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Invasive Plant Species of Deviar Beat, Settur Reserve Forest, Rajapalayam Taluk, Virudhunagar District, Tamil Nadu

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Abstract— **Invasive plant species are those that are not native to the ecosystem under consideration and that cause or are likely to cause economic or environmental harm or harm to human, animal, or plant health. Plant species under domestication or cultivation and under human control are not invasive species. Many invasive species are examples of "the tragedy of the commons," or how actions that benefit one individual's use of resources may negatively impact others and result in a significant overall increase in damage to the economy, the environment, or public health. The present study is an attempt to survey of the invasive plant species of Deviar Beat, Settur Reserve forest, Rajapalayam Taluk, Virudhunagar District, Tamil Nadu, India. Deviar is a one of the beats of Settur Reserve Forest. It is situated as a part of Western Ghats (Tenkasi National highway) near Rajapalayam of Virudhunagar district of Tamil Nadu, India. The overall area cover of Deviar beat is 1200 hectare. The elevation ranges from 300M to 1400M. The Deviar beat comprises Dry Deciduous forest, Moist Deciduous forest, Riparian Forest, Evergreen Forest, and Grassland Forest. The present study deals with preparation of comprehensive list of Invasive plants of Deviar beat with background information regarding the family, habit and nativity. A total of 65 invasive alien species under 51 genera, belonging to 26 families have been recorded. Among these, the dicotyledons represented by 45 genera with 58 species following to 23 families and monocotyledons represent by six genera with seven species following to three family.**

Keywords— Invasive plants, Environment, Forest, Deviar beat, Economy, Western Ghats.

I. INTRODUCTION

An invasive species as " a species that is non-native to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health"[22]. Invasive species homogenize the world's biota [1]. For a non-native organism to be considered an invasive species in the policy context, the negative effects that the organism causes or is likely to cause are deemed to outweigh any beneficial effects. Invasive plants are so successful because they often: grow and mature rapidly, spread quickly, can flower and/or set seed over a long period of time, have few known diseases or insects to provide control, thrive in many habitats and are difficult to control [3, 16]. They have effective reproductive and dispersal mechanisms; many are capable of spreading by rhizomes and some can produce new plants from tiny root or stem fragments. Many store energy in extensive root systems and can sprout back repeatedly after cutting. Most invasive plants produce abundant fruit and seeds that are widely dispersed and remain viable in the soil for years. Many non-native introductions provide benefits to society and even among species that technically meet the definition of invasive, societal benefits may greatly exceed any negative effects. However, in some cases any positive effects are clearly overshadowed by negative effects, and this is the concept of causing harm [4]. Convention for Biological Diversity (1992) stressed that Biological invasive species was considered as a form of biological pollution and significant component on human-caused global environmental change and one of the major causes of species extinction. The opportunity of accidental introductions will may become more with rapidly increasing global commerce [2]. Hence the present study is therefore aimed to identify and survey the ivasive plants in Deviar beat.

II. MATERIALS AND METHODS

Deviar (Figure1) is a one of the beats of Settur Reserve Forest. It is situated as a part of Western Ghats (Tenkasi National highway) near Rajapalayam of Virudhunagar district of Tamil Nadu, India. The overall area cover of Deviar beat is 1200 hectare. The elevation ranges from 300M to 1400M. The Deviar beat comprises Dry Deciduous forest, Moist Decviduous forest, Riparian Forest, Evergreen Forest, and Grassland Forest. The temperature varies from 10.8º C to 34.9º C respectively with relative humidity 90%. The study area falls within the high rainfall area of Virudhunagar District of Tamil Nadu. The mean annual rainfall of Deviar beat is 1200 mm.

Fig.1. Area map of Deviar beat

Intensive exploration trips were undertaken from October 2013 to March 2014. Field trips were made twice in a week from the beginning and once in a week later in order to obtain a thorough collection of plants. Through well planned field visits, 65 invasive plants belonging to Angiosperms were collected. Special attention was provided to document the data relating to habit, habitat, association with other plants, frequency, ecological features, height of the plants, colour of the flower *etc*.,

Morphological characters of all specimens were studied critically. The identifications were made with the help of Flora of Presidency of Madras [5, 6] and Flora of Tamil Nadu Carnatic [7] and confirmed their names. Nomenclature is followed as per the Vienna code [8]. Binomial and author citation followed Gamble and Fischer [5, 6]. Nativity of the species and habits were recorded with the help of available floras and checklists [9, 10, 11, 12, 13, 14, 15, 16].

III. RESULTS

A total of 65 invasive alien species under 51 genera, belonging to 26 families have been recorded. Among these, the dicotyledons represented by 45 genera with 58 species following to 23 families and monocotyledons represent by six genera with seven species following to three family. Members of the family *Asteraceae* dominated with 8 species followed by Tiliaceae (5), Fabaceae, Euphorbiaceae, Amaranthaceae and Poaceae (4), Asclepiadaceae, Caesalpiniaceae, Solanaceae and Lamiaceae (3), Capparidaceae, Cyperaceae, Convolvulaceae, Pedaliaceae, Sterculiaceae, Mimosaceae, (2) Acanthaceae. While 9 families namely, Papaveraceae, Verbenaceae, Nyctaginaceae, Passifloraceae, Portulacaceae, Acanthaceae, Scrophulariaceae, Malvaceae, Zygophyllaceae and Arecaceae were represented by single species in Deviar beat (Table I).

Habit wise analysis shows that herbs with 46 species predominate followed by shrubs (6), under shrubs (5), twiners (2), trees (1) and climbers (1) (Fig 2).

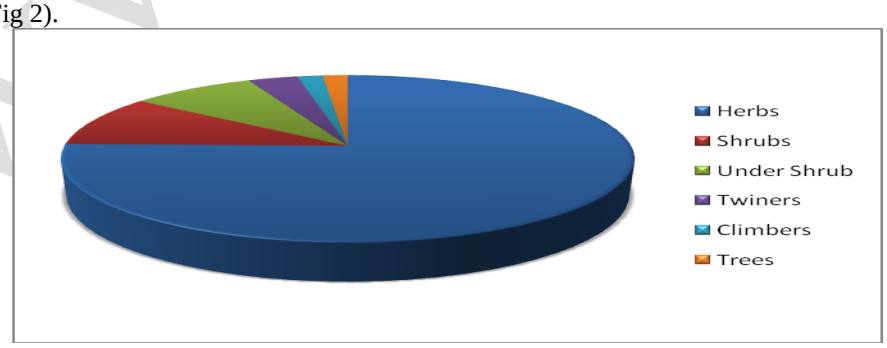

Fig.2. Habit wise Composition of invasive species recorded in study area

The present study reveals that 39 species from tropical America, nine species from tropical Africa, three species from tropical south America, two species from Brazil and one species invaded from temperate south America, south east Asia, tropical east Africa, Peru, Mexico, topical west Asia and tropical central America have invaded into our country.(Fig 3).

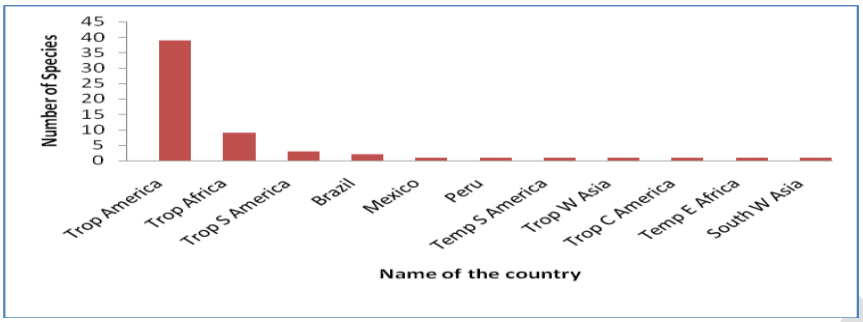

Fig.3. Nativity of invasive species inventoried from study area

TABLE I Binomial name, family, habit and nativity of invasive alien species recorded in Deviar beat, Settur Reserve Forest, Rajapalayam Taluk, Virudhunagar district, Tamil Nadu, India.

S.No	Binomial Name	Family	Habit	Nativity
1.	*Acanthospermum hispidum* DC.	Asteraceae	Herb	Brazil
2.	*Aerva javanica* (Burm. f.) Juss. ex Schult.	Amaranthaceae	Herb	Tropical America
3.	*Aeschynomene americana* L.	Papilionaceae	Herb	Tropical America
4.	*Ageratum conyzoides* L.	Asteraceae	Herb	Tropical America
5.	*Alternanthera pungens* Kunth.	Amaranthaceae	Herb	Tropical America
6.	*Argemone mexicana* L.	Papaveraceae	Herb	Tropical America
7.	*Asclepias curassavica* L.	Asclepiadaceae	Herb	Tropical America
8.	*Bidens pilosa* L.	Asteraceae	Herb	Tropical America
9.	*Blainvillea acmella* (L.) Philipson	Asteraceae	Herb	Tropical America
10.	*Blumea obliqua* (L.) Druce.	Asteraceae	Herb	Tropical America
11.	*Borassus flabellifer* L.	Arecaceae	Tree	Tropical Africa
12.	*Calotropis gigantea* L.	Asclepiadaceae	Shrub	Tropical Africa
13.	*Calotropis procera* (Ait.) R.Br.	Asclepiadaceae	Shrub	Tropical Africa
14.	*Cassia occidentalis* L.	Caesalpiniaceae	Under shrub	Tropical America
15.	*Cassia pumila* Lam.	Caesalpiniaceae	Herb	Tropical America
16.	*Cassia uniflora* Miller.	Caesalpiniaceae	Herb	Tropical America
17.	*Celosia argentea* L.	Amaranthaceae	Herb	Tropical Africa
18.	*Chloris barbata* Sw.	Poaceae	Herb	Tropical America
19.	*Chromolaena odorata* (L.) King & Robinson	Asteraceae	Herb	Tropical America
20.	*Chrozophora rottleri* (Geis.) Spreng.	Euphorbiaceae	Herb	Tropical Africa
21.	*Cleome gynandra* L.	Capparidaceae	Herb	Tropical America
22.	*Cleome viscosa* L.	Capparidaceae	Herb	Tropical America
23.	*Corchorus aestuans* L.	Tiliaceae	Herb	Tropical Africa
24.	*Corchorus fascicularis* Lam.	Tiliaceae	Herb	Tropical America
25.	*Corchorus tridens* L.	Tiliaceae	Herb	Tropical Africa
26.	*Corchorus trilocularis* L.	Tiliaceae	Herb	Tropical Africa
27.	*Croton bonplandianum* Boil.	Euphorbiaceae	Herb	Temperate South America
28.	*Cyperus difformis* L.	Cyperaceae	Herb	Tropical America
29.	*Cyperus iria* L.	Cyperaceae	Herb	Tropical America
30.	*Datura metel* L.	Solanaceae	Under shrub	Tropical America
31.	*Dinebra retroflexa* (Vahl) Panz.	Poaceae	Herb	Tropical America
32.	*Echinocloa colona* (L.) Link	Poaceae	Herb	Tropical South America
33.	*Eclipta prostrata* (L.) Mant.	Asteraceae	Herb	Tropical America
34.	*Euphorbia heterophylla* L.	Euphorbiaceae	Herb	Tropical America
35.	*Euphorbia hirta* (L.) Millsp.	Euphorbiaceae	Herb	Tropical America
36.	*Hyptis suaveolens* (L.) Poit.	Lamiaceae	Under shrub	Tropical America
37.	*Indigofera linifolia* (L.f.) Retz.	Papilionaceae	Herb	Tropical South America
38.	*Indigofera linnaei* Ali.	Papilionaceae	Herb	Tropical Africa
39.	*Indigofera trita* L.f.	Papilionaceae	Under shrub	Tropical Africa

40.	*Ipomoea obscura* (L.) Ker.-Gawl.	Convolvulaceae	Twiner	Tropical Africa
41.	*Ipomoea pes-tigridis* L.	Convolvulaceae	Twiner	Tropical East Africa
42.	*Lantana camara* L.	Verbenaceae	Shrub	Tropical America
43.	*Leonotis nepetiifolia* (L.) R. Br.	Lamiaceae	Herb	Tropical Africa
44.	*Martynia annua* (Houstoun in Martyn) L.	Pedaliaceae	Under shrub	Tropical America
45.	*Melochia corchorifolia* L.	Sterculiaceae	Herb	Tropical America
46.	*Mimosa pudica* L.	Mimosaceae	Herb	Brazil
47.	*Mirabilis jalapa* L.	Nyctaginaceae	Under shrub	Peru
48.	*Ocimum americanum* L.	Lamiaceae	Herb	Tropical America
49.	*Parthenium hysterophorus* L.	Asteraceae	Herb	Tropical North America
50.	*Passiflora foetida* L.	Passifloraceae	Climber	Tropical South America
51.	*Pedalium murex* L.	Pedaliaceae	Herb	Tropical America
52.	*Peristrophe paniculata* (Forskk.) Brummitt	Acanthaceae	Herb	Tropical America
53.	*Portulaca oleracea* L.	Portulacaceae	Herb	Tropical Central America
54.	*Prosopis juliflora* (Sw.) DC.	Mimosaceae	Tree	Mexico
55.	*Ruellia tuberosa* L.	Acanthaceae	Herb	Tropical America
56.	*Saccharum spontaneum* L.	Poaceae	Shrub	Tropical West Asia
57.	*Scoparia dulcis* L.	Scrophulariaceae	Herb	Tropical America
58.	*Sida acuta* Burm. f.	Malvaceae	Herb	Tropical America
59.	*Solanum americanum* Miller.	Solanaceae	Herb	Tropical America
60.	*Solanum torvum* Sw.	Solanaceae	Shrub	West Indies
61.	*Spermacoce hispida* L.	Rubiaceae	Herb	Tropical America
62.	*Tribulus terrestris* L.	Zygophyllaceae	Herb	Tropical America
63.	*Tridax procumbens* L.	Asteraceae	Herb	Tropical America
64.	*Triumfetta rhomboidea* Jacq.	Tiliaceae	Herb	Tropical America
65.	*Waltheria indica* L.	Sterculiaceae	Herb	Tropical America

IV. Discussion

The present study reveals that the highest number of invasive species is recorded in *Asteraceae*. The predominance of *Asteraceae* species in invasive category shows high impact of neotropical on the regions of our country[3]. With large number of seeds and parachute mechanisms the members of *Asteraceae* easily established their life on wide range of climatic conditions [17]. *Parthenium hysterophorus* came to India through cereal import along with wheat during 1950s'. Likewise, *Ageratum conyzoides* introduced as an ornamental during nineteenth century. *Lantana camara* was introduced as an ornamental in India during 1809 - 1810. At present these species found extensively from the Himalayas to Capecomorin (the southern tip of India) as a weed and invasive [18].

In general, introduced species affects the agriculture in many ways. They reduce the crop yield [19]; the land value; the quality of crop produce, and human efficiency [20]. According to Stevens [21] 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 [16]. The invasive alien species are ready colonizers in disturbed areas and cause considerable ecological damage to 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 [3]. The present study reveals that these invasive species become a menace and in turn make endanger our native ecosystems.

V. Conclusion

To conclude, a total of 65 invasive plants were identified in Deviar beat. These invasive plants become predominant in our region and they will eliminate the natural vegetation soon. So the awareness with these invasive alien plants should be needed to develop and protect our native vegetation.

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