



Plant Archives

Journal homepage: <http://www.plantarchives.org>

DOI Url : <https://doi.org/10.51470/PLANTARCHIVES.2024.v24.no.1.092>

INVASIVE ALIEN PLANTS OF ACHARYA JAGDISH CHANDRA BOSE INDIAN BOTANIC GARDEN, HOWRAH, WEST BENGAL, INDIA

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(Date of Receiving-11-12-2023; Date of Acceptance-15-02-2024)

ABSTRACT

A study was undertaken at Acharya Jagdish Chandra Bose Indian Botanic Garden, Howrah to document the invasive alien species that were introduced in the Garden. The study was performed by regular survey of different divisions at different growth stages followed by consulting updated Floras which resulted in enlisting 49 species under 43 genera belonging to 32 families. It was observed that out of 49 species, majority of them are native to tropical America and herbs (63.3%) are the dominant elements followed by shrubs, trees and climbers. The invasive alien species of AJCBIBG majorly belong to three families Asteraceae, Capparaceae and Mimosaceae.

Key words : Invasive alien plants, Botanical Garden.

Introduction

Invasive alien species spread either accidentally or intentionally throughout the world and Acharya Jagdish Chandra Bose Indian Botanic Garden, Howrah, West Bengal, spread in an area of 273 acre is not an exception. The AJCBIBG is one among the oldest and best landscaped garden of the world, established in the year 1787 by Col. Robert Kyd. It shares a rich history of plant introduction since its establishment. Most of the exotic species in India were introduced through this Garden and these species are now being cultivated as commercial and plantation crops in the country, some are coffee, cardamom, pepper, nutmeg, cotton, tobacco, indigo, sago and teak. Apart from the above mentioned some species that are now considered as noxious weeds, such as *Pontederia crassipes* Mart., *Lantana camara* L., *Parthenium hysterophorus* L. etc. were also introduced through this Garden mainly for their ornamental flower, which are now menace to the ecological system. *Lantana camara* has been rated as one of the worst invasive species identified by the Global Invasive Species

Database and is enlisted in ten top 100 invasive species of the world (GISD, 2010). Sharma and Raghubanshi (2009) reported that the fast invasion of *Lantana camara* in the dry deciduous forest, is changing the forest structure and *Parthenium hysterophorus* L., an obnoxious invasive weed from tropical America had entered India accidentally in 1810 (Paul, 2010). The main reason for vast spread of this invasive alien species across the nation is its fast growth rate, adaptability to diverse environmental conditions, high reproduction, early maturity and efficient seed dispersal mechanism, which make its survival rate better in extreme and unfavourable conditions. These species compete for nutritional requirement with other plant because of which in a certain span of time it abandons or eliminates native species and covers the whole area by its population growth. Biological invasions have been recognized as one of the most serious global processes impacting the structure, composition and function of natural and semi-natural ecosystems (Rastogi *et al.*, 2015). As AJCBIBG is a place for both *ex-situ* as well as *in-situ* conservation of plants of endemic and

threatened categories, it is imperative to carry out an exercise to find and manage the invasive alien species. In this direction a study was carried out in documenting the invasive alien species of AJCBIBG.

Materials and Methods

Regular field surveys in various divisions of AJCBIBG were undertaken at different stages of the growth of plants to collect, correctly identify and document

the invasive alien species of the Garden. The plants were collected at their flowering stage and their association with other plants, ecological parameters and other characters were also recorded. The plants were identified by consulting the Floras, monographs and websites and a list of invasive alien species was prepared of about 49 species with accepted name, family name, habit and its nativity. The data obtained were further analyzed and discussed.

Table 1 : Invasive alien plant species of AJCBIBG.

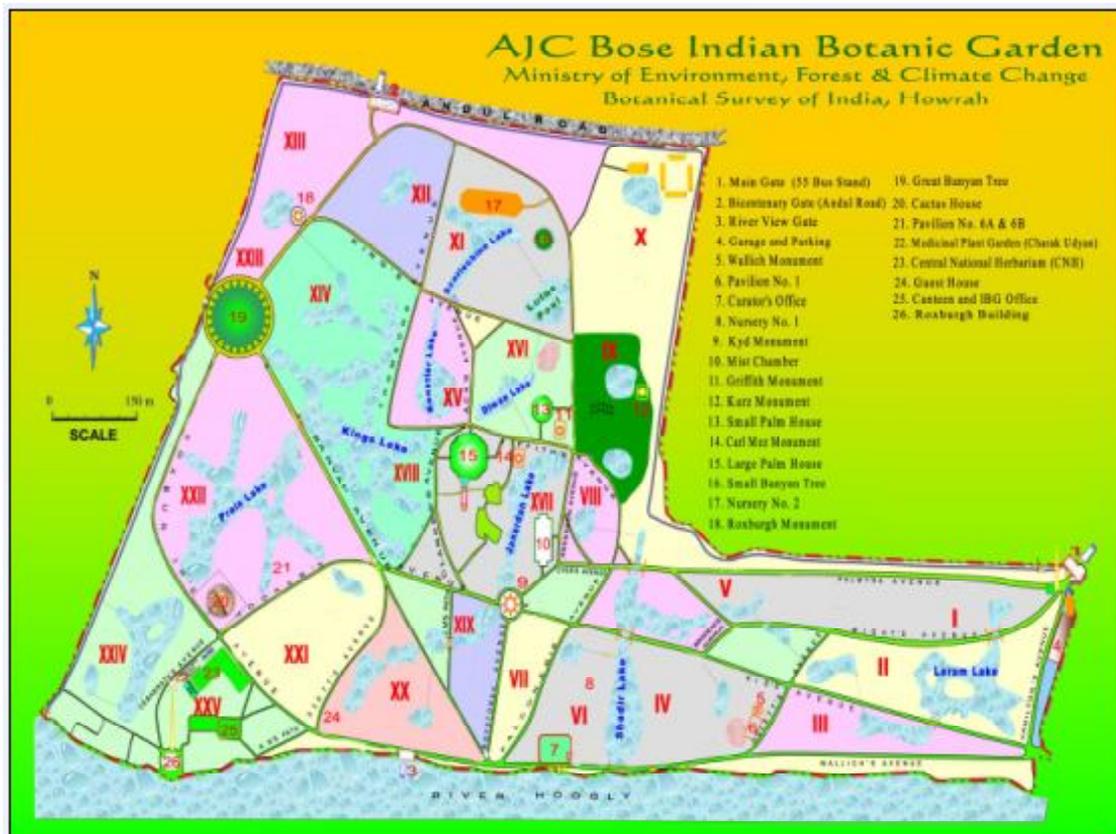
S. no.	Species	Family	Habit	Nativity
1.	<i>Vachellia farnesiana</i> (L.) Wight & Arn. [= <i>Acacia farnesiana</i> (L.) Willd.]	Fabaceae	Tree	TAM
2.	<i>Antigonon leptopus</i> Hook. & Arn.	Polygonaceae	Shrub	TAM
3.	<i>Achyranthes aspera</i> L.	Amaranthaceae	Shrub	AS
4.	<i>Aeschynomene aspera</i> L.	Fabaceae	Herb	NAM
5.	<i>Ageratum conyzoides</i> L.	Asteraceae	Shrub	TAM
6.	<i>Alternanthera sessilis</i> (L.) DC.	Amaranthaceae	Shrub	TAM
7.	<i>Borassus flabellifer</i> L.	Arecaceae	Tree	TAM
8.	<i>Calotropis gigantea</i> (L.) W.T.Aiton	Apocynaceae	Shrub	TAM
9.	<i>Calotropis procera</i> (Aiton) W.T.Aiton	Apocynaceae	Shrub	TAM
10.	<i>Cardiospermum halicacabum</i> L.	Sapindaceae	Climber	TAM
11.	<i>Ceratophyllum demersum</i> L.	Ceratophyllaceae	Herb	EU
12.	<i>Cleome gynandra</i> L.	Capparaceae	Herb	TAM
13.	<i>Cleome monophylla</i> L.	Capparidacea	Herb	TAM
14.	<i>Cleome rutidosperma</i> DC.	Capparaceae	Herb	TAM
15.	<i>Cleome viscosa</i> L.	Capparaceae	Herb	TAM
16.	<i>Crotalaria retusa</i> L.	Fabaceae	Herb	TAM
17.	<i>Cryptostegia grandiflora</i> Roxb. ex R.Br.	Asclepiadaceae	Herb	MG
18.	<i>Cuscuta reflexa</i> Roxb.	Cuscutaceae	Herb	MR
19.	<i>Datura metel</i> L.	Solanaceae	Shrub	TAM
20.	<i>Pontederia crassipes</i> Mart. (= <i>Eichhornia crassipes</i> (Mart.) Solms.)	Pontederiaceae	Herb	TAM
21.	<i>Gomphrena serrata</i> L.	Amaranthaceae	Herb	TAM
22.	<i>Ipomoea carnea</i> Jacq.	Convolvulaceae	Shrub	TAF
23.	<i>Ipomoea quamoclit</i> L.	Convolvulaceae	Herb	TAM
24.	<i>Lantana camara</i> L.	Verbenaceae	Herb	TAM
25.	<i>Leucaena leucocephala</i> (Lam.) de Wit	Mimosaceae	Shrub	TAM
26.	<i>Ludwigia adscendens</i> (L.) H.Hara	Onagraceae	Herb	TAM
27.	<i>Mimosa pudica</i> L.	Mimosaceae	Herb	TAM
28.	<i>Mirabilis jalapa</i> L.	Nyctaginaceae	Herb	TAM
29.	<i>Muntingia calabura</i> L.	Tiliaceae	Tree	TAM
30.	<i>Neltuma juliflora</i> (Sw.) Raf. [= <i>Prosopis juliflora</i> (Sw.) DC.]	Mimosaceae	Tree	TAM
31.	<i>Opuntia elatior</i> Mill.	Cactaceae	Shrub	TAM

Table 1 continued...

Table 1 continued...

32.	<i>Oxalis corniculata</i> L.	Oxalidaceae	Herb	EU
33.	<i>Parthenium hysterophorus</i> L.	Asteraceae	Herb	TAM
34.	<i>Pistia stratiotes</i> L.	Araceae	Herb	TAM
35.	<i>Pithecellobium dulce</i> (Roxb.) Benth.	Mimosaceae	Tree	TAM
36.	<i>Physalis angulata</i> L. (\ [= <i>Physalis minima</i> L.]	Solanaceae	Herb	TAM
37.	<i>Ricinus communis</i> L.	Euphorbiaceae	Shrub	TAF
38.	<i>Ruellia tuberosa</i> L.	Acanthaceae	Herb	TAM
39.	<i>Saccharum spontaneum</i> L.	Poaceae	Herb	ML
40.	<i>Salvinia molesta</i> Mitch.	Salviniaceae	Herb	TAM
41.	<i>Scoparia dulcis</i> L.	Scrophulariaceae	Herb	TAM
42.	<i>Senna alata</i> (L.) Roxb.	Caesalpiniaceae	Tree	TAM
43.	<i>Sida acuta</i> Burm.f.	Malvaceae	Herb	TAM
44.	<i>Sonchus oleraceus</i> L.	Asteraceae	Herb	MR
45.	<i>Stachytarpheta jamaicensis</i> (L.) Vahl	Verbenaceae	Herb	TAM
46.	<i>Trapa natans</i> L.	Trapaceae	Herb	EU
47.	<i>Tridax procumbens</i> L.	Asteraceae	Herb	TAM
48.	<i>Turnera ulmifolia</i> L.	Turneraceae	Herb	TAM
49.	<i>Typha domingensis</i> Pers. [= <i>Typha angustata</i> Bory&Chaub.]	Typhaceae	Herb	TAM

Abbreviations: Habits: H- Herb, S-Shrub, C-Climber, T-Tree, AS- Asia, EU-Europe, NAM- North America, ML- Malaysia, TAM- Tropical America, TAF-Tropical Africa, MR-Mediterranean, MG-Madagascar.



Map 1 : Study Area

Results and Discussion

The present study documented 49 invasive alien species, belonging to 43 genera and 32 families from AJCBIBG. Out of the total plant listed it was found that 63.30% of the invasive alien species are herbs, 22.45% of the species are shrubs, 12.24% of the species are trees and only 2.04% are climbers. Furthermore, it was found that 77.54% of the invasive alien species are native

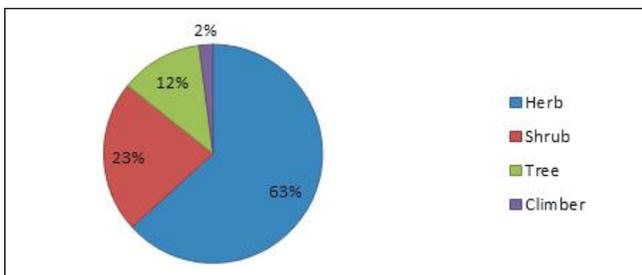
to tropical America, 6.12% of the species are native to Europe, 6.12% of the species are native to tropical Africa, 4.08% of species are native to Mediterranean region, 2.04% of species belong to Asia, 2.04% of species belong to Madagascar and 2.04% of species belong to Malaysia. The invasive alien species majorly belong to three angiospermic families, Asteraceae, Capparaceae and Mimosaceae.



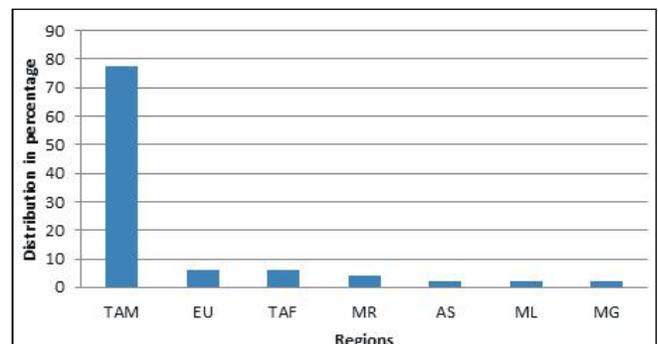
Fig. 1 : a. *Antigonon leptopus* b. *Achyranthes aspera* c. *Alternanthera sessilis* d. *Borassus flabellifer* e. *Calotropis procera* f. *Cardiospermum halicacabum* g. *Cleome gynandra* h. *Cleome rutidosperma* i. *Cleome viscosa* j. *Cuscuta reflexa* k. *Pontederia crassipes* l. *Ipomoea carnea*.



Fig. 2 : a. *Lantana camara* b. *Leucaena leucocephala* c. *Ludwigia adscendens* d. *Mimosa pudica* e. *Mirabilis jalapa* f. *Muntingia calabura* g. *Neltuma juliflora* h. *Oxalis corniculata* i. *Pistia stratiotes* j. *Ricinus communis* k. *Ruellia tuberosa* l. *Saccharum spontaneum*.



Graph 1 : Diversity of habits of Invasive Alien species in AJCBIBG



Graph 2 : Nativity in (%) of Invasive Alien species in AJCBIBG

Conclusion

The study on invasive alien species of AJCBIBG revealed that most of the species are native to tropical American region. The three major families of invasive alien species are Asteraceae, Capparaceae and Mimosaceae. Herbs are the dominant form followed by shrubs, trees and climbers. The present study further confirms that mostly the invasive species are herbaceous and predominantly of tropical American origin. The invasive alien species exhibit vigorous growth and multiplied very fast dominating and affecting the other native plants in the garden. So, proper and timely management of the growth and development of the invasive and alien species is the need of the hour.

Acknowledgements

The authors are thankful to the Director, Botanical Survey of India, Kolkata for encouragement, support and providing infrastructural facilities. Thanks are also due

to the Scientist-E and H.o.O, AJC Bose Indian Botanic Garden, Botanical Survey of India, Howrah-711103.

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