SJIF Impact Factor (2025): 8.688| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 10 | Issue: 6 | June 2025 - Peer Reviewed Journal

EXPLORATION OF INVASIVE ALIEN PLANT SPECIES IN SATPUDA FOREST OF BULDHANA DISTRICT, MAHARASHTRA (INDIA)

Mukinda B. Sapkal[1*], Dr. Dhananjay S. Talwankar[2]

[1] *Research Scholar, Department of Botany, G.S. Science, Arts and Commerce College, Khamgaon District Buldana-444303 (M.S), India.*

[2] *Principal, G.S. Science, Arts and Commerce College, Khamgaon District Buldana-444303 (M.S), India.*

**Corresponding Author*

ABSTRACT

The Invasive alien species are plants, animals, pathogen and other organism that are immigrant and non-native to an ecosystem which may cause harmful effects on biodiversity, economic and human health viz. Parthenium hysterophorus, Prosopisjuliflora etc. Alien invasive species supplant native ecosystem directly or indirectly by their activity in many ways like native species reducing reproductivity, changing chemical profile and soil texture as well as compete for water and sunlight. The current study explored and enlisted of invasive Alien species of Satpuda forest of Buldhana District, Maharashtra (India). A total of 84 invasive alien species under 60 genera, belonging to 31 families have been documented. The current research aim to gather information about invasive alien species in satpuda forest of Buldhana district.

KEYWORDS: *Invasive Alien Species, Ecosystem, Satpuda, Parthenium Hysterophorus, Prosopis Juliflora.*

INTRODUCTION

The human activity Invasive angiosperms are species that are introduced to new geographic areas. These plants were multiplied and spread tremendously as compare to native flora(Singh & Rehman, 2022).After habitat destruction of the biodiversity the invasion species has been recognizing as the second worst threat(Patil Geeta et al., 2020). Alien invasive species are non-native or exotic species which are introduced either on purpose or accidentally. These species to be introduced in many countries through import and export for the purpose of ornamentation as well as grains. In the early 19th century in India Lantana camara was introduced as an ornamental plant and in 1956 Parthenium grass was introduced through wheat imports from America. Now a day, various invasive plants like Lantana camara have occupied almost every continent of the globe(Chavre & Patil, 2023).Due to the globalization, rise in international trade, travel and tourism the spread of alien species are increase remarkably. As a participant in global agreements and economic exchanges the India is vulnerable to the unintentional introduction of these non-native species. This growing risk the urgent need for a effective management strategy to control the impact of invasive species across the country.(Patil DA, 2017)

The invasive alien species have adversely and negative effect on the native species and even entire ecosystem to the extent that it includes the extinction of species (A. Gole, 2016)The biological invasion may be considered as a form of biological pollution and the significant component of anthropogenic changes leading to extinction of domestic species (Vijay & Ashok, 2015)Our Indian agricultural and forestry systems depends on a variety of foreign species(Mishra et al., 2024)Introduced or spreading of Invasive alien's species outside their natural habitats have affected natural biodiversity in almost every ecosystem type on earth and are one of the greatest warning to biodiversity. Beginning in the 17th century, these alien species have considered near about 40% of the mix with indigenous flora.The issue continues to increase at great socio-economic health as well as ecological cost around the world. Invasive alien species exacerbate poverty and hinder development through their effect on agriculture, forestry, fisheries and natural ecosystems which are important vital to the livelihoods of people in developing countries (Rothe & Dhale, 2016)

METHODOLOGY

Study Area

The present study has been carried out in Satpuda forest and nearby area in Buldhana district of Maharashtra.

Material and Methods

The survey carried out during the July- January 2022-23 frequent field trips were arranged in order to collect information about invasive alien plant species located in Satpuda forest. The data was collected using the interview and discussion with local tribes, who know invasive alien species and some aware about their impact on economic as well as health related issue. The discussion were taken with local peoples in different villages in satpuda forest.

Collection and Identification

During the field visits, Invasive alien plant species were collected and shade dried. The collected Specimen identified from the available floras and literature at Department of Botany, G. S. Science, Arts and Commerce College, Khamgaon Dist. Buldhana (M.S.). The invasive alien plant species listed alphabetically with the Scientific Name, family, Native, life form, habit, habitat and Introduction Mode etc. (table-1)

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Table-1 : Invasive alien plant species from satpuda forest and nearby area

SN	Scientific Name	Family	Native	Life Form	Habit	Habitat	Introduction Mode
1	*Acanthospermum hispidum* DC.	Asteraceae	Brazil	Herb	Annual	Wastelands	Unintentional
2	*Ageratum conyzoides* L.	Asteraceae	Tropical America	Herb	Annual	Wastelands	Unintentional
3	*Alternanthera paronychioides* St. Hill.	Amaranthaceae	Tropical America	Herb	Perennial	River basin	Unintentional
4	*Alternanthera sessilis* (L.) DC.	Amaranthaceae	Tropical America	Herb	Perennial	River basin	Unintentional
5	*Alternanthera tenella* Colla	Amaranthaceae	Tropical America	Herb	Annual	Wastelands	Unintentional
6	*Amaranthus spinosus* L.	Amaranthaceae	Tropical America	Herb	Annual	Cultivated fields	Unintentional
7	*Anagallis arvensis* L.	Primulaceae	Europe	Herb	Annual	Cultivated fields	Unintentional
8	*Antigonon leptopus* Hook.&Arn.	Polygonaceae	Tropical America	Climber	Perennial	Road side	Ornamental
9	*Argemone Mexicana* L.	Papaveraceae	SouthAmerica	Herb	Annual	Wastelands	Unintentional
10	*Bidens ternatea* (Lour.) Merr.& Scheriff.	Asteraceae	Tropical America	Herb	Annual	Cultivated fields	Unintentional
11	*Blainvillea acmella* (L.*f*.) Philipson	Asteraceae	Tropical America	Herb	Annual	Wastelands	Unintentional
12	*Blumea eriantha* DC.	Asteraceae	Tropical America	Herb	Perennial	Wastelands	Unintentional
13	*Blumea lacera* (Burm.*f*.) DC.	Asteraceae	Tropical America	Herb	Annual	Wastelands	Unintentional
14	*Calotropisgigantea*(L.)R. Br.	Asclepiadaceae	TropicalAfrica	Shrub	Perennial	Wastelands	Unintentional
15	*Calotropis procera* (Ait.) R.Br.	Asclepiadaceae	TropicalAfrica	Shrub	Perennial	Wastelands	Unintentional
16	*Cassia occidentalis* L.	Caesalpiniaceae	SouthAmerica	Herb	Perennial	Wastelands	Unintentional
17	*Cassia pumila* Lam.	Caesalpiniaceae	Tropical America	Herb	Annual	Wastelands	Unintentional
18	*Cassia tora* L.	Caesalpiniaceae	SouthAmerica	Herb	Annual	Wastelands	Unintentional
19	*Cassia uniflora* Mill.	Caesalpiniaceae	South America	Herb	Annual	Wastelands	Unintentional
20	*Celosia argentea* L.	Amaranthaceae	TropicalAfrica	Herb	Annual	Cultivated fields	Food
21	*Ceratophyllum demersum* L.	Ceratophyllaceae	Tropical America	Herb	Annual	Aquatic	Unintentional
22	*Chrozophora rottleri* (Geis.) Juss. Ex Spreng.	Euphorbiaceae	TropicalAfrica	Herb	Annual	Wastelands , Cultivated fields	Unintentional
23	*Cleome gynandra* L.	Capparaceae	Tropical America	Herb	Annual	Wastelands	Unintentional
24	*Cleome viscose* L.	Capparaceae	Tropical America	Herb	Annual	Wastelands, Cultivated fields	Unintentional
25	*Corchorus aestuans* L.	Tiliaceae	Tropical America	Herb	Annual	Forests , Wastelands	Unintentional
26	*Corchorus olitorius* L.	Tiliaceae	TropicalAfrica	Herb	Annual	Cultivated fields	Unintentional

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27	*Corchorus tridens* L.	Tiliaceae	TropicalAfrica	Herb	Annual	Wastelands	Unintentional
28	*Corchorus trilocularis* L.	Tiliaceae	TropicalAfrica	Herb	Annual	Wastelands	Unintentional
29	*Cuscuta chinensis* Lam.	Cusutaceae	Mediterranean	Herb	Perennial	Parasites	Unintentional
30	*Cyperus difformis* L.	Cyperaceae	Tropical America	Sedges	Annual	Cultivated fields	Unintentional
31	*Cyperus iria* L.	Cyperaceae	Tropical America	Sedges	Annual	Cultivated fields	Unintentional
32	*Datura innoxia* Mill.	Solanaceae	Tropical America	Shrub	Perennial	Wastelands	Unintentional
33	*Datura metel* L.	Solanaceae	Tropical America	Shrub	Perennial	Wastelands	Unintentional
34	*Digera muricata* (L.) Mart.	Amaranthaceae	South West Asia	Herb	Annual	Cultivated fields	Unintentional
35	*Dinebra retroflexa* (Vahl) Panz.	Poaceae	Tropical America	Grass	Perennial	Wastelands , Cultivated fields	Unintentional
36	*Echinochloa colona* (L.) Link	Poaceae	South America	Grass	Annual	River basin	Unintentional
37	*Echinops echinatus* Roxb.	Asteraceae	Afghanistan	Herb	Annual	Wastelands , Cultivated fields	Unintentional
38	*Eclipta prostrate* (L.) Mant.	Asteraceae	Tropical America	Herb	Annual	Road side	Unintentional
39	*Eichhornia crassipes* (C.Martius) Solms.	Pontederiaceae	Tropical America	Herb	Perennial	Aquatic	Unintentional
40	*Euphorbia cyathophora* Murray	Euphorbiaceae	Tropical America	Herb	Annual	Wastelands	Unintentional
41	*Euphorbia hirta* L.	Euphorbiaceae	Tropical America	Herb	Annual	Wastelands	Unintentional
42	*Euphorbia indica* Lamk.	Euphorbiacee	Tropical America	Herb	Annual	Wastelands	Unintentional
43	*Glossocardia bosvallea* (L.*f.*) DC.	Asteraceae	EastIndies	Herb	Annual	Wastelands	Unintentional
44	*Hyptis suaveolens* (L.) Poit.	Lamiaceae	Tropical America	Herb	Annual	Road side	Unintentional
45	*Impatiens balsamina* L.	Balsaminaceae	Tropical America	Herb	Annual	River basin	Ornamental
46	*Indigofera hirsute* L.	Fabaceae	Tropical America	Herb	Annual	Wastelands	Unintentional
47	*Indigofer alinifolia* (L.*f.*) Retz.	Fabaceae	South America	Herb	Annual	Road side	Unintentional
48	*Indigo feralinnaei* Ali	Fabaceae	TropicalAfrica	Herb	Annual	Forests	Unintentional
49	*Indigo feratrita* L.*f.*	Fabaceae	Tropical Africa	Shrub	Perennial	Forests	Unintentional
50	*Ipomoea carnea* Jacq. subsp.*fistulosa* (Mart.exChoisy) Austin	Convolvulaceae	Tropical America	Shrub	Perennial	Wastelands	Unintentional
51	*Ipomoea hederifolia* L.	Convolvulaceae	Tropical America	Herb	Annual	Forests	Unintentional
52	*Ipomoea obscura* (L.) Ker.-Gawl.	Convolvulaceae	Tropical Africa	Herb	Perennial	Wastelands	Unintentional
53	*Ipomoea pes-tigridis* L.	Convolvulaceae	Tropical East Africa	Herb	Annual	Wastelands	Unintentional
54	*Ipomoea quamoclit* L.	Convolvulaceae	Tropical America	Herb	Perennial	Wastelands	Ornamental
55	*Lagascea mollis* Cav.	Asteraceae	Central America	Herb	Annual	Cultivated fields	Unintentional
56	*Lantana camara* L.	Verbenaceae	Tropical America	Herb	Perennial	Forests	Ornamental
57	*Leonotis nepetiifolia* (L.)R.Br.	Lamiaceae	Tropical Africa	Herb	Annual	Wastelands	Unintentional

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58	*Leucaena latisiliqua* (L.)Gilli.	Mimosaceae	Tropical America	Tree	Perennial	Wastelands	Fodder
59	*Malvastrum coromandelianum* (L)	Malvaceae	Tropical America	Herb	Perennial	Wastelands	Unintentional
60	*Martynia annua* L.	Pedaliaceae	Tropical America	Herb	Perennial	Wastelands	Unintentional
61	*Merremia aegyptia* (L.) Urb.	Convolvulaceae	Tropical America	Climber	Perennial	Wastelands	Unintentional
62	*Mimosa pudica* L.	Mimosaceae	Brazil	Herb	Perennial	Wastelands	Ornamental
63	*Mirabilis jalapa* L.	Nyctaginaceae	Peru	Herb	Annual	Wastelands	Ornamental
64	*Ocimum americanum* L.	Lamiaceae	Tropical America	Herb	Annual	Wastelands	Unintentional
65	*Opuntia stricta* Haw.var.*dillenii* (Ker.-Gawl.) Benson	Cactaceae	Tropical America	Shrub	Perennial	Wastelands	Unintentional
66	*Oxalis corniculata* L.	Oxalidaceae	Europe	Herb	Perennial	Cultivated fields	Unintentional
67	*Parthenium hysterophorus* L.	Asteraceae	North America	Herb	Annual	Wastelands	Unintentional
68	*Pennisetum purpureum* Schum.	Poaceae	Tropical America	Grass	Annual	Forests	Fodder
69	*Peristrophe paniculata* (Forssk.) Brummit	Acanthaceae	Tropical America	Herb	Annual	Wastelands	Unintentional
70	*Physalis angulata* L.	Solanaceae	Tropical America	Herb	Annual	Wastelands	Unintentional
71	*Physalis minima* L.	Solanaceae	Tropical America	Herb	Annual	Wastelands	Unintentional
72	*Portulaca oleracea* L.	Portulacaceae	South America	Herb	Annual	Wastelands	Unintentional
73	*Portulaca quadrifida* L.	Portulacaceae	Tropical America	Herb	Annual	Wastelands	Unintentional
74	*Prosopis juliflora* (Sw.) DC.	Mimosaceae	Mexico	Shrub	Perennial	Wastelands	Agroforestry
75	*Saccharum spontaneum* L.	Poaceae	Tropical West Asia	Grass	Perennial	River basin	Unintentional
76	*Sesbania bispinosa* (Jacq.) W.F. Wight	Fabaceae	Tropical America	Shrub	Annual	River basin	Unintentional
77	*Sida acuta* Burm. *f.*	Malvaceae	Tropical America	Herb	Annual	Wastelands	Unintentional
78	*Solanum nigrum* L.	Solanaceae	Tropical America	Herb	Annual	Cultivated fields	Unintentional
79	*Sonchus oleraceus* L.	Asteraceae	Mediterranean	Herb	Annual	River basin	Unintentional
80	*Tribulus terrestris* L.	Zygophyllaceae	Tropical America	Herb	Perennial	Wastelands	Unintentional
81	*Tridax procumbens* L.	Asteraceae	Central America	Herb	Perennial	Cultivated fields	Unintentional
82	*Triumfetta rhomboidea* Jacq.	Tiliaceae	Tropical America	Herb	Annual	Wastelands	Unintentional
83	*Typha angustifolia* L.	Typhaceae	Tropical America	Herb	Perennial	River basin	Unintentional
84	*Xanthium indicum* Koenig	Asteraceae	Tropical America	Shrub	Annual	Road side	Unintentional

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RESULTS AND DISCUSSION

The present research focus on invasive alien plant species in Satpuda forest and nearby area in Buldhana district of Maharashtra. The total 84 plant species identified and among these 54 genera and 77 species of 28 families belonging to dicotyledons as well as 06 genera and 07 species of 03 families represented as monocotyledons (Figure 1).

The survey represented invasive alien plant species in the table with significant patterns in plant biodiversity, invasion species and ecological characteristics. The data shows a strong dominance of 50 species (59.52 %) originating from Tropical America and 11 species (13.09 %) of Tropical Africa, these regions indicate as major sources of biological introductions to the research area(Figure 2). The Asteraceae family as the most represented with 14 species (16.66 %), followed by the family of Amaranthaceae and Convolvulaceae with 6 species each (7.1%), reflecting their invasive potential and successful adaptation in the local ecosystem.

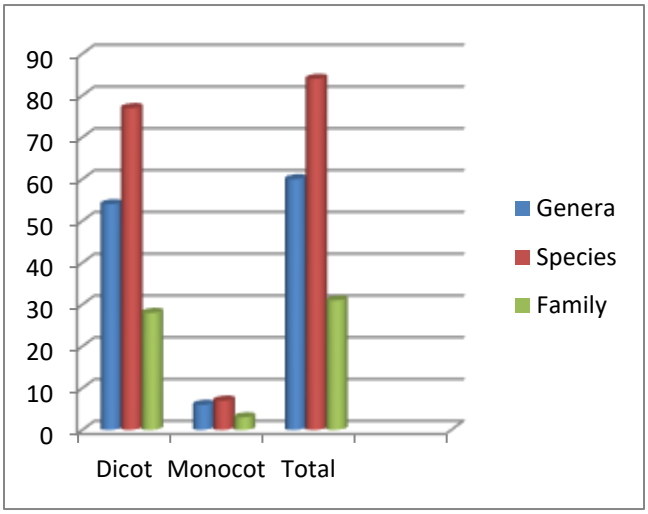


Figure 1. Status of genera, species and family of Invasive Alien plant species in Satpuda forest.Species.

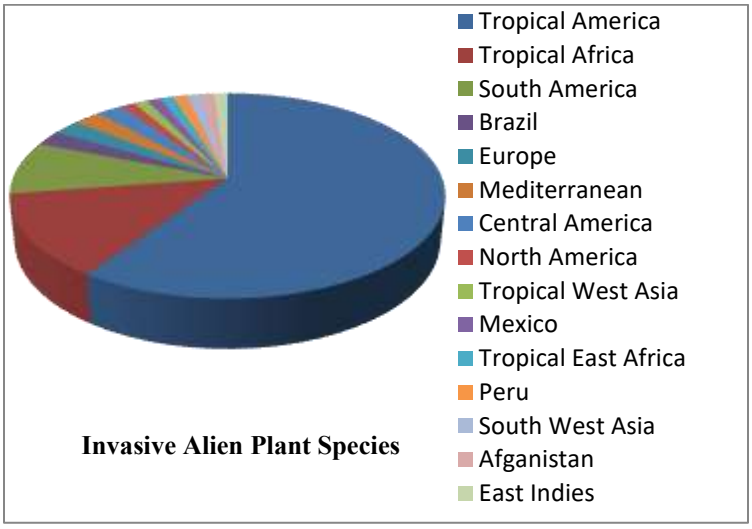


Figure 2. Status of Nativeof Invasive Alien Plant

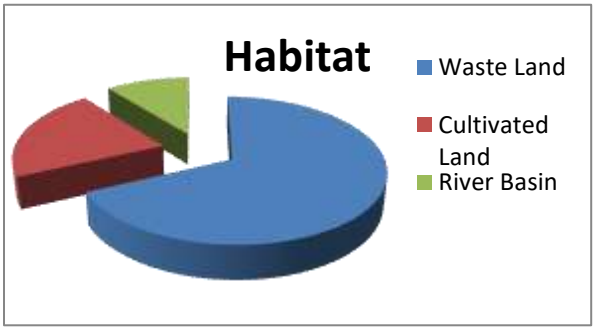


Figure 3. Status ofDominant Habitat of Invasive Alien Plant Species.Of Invasive Alien Species.

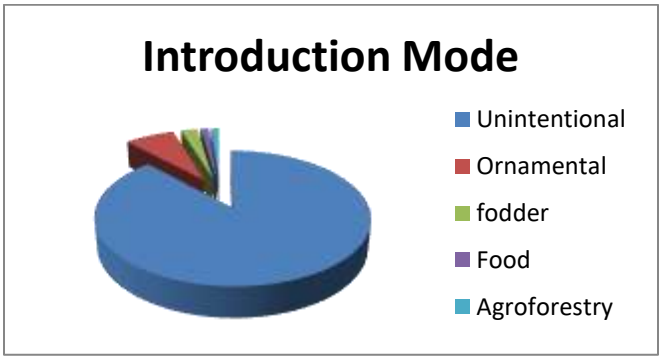


Figure 4. Status of Dominant Introduction Mode

Life form analysis illustrate that herbaceous plants (H) dominate the species composition about 65 species (77.38 %), with annuals (A) slightly more number than perennials (P) among the herbaceous growth forms. The habitat distribution shows that wastelands (W) hold-up the highest number of species 51, followed by cultivated fields (CF) 16 species and river basin (RB) 8 species, these human-impacted areas are identified as highly vulnerable to invasive plant species (Figure 3).

The introduction mode data disclose that unintentional introduction (Ui) accounts for the majority of cases 74 species (88.09 %), however, intentional introductions for ornamental (O) 6 species, food (Fd) 1 species, fodder (Fo) 2 species, and Agroforestry (Af) 1

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species (Figure 4). The purposes of the demonstrate how human activities have deliberately shaped the local flora. The species like Lantana camara and Prosopisjuliflora are known globally for their invasive characteristics, which have established successfully in the study area through the purpose of ornamental and a forestation programs. The high proportion of Tropical American species propose particular climatic compatibility with the study region, while the prevalence of herbaceous annuals indicates local ecosystems prone to disturbance.

The population of species in wastelands points to these areas as invasion hotspots requiring prioritized management. These patterns have important effects on native biodiversity conservation, as many of these introduced species may compete with indigenous local flora for resources. Many invasive alien plant species are adverse effects on wild vegetable and medicinal plants which is use as traditionally. So, it is important to awareness at different levels like tribal and local peoples which are living in rural and urban area through government,non-government bodies as well as by inviting Botanist, Environmentalist and Agriculturist.

Acknoledgements
The authors thankful to G.S. Science, Arts & Commerce College, Khamgaon for providing facilities.

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