

Impact Invasive Weed Species In The Crop Lands And Aquatic Ponds Of Kanyakumari District, Tamil Nadu, India

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ABSTRACT

Invasive species are a major driver of global the crop environmental change contributing to the loss of biodiversity, altering of ecosystem services worldwide including in India. The Present study aimed to document the invasive alien weeds in crop land and aquatic ponds of Kanyakumari district, India. The invasive alien weeds present in the crops of Rubber, Banana, Coconut, Pineapple, Paddy and also the aquatic alien weeds present in the ponds of Kanyakumari district were recorded. Frequent and regular field visit have been carried out in study area during 2019-2022 covering different seasons. A total of 152 species belonging to 76 genera and 51 families were recorded. Asteraceae was the most dominant family with 22 species, Poaceae (15 species), Amaranthaceae (11 species), Fabaceae (9 species), Convolvulaceae, Malvaceae (7 species each). Of these 152 species 132 were herb, 12 were shrub and 8 were climber. Sixty-four species from tropical America united, 17 species from temperate South America, 28 species tropical Africa, 12 species from Tropical central America. The most common invasive species are *Ageratina adenophora*, *Ageratum conyzoides*, *Alternanthera philoxeroides*, *Antigonon leptopus*, *Argemone Mexicana*, *Biden Pilosa*, *Chromolaena odorata*, *Cyperus iria*, *Eichhornia crassipes*, *Hyptis suaveolens*, *Lantana Camara*, *Mikania micrantha*, *Parthenium hysterophorus*, *Cassia occidentalis*, *Tridax procumbens*, and *Xanthium strumarium*. The most aquatic invasive species are *Azolla pinnata*, *Eichhornia crassipes*, *Ludwigia adscendens*, *Ludwigia octovalvis*, *Monochoria vaginalis*, *Pistia stratiotes*, *Salvinia molesta*, *Trapa natans*. The management of such invasive alien weeds must focus on the prevention of spread of such species to new area along with the removal of the already established invasive species of the area.

Keywords: Agro-ecosystem, biodiversity Invasive weeds, infestation, Kanyakumari, management, prevention

Introduction

Invasion of alien plant species in recent times has been recognized as the second worst threat after habitat destruction [2]. Among the conservative estimate of 250,000 flowering plants in the world [4] more than 8000 species are weeds [5]. The weeds grow along with their crop plants (agro-ecosystems) and are regarded as nuisance of crops. An 'Alien' species is an exotic or non-indigenous species which are evolved elsewhere and have been intentionally or accidentally introduced outside their natural adaptive ranges and dispersal potential [29]. Weeds are defined as plants which originate in their natural environment and hamper crops

and human activities, and become part of dynamic ecosystems [1]. Increasing human mobility and expansion of global trade has led the alien species to migrate in new ecosystem at large magnitude and scale. The naturalization of alien species in new ecosystem becomes of concern when such species turn themselves in to invasive nature by successfully reproducing and aggressively colonizing in such a magnitude as to displace the native species. Such naturalized species are called invasive [19]. Invasive plants are non-native plants that are introduced in to an area and spread at a very fast rate with significant ecological and economic impacts. Based on these features propose the following definitions to define the alien species” A non native species to the agro-ecosystem or country under consideration that spreads naturally, interferes with the biology and existence of native species, poses a serious threat to the agro-ecosystem and cause economic loss’. Alien invasive species can alter the structure and function of an ecosystem by repressing or excluding native species either directly by out competing them for water and mineral resources or indirectly by changing the way in which nutrients are cycled through the ecosystem [11].The ability of alien invasive species to exploit anthropogenic disturbances and affect the native species through allelopathic strategies together the absence of natural enemies in the new ecosystem where there are introduced has led them to get distributed in all kinds of ecosystem throughout the world [15]. A scientific study on the biology and impact of individual alien invasive species on different ecosystem of a particular region always need a basic database of naturalized alien species of that area [30]. As many as 173 alien species invading the different landscapes of India has been reported by [18]. Studies on the floristic composition of invasive alien weeds in Dhenkanal district of Odisha. A total of 107 species belonging to 34 families were recorded. [7],[8].The major characteristics of invasive alien weeds are ability to out compete native species for space, water, nutrients and other essential resources, adaptability to a variety of environmental conditions and absence of natural predators and parasites. They are prolific seed producers and highly successful in seed dispersal, germination and colonization [28] Because of these characteristics, it is very difficult to control or eliminate these invasive weeds. Invasive plants threaten food and fiber production worldwide. While economic costs are enormous, the ecological cost is irretrievable due to loss of native species and ecosystems. Over the past several decades, there has been a heightened concern at the national and international levels about the impacts of habit destruction and chemical pollution on biodiversity [21]. In recent years, the impact of invasive species on biodiversity has also become a major concern. The present study carried out the invasive alien weeds in different crop land and aquatic ponds of Kanyakumari district

Materials and Methods

The present study was undertaken in crop land Agro-ecosystem of Kanyakumari district, Tamilnadu. The district lies between 77° 15 and 77°36’ of the eastern longitudes and 8° 03’ and 8°35’ of the northern latitudes. Kanyakumari district is an area of 1672 sq km it occupies 1.29% of the total extent of Tamilnadu. The total area of land under cultivation in Kanyakumari district has been estimated at 36875 hectares. Kanyakumari district comes under Malabar region. The Malabar region, which broadly consists of parts of the Kerala, Western Ghats mountain district of Tamil Nadu, Udhagamandalam (Nilgiri), and Kanyakumari. The agriculture is the main occupation of the people of this district. The district has a favourable agro-climatic condition, the climate is mostly warm and humid. The maximum and the minimum temperature are 37. 5°C and 23.7°C respectively. The soils are mostly red loam and laterite in nature.

To study the alien weeds present in the Rubber plantations five sites have been selected viz., Manjalumoodu (Makkadu 8.3763°N and 77.2230°E), Netta (Vaikundam 8.47549° N and 77.2330° E). Chittar (Ambadi 8.3311 ° N and 77.9222 ° E), Alancholai (Maruthi 8.4305 ° N and 77.2585 ° E), Aarukani (Ganthimathi 8.34457 ° N and 77.1877 ° E).

The sites selected for Banana plantations were Tiruvithancode (8.2396 ° N and 77.3066 ° E), Padmanabhapuram (8.2446 ° N and 77.3367 ° E), Kumarakoil (8.2437 ° N and 77.3495 ° E). Chitharal (8.3324 ° N and 77.2384 ° E), Mukkutukal (8.3944 ° N and 77.2169 ° E).

The sites selected for Paddy fields were Kuttakarai (8.6089 ° N and 77.9785 ° E). Thottiyodu (8.2091 ° N and 77.3673 ° E), Vishnupuram (8.940 ° N and 77.564 ° E), Erachakulam (8.2354 ° N and 77.4325 ° E), Parvathipuram (8.7817 ° N and 77.42268 ° E). Azhagiyapandipuram (8.3048 ° N and 77.44016 ° E), Derisanamcope (8.4048 ° N and 77.55016 ° E), Boothapandi (8.1622 ° N and 77.2624 ° E).

The sites selected for Coconut plantations were Mandaikadu (8.1631 ° N and 77.2786 ° E), Colachal (8.1786 ° N and 77.2561 ° E). Thengappatanam (8.2393 °N and 77.1730 °E), Rajakkamangalam (8.1290 ° N and 77.3640 ° E), Puthalam (8.0632 ° N and 77.2800 ° E). The sites selected for Pineapple plantations were Thirparappu (8.37642 ° N and 77.2227 ° E), Pechiparai (8.45303 ° N and 77.30681 ° E). To study the aquatic weeds, forty ponds have been selected randomly across the district.

Field surveys have been carried out in the study area from 2017 to 2021, covering different seasons. During field trips, voucher specimens of every species were collected in flowering and fruiting stages and detailed field notes were prepared on the spot. Special emphasize was given on data pertaining to habit, habitat association with other species. The specimens were then poisoned with Mercuric Chloride in alcohol. Further processes of pressing, mounting and labeling were done following the instructions given by [6]. The mounted specimens were deposited in the Herbarium of Botany Department and Research centre N.M.C.College, Marthandam.

Initially identification was provisionally done by using Flora of the Presidency of Madras [3], Prevalent weed flora in Penninsular India [17], Flora of Tamil Nadu Grasses ,Flora of Tamilnadu Carnatic [10], and Flora of the Western Ghats [14]. An extensive review of literature on nativity species [14], [9], [10],[24]. Plants were classified according to the Modified Bentham and Hooker system with necessary alterations.

Result and Discussion

A total of 152 alien invasive weeds (Table 1) belonging to 76 genera and 51 families were documented from different agro-ecosystem of Kanyakumari district. Asteraceae was the most dominant family with 22 species, Poaceae (15 species), Amaranthaceae (11 species), Fabaceae (9 species), Convolvulaceae, Malvaceae (seven species each), Cyperaceae, Euphorbiaceae (Five species each), Solanaceae, Lamiaceae (Four species each), Leguminosae, Onagraceae, Oxalidaceae, Capparaceae, Asclepiadaceae, Verbenaceae (Three species each), Agavaceae, Apocyanaceae, Boraginaceae, Ponteriaceae, Portulacaceae, Rubiaceae, Tiliaceae (Two species each), Acanthaceae, Araceae, Cactaceae, Combretaceae, Commelinaceae, Crassulaceae, Cuscutaceae, Lauraceae, Lemnaceae, Liliaceae, Menispermaceae, Papaveraceae, Passifloraceae, Pedaliaceae, Piperaceae, Plumbaginaceae, Primulaceae, Salviniaceae, Scrophulariaceae, Trapaceae, Typhaceae, Uticaceae, Zygophyllaceae (one species each).

Of these 152 species 132 were herb, 12 were shrub and 8 were climber. On the basis of the nativity of the species a total of 16 geographical regions were recorded in the present study. Out of the 152 species documented Sixty-four species from tropical America united, 17 species from temperate South America, 28 species tropical Africa, 12 species from Tropical central America, 8 species from Tropical South America, six species from Tropical North America, Tropical South America, 4 species from tropical Asia, three species from west indices, two species each Europe, Mediterranean, West Asia, one species each Tropical East America North Australia, Peru. The American continents contributed majority of noxious invasive plants.

The spread and infestation of some common species like *Ageratum conyzoides*, *Alternanthera philoxeroides*, *Antigonon leptopus*, *Argemone Mexicana*, *Biden Pilosa*, *Chromolaena odorata*, *Cyperus iria*, *Eichhornia crassipes*, *Hyptissuaveolens*, *Lantana Camara*, *Mikania micrantha*, *Parthenium hysterophorus*, *Cassia occidentalis*, *Tridax procumbens*, *Xanthium strumarium* seems to have been introduced deliberately. Further it has been observed that few species like *Parthenium hysterophorus*, *Lantana camara*, *Ageratum conyzoides* are highly invasive weeds in the study area.

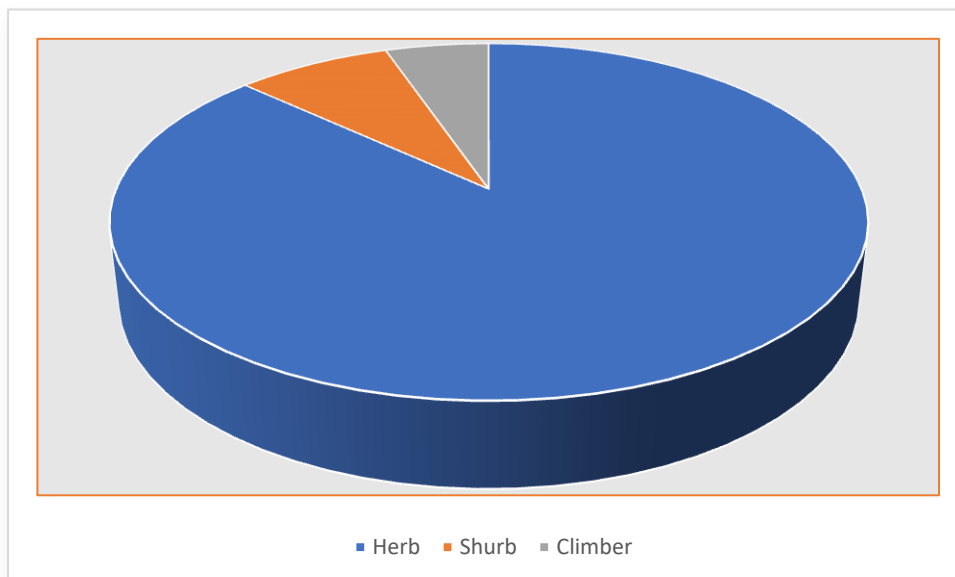


Figure 1 Habitwise distribution of the invasive alien weeds in the study area.

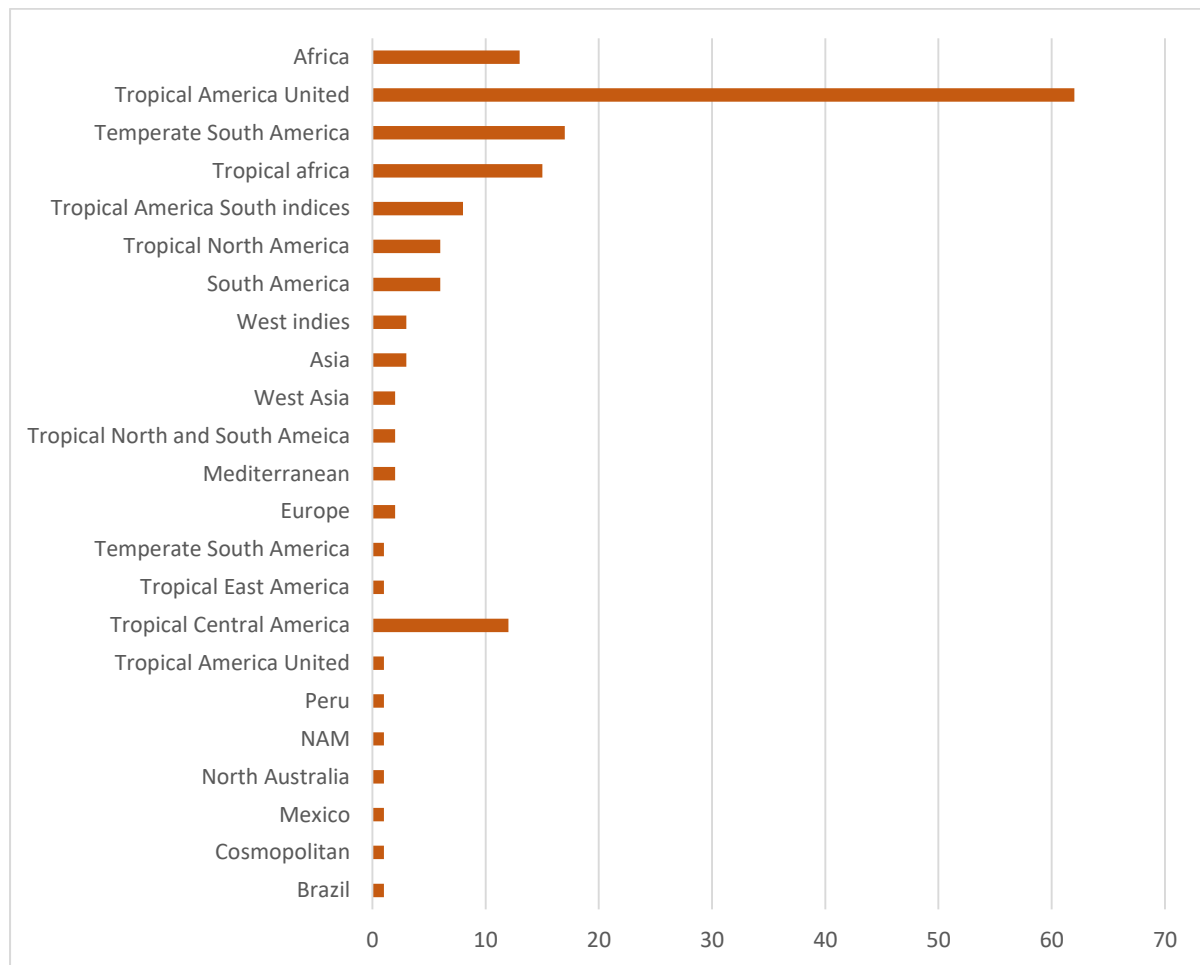


Figure 2 Contribution of different geographical regions to the invasive weeds in the study area

The invasive alien species are ready colonizers in disturbed areas and cause considerable ecological damage to India's natural areas, speed the disappearance of threatened and endemic species, reduce the carrying capacity of pastures, increase the maintenance costs of croplands, and interfere with our enjoyment of the outdoors [26]. Of these, some species may have invaded only a restricted region, but had a huge probability of expanding, and caused great damage. Other species may already be globally widespread and causing cumulative but less visible damage [27]. Alien species are nonnative or exotic organisms that occur outside their natural adapted ranges and dispersal potential [11]. These invasive species are widely distributed in all kinds of ecosystems throughout the world and include all categories of living organisms. Nevertheless, plants, mammals and insects comprise the most common types of invasive alien species in terrestrial environments [16]. An important requirement for successful colonization of invaders is open habitat with reduced competition [25]. Invasive species of Asteraceae exhibited a much higher reproductive capacity than those of other families. This high reproductive capacity is achieved by partitioning of reproductive capital into a large number of propagules that are minute, light and wind dispersed [22]. Various other workers have also reported the dominance of Asteraceae among invasive alien weeds in Indian Himalaya region [23]. Various other workers have also reported the alien invasive species in Tamilnadu [20],

[13].The invasive species cause loss of biodiversity through species extinction and their impact on ecosystem function. Differences between native and invasive plant species in their resource acquisition and consumption may cause a change in soil structure, decomposition, and nutrient content of the soil. Thus, invasive species are a serious hindrance to conservation with significant undesirable impacts on the goods and services provided by crop lands

Conclusion

Invasive alien weeds are a major threat to natural ecosystem and habitat. Commercial exploitation of these weeds may be initiated to reduce the population. All efforts to control invasive alien weeds to date have proved unsatisfactory and these weeds are extending their domain to new areas. Hence utilization could be one of the most effective means of reducing the problem of invasive alien weeds. The most invasive species are *Ageratum conyzoides*, *Alternanthera philoxeroides*, *Antigonon leptopus*, *Argemone Mexicana*, *Biden Pilosa*, *Chromolaena odorata*, *Cyperus iria*, *Eichhornia crassipes*, *Hyptissuaveolens*, *Lantana Camara*, *Mikania micrantha*, *Parthenium hysterophorus*, *Cassia occidentalis*, *Tridax procumbens*, *Xanthium strumarium*. The most aquatic invasive species are *Azolla pinnata*, *Eichhornia crassipes*, *Ludwigia adscendens*, *Ludwigia octovalvis*, *Monochoria vaginalis*, *Pistia stratiotes*, *Salvinia molesta*, *Trapa natans*. Plant invasions in the new areas alter indigenous community composition, deplete species diversity, affect ecosystem process, and ecological imbalance. A quick inventory and plant identification network are, therefore needed for early detection and reporting of noxious weeds in order to control the spread of invasive plant species. Therefore, the management of such invasive alien weeds must focus on the prevention of spread of such species to new area along with the removal of the already established invasive species of the area.

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Table 1: Invasive alien weeds in the study area				
No	Botanical Name	Family	Habit	Nativity
1	<i>Abrus precatorius</i> L.	Fabaceae	Climber	TAS
2	<i>Abutilon hirtum</i> (Lam.)Sweet	Malvaceae	Shrub	TAF
3	<i>Acalypha indica</i> L.	Euphorbiaceae	Herb	TAF
4	<i>Acanthospermum hispidum</i> Dc.	Asteraceae	Herb	TSA
5	<i>Achyranthes aspera</i> L.	Amaranthaceae	Herb	TAF
6	<i>Acmella paniculata</i> (L)R.K.Jansen	Asteraceae	Herb	TSA
7	<i>Aerva javanica</i> (Burm.f)Juss. Ex. Schult	Amaranthaceae	Herb	TA
8	<i>Agave americana</i> L.	Agavaceae	Shrub	TNA
9.	<i>Agave cantala</i> (Haw.)Roxb.	Agavaceae	Shrub	TNA
10	<i>Ageratina adenophora</i> (Spreng.)	Asteraceae	Herb	TA
11	<i>Ageratum conyzoides</i> L.	Asteraceae	Herb	TA
12	<i>Aloe vera</i> (L.)Burm.f	Liliaceae	Herb	TAS
13	<i>Alternanthera bettzickiana</i> (Regel)G.Nichols	Amaranthaceae	Herb	TSA
14	<i>Alternanthera paronychioides</i> A. St.Hill.	Amaranthaceae	Herb	TA
15	<i>Alternanthera philoxeroides</i> (Mart.)Griseb.	Amaranthaceae	Herb	TA
16	<i>Alternanthera pungens</i> Kunth.	Amaranthaceae	Herb	TA
17	<i>Alternanthera sessilis</i> (L.)R.Br. Ex. Dc.	Amaranthaceae	Herb	TA
18	<i>Alternanthera spinosus</i> L.	Amaranthaceae	Herb	TA
19	<i>Amaranthus spinosus</i> L.	Amaranthaceae	Herb	TA
20	<i>Amaranthus viridis</i> L.	Asteraceae	Herb	TNA
21	<i>Anagalis arvensis</i> L.	Primulaceae	Herb	WA
22	<i>Anisomeles indica</i> (L.)Kuntze	Lamiaceae	Herb	TAS
23	<i>Antigonon leptopus</i> Hook.&Arn	Polygonaceae	Climber	TNA
24	<i>Apluda mutica</i> L.	Poaceae	Herb	TAF
25	<i>Argemone mexicana</i> L.	Papaveraceae	Herb	TSA
26	<i>Arundo donax</i> L.	Poaceae	Herb	TAS
27	<i>Asclepias curassavica</i> L.	Asclepiadaceae	Herb	TNA
28	<i>Axonopus compressus</i> (Sw.)P.Beauv	Poaceae	Herb	TSA
29	<i>Azolla pinnata</i> R.Br	Azollaceae	Herb	TAU
30	<i>Bidens pilosa</i> L.	Asteraceae	Herb	TA
31	<i>Biophytum sensitivum</i> (L.)DC	Oxalidaceae	Herb	TAS
32	<i>Blumea lacera</i> (Burm.f)Dc.	Asteraceae	Herb	TA
33	<i>Boerhavia diffusa</i> L.	Nyctaginaceae	Herb	TA
34	<i>Boerhavia erecta</i> L.	Nyctaginaceae	Herb	TNSA
35	<i>Calotropis gigantea</i> (L)R.Br.	Asclepiadaceae	Shrub	TA
36	<i>Calotropis procera</i> (Ait) R.Br	Asclepiadaceae	Shrub	TA

37	<i>Cassia absus</i> L.	Leguminosae	Herb	TA
38	<i>Cassia occidentalis</i> L.	Leguminosae	Herb	TSA
39	<i>Cassia tora</i> L.	Fabaceae	Herb	TSA
40	<i>Cassytha filiformis</i> L.	Lauraceae	Climber	TSA
41	<i>Catharanthus roseus</i> (L.) G.Don.	Apocynaceae	Herb	TA
42	<i>Centrosema pubescens</i> Benth.	Fabaceae	Climber	TNSA
43	<i>Chenopodium album</i> L.	Chenopodiaceae	Herb	EU
44	<i>Chloris barbata</i> Sw.	Poaceae	Herb	TA
45	<i>Chromolaena odorata</i> (L.) R.M.King &H.Rob.	Asteraceae	Herb	TA
46	<i>Cleome gynandra</i> L.	Capparaceae	Herb	TA
47	<i>Cleome rutidosperma</i> Dc.	Capparaceae	Herb	TA
48	<i>Cleome viscosa</i> L.	Capparaceae	Herb	TA
49	<i>Clitoria ternatea</i> L.	Fabaceae	Climber	TAF
50	<i>Coldenia procumbens</i> L.	Boraginaceae	Herb	TAF
51	<i>Combretum indicum</i> (L.)Defilipps	Combretaceae	Climber	TAF
52	<i>Commelina benghalensis</i> L.	Commelinaceae	Herb	TAF
53	<i>Corchorus aestuans</i> L.	Tiliaceae	Herb	TA
54	<i>Crotalaria pallida</i> Aiton.	Fabaceae	Herb	TA
55	<i>Crotalaria retusa</i> L.	Fabaceae	Herb	TA
56	<i>Croton bonplandianus</i> Bail.	Euphorbiaceae	Herb	TESA
57	<i>Cuscuta reflexa</i> Roxb.	Cuscutaceae	Herb	ME
58	<i>Cynodon dactylon</i> L.	Poaceae	Herb	AF
59	<i>Cyperus compressus</i> L.	Cyperaceae	Herb	TAS
60	<i>Cyperus difformis</i> L.	Cyperaceae	Herb	TA
61	<i>Cyperus iria</i> L.	Cyperaceae	Herb	TA
62	<i>Cyperus rotundus</i> L.	Cyperaceae	Herb	TAF
63	<i>Dactyloctenium aegyptium</i> (L.)Willd	Poaceae	Herb	TAF
64	<i>Datura metel</i> L.	Solanaceae	Shrub	TA
65	<i>Datura stramonium</i> L.	Solanaceae	Herb	TA
66	<i>Digera muricata</i> (L.)Mart.	Amaranthaceae	Herb	NAM
67	<i>Digitaria ciliaris</i> (Retz.)Koeler	Poaceae	Herb	TAF
68	<i>Echinochloa colona</i> (L.)Link	Poaceae	Herb	TSA
69	<i>Echinochloa crusgalli</i> (L.)Beauv.	Poaceae	Herb	TSA
70	<i>Eclipta prostrata</i> (L.)L.	Asteraceae	Herb	TA
71	<i>Eichhornia crassipes</i> (Mart.)Solms.	Pontederiaceae	Herb	SA
72	<i>Elephantopus scaber</i> L.	Asteraceae	Herb	TAS
73	<i>Emilia sonchifolia</i> (L.)Dc.	Asteraceae	Herb	TA
74	<i>Euphorbia heterophylla</i> L.	Convolvulaceae	Herb	TA
75	<i>Euphorbia hirta</i> L.	Euphorbiaceae	Herb	TA
76	<i>Evolvulus nummularis</i> (L.)L.	Convolvulaceae	Herb	TA

77	<i>Fimbristylis miliacea</i> (L.)Vahl.	Cyperaceae	Herb	TAS
78	<i>Galinosoga parviflora</i> Cav.	Asteraceae	Herb	TA
79	<i>Galium aparine</i> L.	Rubiaceae	Herb	AF
80	<i>Gomphrena celosioides</i> Mart.	Amaranthaceae	Herb	TA
81	<i>Gomphrena serrata</i> L.	Amaranthaceae	Herb	TA
82	<i>Grangea maderaspatana</i> (L.)Poir.	Asteraceae	Herb	TSA
83	<i>Heliotropium indicum</i> L.	Boraginaceae	Herb	SA
84	<i>Hyptis suaveolens</i> (L.)Poit	Lamiaceae	Herb	TA
85	<i>Impatiens balsamina</i> L.	Balsaminaceae	Herb	TA
86	<i>Imperata cylindrica</i> (L.) P.Beauv.	Poaceae	Herb	TA
87	<i>Indigofera linnaei</i> Ali.	Fabaceae	Herb	TA
88	<i>Ipomoea carnea</i> Jacq.	Convolvulaceae	Shrub	TA
89	<i>Ipomoea obscura</i> (L.)Ker-Gawl.	Convolvulaceae	Herb	TA
90	<i>Ipomoea pes-tigridis</i> L.	Convolvulaceae	Herb	TEA
91	<i>Ipomoea quamoclit</i> L.	Convolvulaceae	Herb	TA
92	<i>Jatropha gossypifolia</i> L.	Euphorbiaceae	Shrub	NA
93	<i>Kalanchoe pinnata</i> (Lam.)Pers.	Crassulaceae	Shrub	AF
94	<i>Lantana camara</i> L.	Verbenaceae	Herb	TA
95	<i>Lemna minor</i> L.	Lemnaceae	Herb	AF
96	<i>Ludwigia adscendens</i> (L.)Hara	Onagraceae	Herb	TA
97	<i>Ludwigia octovalvis</i> (Jacq.)Raven.	Onagraceae	Herb	TA
98	<i>Ludwigia perennis</i> L.	Onagraceae	Herb	TA
99	<i>Malvastrum coromandelianum</i> (L.)Garcke	Malvaceae	Herb	TA
100	<i>Melinis repens</i> (Willd.)Zizka	Poaceae	Herb	AF
101	<i>Merremia dissecta</i> (Jacq.)Hallier.f	Convolvulaceae	Climber	TA
102	<i>Mikania micrantha</i> Kunth.	Asteraceae	Climber	TA
103	<i>Mimosa invisa</i> Colla	Fabaceae	Shrub	SA
104	<i>Mimosa pudica</i> L.	Leguminosae	Herb	BZ
105	<i>Mirabilis jalapa</i> L.	Nyctaginaceae	Herb	PR
106	<i>Monochoria vaginalis</i> (Burm.f) C.Presl.	Pontederiaceae	Herb	TA
107	<i>Ocimum americanum</i> L.	Lamiaceae	Herb	TA
108	<i>Ocimum basilicum</i> L.	Lamiaceae	Herb	AF
109	<i>Opuntia stricta</i> (Haw.)Haw.	Cactaceae	Herb	TA
110	<i>Oxalis corniculata</i> L.	Oxalidaceae	Herb	EU
111	<i>Oxalis corymbosa</i> Dc.	Oxalidaceae	Herb	SA
112	<i>Parthenium hysterophorus</i> L.	Asteraceae	Herb	TNA
113	<i>Passiflora foetida</i> L.	Passifloraceae	Herb	TSA
114	<i>Pedaliium murex</i> L.	Pedaliaceae	Herb	TA
115	<i>Pennisetum purpureum</i> Schum.	Poaceae	Herb	TA
116	<i>Peperomia pellucida</i> (L.)Kunth.	Piperaceae	Herb	TSA

117	<i>Phyllanthus amarus</i> Schum.&Thonn	Euphorbiaceae	Herb	SA
118	<i>Physalis minima</i> L.	Solanaceae	Herb	TA
119	<i>Pilea microphylla</i> (L.)Liebm.	Urticaceae	Herb	TSA
120	<i>Pistia stratiotes</i> L.	Araceae	Herb	TA
121	<i>Plumbago zeylanica</i> L.	Plumbaginaceae	Herb	TCA
122	<i>Portulaca oleraceae</i> L.	Portulacaceae	Herb	TSA
123	<i>Portulaca quadrifida</i> L.	Portulacaceae	Herb	TA
124	<i>Rauvolfia tetraphylla</i> L.	Apocynaceae	Herb	TCA
125	<i>Ruellia tuberosa</i> L.	Acanthaceae	Herb	TA
126	<i>Saccharum spontaneum</i> L.	Poaceae	Herb	WA
127	<i>Salvinia molesta</i> D.Mitch.	Salviniaceae	Herb	TSA
128	<i>Scoparia dulcis</i> L.	Scrophulariaceae	Herb	TA
129	<i>Setaria pumila</i> (Poir.)Roem&Schult.	Poaceae	Herb	AF
130	<i>Setaria viridis</i> (L.)P.Beauv.	Poaceae	Herb	AF
131	<i>Sida acuta</i> Burm.f	Malvaceae	Herb	TA
132	<i>Sida cordata</i> (Burm.f)Waalk.	Malvaceae	Herb	AS
133	<i>Sida cordifolia</i> L.	Malvaceae	Herb	AS
134	<i>Sida rhombifolia</i> Burm.f	Malvaceae	Herb	AF
135	<i>Solanum torvum</i> Sw.	Solanaceae	Shrub	TCA
136	<i>Sonchus aspera</i> L.	Asteraceae	Herb	ME
137	<i>Spermacoce hispida</i> L.	Rubiaceae	Herb	TA
138	<i>Sphagneticola trilobata</i> (L.)Pruski	Asteraceae	Herb	SA
139	<i>Spilanthes radicans</i> Jacq.	Asteraceae	Herb	TSA
140	<i>Stachytarpheta urticaefolia</i> (Salisb.)Sims.	Verbenaceae	Herb	TA
141	<i>Synedrella nodiflora</i> (L.)Gaern.	Asteraceae	Herb	TCA
142	<i>Tithonia diversifolia</i> Hemsl.	Menispermaceae	Herb	MEX
143	<i>Trapa natans</i> L.	Trapaceae	Herb	AS
144	<i>Tribulus terrestris</i> L.	Zygophyllaceae	Herb	TA
145	<i>Tridax procumbens</i> L.	Asteraceae	Herb	TCA
146	<i>Trifolium repens</i> L.	Fabaceae	Herb	AF
147	<i>Triumfetta rhomboidea</i> Jacq.	Tiliaceae	Herb	TA
148	<i>Typha angustifolia</i> L.	Typhaceae	Herb	AF
149	<i>Urena lobata</i> L.	Malvaceae	Shrub	TAF
150	<i>Vitex negundo</i> L.	Verbenaceae	Shrub	AF
151	<i>Xanthium indicum</i> Koenig	Asteraceae	Herb	AF
152	<i>Xanthium strumarium</i> L.	Asteraceae	Herb	TA

TAS-Tropical America South Indices;TAF-Tropical Africa; TSA-Tropical South America;TA-Tropical America; TNA-Tropical North America; WA-West Asia; TAU-Tropical America United;TNSA-Tropical North and South America;EU-Europe;TESA-

Research paper

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Tropical East and South America;EU-Europe;SA-South America;AF-Africa; Tropical East America;NA-North America;BZ-Brazil;PR-Peru;ME-Mediterranean;MEX-Mexico;TCA-Tropical Central America