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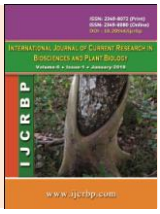

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Invasive flora of Poondi stream, Kodaikanal, Tamil Nadu

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ABSTRACT

Invasive Species as an alien species which becomes established in natural or semi-natural ecosystems or habitat, an agent of change and threatens native biological diversity. A Comprehensive and exhaustive study on alien plants existing in Poondi stream of Kodaikanal region for about 9.5 kilometer from Poondi dam to Kumboor village was undertaken for a period of 24 months from January, 2015 to December, 2016.By the current research work, it was recorded that a total of 51 alien species belonging to 45 genera distributed among 28 families of angiospermic alien species. Among 51 species of alien, dicotyledons were represented by 41 species of 36 genera belonging to 22 families and monocotyledons by 10 species of 9 genera belonging to 6 families. This paper concluded that impact of invasiveness created by these alien species should controlled by planting native species into the natural forest area.

Introduction

IUCN (International Union for Conservation of Nature and Natural Resources) defines "Invasive Species" as an alien species which becomes established in natural or semi-natural ecosystems or habitat, an agent of change and threatens native biological diversity. A taxon can be considered successfully naturalized after overcoming geographical, environmental and reproduction barriers, while an invasive species requires, in addition, overcoming dispersal barrier within the new region (Richardson et al., 2000). They are noxious and cause negative impact in environment, ecosystems, habitats, native biodiversity, economics and even human health (Khanna, 2009). Invasive species has faster rates of growth and biomass production compared to native species, higher competitive ability, high reproductive efficiency including production of a large number of seeds, efficient dispersal, vegetative reproduction, rapid establishment and other traits that help them adapt to new habitats (Sharma et al., 2005; Simberloff et al., 2005). On these aspects, there is an apparent need for a regional and national authentic database on invasive alien species for monitoring their spread and impact in various regions and for devising appropriate management strategies.

Materials and methods

Description of the study stream – Poondi

Geographical details

The area of investigation – Poondi stream is lies between 77° 18' 14.3" – 77° 20' 23.6" E longitude and 10° 11' 11.4" – 10° 14' 20.9" N latitude. The

altitude of the study area ranged from 1200 to 2100 m above Mean Sea Level. Temperature of the study area was varied from 11.28° C to 20.78° C. The area of investigation receives 122.80 mm and 171.7 mm of precipitation as minimum and maximum rainfall, during the study period (2015-16).

Methodology

A Comprehensive and exhaustive study on alien plants existing in Poondi stream of Kodaikanal region for about 9.5 kilometer from Poondi dam to Kumboor village was undertaken for a period of 24 months from January, 2015 to December, 2016. All the alien plants collected were botanically identified by referring Flora of Palni hills, (Matthew, 1999) and Flora of Tamil Nadu – a database (Narasimhan, 2006).

Results and discussion

By the current research work, it was recorded that a total of 51 alien species belonging to 45 genera distributed among 28 families of angiospermic alien species (Table 1). Among 51 species of alien, dicotyledons were represented by 41 species of 36 genera belonging to 22 families and monocotyledons by 10 species of 9 genera belonging to 6 families (Fig. 1).

Table 1. List of alien plants recorded from the study stream.

Botanical Name	Family	Habit	Native region
Acacia dealbata L.	Mimosaceae	Tree	Australia
Achyranthes aspera L.	Amaranthaceae	Herb	South-East Africa
Acmella calva (DC.) R.K.Jansen	Asteraceae	Herb	America
Agave americana L.	Agavaceae*	Shrub	Tropical America
Ageratina adenophora (Spreng.) R.M. King & H.Rob	Asteraceae	Shrub	Tropical America
Ageratum conyzoides L.	Asteraceae	Herb	Tropical America
Alnus nepalensis D. Don	Betulaceae	Tree	South-East Asia
Asclepias curassavica L.	Asclepiadaceae	Shrub	Tropical America
Bidenspilosa L.	Asteraceae	Herb	Tropical America
Calceolaria gracilis Kunth	Scrophulariaceae	Herb	Tropical America
Cardamine africana L.	Brassicaceae	Herb	Africa
Chenopodium ambrosioides L.	Chenopodiaceae	Herb	Tropical America
Chromolaena odorata (L.) R. M. King & H. Rob.	Asteraceae	Shrub	Tropical America
Cotoneaster buxifolius Lindl.	Rosaceae	Shrub	China
Cymbopogon citratus (DC. ex Nees) Stapf.	Poaceae*	Herb	South-East Asia
Cynodon dactylon (L.) Pers.	Poaceae*	Herb	Europe
Cyperus difformis L.	Cyperaceae*	Herb	Tropical America
Cyperusiria L.	Cyperaceae*	Herb	Tropical America
Erigeron karvinskianus DC.	Asteraceae	Herb	Tropical America
Eucalyptus citriodora Hook. f.	Myrtaceae	Tree	Tropical Australia
Eucalyptus globulus Labill.	Myrtaceae	Tree	Tropical Australia
Euphorbia cyathophora Murray	Euphorbiaceae	Shrub	Tropical America
Furcraea foetida (L.) Haw.	Agavaceae*	Shrub	Tropical America
Galinsoga parviflora Cav.	Asteraceae	Herb	Tropical America
Hibiscus mutabilis L.	Malvaceae	Shrub	China
Impatiens balsamina L.	Balsaminaceae	Herb	Tropical America
Ipomoea nil (L.) Roth	Convolvulaceae	Climber	Tropical America
Lantana camara L. var. *aculeata* L.	Verbenaceae	Shrub	Tropical America
Lantana wightiana Wall ex Gamble	Verbenaceae	Shrub	Tropical America
Ludwigia adscendens L.	Onagraceae	Shrub	Tropical America
Ludwigia octovalvis Jacq.	Onagraceae	Herb	Tropical Africa
Mimosa pudica L.	Mimosaceae	Herb	Brazil
Monochoria vaginalis (Burm.f.) C.Presl ex Kunth	Pontederiaceae*	Herb	Tropical America
Nicandra physalodes (L.) Gaertn.	Solanaceae	Herb	Tropical America
Oxalis corniculata L.	Oxalidaceae	Herb	Europe
Oxalis latifolia Kunth.	Oxalidaceae	Herb	Tropical America

Table 1. Cntd....

Botanical Name	Family	Habit	Native region
Panicum maximum Jacq.	Poaceae*	Herb	Tropical Africa
Parthenium hysterophorus L.	Asteraceae	Shrub	North America
Passiflora subpeltata Ortega	Passifloraceae	Climber	Tropical America
Pistia stratiotes L.	Araceae*	Herb	Tropical America
Plantago erosa Wall.	Plantaginaceae	Herb	Euro-Asia
Psidium guajava L.	Myrtaceae	Tree	Tropical America
Ricinus communis L.	Euphorbiaceae	Shrub	Tropical America
Rubus ellipticus Smith	Rosaceae	Shrub	Tropical America
Solanum pseudocapsicum L.	Solanaceae	Shrub	Tropical America
Solanum seaforthianum Andrews	Solanaceae	Climber	Tropical America
Spergula arvensis L.	Caryophyllaceae	Herb	Europe
Turnera ulmifolia L.	Turneraceae	Herb	Tropical America
Typha angustata Bory and Chaub	Typhaceae*	Herb	Tropical America
Verbascum thapsus L.	Scrophulariaceae	Herb	Mediterranean Region
Verbena bonariensis L.	Verbenaceae	Herb	Tropical America

Note: * = Monocot families; Others are Dicots.

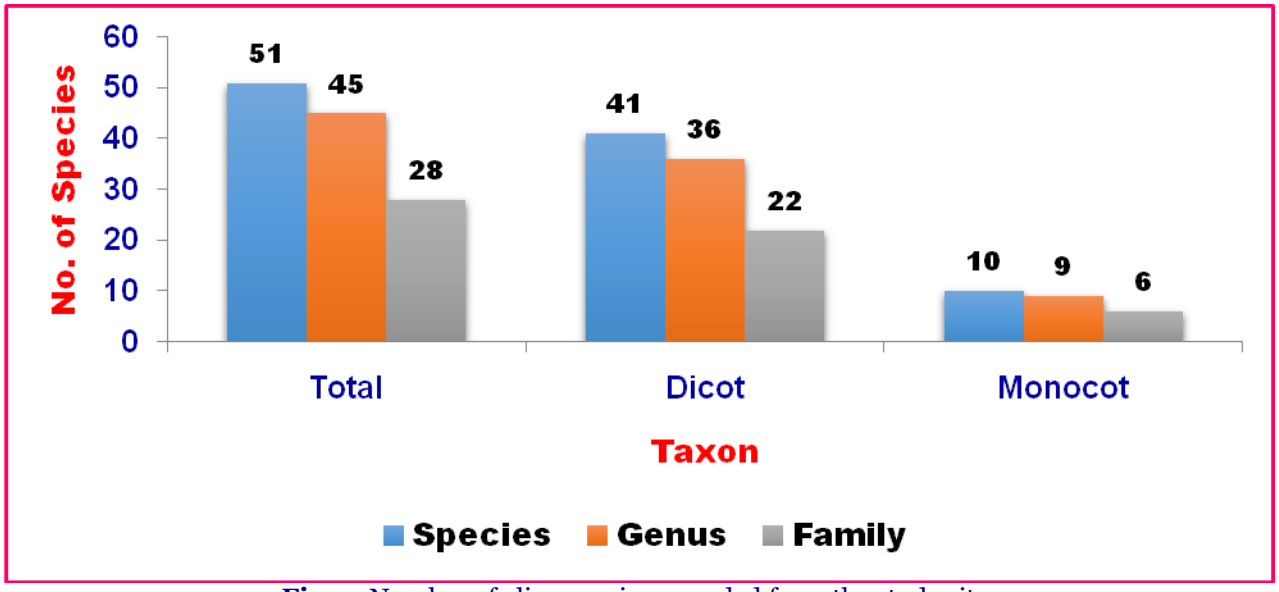

Fig. 1: Number of alien species recorded from the study site.

Of dicotyledons, Asteraceae (15.68%) was found to be dominant and largest family comprising 8 species. Myrtaceae, Solanaceae and Verbenaceae (5.89% each) shared the second largest family status; they were represented by 3 species and 13 families were represented by single species (each 1.96% each) (Table 2; Fig. 2). In case of the alien plants recorded under dicots, *Eucalyptus*, *Lantana*, *Ludwigia*, *Oxalis* and *Solanum* were represented by 2 species and which were found to be the dominant genus and the rest of the 31 genus were represented as monospecific genera (Table 1).

In case of monocotyledons, Poaceae (5.89%) was recorded as dominant family with 3 species followed by Agavaceae and Cyperaceae (3.92%) and they were found to be second dominant family comprising 2 species and rest of the 3 families (Araceae, Turneraceae and Typhaceae) were represented by single species (1.96% each) (Table 2; Fig. 3). Among the alien plants recorded under monocots, *Cyperus* was represented by 2 species and it was found to be the dominant genus and the rest of the 8 genus were represented as monospecific genera (Table 1).

Regarding the habits of the alien plant species recorded, herbs (28 species) were found to be more in number than shrubs (15 species) followed by trees (5 species) and climbers (3 species). In

the case of dicotyledons, among 41 species, 20 species were found to be as herbs, 13 species were found to be shrubs, 5 species were as trees and 3 species as climbers. In case of monocotyledons, 8 species of herbs and 2 species of shrubs, totally 10 species were recorded. There were neither climbers nor trees recorded in monocots (Table 1; Fig. 4).

Table 2. List of families with number of genus and species of alien plants.

Family Name	No. of Genus	No. of Species	% of total Species
Agavaceae*	2	2	3.92
Amaranthaceae	1	1	1.96
Araceae*	1	1	1.96
Asclepiadaceae	1	1	1.96
Asteraceae	8	8	15.68
Balsaminaceae	1	1	1.96
Betulaceae	1	1	1.96
Brassicaceae	1	1	1.96
Caryophyllaceae	1	1	1.96
Chenopodiaceae	1	1	1.96
Convolvulaceae	1	1	1.96
Cyperaceae*	1	2	3.92
Euphorbiaceae	2	2	3.92
Malvaceae	1	1	1.96
Mimosaceae	2	2	3.92
Myrtaceae	2	3	5.89
Onagraceae	1	2	3.92
Oxalidaceae	1	2	3.92
Passifloraceae	1	1	1.96
Plantaginaceae	1	1	1.96
Poaceae*	3	3	5.89
Pontederiaceae*	1	1	1.96
Rosaceae	2	2	3.92
Scrophulariaceae	2	2	3.92
Solanaceae	2	3	5.89
Turneraceae	1	1	1.96
Typhaceae*	1	1	1.96
Verbenaceae	2	3	5.89
Total	**45**	**51**	**100**

Note: * = Monocot families; Others are Dicots.

There are number of studies have been strongly confirmed that the members of Asteraceae were found more among alien species. It includes invasive plant species occurring in Boluvampatti Forest Range located at Southern Western Ghats (Aravindhan and Rajendran, 2014), alien species habiting in Thiruvallur district (Udayakumar et al., 2014), invasive flora of Valley district of Manipur (Singh et al., 2015).

By the present investigation also, it was documented that the family Asteraceae was represented with large number of species in study stream. It was stated that 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 (Raghubanshi et al., 2005)

Regarding the native region of alien species recorded, 32 species (62.75%) were belonging to Tropical America, 3 species (5.89%) were belonging to Europe, 2 species (3.92% each) from

China, South-East Asia, Tropical Africa and Tropical Australia respectively and 1 species (each of 1.96%) from Africa, America, Australia, Brazil, Euro-Asian, Mediterranean region, North America and South-East Africa, respectively (Table 1; Fig. 5).

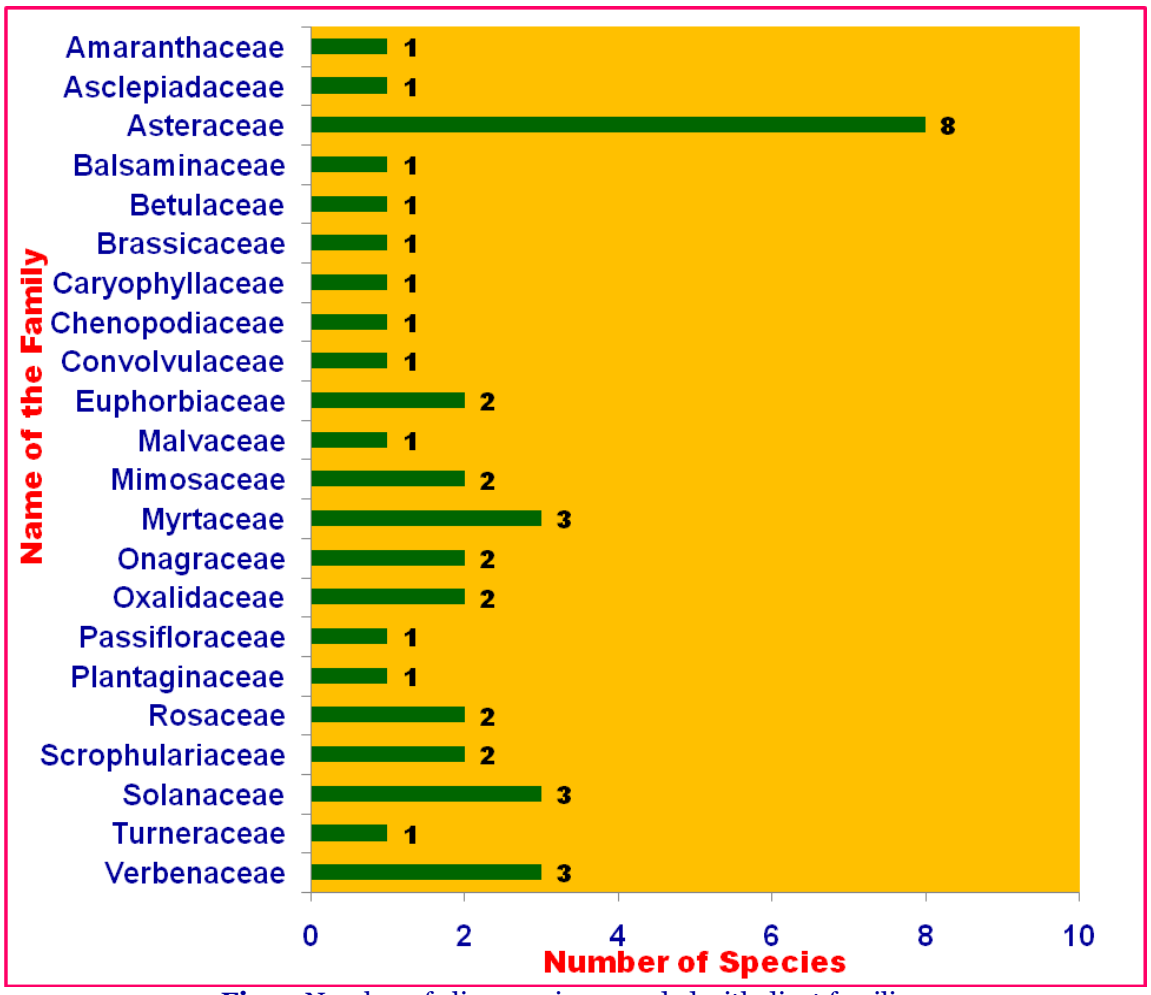

Fig.2: Number of alien species recorded with dicot families.

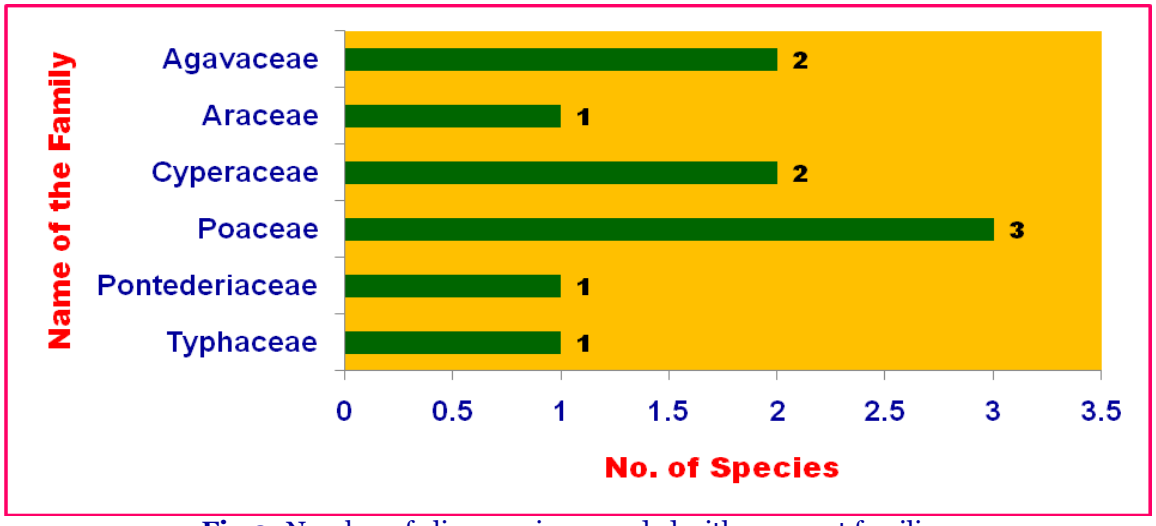

Fig.3: Number of alien species recorded with monocot families.

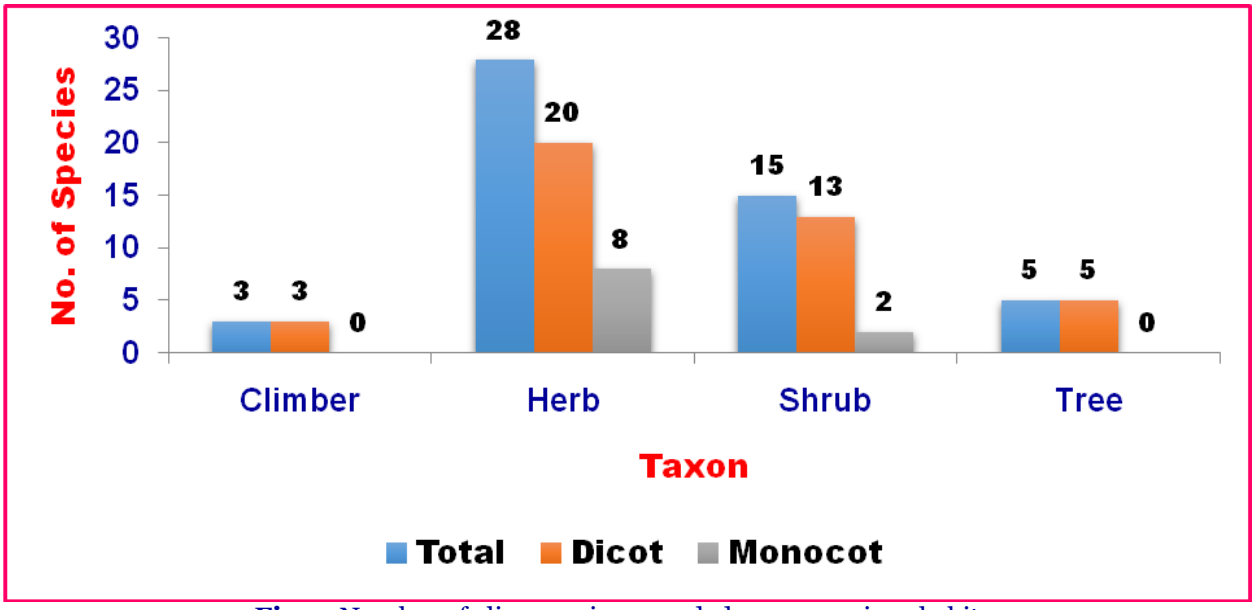

Fig.4: Number of alien species recorded among various habits.

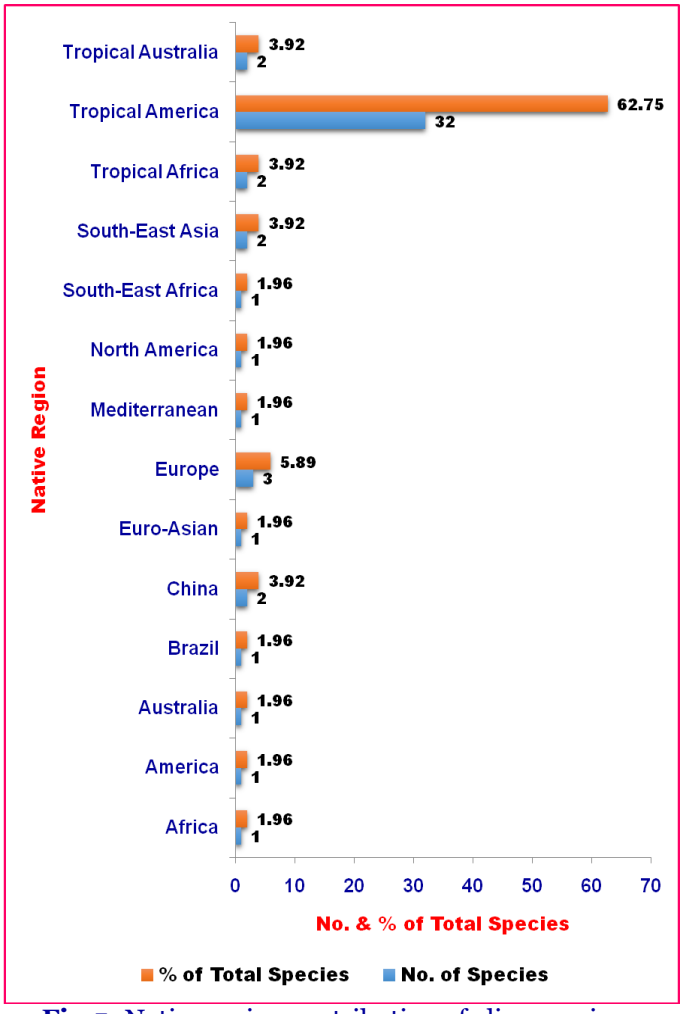

Fig.5: Native region contribution of alien species.

Conclusion

The impact of invasiveness created by these alien species should controlled by planting native species into the natural forest area.

Conflict of interest statement

Authors declare that they have no conflict of interest.

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