

Research Article

Invasive Alien Flora of Thiruvallur District, Tamil Nadu, India

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Abstract: A qualitative floristic survey conducted in Thiruvallur district to record alien invasive flora. This study recorded 136 species in 90 genera and 37 families. The most speciose family of study area is Asteraceae (with 18 species), Convolvulaceae (11), Caesalpiniaceae (9) and Amaranthaceae (8). While 12 families which include Apocynaceae, Balsaminaceae, Cactaceae, Liliaceae were represented by just single species' in study area. Among genera, Cassia with 9 species dominated the study area followed by *Ipomoea* (7) and *Indigofera* (5). Eighty-nine species from tropical America, 19 from tropical Africa and 6 from tropical South America invaded into Thiruvallur district, Tamil Nadu, India. Of eight life forms herb represented with 95 species followed by shrub and under-shrub (11 species each). Study that concentrates on quantitative analysis is essential to assess the impact of invasive alien species on native flora of Thiruvallur district.

Keywords: Introduced species; tropical Africa; tropical America; tropical South America; South India

INTRODUCTION

The biological invasion of alien species is recognized as the second worst threat to the existence of biodiversity (www.cbd.int/convention). Invasive species homogenize the world's biota [1]. Besides invasion reduce global biodiversity richness. In addition, biological invasion enhance species extinction [2]. Floristic surveys provide essential baseline data to policymakers, urban planners and landscape developers [3-8]. Invasive alien species (IAS) affect indigenous flora as well as fauna [9]. Researchers recognised the impact of IAS, conducted research throughout the world [1, 10-14].

Urbanisation plays a major role in invasion [15-16]. Rising CO₂ concentration escalates the environmental impacts of alien invasive species [17-18]. Transportation of food materials from one place to another place (one country to other; one continent to other etc.) through road, water and air also plays a significant role in the introduction of species [19]. For instance, through wheat export in the year 1956, the USA introduced a worst invasive weed *Parthenium hysterophorus* in to India. Nowadays the state and central governments in India are very strict, they framed strict rules and regulations through quarantine procedures to avoid species invasion.

It is well known that the invasive species compete with indigenous species for nutrition, light, water and space [20-22]. Through allelopathic effects invasive species alter the population structure and natural dynamics

of native biota [23]. Researchers recorded the impacts of IAS on native species in many places in India. Very limited data had been made available on IAS for Thiruvallur district hence this study was planned to fill the gap.

MATERIALS AND METHODS

Thiruvallur (Figure 1) is one of the fastest growing districts of Tamil Nadu in terms of economy and human population. Geographically the district situated between 12°15', 13°15' North latitude, 79°15', and 80°20' East longitude. Geographical cover of the district is 3422 km². The district has Kancheepuram, Vellore, Bay of the Bengal and Andhra Pradesh as South, West, East, and North borders, respectively. The mean maximum and minimum temperatures are 33 °C and 24 °C respectively with relative average humidity 76.8%. The average annual rainfall is around 1108 mm with two thirds of the annual rainfall received during the northeast monsoon (September-December). As on 2001 survey the human population is 2.75 million.

Qualitative floristic survey conducted in Thiruvallur district during the month of January to December 2013. Binomial and author citation followed Gamble and Fischer (1915-1935). Nativity of the species and life forms were recorded with the help of available floras and checklists [24-35].

RESULTS

Species, genera and family

A total of 136 angiosperm species in 90 genera and 37 families were recorded through qualitative floristic survey in Thiruvallur district during January-December 2013. Members of the family Asteraceae dominated with 18 species followed Papilionaceae and Convolvulaceae (each 12), Caesalpiniaceae (9), Amaranthaceae (8), Euphorbiaceae (7) and Brassicaceae (6) (Table 1). While 12 families namely, Apocynaceae, Araceae, Balsaminaceae, Cactaceae, Liliaceae, Melastomataceae, Nyctaginaceae, Papaveraceae, Passifloraceae, Polygonaceae, Rubiaceae and Typhaceae were represented by just single species in study area (Table 1). Among 90 genera *Cassia* with 9 species dominated the study area followed by *Ipomoea* (7) and *Indigofera* (5); *Cleome* and *Corchorus* (4 species each); *Ageratum*

Alternanthera, *Blumea* and *Ludwigia* (3 species each) (Table 1).

Life forms

Among eight life forms, herbs dominated the flora with 95 species followed by shrubs and undershrubs (11 species each), twiner (8 species), aquatic herbs and shrubs (4 species each), climber (3) and woody climber (one species) (Table 2; Figure 2).

Nativity of invasive species

Eighty nine species from tropical America, 19 from tropical Africa, six from tropical south America, three from central America, two each from Australia, Brazil, Mediterranean, tropical north America and West Indies invaded into Thiruvallur district, Tamil Nadu, India (Table 1; Figure 3).

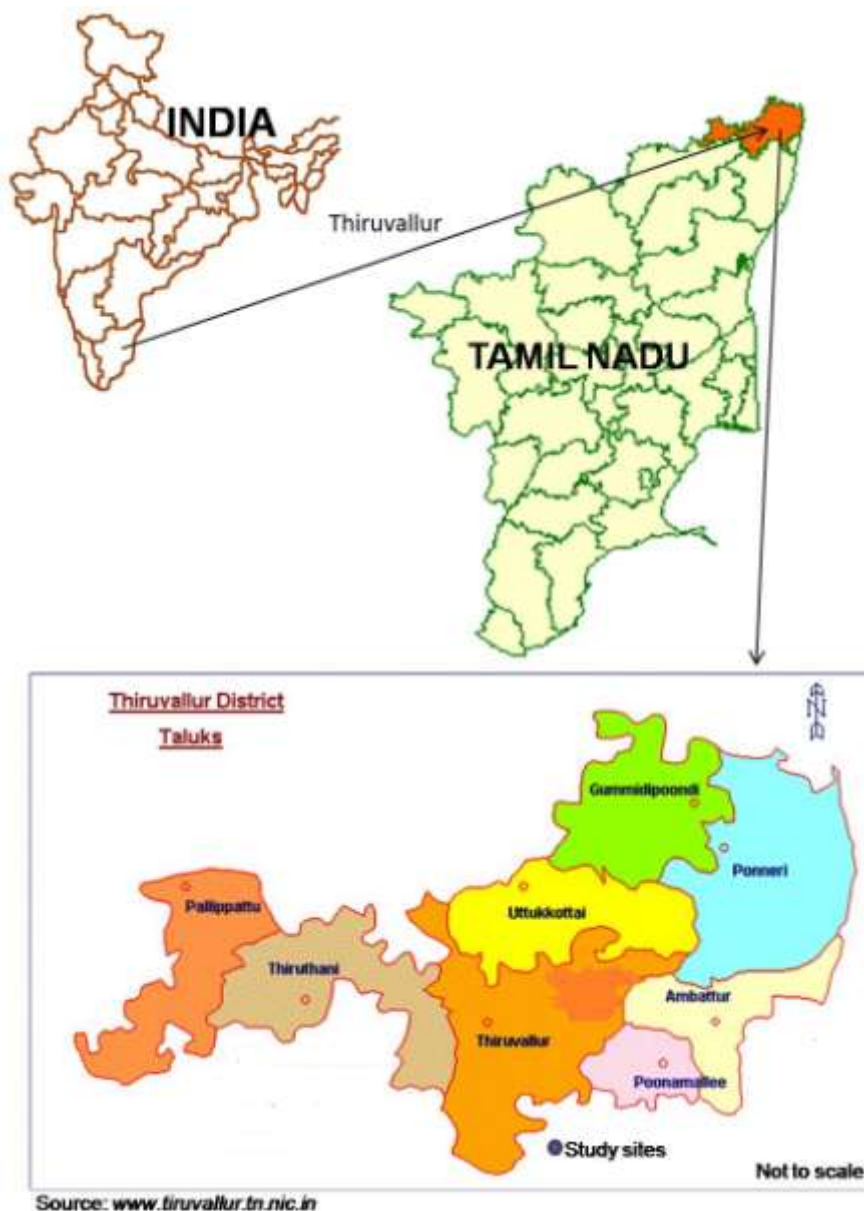


Figure 1. Map of Thiruvallur District wherein invasive alien species were recorded

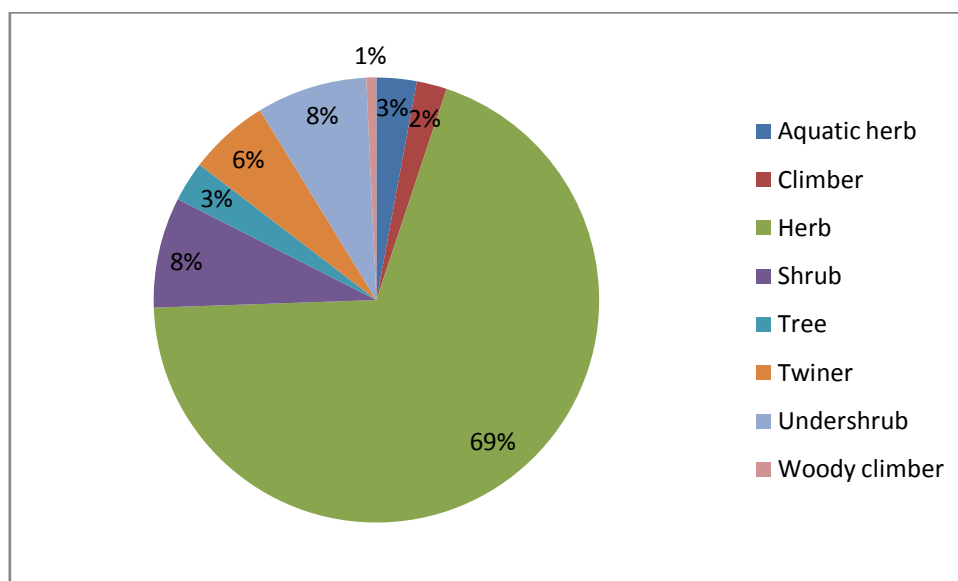


Figure 2. Composition of life-forms of invasive alien species recorded in study area

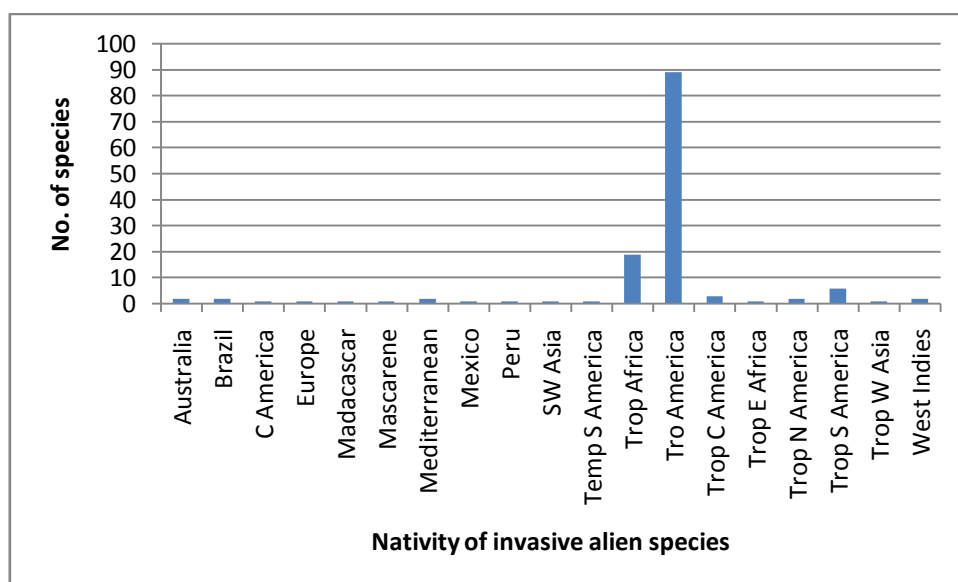


Figure 3. Nativity of alien invasive species inventoried from study area

Table 1. Botanical name, family and nativity of invasive alien species recorded in Thiruvallur district, Tamil Nadu, India

Botanical name	Family	Nativity
<i>Acacia farnesiana</i> (L.) Willd.	Mimosaceae	Tropical South America
<i>Acacia auriculiformis</i> L.	Mimosaceae	Australia
<i>Acanthospermum hispidum</i> DC.	Asteraceae	Brazil
<i>Aerva javanica</i> (Burm. f.) Juss. ex Schult.	Amaranthaceae	Tropical America
<i>Aeschynomene americana</i> L.	Papilionaceae	Tropical America
<i>Ageratina adenophora</i> (Spreng.) King & Robinson	Asteraceae	Tropical America
<i>Ageratum conyzoides</i> L.	Asteraceae	Tropical America
<i>Ageratum houstonianum</i> Mill. Gard.	Asteraceae	Tropical America
<i>Alternanthera paronychioides</i> A. St.	Amaranthaceae	Tropical America
<i>Alternanthera phyloxeroides</i> (Mart.) Griseb.	Amaranthaceae	Tropical America

Botanical name	Family	Nativity
<i>Alternanthera pungens</i> Kunth.	Amaranthaceae	Tropical America
<i>Alternanthera tenella</i> Colla.	Amaranthaceae	Tropical America
<i>Antigonon leptopus</i> Hook. & Arn.	Polygonaceae	Tropical America
<i>Argemone mexicana</i> L.	Papaveraceae	Tropical America
<i>Asclepias curassavica</i> L.	Asclepiadaceae	Tropical America
<i>Asphodelus tenuifolius</i> Cav.	Liliaceae	Tropical America
<i>Bidens pilosa</i> L.	Asteraceae	Tropical America
<i>Blainvillea acmella</i> (L.) Philipson	Asteraceae	Tropical America
<i>Blumea eriantha</i> DC.	Asteraceae	Tropical America
<i>Blumea lacera</i> (Burm. f.) DC.	Asteraceae	Tropical America
<i>Blumea obliqua</i> (L.) Druce	Asteraceae	Tropical America
<i>Calotropis gigantea</i> L.	Asclepiadaceae	Tropical Africa
<i>Calotropis procera</i> (Ait.) R.Br.	Asclepiadaceae	Tropical Africa
<i>Cardamine hirsuta</i> L.	Brassicaceae	Tropical America
<i>Cardamine trichocarpa</i> Hochst. ex A.Ricch.,	Brassicaceae	Tropical America
<i>Cassia absus</i> L.	Caesalpinaceae	Tropical America
<i>Cassia alata</i> L.	Caesalpinaceae	Tropical America
<i>Cassia hirsuta</i> L.	Caesalpinaceae	Tropical America
<i>Cassia obtusifolia</i> L.	Caesalpinaceae	Tropical America
<i>Cassia occidentalis</i> L.	Caesalpinaceae	Tropical America
<i>Cassia pumila</i> Lam.	Caesalpinaceae	Tropical America
<i>Cassia rotundifolia</i> Pers.	Caesalpinaceae	Tropical America
<i>Cassia tora</i> L.	Caesalpinaceae	Tropical America
<i>Cassia uniflora</i> Miller	Caesalpinaceae	Tropical America
<i>Catharanthus pusillus</i> (Murray) Don.	Apocynaceae	Tropical America
<i>Celosia argentea</i> L.	Amaranthaceae	Tropical Africa
<i>Chamaesyce hirta</i> (L.) Millsp.	Euphorbiaceae	Tropical America
<i>Chloris barbata</i> Sw.	Poaceae	Tropical America
<i>Chromolaena odorata</i> (L.) King & Robinson	Asteraceae	Tropical America
<i>Chrozophora rottleri</i> (Geis.) Spreng.	Euphorbiaceae	Tropical Africa
<i>Cleome gynandra</i> L.	Brassicaceae	Tropical America
<i>Cleome monophylla</i> L.	Brassicaceae	Tropical Africa
<i>Cleome rutidosperma</i> DC.	Brassicaceae	Tropical America
<i>Cleome viscosa</i> L.	Brassicaceae	Tropical America
<i>Clidemia hirta</i> (L.) D. Don.	Melastomataceae	Tropical America
<i>Corchorus aestuans</i> L.	Tiliaceae	Tropical Africa
<i>Corchorus fascicularis</i> Lam.	Tiliaceae	Tropical America
<i>Corchorus tridens</i> L.	Tiliaceae	Tropical Africa
<i>Corchorus trilocularis</i> L.	Tiliaceae	Tropical Africa

Botanical name	Family	Nativity
<i>Crotalaria pallida</i> Dryand	Papilionaceae	Tropical America
<i>Crotalaria retusa</i> L.	Papilionaceae	Tropical America
<i>Croton bonplandianum</i> Boil.	Euphorbiaceae	Temperate South America
<i>Cryptostegia grandiflora</i> R.Br.	Asclepiadaceae	Madagascar
<i>Cuscuta chinensis</i> Lam.	Convolvulaceae	Mediterranean
<i>Cuscuta reflexa</i> Roxb.	Convolvulaceae	Mediterranean
<i>Cyperus difformis</i> L.	Cyperaceae	Tropical America
<i>Cyperus iria</i> L.	Cyperaceae	Tropical America
<i>Datura innoxia</i> Mill.	Solanaceae	Tropical America
<i>Datura metel</i> L.	Solanaceae	Tropical America
<i>Digera muricata</i> (L.) Mart.	Amaranthaceae	South West Asia
<i>Echinochloa colona</i> (L.) Link.	Poaceae	Tropical South America
<i>Eclipta prostrata</i> (L.) Mant.	Asteraceae	Tropical America
<i>Eichhornia crassipes</i> (C. Martius) Solms-Loub	Pontederiaceae	Tropical America
<i>Emilia sonchiflora</i> (L.) DC,	Asteraceae	Tropical Africa
<i>Euphorbia cyathophora</i> Murray	Euphorbiaceae	Tropical America
<i>Euphorbia heterophylla</i> L.	Euphorbiaceae	Tropical America
<i>Evolvulus nummularius</i> (L.) L.	Convolvulaceae	Tropical America
<i>Gomphrena serrata</i> L.	Amaranthaceae	Tropical America
<i>Grangea maderaspatana</i> (L.) Poir.	Asteraceae	Tropical South America
<i>Hyptis suaveolens</i> (L.) Poit.	Lamiaceae	Tropical America
<i>Impatiens balsamina</i> L.	Balsaminaceae	Tropical America
<i>Imperata cylindrica</i> (L.) Raensch	Poaceae	Tropical America
<i>Indigofera astragalina</i> DC.	Papilionaceae	Tropical Africa
<i>Indigofera glandulosa</i> Roxb. ex Willd.	Papilionaceae	Tropical America
<i>Indigofera linifolia</i> (L.f.) Retz.	Papilionaceae	Tropical South America
<i>Indigofera linnaei</i> Ali.	Papilionaceae	Tropical Africa
<i>Indigofera trita</i> L.f.	Papilionaceae	Tropical Africa
<i>Ipomoea carnea</i> Jacq.	Convolvulaceae	Tropical America
<i>Ipomoea ericarpa</i> R. Br.	Convolvulaceae	Tropical Africa
<i>Ipomoea hederifolia</i> L.	Convolvulaceae	Tropical America
<i>Ipomoea obscura</i> (L.) Ker.-Gawl.	Convolvulaceae	Tropical Africa
<i>Ipomoea pes-tigridis</i> L.	Convolvulaceae	Tropical East Africa
<i>Ipomoea quamoclit</i> L.	Convolvulaceae	Tropical America
<i>Ipomoea staphylina</i> Roem. & Schult	Convolvulaceae	Tropical Africa
<i>Lagascea mollis</i> Cav.	Asteraceae	Tropical Central America
<i>Lantana camara</i> L.	Verbenaceae	Tropical America
<i>Leonotis nepetiifolia</i> (L.) R. Br.	Lamiaceae	Tropical Africa
<i>Leucaena leucocephala</i> (L.) de Wit	Mimosaceae	Tropical America

Botanical name	Family	Nativity
<i>Ludwigia adscendens</i> (L.) Hara.	Onagraceae	Tropical America
<i>Ludwigia octovalvis</i> (Jacq.) Raven	Onagraceae	Tropical Africa
<i>Ludwigia perennis</i> L.	Onagraceae	Tropical Africa
<i>Macroptilium atropurpureum</i> (DC.) Urban	Papilionaceae	Tropical America
<i>Macroptilium lathyroides</i> (L.) Urban	Papilionaceae	Tropical Central America
<i>Malvastrum coromandelianum</i> (L.) Garcke	Malvaceae	Tropical America
<i>Martynia annua</i> (Houstoun in Martyn) L.	Pedaliaceae	Tropical America
<i>Mecardonia procumbens</i> (Mill.) Small	Scrophulariaceae	Tropical North America
<i>Melochia corchorifolia</i> L.	Sterculiaceae	Tropical America
<i>Merremia aegyptia</i> (L.) Urban	Convolvulaceae	Tropical America
<i>Mimosa pudica</i> L.	Mimosaceae	Brazil
<i>Mirabilis jalapa</i> L.	Nyctaginaceae	Peru
<i>Monochoria vaginalis</i> Burm. f.	Pontederiaceae	Tropical America
<i>Ocimum americanum</i> L.	Lamiaceae	Tropical America
<i>Opuntia stricta</i> (Haw.) Haw.	Cactaceae	Tropical America
<i>Parthenium hysterophorus</i> L.	Asteraceae	Tropical North America
<i>Passiflora foetida</i> L.	Passifloraceae	Tropical South America
<i>Pedaliium murex</i> L.	Pedaliaceae	Tropical America
<i>Pennisetum purpureum</i> Schum.	Poaceae	Tropical America
<i>Peristrophe paniculata</i> (Forsk.) Brummitt	Acanthaceae	Tropical America
<i>Phyllanthus tenellus</i> Roxb.	Euphorbiaceae	Mascarene Islands
<i>Physalis angulata</i> L.	Solanaceae	Tropical America
<i>Pistia stratiotes</i> L.	Araceae	Tropical America
<i>Portulaca oleracea</i> L.	Portulacaceae	Tropical Central America
<i>Portulaca quadrifida</i> L.	Portulacaceae	Tropical South America
<i>Prosopis juliflora</i> (Sw.) DC.	Mimosaceae	Mexico
<i>Ruellia tuberosa</i> L.	Acanthaceae	Tropical America
<i>Saccharum spontaneum</i> L.	Poaceae	Tropical West Asia
<i>Scoparia dulcis</i> L.	Scrophulariaceae	Tropical America
<i>Sesbania bispinosa</i> (Jacq.) White	Papilionaceae	Tropical America
<i>Sida acuta</i> Burm. f.	Malvaceae	Tropical America
<i>Solanum americanum</i> Miller	Solanaceae	Tropical America
<i>Solanum torvum</i> Sw.	Solanaceae	West Indies
<i>Spermacoce hispida</i> L.	Rubiaceae	Tropical America
<i>Stachytarpheta jamaicensis</i> (L.) Vahl.	Verbenaceae	Tropical America
<i>Synadenium grantii</i> Hook. f.	Euphorbiaceae	Tropical America
<i>Synedrella nodiflora</i> (L.) Gaertn.	Asteraceae	West Indies
<i>Torenia fournieri</i> Linden ex E. Fournier	Scrophulariaceae	Australia
<i>Tribulus lanugonosus</i> L.	Zygophyllaceae	Tropical America

Botanical name	Family	Nativity
<i>Tribulus terrestris</i> L.	Zygophyllaceae	Tropical America
<i>Tridax procumbens</i> L.	Asteraceae	Central America
<i>Triumfetta rhomboidea</i> Jacq.	Tiliaceae	Tropical America
<i>Turnera subulata</i> J.E. Smith	Turneraceae	Tropical America
<i>Turnera ulmifolia</i> L.	Turneraceae	Tropical America
<i>Typha angustata</i> Bory. & Choub.	Typhaceae	Tropical America
<i>Urena lobata</i> L.	Malvaceae	Tropical Africa
<i>Waltheria indica</i> L.	Sterculiaceae	Tropical America
<i>Xanthium strumarium</i> L.	Asteraceae	Tropical America

Table 2. Botanical, life-forms, common and local names of invasive alien species recorded from Thiruvallur district, Tamil Nadu, India

Binomial	Life-form	Common name	Local name (Tamil)
<i>Acacia farnesiana</i> (L.) Willd.	Tree	Fragrant Acacia	Peevelamaram
<i>Acacia auriculiformis</i> L.	Tree	Australian Wattle	Pencil maram
<i>Acanthospermum hispidum</i> DC.	Herb	Brisly Starbur	Kanthimul
<i>Aerva javanica</i> (Burm. f.) Juss. ex Schult.	Herb	Desert Cotton	Peelai
<i>Aeschynomene americana</i> L.	Herb	American joint-vetch	Thakkai poondu
<i>Ageratina adenophora</i> (Spreng.) King & Robinson	Herb	Crofton weed	-
<i>Ageratum conyzoides</i> L.	Herb	Goat weed	Neichotti poondu
<i>Ageratum houstonianum</i> Mill. Gard.	Herb	Floss flower	-
<i>Alternanthera paronychioides</i> A. St.	Herb	Smooth Chaff Flower	-
<i>Alternanthera philoxeroides</i> (Mart.) Griseb.	Herb	Alligator weed	-
<i>Alternanthera pungens</i> Kunth.	Herb	Khaki Weed	-
<i>Alternanthera tenella</i> Colla.	Herb	Joy Weed	Ottumul
<i>Antigonon leptopus</i> Hook. & Arn.	Climber	Railway creeper	Kodirosaa
<i>Argemone mexicana</i> L.	Herb	Prickly poppy	Brahmathandu
<i>Asclepias curassavica</i> L.	Herb	Blood flower	Chinna Kalli Chedi
<i>Asphodelus tenuifolius</i> Cav.	Herb	Bosail	-
<i>Bidens pilosa</i> L.	Herb	Spanish needle	Kothimullu
<i>Blainvillea acmella</i> (L.) Philipson	Herb	Para Cress Flower	-
<i>Blumea eriantha</i> DC.	Herb	-	-
<i>Blumea lacera</i> (Burm. f.) DC.	Herb	Blumea	Kattumullangi
<i>Blumea obliqua</i> (L.) Druce	Herb	-	-
<i>Calotropis gigantea</i> L.	Shrub	Madar	Erukku
<i>Calotropis procera</i> (Ait.) R.Br.	Shrub	Swallow wort	Vellerukku
<i>Cardamine hirsuta</i> L.	Herb	Hairy Bitter Cress	-
<i>Cardamine trichocarpa</i> Hochst. ex A.Ricch.,	Herb	Bitter Cress	-
<i>Cassia absus</i> L.	Herb	-	-

Binomial	Life-form	Common name	Local name (Tamil)
<i>Cassia alata</i> L.	Shrub	Roman Candle	-
<i>Cassia hirsuta</i> L.	Undershrub	Velvet Cassia	-
<i>Cassia obtusifolia</i> L.	Herb	Sickle Senna	-
<i>Cassia occidentalis</i> L.	Undershrub	Negro's Coffee	Peyaavarai
<i>Cassia pumila</i> Lam.	Herb	-	-
<i>Cassia rotundifolia</i> Pers.	Herb	Round-leaf Cassia	-
<i>Cassia tora</i> L.	Herb	Sickle Senna	-
<i>Cassia uniflora</i> Miller	Herb	-	-
<i>Catharanthus pusillus</i> (Murray) Don.	Herb	Tiny Periwinkle	Milagai Poondu
<i>Celosia argentea</i> L.	Herb	Wool flower	Kozhi poo
<i>Chamaesyce hirta</i> (L.) Millsp.	Herb	Snake weed	Ammaan pachcharisi
<i>Chloris barbata</i> Sw.	Herb	Swollen Finger Grass	Mayirkondaipul
<i>Chromolaena odorata</i> (L.) King & Robinson	Herb	Siam weed	-
<i>Chrozophora rottleri</i> (Geis.) Spreng.	Herb	Rottler's Chrozophora	Purapirakkai
<i>Cleome gynandra</i> L.	Herb	African Cabbage	Nalvelai
<i>Cleome monophylla</i> L.	Herb	-	Ell sakkalathi
<i>Cleome rutidosperma</i> DC.	Herb	Purple Cleome	-
<i>Cleome viscosa</i> L.	Herb	Asian Spider Flower	Naikadugu
<i>Clidemia hirta</i> (L.) D. Don.	Shrub	Koster's curse	-
<i>Corchorus aestuans</i> L.	Herb	-	-
<i>Corchorus fascicularis</i> Lam.	Herb	-	-
<i>Corchorus tridens</i> L.	Herb	Wild Jute	Kattu sanappai
<i>Corchorus trilocularis</i> L.	Herb	African Jute	Kattu sanappai
<i>Crotalaria pallida</i> Dryand	Herb	Smooth Crotalaria	-
<i>Crotalaria retusa</i> L.	Herb	Rattle Weed	Kilukiluppai
<i>Croton bonplandianum</i> Boil.	Herb	Ban Tulsi	Rayil poondu
<i>Cryptostegia grandiflora</i> R.Br.	Climber	Rubber Vine	-
<i>Cuscuta chinensis</i> Lam.	Twiner	China Dodder	Aakashavalli
<i>Cuscuta reflexa</i> Roxb.	Twiner	Dodder	Aakashavalli
<i>Cyperus difformis</i> L.	Herb	Flat Sedge	-
<i>Cyperus iria</i> L.	Herb	Rice-Field Flat Sedge	-
<i>Datura innoxia</i> Mill.	Undershrub	Thorn Apple	Oomaththai
<i>Datura metel</i> L.	Undershrub	Mad Plant	Oomaththai
<i>Digera muricata</i> (L.) Mart.	Herb	False Amarantha	Kattu keerai
<i>Echinochloa colona</i> (L.) Link.	Herb	Shama Millet	-
<i>Eclipta prostrata</i> (L.) Mant.	Herb	False Daisy	Karisalaankanni
<i>Eichhornia crassipes</i> (C. Martius) Solms-Loub	Aquatic Herb	Water Hyacinth	Vengaaya thamarai
<i>Emilia sonchifloia</i> (L.) DC,	Herb	Lilac Tassle Flower	-
<i>Euphorbia cyathophora</i> Murray	Herb	Poinsettia	Paal perukki keerai

Binomial	Life-form	Common name	Local name (Tamil)
<i>Euphorbia heterophylla</i> L.	Herb	Fire Plant	Paal perukki keerai
<i>Evolvulus nummularius</i> (L.) L.	Herb	Roundleaf Bindweed	Elikkadhu ilai
<i>Gomphrena serrata</i> L.	Herb	Prostrate Gomphrena	-
<i>Grangea maderaspatana</i> (L.) Poir.	Herb	Madras Carpet	Masipathri
<i>Hyptis suaveolens</i> (L.) Poit.	Undershrub	Wild Spikenard	Kattu thumbai
<i>Impatiens balsamina</i> L.	Herb	Balsam	Kaasithumbai
<i>Imperata cylindrica</i> (L.) Raensch	Herb	Cotton Grass	-
<i>Indigofera astragalina</i> DC.	Undershrub	Hairy Indigo	-
<i>Indigofera glandulosa</i> Roxb. ex Willd.	Herb	Three-Leaf Indigo	Baragadam
<i>Indigofera linifolia</i> (L.f.) Retz.	Herb	Narrow-Leaf Indigo	-
<i>Indigofera linnaei</i> Ali.	Herb	Birdsville Indigo	Seppunerunji
<i>Indigofera trita</i> L.f.	Undershrub	Asian Indigo	Punal murungai
<i>Ipomoea carnea</i> Jacq.	Shrub	Morning Glory Bush	Onaanthalai
<i>Ipomoea eriocarpa</i> R. Br.	Twiner	Tiny Morning Glory	Thali keerai
<i>Ipomoea hederifolia</i> L.	Twiner	Star Glory	-
<i>Ipomoea obscura</i> (L.) Ker.-Gawl.	Twiner	Obscure Morning Glory	Siruthali
<i>Ipomoea pes-tigridis</i> L.	Twiner	Tiger's foot	Pulichchuvadi
<i>Ipomoea quamoclit</i> L.	Twiner	Cypress Vine	Mayirmanikkam
<i>Ipomoea staphylina</i> Roem. & Schult	Woody climber	Lesser Glory	Oonaankodi
<i>Lagascea mollis</i> Cav.	Herb	Silk Leaf	-
<i>Lantana camara</i> L.	Shrub	Wild Sage	-
<i>Leonotis nepetiifolia</i> (L.) R. Br.	Herb	Lion's Ear	-
<i>Leucaena leucocephala</i> (L.) de Wit	Tree	Subabul	Thagarai maram
<i>Ludwigia adscendens</i> (L.) Hara.	Aquatic Herb	Water Primrose	Neer kiraambu
<i>Ludwigia octovalvis</i> (Jacq.) Raven	Herb	Willow Primrose	Kattu kiraambu
<i>Ludwigia perennis</i> L.	Herb	Water Purslane	Neer kiraambu
<i>Macroptilium atropurpureum</i> (DC.) Urban	Herb	Purple Bush-bean	-
<i>Macroptilium lathyroides</i> (L.) Urban	Undershrub	Phasey Bean	-
<i>Malvastrum coromandelianum</i> (L.) Garcke	Herb	False Mallow	-
<i>Martynia annua</i> (Houstoun in Martyn) L.	Undershrub	Tiger's Claw	Pulinagam
<i>Mecardonia procumbens</i> (Mill.) Small	Herb	Baby Jump Up	-
<i>Melochia corchorifolia</i> L.	Herb	Chocolate Weed	Pinnakku keerai
<i>Merremia aegyptia</i> (L.) Urban	Twiner	Hairy Woodrose	-
<i>Mimosa pudica</i> L.	Herb	Touch-Me-Not	Thottaalsurungi
<i>Mirabilis jalapa</i> L.	Undershrub	4 'o' Clock plant	Andhimalli
<i>Monochoria vaginalis</i> Burm. f.	Aquatic herb	Oval-leafed Pondweed	-
<i>Ocimum americanum</i> L.	Herb	Hoary Basil	Kaattu Thulasi
<i>Opuntia stricta</i> (Haw.) Haw.	Shrub	Prickly Pear	Sappaaththikalli
<i>Parthenium hysterophorus</i> L.	Herb	Parthenium	Mookkuththi poondu

Binomial	Life-form	Common name	Local name (Tamil)
<i>Passiflora foetida</i> L.	Climber	Stinking Passion-flower	Kurangu pazham
<i>Pedaliium murex</i> L.	Herb	Puncture Vine	Nerunjimul
<i>Pennisetum purpureum</i> Schum.	Herb	Napier Grass	-
<i>Peristrophe paniculata</i> (Forsk.) Brummitt	Herb	Panicled Foldwing	Nagananda
<i>Phyllanthus tenellus</i> Roxb.	Herb	-	Melanelli
<i>Physalis angulata</i> L.	Herb	Cutleaf Groundcherry	Thol thakkaali
<i>Pistia stratiotes</i> L.	Aquatic Herb	Water Lettuce	Aagaaya thamarai
<i>Portulaca oleracea</i> L.	Herb	Purslane	Paruppukeerai
<i>Portulaca quadrifida</i> L.	Herb	Chicken Weed	Pasalai keerai
<i>Prosopis juliflora</i> (Sw.) DC.	Tree	Mesquite	Velikkaaththaan
<i>Ruellia tuberosa</i> L.	Herb	Menow Weed	Pattaasukaay
<i>Saccharum spontaneum</i> L.	Shrub	Townsend' Grass	Peikarumbu
<i>Scoparia dulcis</i> L.	Herb	Sweet Broom Weed	Sarakkotthini
<i>Sesbania bispinosa</i> (Jacq.) White	Shrub	Prickly Sesban	Mulchembai
<i>Sida acuta</i> Burm. f.	Herb	Common Wireweed	Pazhampasi
<i>Solanum americanum</i> Miller	Herb	Night Shade	Manithakkaali
<i>Solanum torvum</i> Sw.	Shrub	Turkey Berry	Sundaikaaya
<i>Spermacoce hispida</i> L.	Herb	Ken Fern	Naththaichoori
<i>Stachytarpheta jamaicensis</i> (L.) Vahl.	Herb	Blue Rats' tail	Seemai Nayuruvi
<i>Synadenium grantii</i> Hook. f.	Shrub	African Milkbush	Ilai kalli
<i>Synedrella nodiflora</i> (L.) Gaertn.	Herb	Cynderalla Weed	Mulpachilai
<i>Torenia fournieri</i> Linden ex E. Fournier	Herb	Wishbone Flower	-
<i>Tribulus lanugonosus</i> L.	Herb	Land Caltrops	Seruppadaai
<i>Tribulus terrestris</i> L.	Herb	Land Caltrops	Seruppadaai
<i>Tridax procumbens</i> L.	Herb	Mexican Daisy	Vettukaaya poondu
<i>Triumfetta rhomboidea</i> Jacq.	Herb	Bur Weed	Aadai otti
<i>Turnera subulata</i> J.E. Smith	Herb	White Alder	-
<i>Turnera ulmifolia</i> L.	Herb	Yellow Alder	-
<i>Typha angustata</i> Bory. & Choub.	Herb	Cat tail	Poonaiivaal pul
<i>Urena lobata</i> L.	Herb	Caesar Weed	Ottatti
<i>Waltheria indica</i> L.	Herb	Velvet Leaf	-
<i>Xanthium strumarium</i> L.	Herb	Cocklebur	Marul oomathai

DISCUSSION

Asteraceae represented by large number of species in study area. Asteraceae is one of the largest flowering plant families in the world. With large number of seeds and parachute mechanisms the members of Asteraceae easily established their life on wide range of climatic conditions [36]. *Ageratum conyzoides* introduced as an ornamental during nineteenth century. Now the species' grows extensively as a weed on disturbed forest lands, pastures, wastelands and agricultural lands in India.

Likewise, *Parthenium hysterophorus* came to India through cereal import along with wheat during 1950s' [37].

Numbers of purposefully introduced species become invasive in India. *Lantana camara*, a shrub species introduced as an ornamental in India during 1809-1810. At present the species found extensively from the Himalayas to Capecomorin (the southern tip of India) as a weed and invasive [37]. *Eichhornia crassipes* (introduced

from Brazil during 1914-1916), *Ipomoea carnea* were also introduced as ornamentals from tropical America. Now they grow aggressively in aquatic ecosystems all over the Indian subcontinent.

Wide range of tolerance on varied soils and climatic conditions, production of easily dispersible large number of seeds, aggressive root system, long reproductive periods and broad native range are characteristic features of invasive species hence continuous monitoring and control the spread of those species is important to protect native species from extinction [38]. It has been reported in a preliminary study that invasive species likely to have relatively small amounts of DNA in their cell nuclei. It seems that the cells of these plants are able to multiply faster thus the entire plant can grow quickly than species of higher cellular DNA content. This phenomenon provides them support in disturbed sites (cited from [38]).

Through allelopathy invasive species suppress the growth, development and reproduction of native species [39]. Chemically allelochemicals are phenolic acids, flavonoids and other aromatic compounds (i.e., terpenoids, steroids, alkaloids and organic cyanides). By producing allelochemicals invasive species affect natural life-cycles of indigenous species directly or indirectly. Through weathering, leaching, exudation or volatilization invasive species contain native species [40]. For example, *Parthenium hysterophorus* affects the general growth of wheat, rhizomes of *Cyperus rotundus* affects the dry matter production of wheat, leaf and inflorescence of *Amaranthus spinosus* influence the vegetative and reproductive phases of wheat [40]. However, native species also have allelopathic effects on introduced weed species. In a book, Subramanian et al. (1993) suggested that the phytotoxic compounds of crop plants might be isolated and used as natural herbicide. In addition, incorporation of allelopathic character into a crop variety gains a competitive advantage over certain aggressive introduced weeds.

In general, introduced species affects the agriculture in many ways. They reduce the crop yield [41, 42]; the land value; the quality of crop produce, and human efficiency [43]. In general, weeds produce large number of seeds. According to Stevens [44] perennials, biennials and annuals produce 16629, 26600 and 20832 seeds/plant, respectively. With lump sum amount of seeds, they easily spread and establish their lives successfully on suitable media. By dormancy, viability and prolific seed production they persist on agricultural and forestlands.

CONCLUSION

This study qualitatively assessed the alien invasive flora of Thiruvallur District in Tamil Nadu. Studies that deal with quantitative enumeration are needed to assess the impact of invasive species on native flora and fauna. Further, the rules and regulations of Convention on Biological Diversity (CBD), the International Standard for

Phytosanitary Measures (ISPMs) of the International Plant Protection Convention (IPPC), Agreement on Sanitary and Phytosanitary (SPS) Measures of the World Trade Organisation (WTO), and Plant Quarantine (PQ) procedures should followed strictly to contain further invasion of non-native species into India.

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