsules 3 - 5 x 3 - 4 mm, ovoid, stellate hairy. Seeds 2-3 mm long, trigonous, brown with black patches, caruncle cream.



Cylindropuntia ramosissima (Engelm.) F.M. K.

Native : USA and Mexico

Synonym : *Opuntia ramosissima* Engelm.
Common name : Diamond cholla
Local name : Suraimullu
Family : Cactaceae

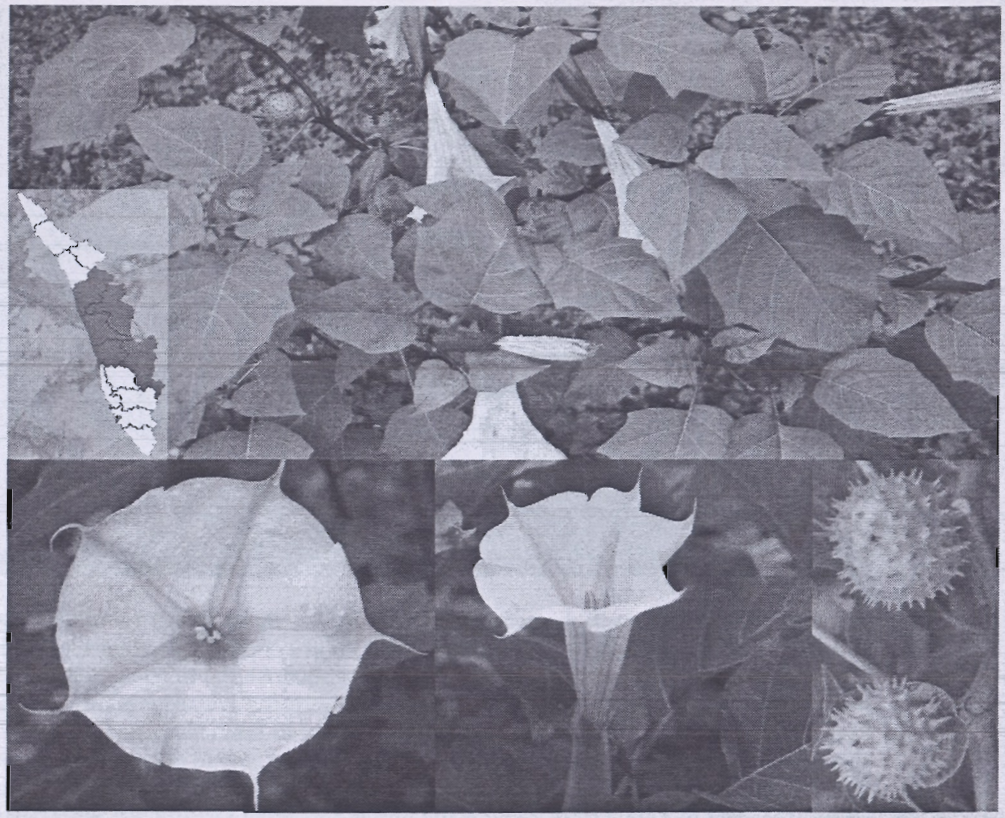
Ecology and distribution : *Cylindropuntia ramosissima* is a thick succulent shrubby cactus with large thorns. It has many narrow branches made up of cylindrical segments, green in color turning gray when dry and the surface divided in to squarish flat tubercles which bear long, straight and sharp thorns. In India, it may have been introduced as a hedge plant to protect crops from wildlife. The cactus is locally known as 'Surai mullu' in Tamil Nadu because of the papery covering on the thorns. The thorns are poisonous and it is not easy to remove these when struck because of the reverse barbed nature which makes them grab firmly to the skin. The cactus has recently crossed to Kerala from Tamil Nadu and is spreading fast in open areas, abandoned lands and along roadside especially in dry areas. Propagation is mainly vegetative. The plant has recently been recorded from Palakkad district in the State.

Description : Scandent thicket forming shrubs, intricately branched, 0.5-2 m in height. Stem segments firmly attached, green, rope like, cylindric, 2-8 x 0.4-1 cm; tubercles rhombic, convex, 0.4-0.8 cm; areoles subcircular abaxially, adaxially becoming usually deltate-linear; glochid-bearing portion protruding distally, wedged between bases of 2 adjacent tubercles, 4-7 x 1-1.5 mm. Spines 0-5 per areole, usually in distal areoles or sometimes absent or nearly so, tan to red-brown to deep purple, aging gray; major abaxial spines 0-1, the longest spine spreading, 2.5-6 cm; adaxial spines usually reflexed, short to ca. 1 cm long; sheaths baggy. Glochids in subcircular to linear adaxial tuft, yellow to tan to brown, up to 2 mm. Flowers: inner tepals bronze-red ± suffused rose, with mid stripes darker, ovate, 6-13 mm, acute-apiculate to attenuate; filaments greenish; anthers yellow; style whitish or blushed with rose-pink or light green; stigma lobes whitish. Fruits maturing tan, ellipsoid to stipitate-ellipsoid, 15-30 x 10-15 mm, dry at maturity, tuberculate, developing increasingly burlike, with many bristlelike spines; areoles 40-66, evenly spaced, woolly. Seeds pale yellow to tan-gray, angular to squarish in outline, warped, 4-4.5 x 3.5-4 mm, sides irregularly concave-convex; girdle smooth.

Datura stramonium L.

Native : North America

Synonym : *Datura bernhardii* Lundstr.
Common name : Common thorn-apple
Local names : Ummam, Velutha ummam
Family : Solanaceae



Ecology and distribution : *Datura stramonium* is a bushy annual which grows in wastelands, garbage dumps and along roadside as a weed. It grows well in moderately good soils but prefers a rich light sandy soil or a calcareous loam in open areas. Flowers are axillary, erect, white, and sweet scented (especially at night). Fruits are as large as walnuts and thorny. The whole plant is considered as narcotic, anodyne, and antispasmodic. It is noted as an invasive plant especially in abandoned and waste lands. The seed dormancy is high and the seeds will germinate only when the soil is disturbed. The plant is widespread in the State but invasiveness is high in Ernakulam, Idukki, Malappuram, Palakkad and Thrissur districts.

Description : Shrubs, branched, pubescent; the branches often purplish. Leaves 8-17 x 4-13 cm, ovate or broadly so, sinuately dentate, minutely puberulose, cuneate. Petiole 2-5 cm long. Calyx 3.5-5.5 cm long, tubular, 5-dentate, puberulous, persistent. Lobes 6-9 mm long, strongly reflexed in fruit, apiculate. Corolla 7-10 cm long, white or purplish suffused; limb up to 8 cm broad, shallowly 5-lobed, with the lobes, triangular-acuminate. Anthers 5 mm long, with the lobes narrow oblong, usually white. Capsule erect, 3-4 cm long, ovoid, spiny and densely pubescent, splitting by 4 valves; spines up to 5 mm long. Seeds 3 mm long, reniform, reticulate-foveolate, and black.

Duranta erecta L.

Native : South America

Synonym : *Duranta repens* L.

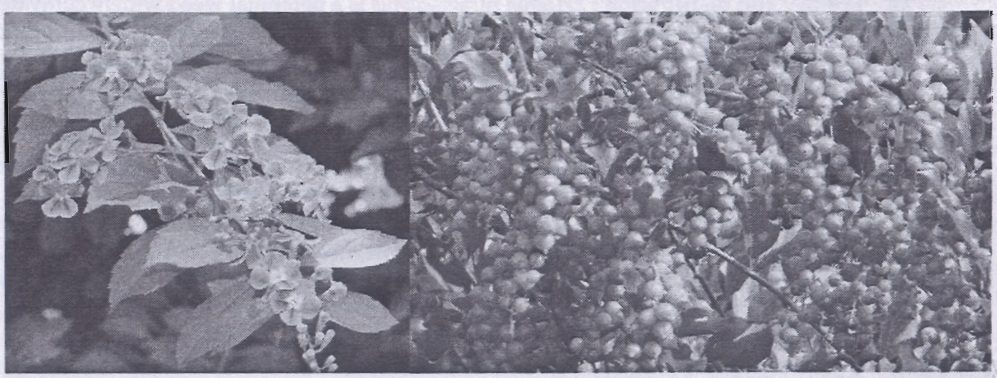
Common name : Duranta

Local name : Duranta

Family : Verbenaceae

Ecology and distribution : *Duranta erecta* is a sprawling shrub cultivated widely in the tropics and subtropics for ornamental purposes. The plant occurs in disturbed forests, vacant lands and abandoned areas. It is an invasive species in the Asia-Pacific region and South Africa. The flowers are light-blue or lavender in colour produced in tight clusters on terminal and axillary stems throughout the year. The leaves and berries contain toxic substances. Propagation is through seeds. In Kerala, the plant poses a major threat to native plants in Wayanad district.

Description : Shrubs; branches often spiny, terete. Leaves 2.5 - 5.5 x 2-4 cm, elliptic-ovate or obovate, base cuneate, margins entire or coarsely serrate above the middle, apex acute, glabrous; petiole up to 1 cm long. Flowers in simple or panicled racemes, terminal and axillary; pedicel 2-5 mm long. Calyx tubular, fleshy, 3-4 mm long, angled, persistent. Corolla blue or violet, with or without two purplish stripes on the tube; tube 4-6 mm long, densely puberulent outside above the calyx, limb 7-9 mm across, densely puberulent on both surfaces, especially towards the throat within. Stamens 4, didynamous. Ovary globular, 8-locular, 8-ovuled. Drupes yellow or orangeish - yellow, 6-10 mm across, globose, completely enclosed by the fruiting-calyx.



Erigeron karvinskianus DC.

Native : South America and Mexico

Synonym : *Erigeron mucronatus* DC.
Common name : Mexican daisy
Local name : Pottu-poovu
Family : Asteraceae

Ecology and distribution : *Erigeron karvinskianus* is a perennial weed widely cultivated for its attractive, yellow- centered white flowers. It grows well in fertile, well drained and moist soils but can tolerate drought once established. The plant is common along roadsides, vacant lands, high altitude grasslands and forest fringes. It is invasive and grows as a dominant species wherever introduced. The plant grows as a weed in Idukki and Thiruvananthapuram districts.

Description : Sprawling perennial herbs usually forming dense clumps; stem numerous, decumbent to weakly erect, slender, usually branched, glabrate to sparsely pubescent. Leaves 1-4 x 0.1- 1 cm, linear to elliptic, entire to dentate or shallowly lobed, lower ones often oblanceolate and 3-lobed. Heads solitary, 1-1.5 cm in diameter; involucral bracts in 3 series, linear, 3-6 mm long; ray florets 75-100 or more per head, rays white, becoming pink with age, 9-10 mm long; disk florets numerous, corollas yellow. Achenes pale brown, ca. 1 mm long.

Euphorbia heterophylla L.

Native : Central America

Synonym : *Euphorbia prunifolia* Jacq.
Common name : Mexican fire plant
Family : Euphorbiaceae

Ecology and distribution : *Euphorbia heterophylla* is an erect annual herb introduced as an ornamental plant in many countries in the tropics and subtropics. It can spread quickly and invade roadsides, agriculture systems, open areas and wastelands. The species is a troublesome weed in vegetable fields and fields of crop plants such as soybean, cowpea, corn and sugarcane. The milky latex present in all parts of the plant is toxic. It grows as an invasive plant in Alappuzha, Ernakulam, Idukki, Kollam, Malappuram, Pathanamthitta, Thiruvananthapuram and Thrissur districts.

Description : Robust annual herbs, up to 70 cm in height, glabrous to pilose. Leaves alternate below, opposite above, 4-12 x 0.3-7 cm, broadly ovate, elliptic, obovate, or panduriform, rarely linear, glabrous or pilose, margins entire to coarsely serrate, apex acute, short-acuminate, or short-cuspidate, base rounded to cuneate, green, sometimes floral leaves white or with splotches of purple at base, never red; petioles 1-4 cm long; stipules absent or minute and gland-like. Cyathia in dense terminal cymes; involucre 2-2.5 mm high, glabrous, gland 1, cup-shaped with a circular opening, without an appendage; staminate flowers numerous. Capsules subglobose, 3-4 mm long, glabrous; seeds dark brownish gray to black, sometimes mottled, truncate-ovoid, angled, 2-2.5 mm long, coarsely tuberculate, ecarunculate.

Gomphrena celosioides Mart.

Native : South America

Synonym : *Gomphrena decumbens* sensu Gamble
Common name : Water globehead
Local names : Kaattuvaadamalli, Nirvadamalli
Family : Amaranthaceae

Ecology and distribution : *Gomphrena celosioides* is a prostrate or sprawling annual or perennial weed of dry open places. It is common on road sides, disturbed ground, lawns and cultivated areas. The plant is widespread throughout the tropics and subtropics as a less aggressive invader. Propagation is through seeds. The plant grows as a weed in Idukki, Malappuram, Thiruvananthapuram and Thrissur districts in the State.

Description : Prostrate herbs, branchlets woolly. Leaves 2-4 x 1 cm, elliptic, obovate, apex acute, mucronate, spathulate, woolly beneath. Spikes terminal and sometimes axillary, up to 8 cm long; bracts 3 mm, scarious, mucronate, ciliate at apex; bracteoles 2, 2.5 mm, ovate, mucronate; tepals 5, 4.5 mm, lanceolate, acute at apex, woolly at the back of the inner 3 tepals; stamens 5, tube up to 2.5 mm long; ovary 1 mm, 1-ovuled, style 0.4 mm, stigma 2-fid.

Heliconia psittacorum L. f.

Native : South America

Synonym : *Heliconia aurea* Linden ex Lem.

Common name : Parrot's-flower

Local name : Vazhachedi

Family : Heliconiaceae

Ecology and distribution : *Heliconia psittacorum* is an ornamental plant introduced into gardens from where it escaped to grow wild on road sides and vacant and abandoned land. It can easily grow in to a thicket overgrowing and smothering native species. The thickets function as a safe abode for small creatures some of which are harmful to humans and animals. The plant occurs in Ernakulam, Kottayam, Kozhikode and Malappuram districts in the State.

Description : Musoid perennial herb with rhizomatous underground stem, up to 1.5 m tall; pseudostem green, up to 2.5 cm in dia. Leaves simple, petiolate, petioles 7-10 cm long, lamina 30-45 × 7.5-11 cm, lanceolate, acuminate, entire, lower surface glossy, midrib green. Inflorescence one per shoot, up to 14 cm long, terminal on a long peduncle, up to 75 cm long, erect, distichous, a raceme of many-flowered monochasial cymes (cincinni), cincinnal bracts maroon. Flowers pedicellate, pedicels 1.7 cm long, red or yellow, glabrous, bracteate, bracts 4-6, 6-17 cm long, greenish-maroon or yellow, rachis red or yellow, bracteolate, 0.9-2.0 × 0.4 cm, flowers inverted, 9 or more per bract, parrot-green with distal dark green or black band and white tip, acute at the apex. Tepals 6, in 2 cycles, 4.2 cm long; stamens 5, filaments c 2.5 cm long, anthers 2-celled, c 1 cm long, yellow, staminode c. 1.5 cm long, acuminate, shallowly tri-dentate; carpels 3, ovary 3-celled, c 4 mm in dia, off-white with green edge, ovule solitary in each cell, placentation axile, style 1, c 4 cm long, lower portion yellow, upper portion off-white, stigma yellow. Fruit a schizocarp or drupe. Seeds 1-3.

Hypoestes sanguinolenta Hook.

Native : Madagascar

Synonym : *Hypoestes phyllostachya* Baker

Common name : Measles plant

Family : Acanthaceae

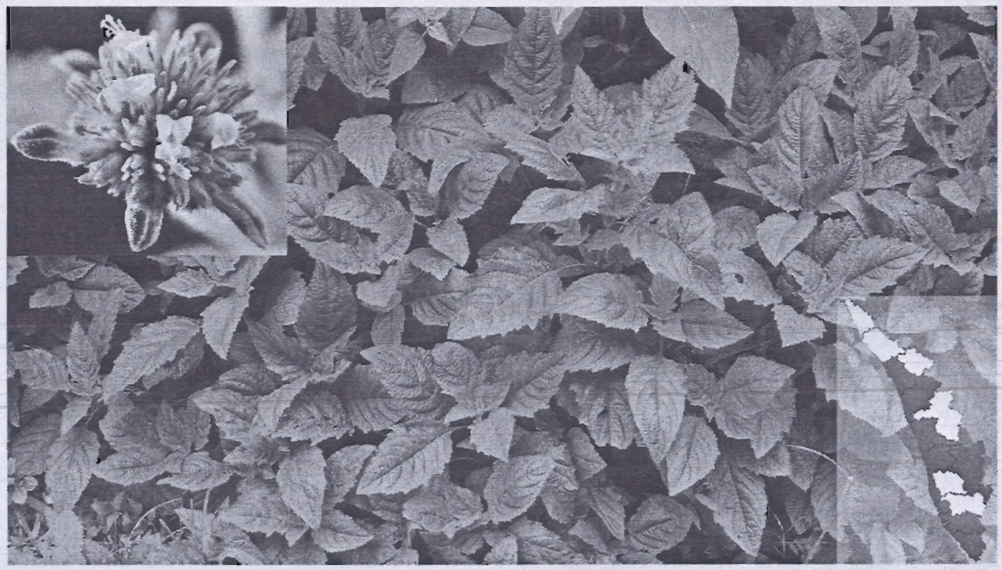
Ecology and distribution : *Hypoestes sanguinolenta* is an ornamental, fast spreading herb which quickly conquers areas wherever introduced displacing native plants. It is common along the fringes of forests, roadsides and in vacant lands. The plant grows either from seeds or cuttings. It has been recorded from Idukki and Wayanad districts.

Description : Suberect herbs, up to 20-30 cm in height, stem branched, cylindrical, jointed. Leaves opposite, 2- 4.5 x 1-2.5 cm, lanceolate, elliptic ovate, acute, entire, variegated; petiole 1-2.2 cm long, glabrous. Flowers axillary; bracts 4, jointed about the terminal end, lobed spathe like, unequal in size, 2 are pointed, other two are obovate, 1-1.5 x 0.1-0.2 cm, hirsute, dark green. Flowers 1 or 2 within the bract. Sepals 5, pale white, hirsute at the tip, lanceolate. Corolla white, tube narrow at the base, ca. 0.7 x 0.1 cm, then dilated and curved, bilipped, lower 3 lobed, lobes ca 0.9 x 0.5 cm, upper 2 lobed, lobes narrow, 1-1.2 x 0.1 cm, pubescent on the dilated and lower part of the lobes. Stamens 2, filaments 0.7-0.9 cm, hairs downwardly pointed, sparse, anther lobe yellow. Ovary 0.2 x 0.1 cm, oblong, tip pointed, glabrous; ovules 4; style 1.7- 1.9 cm, stigma slightly bifid; disc membranous, 4-5 lobed. Fruit a capsule, elongated, 0.3-0.4 x 0.1 cm, puberulous; seeds 4, glabrous.

Hyptis capitata Jacq.

Native : Central America

Synonym : *Hyptis rhomboidea* M.Martens & Galeotti
Common name : Knob weed
Family : Lamiaceae



Ecology and distribution : Knob weed is an erect shrub generally found in disturbed or overgrazed areas, watercourses, pastures, open forests and along roadsides. The plant, which is now widespread throughout the tropics, dominates over and delays growth of native plant species. It is recorded as invasive in Alappuzha, Ernakulam, Idukki, Kollam, Kozhikode, Malappuram, Thiruvananthapuram and Thrissur districts.

Description : Shrubs, up to 2 m tall; stem hollow when old, furrowed or obscurely 4-angled, puberulus. Leaves broadly elliptic to lanceolate, scabrid, nerves 5-7 pairs, oblique. Heads 1-2.5 cm across, on long peduncle, axillary and terminal. Flowers numerous, densely packed; calyx 7 mm long in fruit, glandular, lobes 5-7, acute to acuminate, united well above the middle; corolla 4 mm long, white. Nutlets smooth, black.

Hyptis suaveolens (L.) Poit.

Native : Tropical America

Synonym: *Ballota suaveolens* L.

Common name : Pignut

Local names : Naattapoochedi, Naarikkadu

Family : Lamiaceae

Ecology and distribution : *Hyptis suaveolens* is a soft suffrustescent annual subshrub which occupies roadsides, rail tracks, wastelands, watercourses and open forests. It is an obnoxious invader in these habitats, especially where the soil is well drained, and poses threat to native flora and livestock. In certain parts of the India, it is found to be more damaging to the local flora compared to other neotropical invasive alien plants. In most cases, Hyptis does not allow the native ground flora to surface by physically occupying the land and outgrowing. It is also known to produce allelochemicals which inhibit seed germination of native species. In short, invasion by the plant leads to the loss of indigenous species of palatable, economic and ethno-medicinal importance. Besides, dried-up plants enhance the incidence of fire during summer season. The weed is invasive through out the State except in Kozhikode district.

Description : Subshrubs, up to 1.5 m in height; stem obtusely 4-angular, thinly hairy. Leaves ovate, acute, hispid below, glabrate above; petiole up to 5 cm long. Flowers in clusters of 1-12; calyx tube 8 mm long, tubular, 10-ribbed, glandular hairy, teeth spinulose, 4 mm long; corolla 5 mm long, lobes short, glabrous inside, blue. Nutlets 4 x 2.5 mm, compressed, with a ridge on dorsal surface, pubescent, deep brown, mucilaginous when wet.

Ipomoea aquatica Forssk.

Native : Central to South China

Synonym : *Ipomoea reptans* Poir.

Common name : Water spinach

Local name : Kozhuppa

Family : Convolvulaceae

Ecology and distribution : *Ipomoea aquatica* is a semi-aquatic tropical vine. It is a common creeper on the banks of muddy streams and ponds, which will eventually reach out over water surfaces to form mats with other vegetation. On reaching the water surface, it forms dense floating mats of intertwined stems shading out the native submerged plants. Masses of such tangled vegetation obstruct water flow in drainage and flood control canals. Reports indicate that the vine has infested lakes, ponds, and river shorelines in the invaded areas displacing native plants that are important for fish and wildlife. The plant creates dense impenetrable canopies over small ponds and retention basins creating stagnant water condition that is an ideal breeding environment for mosquitoes. It spreads rapidly from plant fragments and its floating seeds allow effective colonization in new areas. The plant has been recorded as an aggressive colonizer in Alappuzha, Ernakulam and Kottayam districts in the State.

Description : Creeping or floating aquatic herbs, stem hollow, rooting at the nodes. Leaves alternate, varies in form, usually oblong-lanceate or narrowly triangular, 5-10 by 2-6 cm, base hastate, apex acute; petiole 6-10 cm long. Flowers purplish-white, solitary or few in cymes. Sepals subequal, 6-8 mm long, oblong-lanceolate, membranous, glabrous. Corolla funnel-form, c. 5 cm long, pale purple to nearly white, tube up to 2 cm long, lobes obscure. Stamens included, filaments unequal, hairy at the base. Ovary glabrous. Capsule globose; seeds 2 or 4, minutely pubescent.

Ipomoea cairica (L.) Sweet

Native : Tropical Africa and Asia

Synonym : *Convolvulus cairicus* L.

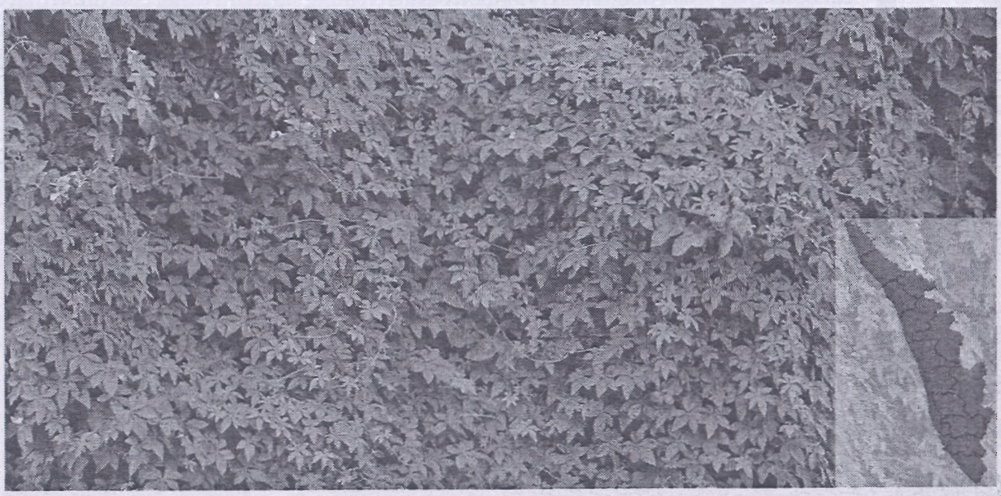
Common name : Railway creeper

Local names : Kolambipoo, Paavadappoo

Family : Convolvulaceae

Ecology and distribution : *Ipomoea cairica* is a fast growing perennial herb with twining and trailing stems. It is common in vacant lands, disturbed sites, plantations, roadsides and along railway lines. Its climbing stem overgrows and smothers native plants obstructing their growth and regeneration. Roots are tuberous and the plant will root at nodes. Flowers are purple, pink or rarely pinkish white. Seeds are dispersed by wind and water. The plant is widespread in the State.

Description : Extensive climbers. Leaves pedately 5-7-foliolate, 3-7 x 4-8 cm, orbicular in outline; lobes elliptic-ovate, apex obtuse to emarginate; petiole up to 4.5 cm long. Flowers solitary or in short racemes; pedicels 1-2.5 cm long. Calyx-lobes subequal, 4-6 mm long, outer obovate, apiculate. Corolla pink, 4.5-6 cm long, funnel-shaped. Stamens 5; filaments pilose below. Style long; stigma globose. Capsule 1-1.2 cm long, subglobose. Seeds 4-6 mm long, subglobose to ovoid, blackish.



Ipomoea carnea Jacq. ssp. *fistulosa* (Mart. ex Choisy) Austin

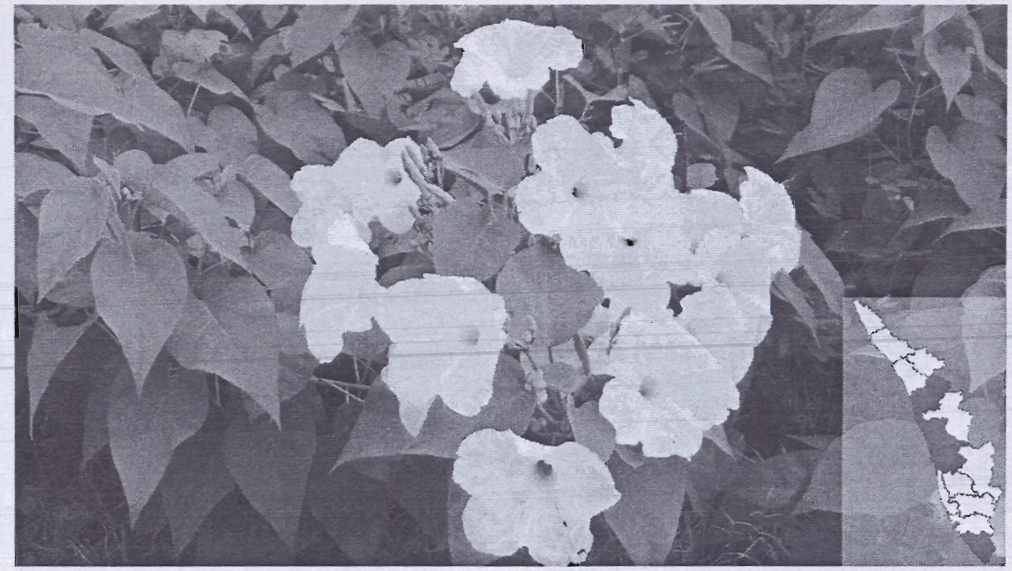
Synonym : *Ipomoea fistulosa* Mart. ex Choisy

Native : Tropical America

Common name : Bush morning glory

Local name : Neyveli katta

Family : Convolvulaceae



Ecology and distribution : *Ipomoea carnea* ssp. *fistulosa* is cultivated in gardens as an ornamental and occurs as a weed along roadsides, near canals, edges of cultivated land and marshy areas. It is widespread and naturalized in most countries in the Asia-Pacific region. The flowers are an attractive pink to lilac in colour. The plant can form mono-specific thickets and replace native flora. It occurs in Ernakulam, Malappuram, Thiruvananthapuram and Thrissur districts.

Description : Erect to subscandent shrubs; stems fistulose at maturity, tomentose. Leaves ovate-lanceate, 4-14 by 2.5-9 cm, base cordate, apex gradually acuminate, lateral veins 8-10 pairs, prominent. Cymes many-flowered, axillary or subterminal; peduncle c. 10 cm long; calyx lobes subequal; corolla pale pink, c. 9 cm long. Capsule ovoid. Seeds pubescent.

Ipomoea hederifolia L.

Native : Tropical America

Synonym : *Quamoclit phoenicea* (Roxb.) Choisy
Common name : Ivy-leaf morning-glory
Local name : Theepori mulla
Family : Convolvulaceae

Ecology and distribution : *Ipomoea hederifolia* was introduced as an ornamental plant in gardens but escaped from there and started occupying roadsides and vacant lands. It is an aggressive climber which can pull over other plants and as result displace them from natural habitats. The plant is widely distributed in the State. It is recorded as an aggressive colonizer in Palakkad district.

Description : Slender twining herbs. Leaves 4-8 x 3.5-7 cm, ovate to suborbicular, entire or 3-5-angled, cordate at base, acute to shortly acuminate at apex, glabrous; petiole up to 6 cm long. Cymes few-flowered, axillary; peduncles 5-8 cm long; pedicels 0.7 - 1 cm long. Calyx lobes 5, 2-4 mm long, oblong or elliptic. Corolla deep red, salver-form, tube up to 3.5 cm long, limb 1.5-2.5 cm across, subentire. Ovary 2-3 mm long, conical, 4-celled; ovule 1 in each cell. Capsule 5-6 mm across, subglobose. Seeds 4, c. 3 mm long, pyriform, black.

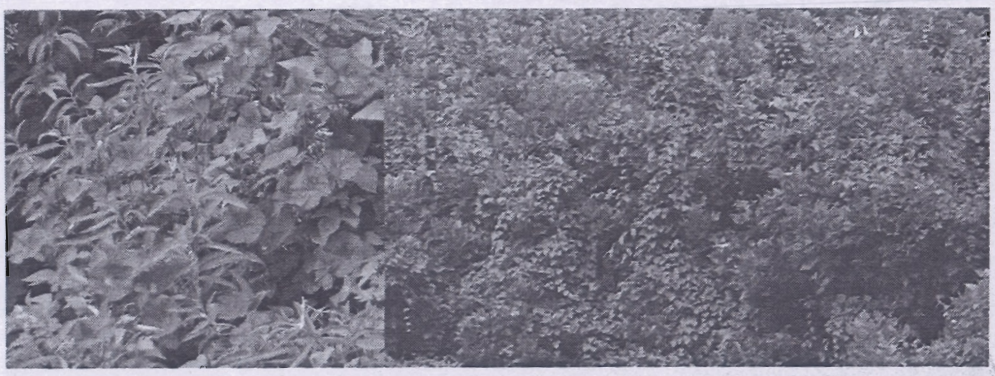
Ipomoea purpurea (L.) Roth

Native : Mexico and Central America

Synonym : *Convolvulus purpureus* L.
Common name : Common morning-glory
Family : Convolvulaceae

Ecology and distribution : *Ipomoea purpurea* is an ornamental vine which grows as an aggressive invader wherever introduced. It can climb over other plants, entangle them, retard growth and prevent regeneration. The plant prefers moist and fertile soils but can grow in a wide variety of soil types. It has invaded and got naturalized throughout the warm temperate and subtropical regions of the world. Although considered as a noxious weed, its several cultivars are grown in gardens for their beautiful flowers which vary in color from white to deep purple. The seeds are known to have a psychedelic effect. Morning glory is recorded as a weed in Alappuzha, Idukki, Malappuram, Thiruvananthapuram and Thrissur districts.

Description : Vines; the stems slender and herbaceous; annual, pilose hirsute with spreading trichomes. Leaves broadly ovate to cordate, 2-10 cm long, entire or trilobate, pubescent on both surfaces. Inflorescences of 1-5 flowered cymose clusters. Flowers on pedicels 8-15 mm long; sepals oblong-lanceolate, 8-16 mm long, apically abruptly acute, hirsute on the basal portion; corolla blue, purple, pink, or with stripes of these colors on a white background, the stripes occasionally broken, throat white, 3-5 cm long. Fruits capsular, depressed-globose, 10 mm long; seeds black, pyriform, glabrous.



Ipomoea quamoclit L.

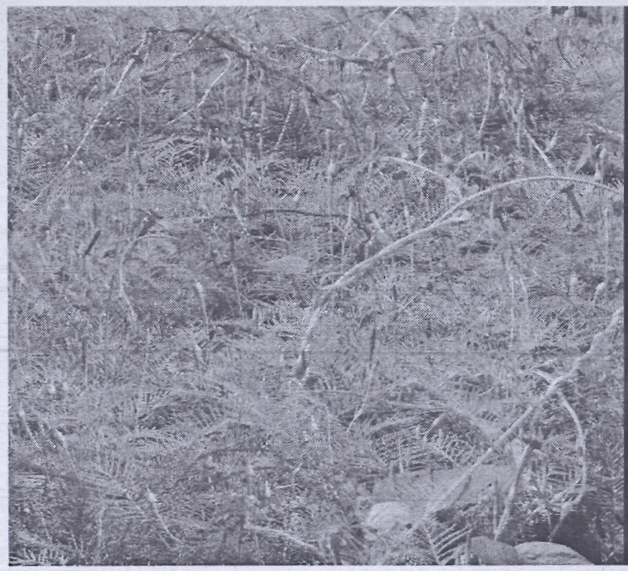
Native : Tropical America

Synonym : *Quamoclit pinnata* (Desr.) Bojer

Common name : Star-glory

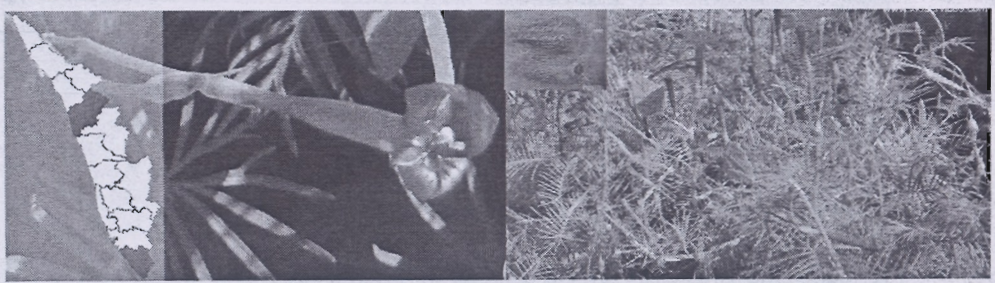
Local names : Akasha-mulla, Narayani poovu

Family : Convolvulaceae



Ecology and distribution : *Ipomoea quamoclit* is an annual twining climber with deeply cut feather-fine leaves and slender-tubed starry flowers. It is commonly grown as a garden plant but escaped to grow outside as an invader in vacant lands and along roadsides. The plant is capable of climbing over other plants to form a thick layer above the canopy cutting sunlight. It grows well in moderately fertile and well-drained soils. All parts of the plant are poisonous. It grows as a weed in Malappuram and Thiruvananthapuram districts.

Description : Slender twining herbs. Leaves alternate, 1.5-4.5 cm long, pinnately dissected; lobes many, 1-1.5 cm long, very narrowly linear, glabrous. Flowers solitary, axillary or in few flowered axillary cymes; peduncles 4-5 cm long; pedicels 1-2 cm long. Calyx lobes 0.4-0.5 cm long, lanceolate. Corolla red; lobes 0.4-0.6 x 0.25-0.3 cm, ovate. Filaments unequal, exserted. Ovary 0.2-0.3 cm long, 4-celled; ovules 1 in each cell; stigmas capitate. Capsule 0.8-1 x 0.5-0.6 cm, ovoid; seeds 4, 0.4-0.5 x 0.1-0.15 cm, compressed, conical, black on drying.



Jatropha gossypifolia L.

Native : South America

Synonym : *Jatropha glandulifera* sensu Manilal & Sivar.

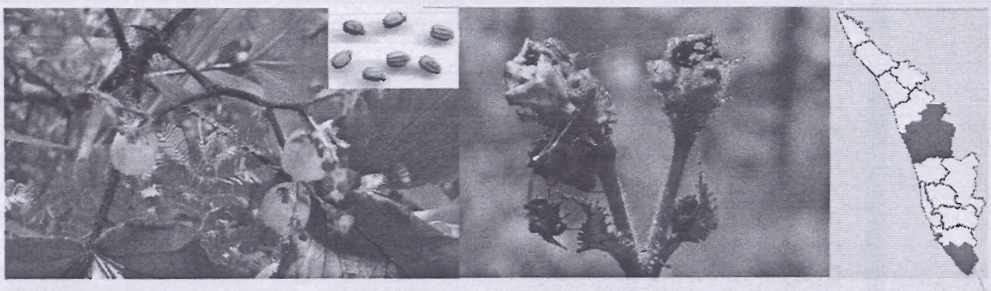
Common name: Cotton Leaf

Local names : Chuvannakadalavanakku, Seemayavanakku

Family : Euphorbiaceae

Ecology and distribution : *Jatropha gossypifolia* is introduced and grown widely for ornamental purposes in some parts of the tropics. It escaped cultivation and grows as an invasive weed in all the introduced areas, disrupting native ecosystems. Leaf and stem of the plant have medicinal properties. It commonly occurs near roadsides, in vacant lands and open areas. In Kerala, it is recorded as an invasive species in Palakkad, Thiruvananthapuram and Thrissur districts.

Description : Shrubs, purplish green and glandular hairy on younger parts. Leaves in close spiral, deeply 3-5-lobed, 7-11 x 8-12 cm, orbicular-cordate, margin with gland-tipped hairs, lobes obtusely acuminate, 5-nerved; stipules glandular-hairy; petiole 3-10 cm long, glandular-hairy. Flowers red with yellow centre, unisexual in axillary and terminal monoecious corymbose cymes. Bracts linear-lanceolate, glandular-hairy. Male perianth lobes free, biseriate, reddish-brown, outer c. 5 mm long, lanceolate, inner ones c. 4 mm long, obovate, villous at base within. Stamens 8-10. Female tepals 5. Stamens 8, biseriate. Ovary 3-celled; ovules solitary in each; styles 3, connate below. Capsule 1.3-17 x 1-1.4 cm, 3-lobed. Seeds oblong, 3-gonous.



Lantana camara L.

Native : Central and South America

Synonym : *Lantana aculeata* L.
Common name : Lantana
Local names : Arippu, Kongini, Poochedi, Unnichedi
Family : Verbenaceae

Ecology and distribution : *Lantana* is a low, erect and vigorous shrub. It has around 650 wild, cultivated and hybrid varieties which occur in over 60 countries around the globe. The diverse and broad geographic distribution of lantana is a reflection of its wide ecological tolerance. Lantana generally grows best in open un-shaded situations such as wastelands, rainforest edges, beachfronts, agricultural areas, and forests recovering from fire or logging. It cannot invade intact rainforests due to the dense and thick canopy but where natural forests are disturbed through logging or other disturbances creating gaps, the plant encroaches into the gaps. In such areas it can become the dominant understorey species disrupting succession and decreasing biodiversity. The plant can also grow individually in clumps or as dense thickets, crowding out desirable species. It threatens natural habitats and native flora and fauna and infests pastures, grazing lands, orchards, plantations and crops such as tea, coffee and coconut. Allelopathic effect of lantana reduces vigor of native plant species and limits productivity. Lantana infestations can sometimes be so persistent that it can completely stall regeneration of rainforests for several years. It causes soil erosion and is toxic to animals since its leaves and seeds contain the allelochemicals viz., Lantadene A and Lantadene B. Thickets of lantana harbors malarial mosquitoes and it is also known to spread the sandal spike disease. Lantana is undoubtedly one among the world's 100 worst invaders which poses threat to several endangered plants, animals and ecological communities. The weed is widely distributed in the State in wastelands, plantations, agriculture areas and disturbed natural forests.

Description : Much branched straggling shrubs; stem 4-angled, armed with short thorns. Leaves 3-6 x 2-4 cm, ovate or elliptic-ovate, base subcordate or truncate, margin creneate-serrate, apex acute to shortly acuminate, scabrous above, puberulous below, veins impressed above; petiole up to 1.5 cm long. Inflorescence terminal and axillary condensed spikes; peduncle 3-4 cm long, shortly prickly. Flowers sessile, orangish-red, changing to deep red on ageing. Bracts closely imbricating. Calyx truncate. Corolla salver-shaped; tube 0.8-1 cm long, slender, cylindric, bent and inflated over stamens; lobes 5, obscurely 2-lipped. Stamens 4, included. Ovary 2-celled; ovules 1 in each cell; style slender; stigma subcapitate. Drupe 2-3 mm across, globose, purple on ripening. Seeds reticulate.

Leucaena leucocephala (Lam.) de Wit

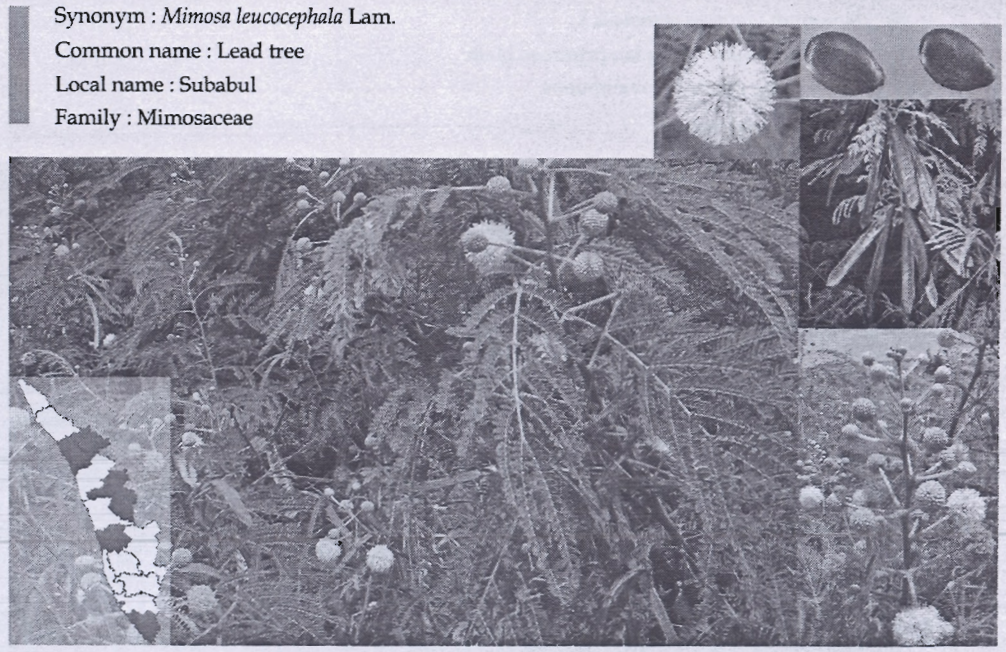
Native : Tropical America

Synonym : *Mimosa leucocephala* Lam.

Common name : Lead tree

Local name : Subabul

Family : Mimosaceae



Ecology and distribution : *Leucaena leucocephala,* a small, evergreen, leguminous tree, is considered a conflict species because of its widespread use for reforestation and forage production and at the same time its unacceptability as an invasive species wherever introduced. The tree is reported as a weed in more than 20 countries and is listed as one among 100 of the world's worst invaders (Global Invasive Species Database). Native throughout the West Indies from the Bahamas and Cuba to Trinidad and Tobago and from southern Mexico to northern South America, the fodder value of Leucaena was recognized over 400 years ago. The tree can easily invade agricultural areas, coastlands, natural forests, planted forests and waste lands and convert large areas into unusable and inaccessible zones. It can tolerate a wide variety of soil conditions except acidity. Leucaena can spread naturally, form dense monospecific thickets and together with the allelopathic effect it can prevent growth of native plants. Eradication of the tree is difficult once established. It is sparsely distributed in Kozhikode, Ernakulam, Palakkad, Thiruvananthapuram and Wayanad districts in the State.

Description : Trees, up to 9 m in height, branchlets puberulous. Leaves bi-pinnate, alternate; stipules small, cauducous; rachis 12-22 cm, slender, pulvinate, puberulent; pinnae 4-6 pairs, 4-15 cm, even pinnate, a gland between the lowest pair or a little lower down on the petiole on the upper side; leaflets 16-40, opposite, subsessile; lamina 0.8-2 x 0.2-0.6 cm, obliquely oblong or obliquely-lanceolate, base obliquely truncate, apex acute or acuminate, margin entire, membranous, glabrous above, pubescent and glaucous beneath; lateral nerves and intercostae obscure. Flowers bisexual, greenish-white, in axillary umbels, globose, up to 1.2 cm across, solitary or 2-3 together; peduncle up to 4 cm long; calyx 3 mm, 5-toothed; petals 5, free; stamens 10; filaments 7 mm; ovary superior, shortly stipitate, puberulent; styles as long as ovary; stigma simple. Fruit a pod, 18-20 x 1.5-2.5 cm, linear-oblong, flat, dehiscent; seeds 15-20, brown, glossy.

Ludwigia peruviana (L.) H. Hara

Native : South America

Synonym : *Jussiaea peruviana* L.

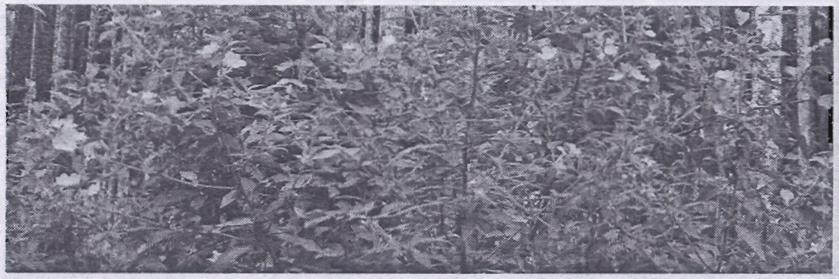
Common name : Peruvian primrose bush

Local name : Kattukarayambooov

Family : Onagraceae

Ecology and distribution : *Ludwigia peruviana* is a perennial, sometimes deciduous, wetland shrub. It may have been introduced to the tropics as an ornamental for its showy bright yellow flowers. The plant is commonly seen in marshy areas, margins of ponds and banks of waterways. Once established, it forms dense, monotypic stands outgrowing and displacing native vegetation. It can reduce the rate of flow in streams causing increased sedimentation and accumulation of organic matter. This may lead to the death of aquatic fauna and a change in composition of the flora. The sand like minute seeds are dispersed by birds. To control spread, seedlings can be hand pulled, but larger plants will reshoot unless the majority of the many long embedded roots are removed. In Kerala, it occurs in Ernakulam, Thrissur, Malappuram, Palakkad, Idukki and Wayanad districts.

Description : Subshrubs, branchlets hirsute. Leaves 8-12 x 3-4 cm, oblong-lanceolate, apex acute, base attenuate, hirsute; petiole up to 1.5 cm long. Flowers ca. 5 cm across; bracteoles up to 1 cm, deciduous; pedicel up to 2 cm; calyx tube ca 2 cm, hirsute, 4-lobed, 1 x 0.5 cm, lanceolate; petals 4, up to 3 x 2 cm, sub-orbicular, yellow; stamens 8; ovary 4-celled, ovules numerous. Capsule ca 3 cm, oblong, slightly 4-angled.



Maesopsis eminii Engl.

Native : West and Central Africa

Synonym : *Karlea berchemioides* Pierre
Common name : Umbrella tree
Local name : Kuda maram
Family : Rhamnaceae

Ecology and distribution : *Maesopsis eminii* is a large tree native to West and Central Africa introduced to many countries for its useful timber. It is an aggressive colonizer of grasslands and disturbed areas within forests capable of replacing indigenous vegetation. It may have been introduced into the State as a shade tree in Coffee plantations or the seeds may have reached through cow dung transported from the nearby States to Kerala which helped growth and colonization. Seedlings of the tree can survive under dense canopy but it needs gaps to grow to the canopy. It out-competes native saplings and when it grows to the top canopy, spreads out over nearby trees cutting sunlight available to them. The tree can alter soil properties, increase pH level, affect soil fauna and promote soil erosion. It is a self pruning tree the seeds of which can remain dormant up to 200 days. The tree was recently located in Wayanad district.

Description : Trees up to 30 m in height, bark pale brown, furrowed; blaze red, branchlets pubescent. Leaves opposite or subopposite, deccussate; stipules subulate, cauducous; petiole 10-20 mm long, slender, glabrous; lamina 8.5-12 x 2.5-4, ovate-lanceolate, oblong-ovate or lanceolate, base obliquely obtuse, apex acuminate, margin serrate, glabrous, chartaceous; lateral nerves 7-10 pairs, parallel, slender, prominent, intercostae reticulate. Flowers bisexual, greenish-yellow, 6 mm across; pedicel 0.5 cm; calyx tube obconic; lobes 5, deltoid; petals 5, green, orbicular, concave; disc 10-lobed; stamens 5, enclosed by the petals; ovary superior, ovoid, 1-celled, ovule-1, erect; style stout; stigma 5-furrowed. Fruit a drupe, up to 3 x 1.5 cm, oblong-obovoid, orange, muricate; seed one.

Merremia vitifolia (Burm. f.) Hallier f.

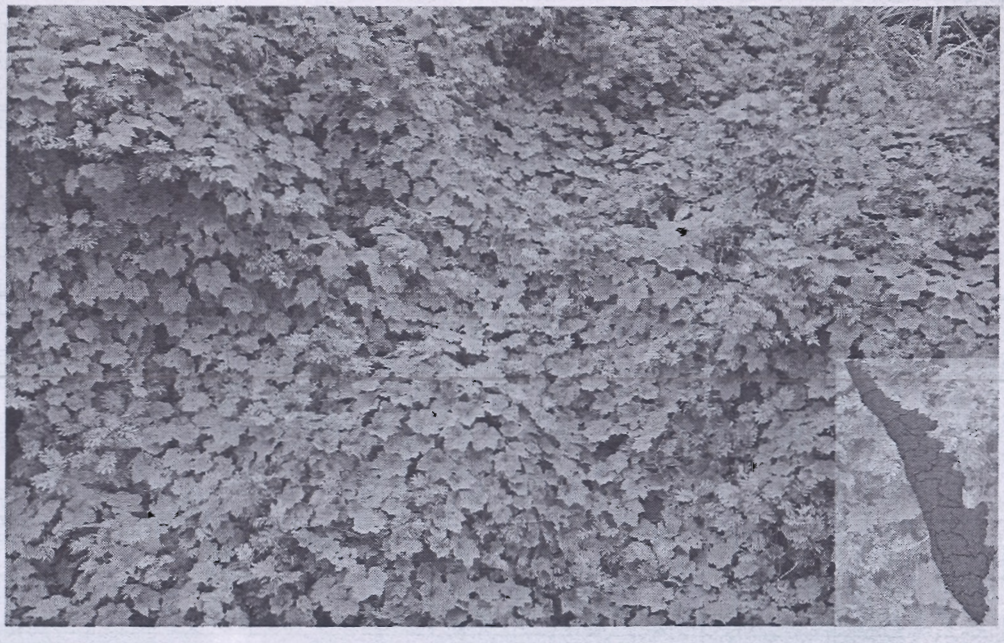
Native : Indo-Malesia and China

Synonym : *Convolvulus angularis* Burm. f.

Common name : Grape-leaf wood rose

Local names : Manja kolambi valli, Manja vayaravalli, Vana vayara

Family : Convolvulaceae



Ecology and distribution : An ornamental climber which has the ability to smother native flora by its aggressive twining habit. It grows well in vacant lands, forest edges, plantations and waste lands. Although shade intolerant, it can grow in partial shade. *Merremia* is widespread in the State.

Description : Twiners; stem brownish-black, young shoots patently hairy. Leaves lobed, 6-12 cm long, equally wide, base cordate, margin dentate-serrate, acute to acuminate at apex of lobation, sparsely fulvous hairy on both sides, basally 7-ribbed; petiole 3-8 cm long. Inflorescence axillary, 1-3-flowered cymes; peduncles 4-5 cm long. Sepals 10-15 x 6-8 mm, ovate-lanceolate, mucronate, outer hirsute, inner glabrescent. Corolla yellow, campanulate, 3.5-5 cm long, 4-6 cm across. Ovary 2-celled, ovules 2 in each cell. Capsule 1-1.2 cm across, globose, fruiting sepals much larger. Seeds 4, 6-8 mm, long ovoid.

Mikania micrantha Kunth

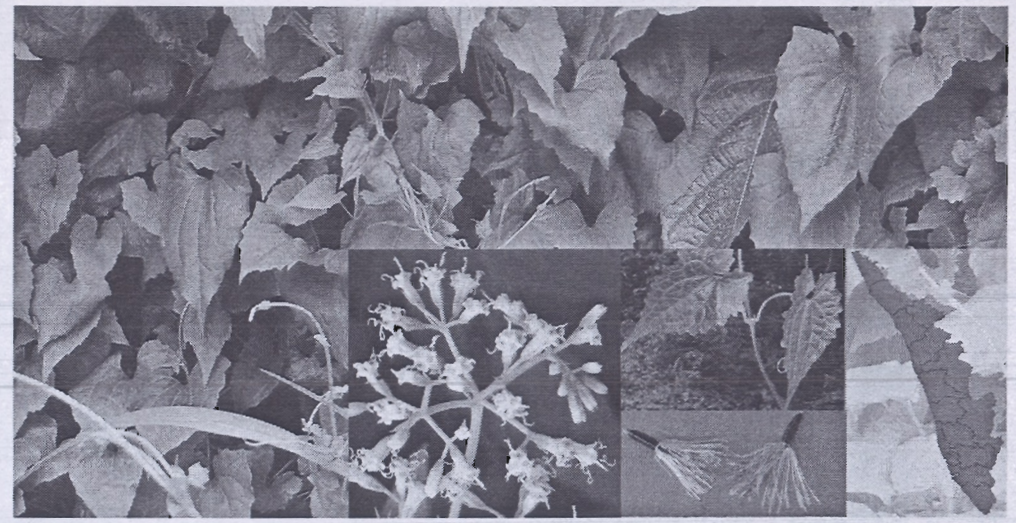
Native : North, Central and South America

Synonym : *Mikania scandens* Clarke

Common name : Mile-a-minute weed

Local names : Americanvally, Dhritharashtra pacha, Mayakkuvally

Family : Asteraceae



Ecology and distribution : *Mikania* is a fast growing perennial climber native to tropical and subtropical zones of northern, central and southern America. It was introduced in northeast India in the 1940's as a non leguminous ground cover for tea plantations. The plant is treated as one among 100 of the world's worst invaders in the Global Invasive Species Database. In India, it occurs in several States especially in the north-east and south-west. The occurrence of the weed in Kerala was first reported in 1968 from a rubber plantation at Kottayam. Mikania commonly invades wet places, forest borders and clearings, banks of streams and rivers, roadsides and railway tracks, pastures, forest plantations, agricultural areas, agro-forestry systems, open disturbed areas and barren lands. It can grow luxuriantly on leached and nutrient poor soils and on sandy loam to clayey soils. The weed cannot tolerate shade and hence fails to penetrate undisturbed closed-canopy natural forests. Wherever invaded, mikania can smother, penetrate crowns, choke and pull over plants. It thus causes significant reduction in growth and productivity of several crops including rubber, citrus, teak, eucalypt, pineapple, coconut and plantain. It is also a big threat to native biodiversity. The vine makes harvesting of crops like pineapple and plantain difficult because of the creeping and twining habit. It has affected the livelihood of tribal people in Kerala since it renders harvesting of bamboo and reeds from forests an onerous task. Aerial parts of mikania dry up in summer wherever water is not available and poses a serious fire hazard. The adverse effect of mikania on crops and soil properties is through production of phenolic and flavanoid compounds which are allelopathic to other plants. Mikania is toxic to cattle and its use as a fodder is not recommended. The weed is widely distributed in all districts in the State.

Description : Climbers, stem glandular-hispid. Leaves opposite, 5-8 x 4-6 cm, ovate, apex acute, base cordate, crenate, glabrate; petiole 2-4 cm long. Heads 5 mm long, in axillary panicles; bracts biseriate, outer 2 smaller, inner 3-5, 4 x 1.5 mm, ovate, obtuse. Flowers 3-5, similar, bisexual; corolla 3 mm long, tubular, lobes 5, glandular, white; anthers linear. Achenes 2 mm long, 5-ribbed, black, glabrous; pappus 4 mm long, many, hispid.

Mimosa diplotricha C. Wight ex Sauvalle var. *diplotricha* C. Wight ex Sauvalle

Synonym : *Mimosa invisia* C. Mart.

Native : Tropical America

Common name : Giant sensitive plant

Local name : Anathottawadi

Family : Mimosaceae

Ecology and distribution : Giant sensitive plant is a fast growing leguminous climber. It is cited as one among 100 of the world's worst invaders in the Global Invasive Species Database. Both spiny and spineless varieties of the weed are reported from Kerala. However, the spiny *Mimosa diplotricha* var. *diplotricha* is the most common. Its occurrence in the State was first reported from Perunna, Kottayam district in 1964. The weed grows best in habitats such as wastelands, disturbed forests, plantations, agricultural systems and along roadsides and railway tracks. In evergreen and semi-evergreen forests, infestation is limited to the fringes of the forest wherever canopy is open due to disturbance. It scrambles vigorously over other plants forming dense tangled thickets up to 3 m in height and in this process prevents regeneration, reproduction and growth of indigenous species. It also impacts growth and establishment of other invasive weeds such as chromolanea, mikania and lantana. All parts of the plant are toxic to herbivores if ingested. The plant occurs all over Kerala.

Description : Rambling shrubs, stem pubescent, prickles short, in 4-rows. Roots are profusely branched and with root nodules.Leaves up to 10 cm long; pinnae opposite, up to 5 cm long; leaflets up to 35 pairs, 5 x 1 mm, oblong, truncate at base, glabrous, sensitive to disturbance.; rachis prickled. Head up to 1.5 cm across, in terminal racemes, peduncled. Flowers many, 3 mm long; stamens 10, filaments 6 mm long. The pods are clustered, 10 - 35 mm long and 6 mm wide, linear, flat, clothed with small prickles, splitting transversely into one-seeded sections at the groves. The seeds are flat, ovate, spiny, 2 - 2.5 mm long and 0.6 - 1.4 mm thick, glossy and light brown.

Mimosa diplotricha C. Wight ex Sauvalle var. *inermis* (Adelb.) Veldk.

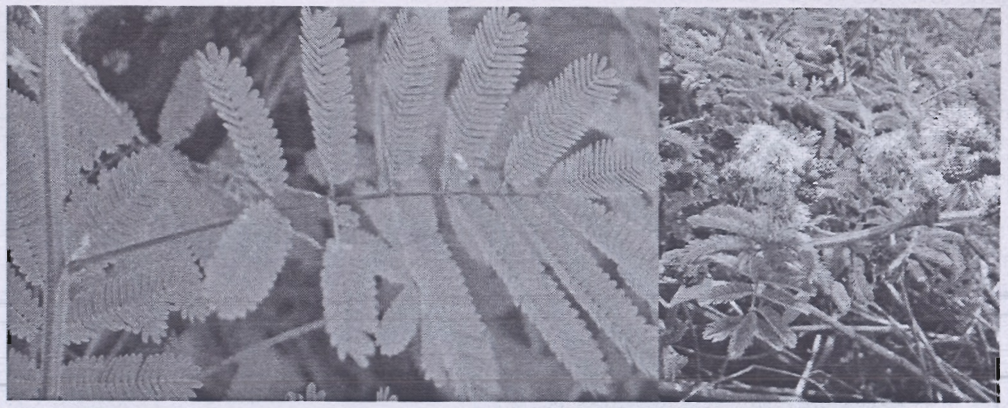
Synonym : *Mimosa invisa* C. Mart. var. *inermis* Adelb.

Native : Tropical America

Common name : Giant sensitive plant

Local name : Anathottawadi

Family : Mimosaceae



Ecology and distribution : *Mimosa diplotricha* var. *inermis* was accidentally introduced into Kerala through seeds of thorny *M. diplotricha* var. *diplotricha*. Its growth is not a serious issue in most areas but in others it can overgrow and displace native plants. The allelopathic compounds present in the plant contributes to this effect and its unpalatability to cattle. It is sparsely distributed in all districts in the State.

Description : Straggling subshrubs; stem 4-angular, without prickles. Leaves alternate up to 12 cm long; rachis, tomentose; pinnae 5-10 pairs; leaflets c.20 pairs, oblong, 3-7 by 0.75-1 mm, overlapping, base oblique-truncate, apex acute-mucronate. Flowers pink. Lomentum flat, margin with recurved prickles; seeds 3-5, subrhombic.

Mimosa pudica L.

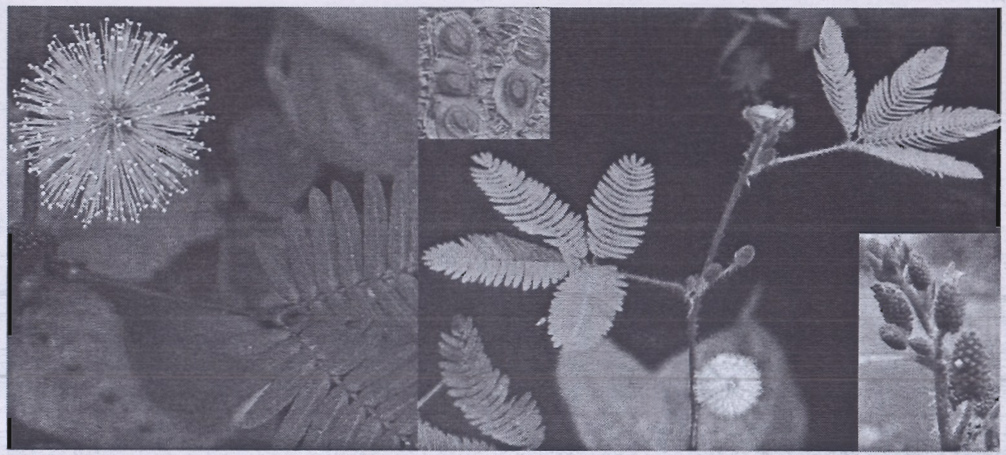
Native : South America

Synonym : *Mimosa tetrandra* Humb. & Bonpl. ex Willd.

Common name : Touch-me-not

Local name : Thottavadi

Family : Mimosaceae



Ecology and distribution : *Mimosa pudica* is a creeping annual or perennial prickly herb commonly found in agricultural areas, plantations, riversides, abandoned areas and vacant lands. It is considered as a pantropical weed. The compound leaves fold inward and droop when touched or shaken only to re-open later. It will spread aggressively in invaded areas covering large areas interrupting the growth of other plants. Crops it tends to affect include corn, coconut, tomato, cotton, coffee, banana, soybean, papaya, and sugar cane. Dry thickets of mimosa can be a fire hazard. Grazing on mimosa is reported can be toxic to livestock. Plant propagation is through seeds. The plant is widespread in Kerala.

Description : Diffuse or spreading herbs; stem terete with distant, recurved prickles. Leaves bipinnate, sensitive; pinnae 2-3 pairs, palmately arranged, 4-6 cm long; leaflets 14-20 pairs, 4-8 x 1-2 mm, elliptic-oblong, base truncate, margin ciliate, apex acute, overlapping; petiole 2-5 cm long; stipule up to 8 mm long, linear-lanceolate, acute. Flower-heads axillary, 2-3 in a cluster, globose; peduncles 2-2.5 cm long. Flowers pink. Calyx minute, campanulate, 4-lobed. Petals 4, c. 1 mm long, adenate in the lower half; lobes ovate, obtuse, pilose. Stamens 4, exserted; filaments 6-8 mm long, pink. Ovary linear, hairy. Pods 3-5-jointed, 1-1.5 x 0.3-0.4 cm, flat, slightly recurved, bristly. Seeds 2-5, c. 2 mm long, ovoid, compressed.

Mucuna bracteata DC. ex Kurz

Native : Asia

Synonym : *Mucuna exserta* Clake ex C.E.C. Fisch.
Common name : Mucuna
Local name : Thottapayar
Family : Fabaceae

Ecology and distribution : *Mucuna bracteata* is a fast growing, perennial, creeping and aggressively climbing vine imported as a cover crop for to its nitrogen fixing ability. It is drought and shade tolerant . Mucuna can choke, smother and pull down native trees by its gregarious growth and climbing behavior. Its leaves are unpalatable to cattle. Propagation is mainly through seeds and fibrous roots which arise from nodes. The plant produces a transparent liquid when cut which later changes to brown due to oxidation of phenols. The vine has escaped from plantations and occupies road sides, forest boundaries and vacant lands. It is a major threat to rubber and other plantation species unless the growth is managed by periodic cutting. Its aggressive growth as an invader is reported from Alappuzha, Kozhikode, Idukki, Kollam, Palakkad, Pathanamthitta and Thrissur districts.

Description : Gregarious woody climber; young parts grey pubescent. Leaves alternate, trifoliolate, up to 25 cm long; leaflets 6.5-15 x 5-12 cm, laterals obliquely ovate or deltoid, terminal ovate-rhomboid, acute or subacute, base rounded, truncate, glabrous or glabrescent above, adpressed, pubescent beneath. Racemes up to 16 cm long; flowers blackish purple, 3.5-4.5 cm long; bracts ovate extending to the peduncle. Calyx-tube campanulate; two upper teeth quite connate; lowest longer than the middle ones. Petals much exserted; standard not more than half as long as the rostrate keel. Stamens diadelphous; anthers dimorphous. Ovary sessile, many-ovuled; style incurved, beardless; stigma capitate. Pods 8-10 x 1.5-2.5 cm, grayish-brown, tomentose, hairs itching; seeds 4 or 5.

Muntingia calabura L.

Native : Tropical America

Synonym : *Muntingia calabura* var. *trinitensis* Griseb.

Common name : Jamaican cherry

Local name : Pancharappazham

Family : Elaeocarpaceae

Ecology and distribution : *Muntingia calabura* is a small fast growing tree with drooping branches which is cultivated for its sweet fruits. It invades and grows as a weed in wastelands, vacant lands and abandoned areas. The tree can grow well in nutrient poor soils, tolerating both acidic and alkaline conditions. It is resistant to drought. but doesn't tolerate salinity. Propagation is through seeds which are dispersed by birds and bats. Due to its fast growth and invasive character, the tree out-competes indigenous vegetation. The wood of Muntingia which is reddish brown in colour, compact and durable is used in carpentry. The tree is observed to grow as a weed in Ernakulam district in the State.

Description : Trees, up to 7 m in height; branches spreading; branchlets densely villous, glandular-pubescent. Leaves simple, alternate; stipules 1 or 2, 5 mm long, lateral, filiform, hairy; petiole 5 mm long; lamina 6-11 x 2-4 cm, lanceolate or oblong-lanceolate, base obliquely subcordate, apex acuminate, margin serrate, chartaceous, glandular hairy above, woolly beneath; lateral nerves 3-5 pairs, pinnate, prominent, intercostae reticulate, prominent. Flowers bisexual, 1.5-3 cm across, white, rarely pink; pedicels 2-2.5 cm long; sepals 5, 1.5 cm long, lanceolate, valvate, shortly connate at base, densely pubescent; petals 5, thin, ovate, obovate or suborbicular, shortly clawed, entire, imbricate, crumpled in bud; intrastaminal disc annular, bearing a ring of hairs on the exterior margin; stamens many, ca. 1 cm long; filaments filiform; ovary superior, 5-6 mm long, ellipsoid, 5-celled, ovules many; styles short; stigmas capitate, 5-grooved. Fruit a berry, 1-1.5 cm across, red or yellow, subglobular; seeds many, obovoid-ellipsoid, many.

Parthenium hysterophorus L.

Native : North and South America

Synonym : *Parthenium lobatum* Buckl.

Common name : Congress grass

Local name : Congress pacha

Family : Asteraceae

Ecology and distribution : *Parthenium,* an annual herb, was accidentally introduced into India through contaminated cereal grain before 1910 but went unrecorded until 1956. Most of the Indian states are currently under its threat. Parthenium colonizes disturbed sites very aggressively, impacting pastures and croplands and out-competing native species. It grows luxuriantly in waste and vacant lands, forestlands, agricultural systems and urban areas. Allelopathic effect coupled with the absence of natural enemies like insects and microbes are responsible for its rapid spread in the introduced areas. It prefers alkaline, clay loam to heavy black clay soils but tolerates a wide variety of soil types and grows well in areas where the annual rainfall is over 500 mm. Infestation by Parthenium degrades natural ecosystems. It aggressively colonizes disturbed sites and reduces pasture growth and forage production. Its pollen is known to inhibit fruit set in many crops. Pollen grains, air borne pieces of dried plant material and roots of Parthenium can cause allergy type response like hay fever, asthma, skin rashes, peeling skin, puffy eyes, excessive water loss, swelling and itching of mouth and nose, constant cough, running nose and eczema in human beings. In animals, the plant can cause anorexia, alopecia, dermatitis and diarrhea. Parthenium can taint sheep meat and render diary milk unpalatable due to its irritating odour. In India, an extensive outbreak of dermatitis caused by Parthenium allergy involving around 1000 people with some deaths has been reported. The weed is recorded from Kasargod, Palakkad, Idukki, Kollam, Thiruvananthapuram, Thrissur and Wayanad districts.

Description : Erect herbs up to 2 m in height. Leaves alternate, deeply pinnatisect, lobes 7-10 x 1 cm, oblong-lanceolate, apex acute, base decurrent, entire, pubescent. Heads in terminal, lax panicles; bracts 2-seriate, up to 3 x 1.5 mm, ovate, obtuse, ciliate. Florets dissimilar; outer florets 5, rayed, female; corolla ligulate; limb short, entire; inner florets male; corolla tubular, white; anthers obtuse at base. Achenes 2 x 1.5 mm; pappus absent or with two short hooks.

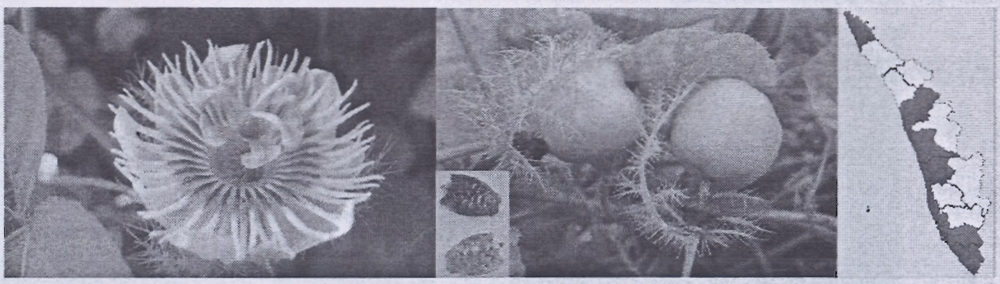
Passiflora foetida var. *foetida* L.

Native : Tropical America

Common name : Stinking passion flower

Local names : Ammummapazham, Poochappazham

Family : Passifloraceae



Ecology and distribution : *Passiflora foetida* is a perennial herbaceous vine which commonly occurs in agricultural areas, abandoned land and roadsides. The plant can form a dense ground cover and climb over low vegetation in the invaded areas preventing or delaying growth and establishment of other species. The weed is recorded from Alappuzha, Ernakulam, Kasargod, Kollam, Malappuram, Thiruvananthapuram and Thrissur districts.

Description : Herbaceous vines. Stem, petioles and leaves glandular-hispid. Leaves 5-7 x 3-5 cm, roughly to deeply 3-5-lobed, suborbicular to ovate, cordate at base, lobes acuminate, adpressed, glandular-pubescent. Petiole up to 1.5 cm long. Stipules deeply dissected to glandular appendaged. Bracts and bracteoles deeply pinnatisect, glandular-pubescent. Flowers axillary, often solitary, 3-4 cm across. Calyx lobes 5, 1-1.5 x 0.6- 0.8 cm, broadly ovate, apically spurred. Petals white, shorter than calyx lobes. Coronal segments in 2 whorls; outer coronal hairs many, 0.8-1 cm long; inner ones 2-3 mm long. Gynandrophore 5 mm long. Stamens 5. Ovary 1-celled; ovules many; styles 3; stigma capitate. Berries 1.5- 2 cm diam., subglobose, yellow, subtended by the bracts and bracteoles. Seeds many, 4-5 mm, ovate, laterally compressed, pitted.

Pennisetum pedicellatum Tan.

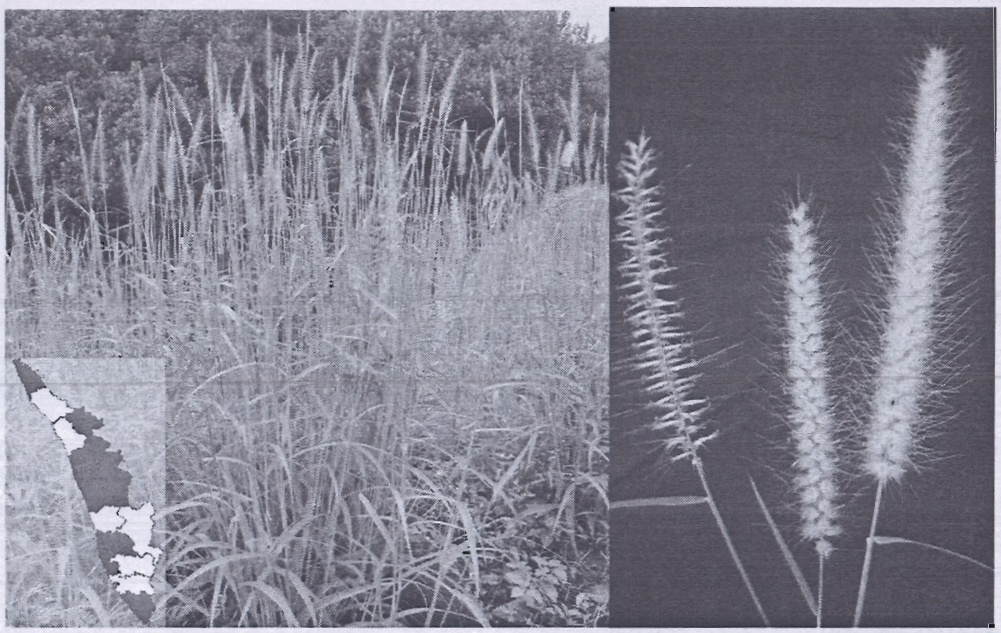
Native : Africa and Asia

Synonym : *Cenchrus pedicellatus* (Trin.) Morrone

Common name : Kyasuwa grass

Local name : Poochavalanpullu

Family : Poaceae



Ecology and distribution : *Pennisetum pedicellatum* was introduced as a pasture grass in parts of Asia but turned invasive in the long run invading open areas, crop lands, vacant lands and forest fringes. It grows well in fertile soil and can tolerate acidic and alkaline soils. It also adapts well to situations of drought and spreads rapidly by self sown seeds. The plant can overgrow native vegetation and displace them. It is recorded as a common invader in Alappuzha, Kasargod, Kottayam, Malappuram, Palakkad, Thiruvananthapuram, Thrissur and Wayanad districts.

Description : Annuals. Culms 30-150 cm high, tufted, erect, nodes glabrous. Leaves linear-lanceolate, acuminate, 5-25 x 0.3-1 cm, rounded at base, tubercle-based hairy or glabrous. Sheaths slightly keeled, sparsely tubercle-based hairy. Ligules membranous, fimbriate. Panicles spiciform, interrupted, 5-15 cm long, fluffy-white or purplish. Rachis puberulous. Involucre enclosing 1-5 spikelets, at least one of them pedicelled, pedicels 1-3 mm long, villous; bristles densely woolly plumose, 0.5-2.5 cm long. Spikelets lanceolate, 4-6 mm long. Lower glume ovate-lanceolate, 1.5-2 x 0.5-1 mm, hyaline, faintly 1-3-nerved, silky villous. Upper glume ovate-lanceolate, 2-3 x 1-1.5 mm, hyaline, faintly 5-nerved, silky villous. Lower floret male or barren. Upper floret bisexual. First lemma ovate, 3-4 x 1-1.5 mm, 3-lobed at apex, hyaline, faintly 5-nerved, teeth ciliolate. Palea minute, hyaline. Stamens 3, anthers 1-1.5 mm long, yellow. Second lemma elliptic, 2-2.5 x 1-1.5 mm, coriaceous, shining, faintly 5-nerved. Palea elliptic, 2-2.5 x 1 mm, coriaceous, 2-keeled. Stamens 3, anthers c. 2 mm long. Ovary oblong, 0.25-0.5 mm; styles 1-2 mm long; stigmas 2-3 mm long, cream-yellow.

Pennisetum polystachyon (L.) Schult.

Native : Tropical Africa

Synonym : *Panicum polystachyon* L.

Common name : Mission grass

Local name : Kothappullu

Family : Poaceae

Ecology and distribution : Mission grass has invaded many countries in the Asia- Pacific region and thrives in the tropical climate. It commonly occurs in disturbed, mostly dry, lowland areas and cultivated fields. It can act as a host for maize streak virus. The plant competes with native plant species, alters the fire regime and can be a potential seed contaminant. It grows as a weed in all districts in the State except Kasargod and Pathanamthitta.

Description : Stout annuals. Culms up to 1.5 m tall, erect; nodes glabrous. Leaves 10-30 x 0.4-1.3 cm, linear or linear-lanceolate, base rounded, apex acuminate, tubercle-based, hairy or glabrous; sheaths up to 22 cm long, keeled,villous at mouth; ligules membranous, fimbriate. Panicles 7-18 cm long, spiciform, cream-yellow or reddish-purple in colour; rachis angular with sharp-edged decurrent wings. Involucre enclosing one sessile spikelet. Spikelets 3-4 mm long, lanceolate. Lower glume 0.5-1 mm long, ovate-acute. Upper glume c. 3 x 1.5 mm, ovate-lanceolate. Lower floret male or barren. Upper floret bisexual. First lemma c. 3 x 1.5 mm, ovate-lanceolate. Palea hyaline. Second lemma 2-3 x 1 mm, oblong-acute, coriaceous. Palea c. 2 x 1 mm, oblong, coriaceous. Stamens 3; anthers yellow. Ovary c. 0.5 mm long; stigma golden-yellow. Grains cylindric, dorsally compressed.

Physalis angulata L.

Native : Tropical Africa, Asia and Australia

Synonym : *Physalis minima* L.
Common name : Sunberry
Local names : Mottam puli, Njottanjodian
Family : Solanaceae

Ecology and distribution : *Physalis angulata,* an annual herb, is common in orchards, nurseries, fallow land, road sides and waste lands. It grows best in moist, fertile soils and is tolerant to partial shade. The plant is widely distributed in the tropics. As an invasive plant, it negatively impacts the growth of native species by competing with them for resources. The fruit, which is wrapped up in the inflated calyx, is edible. Propagation is through seeds. Although widely distributed in the State, it has been noticed to invade ecosystems in Idukki and Thiruvananthapuram districts.

Description : Annual herbs; branches angular. Leaves 3-7 x 1.5-3 cm, ovate or elliptic-lanceolate, base cuneate, unequal sided, margins dentate or sinuate, sometimes entire, apex acute, glabrous or sparsely pubescent; petiole up to 4 cm long. Flowers axillary, solitary; pedicels c. 8 mm long. Calyx campanulate, 5-toothed, c. 2.5 cm across in fruit. Corolla pale-yellow with a purple base, campanulate, c. 8 mm across; limb plicate, shortly lobed. Stamens 5, unequal; anthers oblong. Style linear; stigma obscurely 2-lobed. Berry c. 7 mm across, globose, enclosed by the inflated calyx. Seeds many, discoid, minutely rugose.

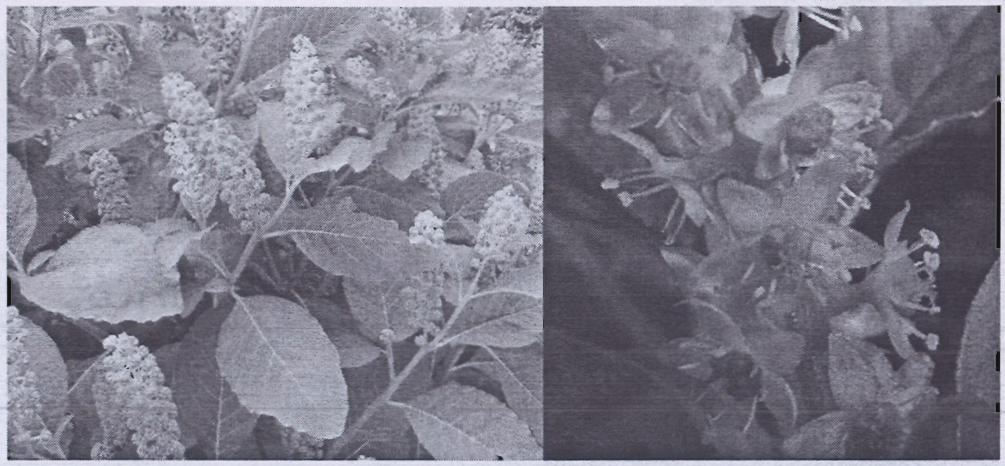
Phytolacca octandra L.

Native : Tropical America

Synonym : *Phytolacca americana* var. *mexicana* L.

Common name : Inkweed

Family : Phytolaccaceae



Ecology and distribution : *Phytolacca octandra* is a large semi-succulent perennial herb. It grows as a weed in disturbed sites, waste lands, roadsides, gardens, pastures, forest margins, open woodlands and creek banks in tropical, sub-tropical and warm temperate regions. The plant is not very aggressive in nature compared to many other invasive alien plants. Reproduction is through seeds which are spread by birds. In Kerala, it has been recorded from Idukki district only.

Description : Erect fleshy herbs up to 2 m in height, Leaves alternate, 8 x 3 cm, obovate to spathulate, acute at apex, narrowed to the base, lineolate. Flowers 5-7 mm across, in long, axillary, 15 cm long racemes, shortly pedicelled; perianth lobes 5, ovate, spreading; stamens 5, free, filaments erect, anthers versatile; ovary depressed-globose, 6-7-lobed, 6-7-celled; ovules solitary in each cell, styles 6-7, short, curved out. Fruit a capsule, 8 mm across, depressed-globose, fleshy; seeds 6-8, biconvex, black, glabrous, polished.

Prosopis juliflora (Sw.) DC.

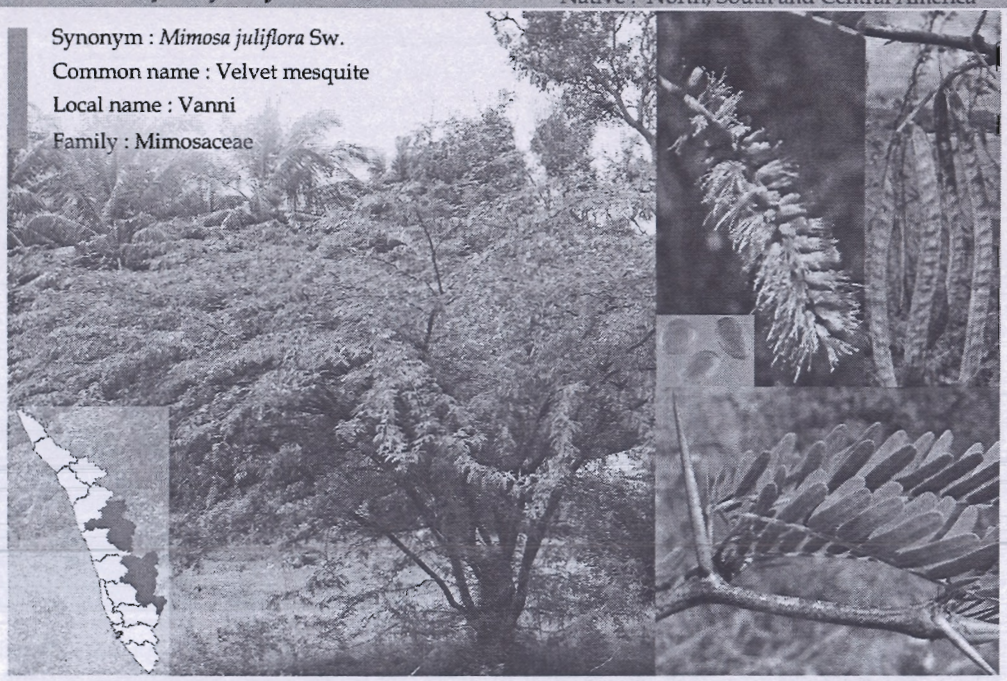
Native : North, South and Central America

Synonym : *Mimosa juliflora* Sw.

Common name : Velvet mesquite

Local name : Vanni

Family : Mimosaceae



Ecology and distribution : *Prosopis juliflora* is a spiny, fast-growing, small- to medium-sized evergreen tree, with a short, crooked trunk and a large crown. It is highly regarded as a fuel wood in many tropical countries. It will coppice, pollard and regenerate rapidly and flourish in a wide range of sites and soil types. The tree is common as an invader in wastelands, degraded sites, grazing areas, crop lands, along river courses, deserts and grasslands. It grows gregariously in its preferred habitats, forming dense, impenetrable thickets. These thickets are a serious threat to native flora and fauna. The carrying capacity of many habitats has been seriously reduced by Prosopis invasion. The tree can also dry out the soil and compete with other plants for water, especially in dry areas. Invasion by Prosopis is not of serious concern in the State and recorded only from Idukki and Palakkad districts. In the neighboring Tamil Nadu, it is the most widespread and damaging invasive plant.

Description : Trees, up to 10 m in height, bark deeply wavily fissured, yellowish-brown; branchlets zig-zag, glabrous; spines straight, ca. 5 mm long, solitary or paired, divergent, up to 5 cm long on older branches. Leaves bi-pinnate, alternate; stipular thorn up to 1.5 cm long; petiole 1-5 cm long, slender; pinnae 2-4, even pinnate, 3-11 cm long, slender, flattened, ending in a short bristle, a circular gland near the base of lower pinnae; leaflets 22-36, opposite; petiolule up to 3 mm; lamina 6-23 x 1.5-5 mm, oblong or linear-oblong, base obtuse, apex obtuse, emarginate or mucronulate, margin entire, glabrous, chartaceous; midrib slightly excentric; lateral nerves prominent beneath. Flowers bisexual, 1.5 mm across, greenish-yellow, subsessile, in axillary spikes, up to 12 cm long; bracteoles minute; calyx 1.5 mm long, campanulate, glabrous, 5-toothed; petals 5, ligulate, sub coherent at base; stamens 10, free, slightly exserted; anthers with an apical gland; ovary superior, stipitate, pubescent, ovules many; style filiform; stigma minute. Fruit a pod, 20-30 x 1.5 cm, pale yellow, glossy, smooth, flattened, with straight parallel sutures or irregularly sub moniliform; seeds ovoid, brown, embedded in pulpy mesocarp.

Pteridium aquilinum (L.) Kuhn

Native : Tropical America

Synonym : *Pteridium aquilinum* var. *lanuginosum Henriq.*

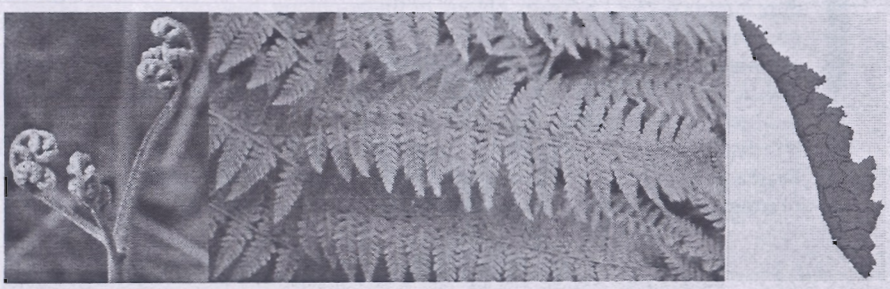
Common name : Bracken fern

Local names : Thaivasoppu, Churuli

Family : Dennstaedtiaceae

Ecology and distribution : A perennial, gregarious fern which can spread fast through its extensive network of underground rhizomes. The spores, which are dispersed by wind, have a long viability period. The rhizomes are the main carbohydrate storage organs and their ability to sprout from small sections aids fast spread of the plant. Pteridium can grow well in different types of soil except waterlogged soils and can tolerate pH levels between 3 and 8. Although it can grow in shaded and un-shaded habitats, best growth is observed in open areas. Pteridium can replace native vegetation by its gregarious growth and it affects land productivity and biodiversity. Control of Pteridium is difficult since it easily sprouts from even a small section of the rhizome which is transported through movement of soil. The water near a bracken-covered area contains carcinogens and hence it is a major threat to livestock and human health. The young shoots of the plant are sensitive to frost and trampling by large mammals. The plant is widespread in the State.

Description : Perennial, gregarious fern with well-branched creeping, underground rhizomes. Fronds directly emerge from underground stems, 200 x 90 cm; the leaf stalk is usually mistaken for the stem. Leaf is divided into numerous segments with the lowest segments three times compound. Clusters of spore cases densely line the in-rolled edges of dorsal side of leaves. Sporangium aggregated into sori on the underside of the frond. A single frond can produce up to 30 million spores and this will be even greater in open habitats. Young fronds produce extrafloral nectaries.



Pueraria phaseoloides (Roxb.) Benth.

Native : Tropical Asia

Synonym : *Dolichos phaseoloides* Roxb.

Common name : Tropical kudzu

Local name : Thotta-payar

Family : Fabaceae

Ecology and distribution : *Pueraria phaseoloides* is a vigorous, deep rooted, twining and climbing legume which is extensively used as a cover crop in plantations of rubber and other crops. It is widely adapted to different types of soils and grows gregariously in vacant lands and along margins of cultivated areas. This fast growing climber can aggressively climb up trees and smother and displace them. The plant grows invasive in all districts in the State except Wayanad.

Description : Gregarious climber. Stem slender, 2-4 m wide, brownish hirsute. Stipules basifixed, ovate-lanceolate, 3-5 mm; stipels linear, 2-3 mm; leaflets broadly ovate, rhomboid, or ovate-rhomboid, terminal one broader, 6-10 × 4.5-9 cm, lateral ones smaller, oblique, entire or 3-lobed, abaxially densely white hirsute, adaxially adpressed hirsute. Racemes solitary, 8-15 cm or more. Bracts and bracteoles linear-lanceolate, 3-4 mm, hirsute. Flowers with short pedicels, clustered at slightly distant nodes. Calyx ca. 6 mm, pilose; lower tooth as long as tube, apex hirsute, others deltoid, shorter than tube. Corolla bluish or lilac; standard suborbicular, 8-12 mm, base with 2 incurved auricles; wings obovate-oblong, slightly longer than keel, one side of base with rounded auricle, claw slender; keel falcate, apex with short beak, base truncate, clawed. Ovary linear, thinly hairy. Legumes subcylindric, 5-8 cm × ca. 4 mm, first adpressed hirsute, later subglabrous. Seeds 15-20, oblong-elliptic, subtruncate at both ends, ca. 4 mm.

Quisqualis indica L.

Native : Myanmar

Synonym : *Combretum indicum* (L.) DeFilipps
Common name : Burma creeper
Local name : Kulamarinji
Family : Combretaceae

Ecology and distribution : *Quisqualis indica* is a shrubby climber with scented flowers. It is widely used as an ornamental plant but can grow as an aggressive colonizer monopolizing invaded sites threatening the native flora. It colonizes open areas, disturbed sites and roadsides. It requires good sunlight for active growth. The plant is widely distributed in the State except in Palakkad and Wayanad districts.

Description : Woody climbers; young branchlets tomentose. Leaves opposite to subopposite, 6-12 x 3-5 cm, elliptic to oblong-elliptic, base rounded to subcordate, often unequal sided, apex acuminate, minutely verrucose above, finely pubescent beneath, chartaceous; petiole up to 1 cm long. Spikes terminal, up to 8 cm long. Flowers fragrant; bracts 2-5 x 1-2 mm, linear. Receptacles 4.5-8 cm long, narrowly tubular, expanding towards the apex, pubescent without. Sepals 2-3 x 1.5-2.5 mm, triangular reflexed. Petals 1-1.5 x 0.4-1 cm, obovate-oblong, obtuse, white, turning deep red at maturity, finely pubescent. Filaments 5-7 mm long. Style adnate to the wall of the upper receptacle for most of its length. Fruit 3-3.5 x 1-1.2 cm, ovate-elliptic, black.

Racosperma auriculiforme (Benth.) Pedley

Native : Tropical Australia

Synonym : *Acacia auriculiformis* Benth.

Common name : Darwin Black Wattle

Local name : Acacia

Family : Mimosaceae

Ecology and distribution : *Racosperma auriculiforme*, a tree legume, has been introduced into Kerala under the social forestry programe to meet fuel wood requirements and other purposes. The tree can grow well under diverse soil and climate conditions. It can withstand drought very well. It has not been considered as an invasive species so far though excellent regeneration is noticed near the plantations under the species. Recent surveys in the State has shown that it can spread and grow as a weed along roadsides, in vacant lands, near plantations and in unmanaged plantations. Invasive nature of the tree has been noticed only in Kasargod district.

Description : Trees, up to 15 m in height, bark brown, smooth; branchlets terete, glabrous. Phyllodes alternate; stipules lateral; petiole 8-20 mm long, pulvinate, slender, glabrous; lamina 7-20 x 1-5 cm, linear, falcate or falcate-elliptic-falcate, base attenuate, apex subacute or obtuse, margin entire, glabrous, coriaceous; 3-6 parallel ribs from the base, palmate, prominent, intercostae reticulate. Flowers bisexual, yellow, 2.5 mm, in axillary spikes, to 4-8 cm long; calyx 0.5-1 x 0.8-1 mm, campanulate; lobes 5; corolla ca. 2 mm long; lobes 5, 1.5-1.8 mm, lobes lanceolate; stamens many, 3-4 mm long; ovary superior, subsessile, glabrous; styles 3-4 mm long. Fruit a pod, 3-10 x 0.5-1 cm, flat, glabrous, woody and much twisted in irregular coils; seeds black, 0.6 x 0.5 cm, with orange-yellow coloured aril.

Ricinus communis L.

Native : Tropical Africa

Synonym : *Cataputia major* Ludw.
Common name : Castor oil plant
Local names : Aavannakku, Kottai
Family : Euphorbiaceae

Ecology and distribution : *Ricinus communis* is a coarse perennial shrub introduced and cultivated in several countries for castor oil which is used extensively in medicine and industries. It is also grown as an ornamental plant. The plant is common in abandoned lands, disturbed sites and cultivated areas from sea level to high altitudes. It prefers moist and well-drained fertile soil at all pH levels for growth but cannot tolerate shade. Propagation is through seeds which contain a toxin viz., 'ricin' which is fatal to humans and animals. It can invade cultivated and non-cultivated areas suppressing growth of indigenous flora. Ricinus is recorded as an aggressive invader in all district except Kannur, Kottayam, Pathanamthitta and Wayanad districts.

Description : Monoecious, branched glaucous shrubs up to 3 m in height. Leaves alternate, palmately 6 – 8 - lobed, peltate, up to 20 x 24 cm; lobes 9-15 x 3-6 cm, lanceolate, margin coarsely serrate, apex acuminate; petiole up to 18 cm long. Flowers in terminal paniculate racemes, pale yellow; male flowers below, female ones above. Male flowers: perianth cupular, 3-5-lobed, c. 4 mm long, lanceolate; stamens many, filaments connate, repeatedly branched. Female flowers: tepals 5, subequal, c. 5 mm long, lanceolate; ovary globose, 3-locular, echinate; ovule 1-per locule; styles 3, papillose. Capsule 1.6-2 cm across, 3-lobed, prickly. Seeds oblong, smooth, marbled, carunculate.

Senna alata (L.) Roxb.

Native : Tropical America

Synonym : *Cassia alata* L.

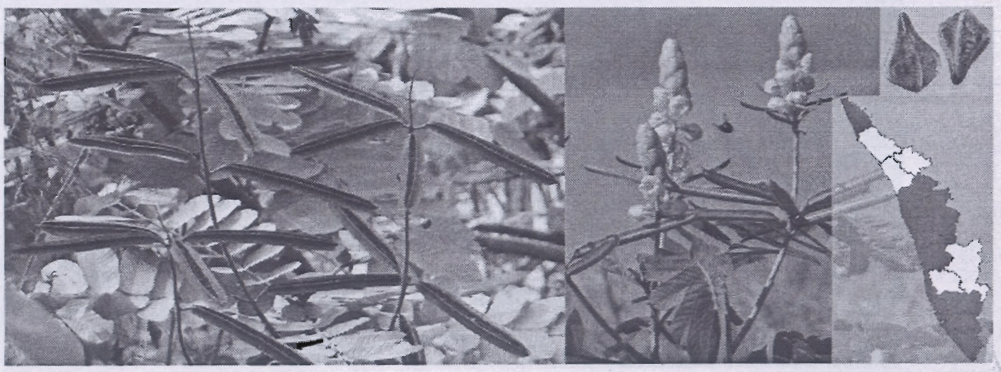
Common name : Candle bush

Local names : Aanathakara, Aattuthakara, Chakrathakara

Family : Caesalpiniaceae

Ecology and distribution : *Senna alata* is an ornamental shrub or tree which grows abundantly in marshy areas, open and abandoned land, roads sides and pastures. It is also called ringworm cassia since the leaves are used to treat ringworm infections. The upright flowers resemble thick yellow candles. The tree performs the best in full sun. It is an aggressive competitor which can shade out and displace native plants. The plant can tolerate a wide range of ecological conditions and can grow well in most soil types. Propagation is through seeds. It grows as a weed in Alappuzha, Ernakulam, Kasargod, Kollam, Malappuram, Palakkad, Pathanamthitta, Thiruvananthapuram and Thrissur districts.

Description : Erect shrubs, up to 4 m tall. Leaves 28 - 60 cm long; leaflets 6-12 pairs, 4-13 x 2-6 cm, oblong to obovate-oblong, base rounded to subcordate, apex rounded; stipules 1-2 cm long, deltoid, base auriculate, apex acute to acuminate. Inflorescence terminal or axillary, many-flowered spicate raceme, 40-60 cm long. Flowers yellow; pedicels 4-8 mm long; bracts petaloid, yellow, 1-2 cm long, ovate-elliptic, subacute. Sepals 1-1.5 cm long, yellow. Petals yellow, 1.5-2 cm long, obovate. Stamens 10, anthers 2 large, 5 medium-sized, and 3 small. Pods 9-14 x 1.5-2 cm, linear, 4-winged, septate, dehiscent. Seeds many, 5-7 x 4-5 mm, rhomboid, compressed, dark brown.



Senna hirsuta (L.) Irwin & Barneby

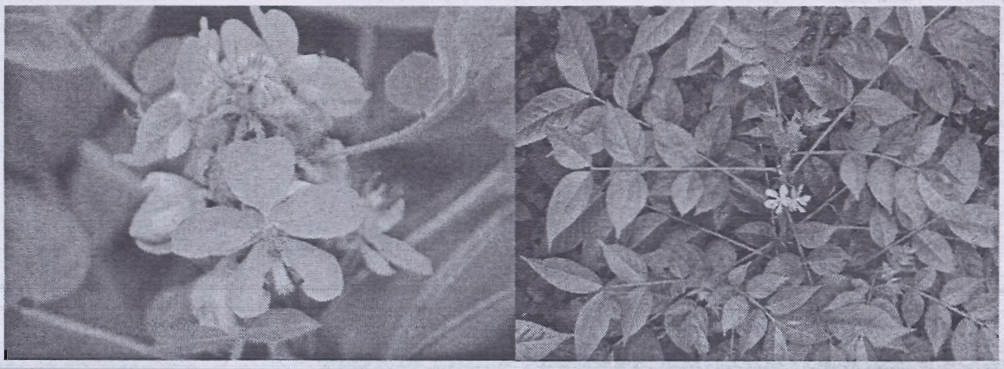
Native : Tropical America

Synonym : *Cassia hirsuta* L.

Common name : Woolly senna

Local name : Ponninthakara

Family : Caesalpiniaceae



Ecology and distribution : *Senna hirsuta* is a shrub which has been introduced and grown as a shade plant and as a soil improver in many countries in the tropics. It grows well in waste lands, gardens, along roadsides, railway embankments, dry ditches and in secondary forests. It is an aggressive colonizer in certain ecosystems. The plant flowers throughout the year; propagation is mainly through seeds. The seeds are dispersed by water and animals that eat its fruits. Seed may also spread as a contaminant in agricultural produce or in mud sticking to the body of animals, footwear, machinery and vehicles. The plant is recorded as an aggressive colonizer in Alappuzha, Idukki, Kollam, Malappuram, Thiruvananthapuram and Thrissur districts.

Description : Erect subshrubs up to 2 m in height, densely hirsute all over. Leaves up to 18 cm long, usually with 3-5 pairs of leaflets; leaflets 3.5-6 x 2-3.5 cm, ovate or elliptic, base rounded, apex acuminate, silky hairy on both sides; rachis 8-12 cm long, a large black gland on the rachis just below the lowest leaflets; stipules 5-8 mm long, linear-lanceolate. Flowers yellow, c.1.5 cm across, in axillary and terminal few-flowered racemes; pedicels 1-1.4 cm long; bracts linear. Sepals 5, 5-8 mm long, oblong, densely hairy without. Petals 5, 0.8-1 cm long, obovate, obtuse. Stamens 10 , unequal, 6 or 7 fertile. Ovary 2-2.5 mm long, tomentose; ovules many; style glabrous. Pods 10-15 x 0.6-0.8 cm, linear, subterete, curved, densely hirsute. Seeds many, c. 3 x 2.5 mm, orbicular, compressed, light brown.

Senna occidentalis (L.) Link

Native : South America

Synonym : *Cassia occidentalis* L.
Common name : Coffee-senna
Local names : Karinthakara, Oolanthakara
Family : Caesalpiniaceae

Ecology and distribution : *Senna occidentalis* is an annual or short-lived perennial shrub which occupies disturbed habitats, roadsides, pastures, forest fringes and vacant lands up to an altitude of 900 m asl. It has become naturalized wherever invaded. Seeds are dispersed through mud adhering to vehicles and machinery or as a contaminant in fodder, hay etc. It grows as a weed in cultivated fields and plantations and is a major issue in heavily grazed grasslands. The foliage and seeds are toxic to cattle and other animals. The plant is recorded from all districts in the State but its invasive nature has been noted in Alappuzha, Ernakulam, Kollam, Malappuram, Thiruvananthapuram, Thrissur and Wayanad districts.

Description : Erect subshrubs up to 2 m tall. Leaves up to 22 cm long; leaflets 4-5 pairs, 2.5-7 x 1.5-3.5 cm, ovate-lanceolate, base rounded, apex acute or acuminate, glabrous or pubescent; rachis up to 18 cm long with a sessile, hemispherical gland at base; stipules 4-7 mm long, linear-lanceolate, acuminate, caducous. Flowers c. 2 cm across, in terminal and axillary racemes, up to 3 cm long; pedicels 0.8-1.2 cm long; bracts linear-lanceolate. Sepals 6-10 mm long, ovate, obtuse, mucronate. Petals 5, yellow, 1-1.5 cm long, obovate. Stamens 10, unequal, only 7 fertile. Pods 5-9 x 0.6-0.8 cm, linear, compressed. Seeds 20-25, 4-5 x 3-4 mm, ovate or suborbicular, compressed, brown.

Senna siamea (Lam.) Irwin & Barneby

Native : South East Asia

Synonym : *Cassia siamea* Lam.
Common name : Ironwood tree
Local name : Manjakonna
Family : Caesalpiniaceae

Ecology and distribution : *Senna siamea* is widely grown as a shade tree in coffee, cocoa and tea plantations or for pole timber and fuel wood. It is also grown for ornamental purposes. The tree is capable of growing in a wide range of climatic conditions but is particularly suited to lowland tropics with a monsoon climate. It is susceptible to cold and frost conditions and cannot thrive well if the dry period exceeds 4-8 months. Propagation is through seeds, stumps or seedlings. It also regenerates vigorously by coppicing. Senna often invades natural habitats and displaces native vegetation.The plant grows as a weed in Kannur, Palakkad, Thiruvananthapuram and Wayanad districts.

Description : Trees, up to 12 m in height, young parts puberulent. Leaves paripinnate, alternate; stipules small, subulate, cauducous; rachis 30-35 cm long, slender, pubescent, grooved above, pulvinate; leaflets 18-30, opposite, estipellate; petiolule 3-4 mm, slender, pubescent; lamina 4-7 × 1.8-2.8 cm, oblong, elliptic-oblong or ovate-oblong, base obtuse or round, apex obtuse, mucronate or retuse, margin entire, glabrous above, glabrous or minutely pubescent and glaucous beneath; lateral nerves 6-10 pairs, pinnate, faint, intercostae reticulate, obscure. Flowers 2.5-3.5 cm long, bisexual, yellow, in terminal or axillary corymbose recemose panicles; bracts linear, curved; sepals 5, 5-7 mm long, suborbicular, subequal, greenish-yellow, puberulent; petals 5, 1.5×0.8 cm, ovate-elliptic, subequal, clawed; stamens 10, upper 3 staminodes small, antheriferous ones 7, lower 2 large, curved, one medium; ovary half inferior, sessile, pubescent, deeply grooved, ovules many. Fruit a pod, 20-25 x 1-1.5 cm, long stipitate, strap-shaped, compressed woody with thick sutures; seeds 20-30, longitudinal.

Senna spectabilis (DC.) Irwin & Barneby

Native : Tropical America

Synonym : *Cassia spectabilis* DC.

Common name : Calceolaria shower

Local name : Manjakonna

Family : Caesalpiniaceae

Ecology and distribution : *Senna spectabilis* is a nitrogen fixing tree widely planted for ornamental purposes or as a shade/boundary tree. It can withstand a wide range of environmental conditions and is found common in vacant lands, river banks, plantations, parks or along roadsides. The tree grows well in deep, moist, sandy or loamy soils but can flourish even in nutrient poor soils. It has good coppicing ability and even old trees still coppice. Propagation is mainly through seeds. The tree is capable of invading natural habitats, grow into thickets and displace indigenous flora. It is recorded as invasive in Wayanad district in the State.

Description : Small trees up to 10 m in height, young parts puberulous to tomentose. Leaves alternate, rachis (including petiole) 20-33 cm long, eglandular; leaflets 8-15 pairs, 4-6 x 1.5-2.5 cm, ovate-lanceolate to lanceolate, chartaceous, acute or subacuminate, obliquely rounded at base, puberulous beneath; petioles 2-3 cm long; petiolules 2-3 mm long; stipules linear, narrowly falcate, ca 1 cm long, deciduous. Flowers in axillary, congested, paniculate-corymbose racemes; peduncles 2-3 cm long; pedicels 1.5-2.5 cm long; bracts ovate or ovate-lanceolate, acute-acuminate, caducous. Sepals unequal, reflexed, concave; outer ovate, about half as long as inners, pubescent; 3 inner ones petaloid, obovate. Petals 2-2.5 cm long, yellow, dark-veined, 4 similar but unequal, shortly clawed. Fertile stamens 7, almost equal in size; anthers yellow, exceeding the filaments, biporose at top; staminodes 3, deeply cordate at both ends. Ovary glabrous; stigma fringed with minute cilia. Pods 17-25 x 1-1.5 cm, shortly stipitate, linear-cylindric, terete, turgid, annulate, septate, dehiscing along the sutures; valves black, woody, cross-ridged, wrinkled; seeds 50 to 70, orbicular, 4-6 x 3-5 mm, pointed at radicle, orange-brown; areole 2-3.5 x 1-2.5 mm, oblong-elliptic.

Senna tora (L.) Roxb.

Native : South America

Synonym : *Cassia tora* L.
Common name : Sickle senna
Local name : Thakara
Family : Caesalpiniaceae

Ecology and distribution : *Senna tora* is an aggressive plant which has naturalized in many countries wherever invaded. It quickly colonizes open and vacant land, plantations and agricultural systems and areas close to water ways altering the composition of native flora. It can tolerate a wide range of soil and climatic conditions but prefers light (sandy), medium (loamy) and heavy (clay) soils which are acidic, neutral or basic. It can grow in open as well as in semi-shade conditions. The weed occurs all over Kerala.

Description : Annual subshrubs, glabrous, up to 1 m tall. Leaves up to 15 cm long, bearing a slender cylindric gland on the rachis between the leaflets of the lower 2 pairs; leaflets 2-4 pairs, 1.5-4.5 x 1.5-2.5 cm, obovate-oblong, base somewhat oblique, apex obtuse, pubescent below; stipules 1-1.5 x 0.1- 0.2 cm, linear. Flowers c. 1.5 cm across, in few-flowered axillary racemes; pedicels 4-6 mm long; bracteoles 2, 2-3 mm long. Sepals 5, 5-6 mm long, obovate-obtuse. Petals 5, yellow, 8-12 mm long, obovate-obtuse. Stamens 10, unequal, only 7 fertile, 3 large, 4 medium, 3 staminodal. Ovary subsessile, pubescent; ovules numerous. Pods 8-14 x 0.3-0.6 cm, linear, subtetragonous, septate between seeds, indehiscent. Seeds 20-30, 4-5 mm long, oblong, compressed, chestnut-brown.

Sesamum radiatum Schum. & Thonn.

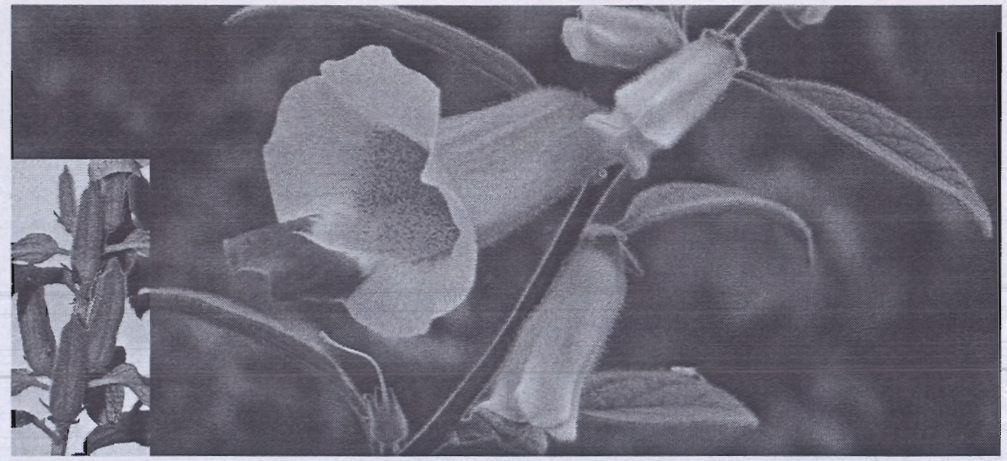
Native : Tropical West Africa

Synonym : *Sesamum mulayanum* Nair

Common name : Wild beriseed

Local name : Kattu ellu

Family : Pedaliaceae



Ecology and distribution : *Sesamum radiatum* is an aggressive invader in a wide range of habitats including nutritionally poor sites and abandoned fields. It is also common in open areas, and along road sides. The plant is used as a leafy vegetable in Africa. The stem of the plant emits a foul smell when broken. It can tolerate heat and drought well and can outgrow native species. The plant is well rooted and hence manual uprooting as a control measure is hard. The spread of the plant is mainly through seeds. It has been recorded as a weed in Alappuzha, Kasaragod and Thrissur districts.

Description : Erect mucilaginous herbs, 1-1.5 m in height, stem 4-angled, moniliform hairy. Lower leaves variously lobed; upper becoming smaller, elliptic to oblong, all bullate hairy on both surfaces. Flowers axillary, solitary. Pedicels 0.5-0.6 cm long. Calyx 5-lobed; lobes 0.4-0.5 cm long, ovate, glandular hairy. Corolla pinkish; tube funnel-shaped, 1.5-21-1.3 cm, scattered glandular hairy, 2-lipped, 5-lobed, hairy within. Stamens 4, didynamous, included. Ovary 2-celled, ovules many; style filiform; stigma 2-lobed. Capsule 2-2.5 x 0.7-1 cm, 4-lobed, oblong, obtuse at apex, densely hairy. Seeds minute, obovate, compressed, arranged in 4 rows, ridged , brown on drying.

Sesbania bispinosa (Jacq.) Wight

Native : Asia and Africa

Synonym : *Aeschynomene bispinosa* Jacq.

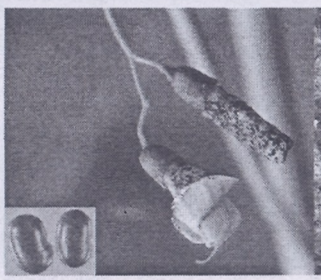
Common name : Prickly sesban

Local names : Kedangu, Kilannu

Family : Fabaceae

Ecology and distribution : *Sesbania bispinosa* is a fast growing annual shrub. It is common in marshy areas, rice fields, disturbed sites and land filled areas. The plant can tolerate a wide range of environmental conditions and can rapidly colonize a given area suppressing indigenous flora. The stem produces a spongy mass of parenchyma under water logged conditions. In Kerala, the weed is distributed in Ernakulam, Kannur, Palakkad, Pathanamthitta and Thrissur districts.

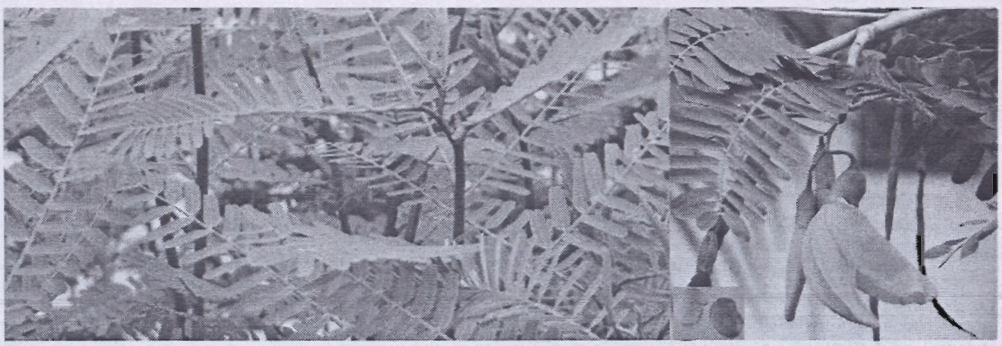
Description : Erect, annual subshrubs up to 3 m tall; stems semi-woody; branches and leaf rachises more or less prickly. Leaves pinnate; rachis 15-35 cm long; stipules membranous, linear-lanceolate, acuminate, 0.6-1 cm long; leaflets 10-50 pairs, linear-oblong, 0.5-2 cm long and 2-5 mm wide, apex obtuse, mucronate, base acute, glabrous on both surfaces. Flowers 1-1.3 cm long, borne on 3-6 flowered drooping racemes; peduncles slender; pedicels 6 mm long, filiform; calyx 3-4 mm long, membranous, glabrous, teeth deltoid, much shorter than the tube; corolla 10-13 mm long, yellow usually with red dots on the back of the glabrous standard. Fruit(pod) 15-23 cm long and c.2 mm in diam, straight or slightly curved with slightly indented margins, 35-40 seeded.



Sesbania grandiflora (L.) Poir.

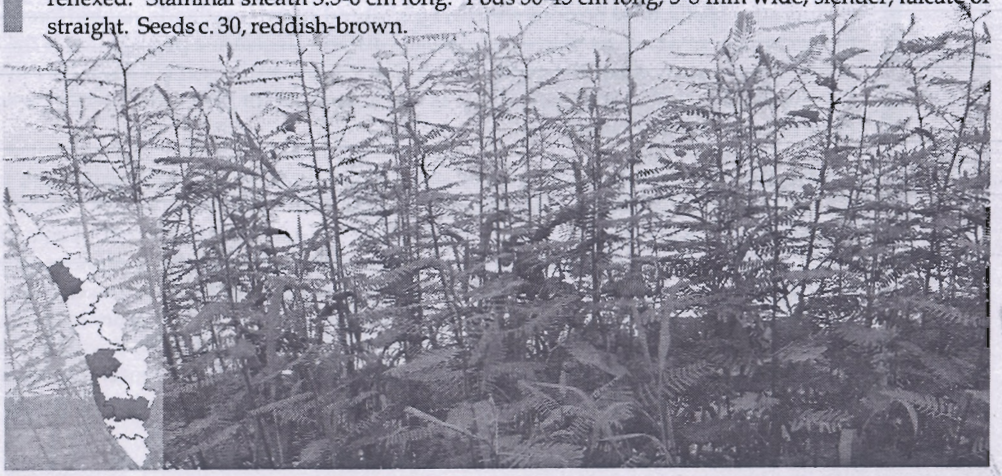
Native : Asia

Synonym : *Robinia grandiflora* L.
Common name : Sesban
Local name : Agathicheera
Family : Fabaceae



Ecology and distribution : *Sesbania grandiflora* is a nitrogen fixing tree introduced into several countries mainly for its fodder value. It is also used as a windbreak and as a prop for certain crops. The tree is commonly grown on paddy bunds, marshy land and open and abandoned areas. It can tolerate a wide range of soil conditions and withstand flooding over short periods by producing floating adventitious roots. In some countries in south-east Asia, the leaves, seed pods and flowers are used for human consumption. It can establish rapidly both through seeds and stem cuttings. Seeds are viable for 1-2 years. The tree is invasive in habit and its thickets are a threat to native flora. It is widely distributed in the State but grows as a weed in Alappuzha, Ernakulam, Kozhikode, and Pathanamthitta districts.

Description : Small soft-wooded trees; up to 7 m tall; branchlets pubescent. Leaves 18-30 cm long; leaflets 12-25 pairs, 1.5-3.5 x 0.6-1.2 cm, oblong, base rounded, apex obtuse, emarginate, glabrous to appressed-pubescent on both the surfaces, glaucous beneath; stipules 5-8 mm long, ovate. Racemes up to 8 cm long, lax, 2-4-flowered. Flowers 7.5-10 cm long, pendulous; pedicels up to 2 cm long; bracts and bracteoles 3-4 mm long, linear-oblong. Calyx 2-3 cm long, campanulate; lobes triangular. Corolla pink or white, 7.5 -10 cm long; standard to 10 x 6 cm, reflexed. Staminal sheath 3.5-6 cm long. Pods 30-45 cm long, 5-8 mm wide, slender, falcate or straight. Seeds c. 30, reddish-brown.



Sphagneticola trilobata (L.) Pruski

Native : Tropical America

Synonym : *Wedelia trilobata* (L.) Hitchc.

Common name : Singapore daisy

Local name : Venappacha

Family : Asteraceae

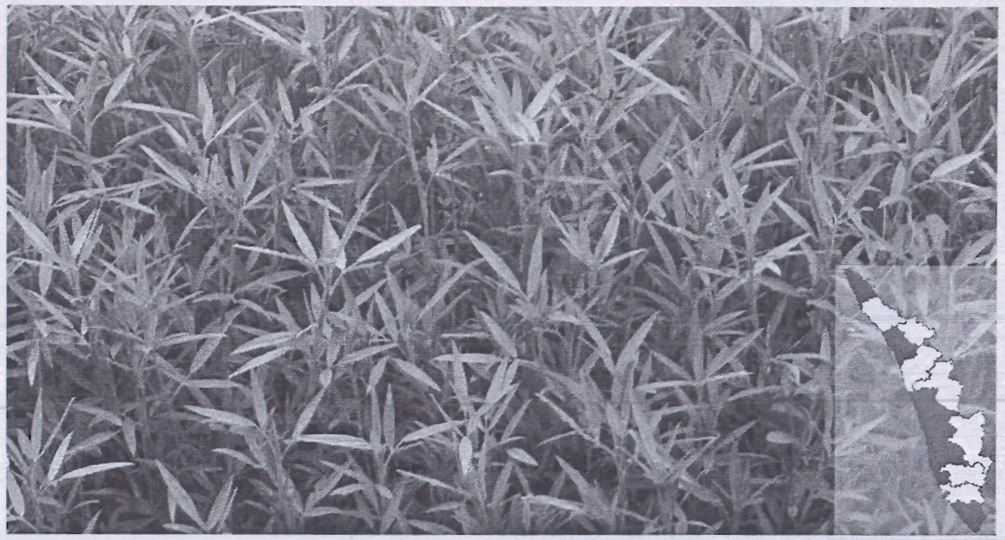
Ecology and distribution : Singapore daisy is a creeping, mat forming perennial herb native to the tropics of Central America. It is a widely planted ornamental species which often escapes from gardens to form a dense ground cover that crowds out or prevents regeneration of other species, including natives. Also, it competes with crops for nutrients, light and water and thereby reduces yield. The plant has a wide ecological tolerance; it can thrive well in open areas with well-drained moist soil and can also withstand inundation, high levels of salinity and frequent dry spells. It is a noxious weed in agricultural areas, coastlands, natural forests, planted forests, urban areas, waste places and garbage dumps. Vegetative propagation is the common mode of reproduction but the plant also produces a few fertile seeds. Global Invasive Species Database has included Singapore daisy as one among 100 of the world's worst invaders. The plant is widespread in Kerala.

Description : Perennial, prostrate herbs, diffuse, rooting at nodes; stems glabrous or pubescent (near nodal region). Leaves elliptic-obovate, usually with 3 angular lobes with toothed margins, acute at apex, basally cuneate, 3-10 x 3-7 cm, glabrous to sparingly pubescent; petiole short, up to 5 mm. Heads radiate, solitary on ebracteate peduncles, 2-2.5 cm across; peduncles strigose, 4-15 cm long. Involucre green; bracts lanceolate, 1-1.5 cm long, ciliate inner narrower. Ray florets 5-8; corolla bright yellow, 1.5-2.0 x 0.5-0.7 cm, 3-4 denticulate; tube short. Ovary trigonous; stigma bilobed. Pappus connate into a spathiform, fimbriate cup at the apex, devoid of awns. Disc florets many; corolla yellow; tube 5-8 mm long, 5-lobed; lobes deltoid, densely pubescent within. Anthers black, syngenecious. Style branches flattened and marginally pubescent. Achenes blackish, warty, 4-6 mm long, crowned by the persistent pappus cup.

Stylosanthes fruticosa (Retz.) Alston

Native : Africa and Asia

Synonym : *Arachis fruticosa* Retz.
Common name : African stylo
Family : Fabaceae



Ecology and distribution : *Stylosanthes fruticosa* is a woody perennial nitrogen fixing herb intercropped or grown in mixtures with crop plants to improve soil fertility. Outside the introduced locations, it is commonly found invading plantations, vacant areas, grasslands and roadsides. It can grow well in sandy, well drained alkaline soils and can tolerate acid soil also. The aggressive nature of the plant impacts the growth of the local flora negatively. It is moderately tolerant to water logging and drought conditions. The seeds are dispersed through water and they remain in the soil for several years. The plant is palatable to cattle but heavy grazing can kill them. It grows invasive in Alappuzha, Ernakulam, Kasargod, Kottayam, Kozhikode, Thiruvananthapuram and Thrissur districts in the State.

Description : Procumbent herbs or undershrubs up to 50 cm in height, root-stock woody. Stem, peduncles and pedicels loosely villous. Leaves 3-foliolate; leaflets 8-20 x 2.5-5 mm, oblong-elliptic or linear-lanceolate, acute at base and apex, mucronate at tip, pubescent on both sides, ciliate on margins; nerves parallel and close; stipules 8-13 mm long, lanceolate, adnate to base of petiole, sheathing, villous without. Flowers yellow 3-5 in terminal heads; bracts and bracteoles 0.8-1.2 cm long, linear-lanceolate, densely hairy. Calyx lobes 2-4 mm long, densely brown hairy. Petals yellow, 4 - 6 mm long. Stamens monadelphous. Ovary 2-3 mm long, suborbicular, woolly; style filiform. Pods 5-8 mm long, monoiliform, 1or 2-articulate; articles pilose, reticulate, fully enclosed in calyx, beak curved. Seeds c. 2.5 mm long, reniform.

Synedrella nodiflora (L.) Gaertn.

Native : West Indies

Synonym : *Verbesina nodiflora* L.
Common name : Synedrella
Local name : Mudianpacha
Family : Asteraceae

Ecology and distribution : *Synedrella nodiflora* is an erect herb which got naturalized in many countries wherever it has been introduced. It is common in disturbed areas, abandoned lands, gardens, along roadsides and in croplands and plantations. The plant can adapt very well to a variety of environmental conditions. It prefers partial shade under plantation crops like tea, coffee, banana and rubber and grows well especially if the soil is moist and fertile. It is palatable to livestock so not a problem in pasture. Propagation is mainly through seeds. The plant is invasive in Alappuzha, Ernakulam, Idukki, Kannur, Kollam, Kozhikode, Malappuram, Palakkad, Pathanamthitta, Thiruvananthapuram and Thrissur districts in the State.

Description : Erect herbs up to 90 cm in height, stem adpressed, hairy. Leaves opposite, 4-8 x 2-4 cm, elliptic-ovate, base cuneate to truncate, narrowly winged on the petiole, margin serrate, apex acute, scabrous on both sides, basally 3-nerved; petiole up to 3 cm long. Heads solitary, axillary and terminal, few-flowered, 0.5-1 cm across, radiate. Phyllaries 2-seriate; outer foliaceous, inner paleaceous. Flowers heterogamous, yellow. Ray flowers: female; corolla tube 2-2.5 mm long; ligule 1-2 mm long, 2-3-lobed; ovary 3 mm long, oblong, winged; style-arms acute. Disc flowers; bisexual; corolla tube 2-3 mm long, lobes 5; stamens 5, included, ovary 2-3 mm long. achenes 3-4 mm long, dimorphic: of ray florets dorsally compressed, with lacerate wings; of disc florets trigonous, not winged, with 2 or 3 rigid awns.

Thevetia peruviana (Pers.) Merr.

Native : Tropical America

Synonym : *Cerbera peruviana* Pers.
Common name : Yellow oleander
Local name : Manja arali
Family : Apocynaceae

Ecology and distribution : *Thevetia peruviana* is an evergreen shrub which is widely grown as a garden plant. It can spread vigorously competing with native flora. The plant can survive on most soils and can easily invade dry tracts. It is toxic to animals. Propagation of the plant is mainly by seeds and also by cuttings. The plant is widely distributed in the State but recorded as an aggressive colonizer only in Palakkad district.

Description : Shrub or small trees. Leaves alternate, clustered near tips of branches, 8-12.6 x 0.7-1 cm, linear-lanceolate, base cuneate, margin recurved, apex acute, glabrous; petiole up to 1 cm long. Flowers in sub-terminal cymes, pedicel up to 2 cm long. Calyx lobes 5, c. 8 mm long, lanceolate, unequal, tube short. Corolla large, golden-yellow, 4-5 cm across, funnel-shaped; tube 4-5 cm long, throat villous; lobes 5, obovate, overlapping to the left. Stamens 5, included; anthers c. 2 mm long, oblong-cordate. Ovary c. 2 mm, depressed-conic; stigma conic with a basal ring. Drupe 2.5-3.5 cm across, broadly turbinate, compressed laterally. Seeds few, strongly flattened.

Tithonia diversifolia (Hemsl.) A. Gray

Native : Mexico to Central America

Synonym : *Mirasolia diversifolia* Hemsl.
Common name : Mexican Sunflower
Local name : Kaippan pachha
Family : Asteraceae

Ecology and distribution : *Tithonia diversifolia* is a stout shrub native to the region from Mexico to Central America. It is an ornamental with beautiful flowers common in gardens, abandoned land and along roadsides. The plant is used as a live fence in certain countries. Its invasion threatens native vegetation leading to loss of biodiversity. Propagation is mainly through seeds. It is recorded from all districts in the State except Thiruvananthapuram.

Description : Shrubs up to 3 m in height, leaves alternate, 10-25 cm long, 3-5 lobed; lobes acute to acuminate, crenulate, base decurrent, tomentose below. Heads 8-12 cm across, solitary, axillary, on long hollow peduncle; bracts 4-seriate, outer smaller, obtuse, puberulus; inner 10-14 mm long, oblong, obtuse. Flowers 2-types; outer female, ligulate; limb 3-5 x 1.5 cm, oblong, entire or 2-toothed, yellow. Inner flowers tubular, bisexual; corolla 8-10 mm long, 5-lobed, yellow; anthers erect, base obtuse, black. Achenes 6 mm long, dark brown, hairy; pappus of two bristles.

Tridax procumbens L.

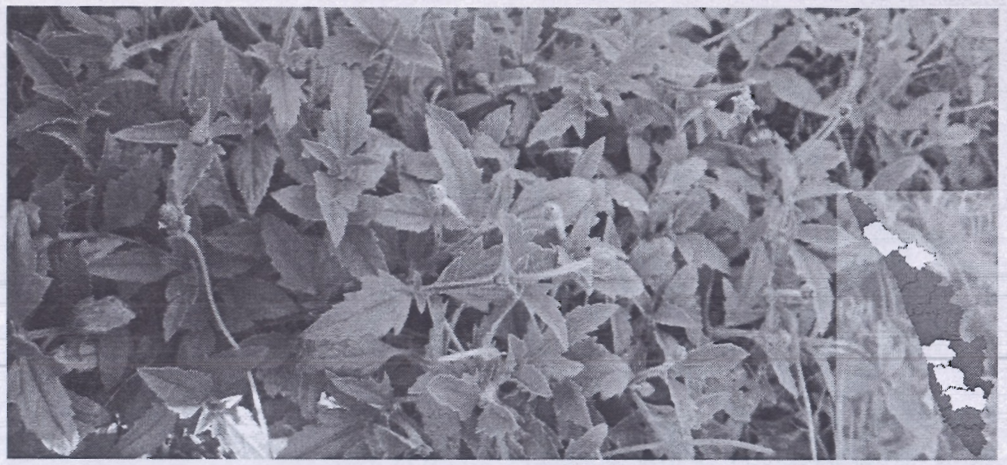
Native : Tropical America

Synonym : *Tridax procumbens* var. *canescens* (Rich. ex Pers.) DC.

Common name : Coat-button

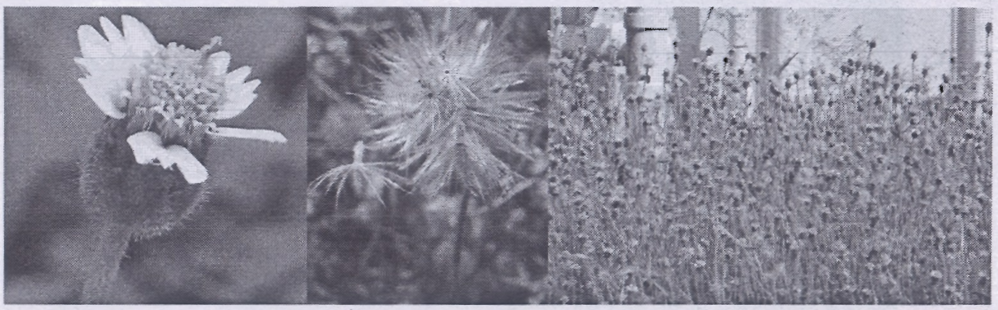
Local names : Kumminnippacha, Muriyampachila, Odiyancheera

Family : Asteraceae



Ecology and distribution : *Tridax procumbens* is a semi-prostrate, perennial herb widely distributed and naturalized in the tropics and subtropics. It is common in dry, sunny, disturbed areas such as vacant land, roadside, lawns and nurseries. Spread is mainly through seeds; the tuft of bristles on the achenes allow the seeds to be dispersed by wind. Tridax is a serious weed of various crops in the Asia-Pacific region and tropical Africa. It is listed as a noxious weed by the United States Department of Agriculture. It is widely distributed in the State but its invasive nature is recorded from Alappuzha, Idukki, Kasargod, Kollam, Kozhikode, Malappuram, Palakkad, Thiruvananthapuram and Thrissur districts.

Description : Procumbent herbs, suberect, up to 20 cm in height. Leaves 3 - 6 x 1.5 - 3 cm, ovate, apex acute, serrate, bulbous-based, hairy; petiole 5-10 mm long. Heads 1.3 x 1.5 cm, solitary, on long peduncles; bracts in 3-series, lanceolate, hairy. Outer row of flowers ligulate, female, limb 3 x 2 mm, 3-toothed, white; inner flowers bisexual, tubular; corolla 6 mm long, 5-lobed at apex, yellow. Achenes 2 mm long, obovoid, densely hairy; pappus many, setaceous.



Turnera subulata Sm.

Native : Tropical America

Synonym : *Turnera elegans* Otto ex Nees

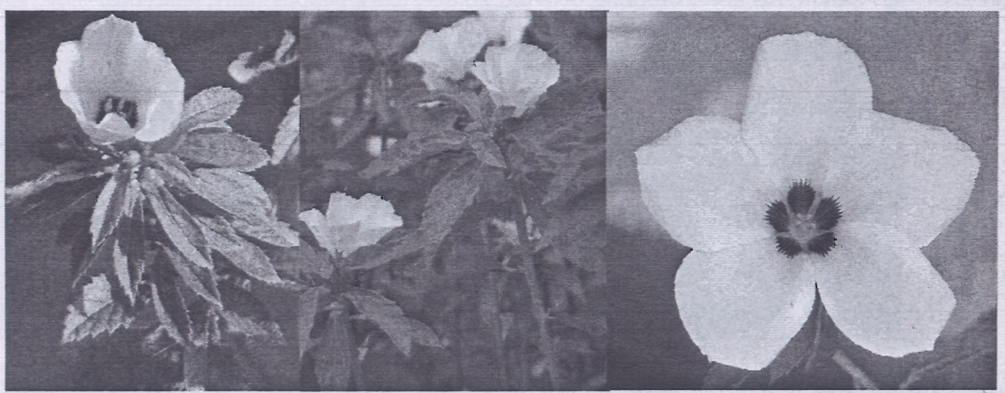
Common name : West Indian holly

Local name : Cheravathaali

Family : Turneraceae

Ecology and distribution : *Turnera subulata*, a subshrub, is common along roadsides, in vacant lands and abandoned areas. It grows profusely in all these habitats especially if they are open and the soil is sandy. The plant grows as a weed in Kasargod and Kozhikode districts in the State.

Description : Subshrubs. Leaves simple, alternate; stipules minute. Lamina elliptic-ovate to lanceate, 2.5-6 by 1-3.5 cm, base cuneate-decurrent; margin serrate-dentate, apex obtuse, subacute to acute, sparsely puberulous, gland-dotted, lateral nerves c. 8 pairs, chartaceous; petiole with a pair of glands towards the apex. Flowers bisexual, 5-merous, solitary in upper leaf-axils; bracteoles linear-subulate; pedicel adnate to the petiole throughout; calyx-tube small, lobes 5, linear; petals 5, yellow with deep purple centre; stamens 5, inserted at the base of calyx-tube. Capsule loculicidal, globose. Seeds many, pitted.



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Kerala State Biodiversity Board