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## 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 $CO_2$ 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 $km^2$. 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 ºC and 24 ºC 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).

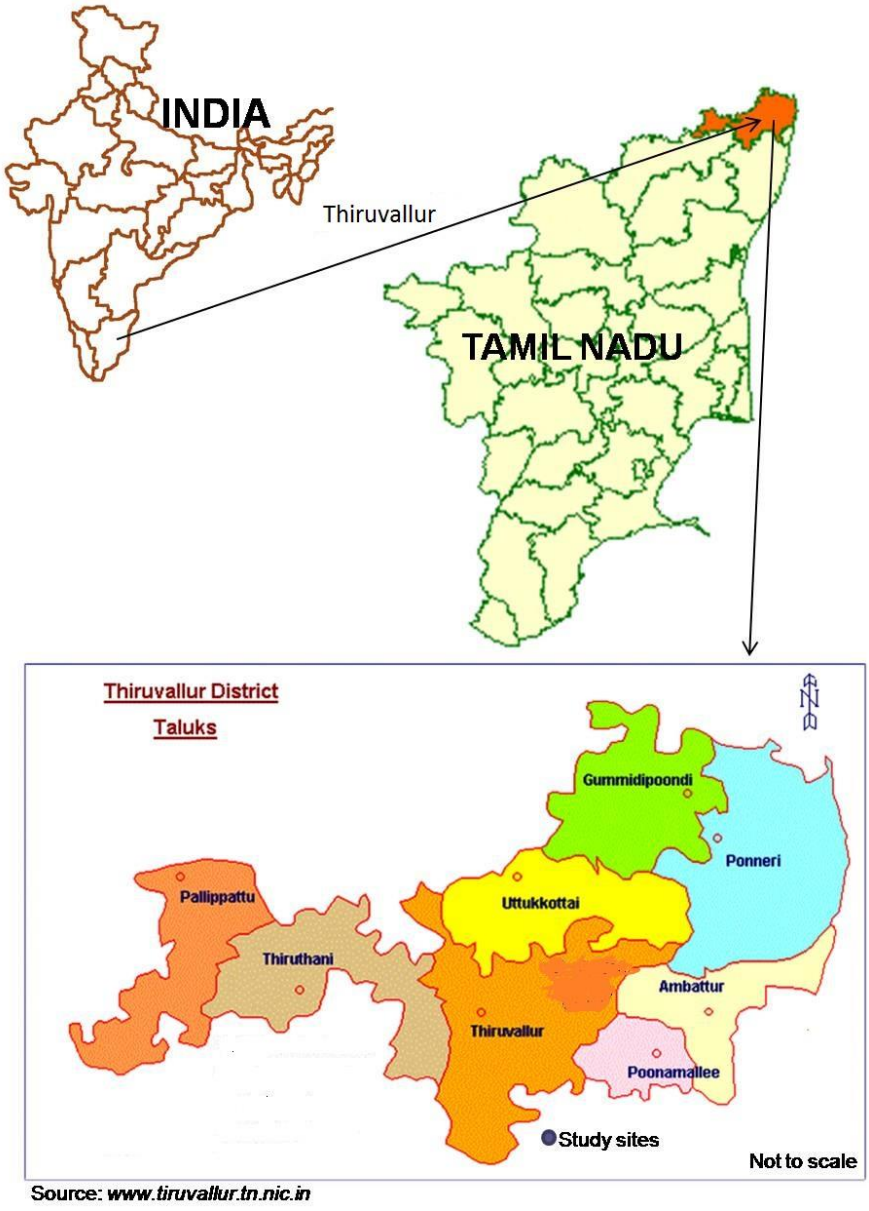


**Figure 1. Map of Thiruvallur District wherein invasive alien species were recorded**

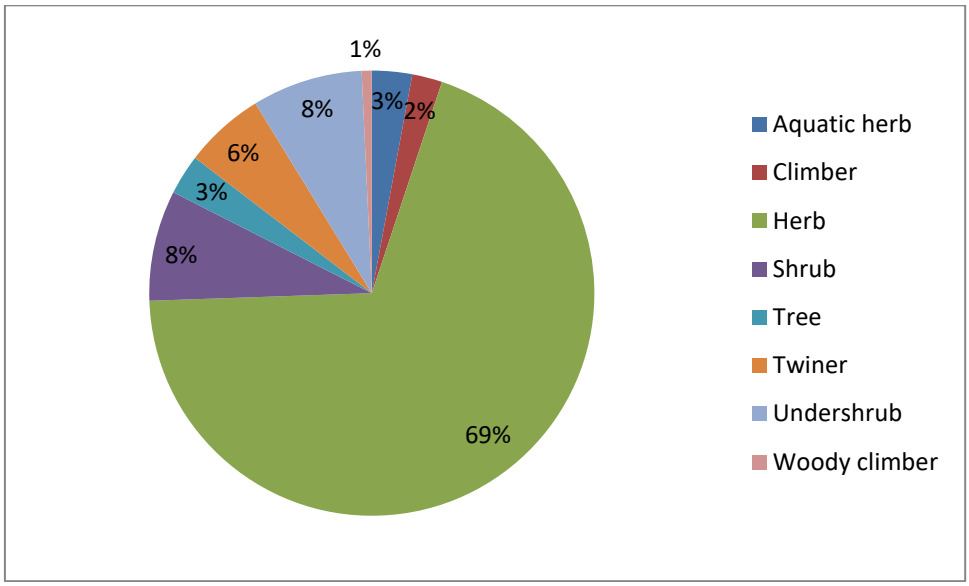


**Figure 2. Composition of life-forms of invasive alien species recorded in study area**

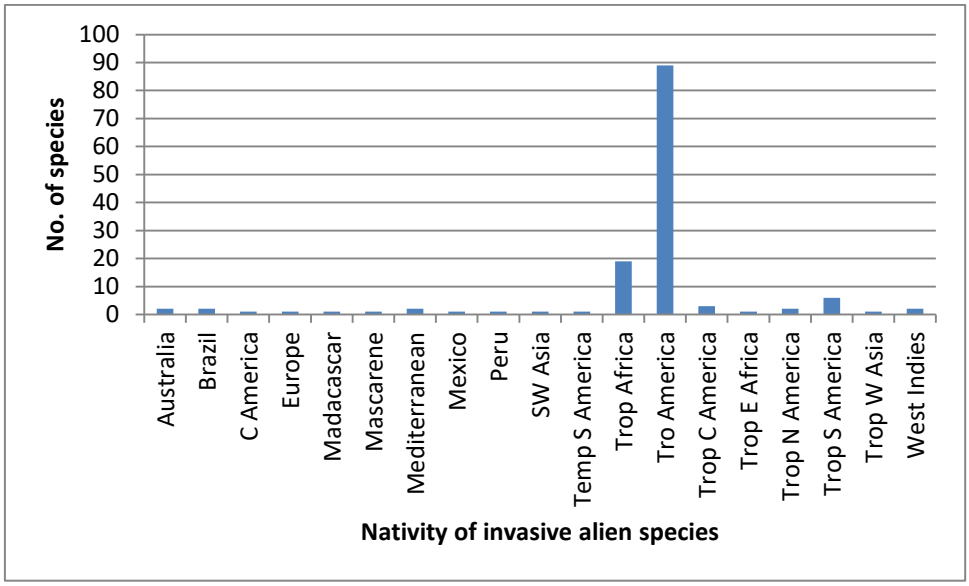


**Figure 3. Nativity of alien invasive species inventoried from study area**

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

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

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

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

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

| Botanical name | Family | Nativity |
|---|---|---|
| *Tribulus terrestris* L. | Zygophyllaceae | Tropical America |
| *Tridax procumbens* L. | Asteraceae | Central America |
| *Triumfetta rhomboidea* Jacq. | Tiliaceae | Tropical America |
| *Turnera subulata* J.E. Smith | Turneraceae | Tropical America |
| *Turnera ulmifolia* L. | Turneraceae | Tropical America |
| *Typha angustata* Bory. & Choub. | Typhaceae | Tropical America |
| *Urena lobata* L. | Malvaceae | Tropical Africa |
| *Waltheria indica* L. | Sterculiaceae | Tropical America |
| *Xanthium strumarium* 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) |
|---|---|---|---|
| *Acacia farnesiana* (L.) Willd. | Tree | Fragrant Acacia | Peevelamaram |
| *Acacia auriculiformis* L. | Tree | Australian Wattle | Pencil maram |
| *Acanthospermum hispidum* DC. | Herb | Brisrly Starbur | Kanthimul |
| *Aerva javanica* (Burm. f.) Juss. ex Schult. | Herb | Desert Cotton | Peelai |
| *Aeschynomene americana* L. | Herb | American joint-vetch | Thakkai poondu |
| *Ageratina adenophora* (Spreng.) King & Robinson | Herb | Crofton weed | - |
| *Ageratum conyzoides* L. | Herb | Goat weed | Neichotti poondu |
| *Ageratum houstonianum* Mill. Gard. | Herb | Floss flower | - |
| *Alternanthera paronychioides* A. St. | Herb | Smooth Chaff Flower | - |
| *Alternanthera philoxeroides* (Mart.) Griseb. | Herb | Alligator weed | - |
| *Alternanthera pungens* Kunth. | Herb | Khaki Weed | - |
| *Alternanthera tenella* Colla. | Herb | Joy Weed | Ottumul |
| *Antigonon leptopus* Hook. & Arn. | Climber | Railway creeper | Kodirosaa |
| *Argemone mexicana* L. | Herb | Prickly poppy | Brahmathandu |
| *Asclepias curassavica* L. | Herb | Blood flower | Chinna Kalli Chedi |
| *Asphodelus tenuifolius* Cav. | Herb | Bosail | - |
| *Bidens pilosa* L. | Herb | Spanish needle | Kothimullu |
| *Blainvillea acmella* (L.) Philipson | Herb | Para Cress Flower | - |
| *Blumea eriantha* DC. | Herb | - | - |
| *Blumea lacera* (Burm. f.) DC. | Herb | Blumea | Kattumullangi |
| *Blumea obliqua* (L.) Druce | Herb | - | - |
| *Calotropis gigantea* L. | Shrub | Madar | Erukku |
| *Calotropis procera* (Ait.) R.Br. | Shrub | Swallow wort | Vellerukku |
| *Cardamine hirsuta* L. | Herb | Hairy Bitter Cress | - |
| *Cardamine trichocarpa* Hochst. ex A.Ricch., | Herb | Bitter Cress | - |
| *Cassia absus* L. | Herb | - | - |

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

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

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

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