JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

INVASIVE PLANTS OF INDORE DISTRICT, MP AND THEIR IMPACT ON INDIGENOUS FLORA.

Dr Sudip Ray
Department of Botany
PMB Gujarati Science College, Indore, Madhya Pradesh, India

Abstract: Present paper deals with the 87 invasive plant species of angiosperms that have been recorded from Indore district, Madhya Pradesh. These 87 plant species have been distributed in 74 genera and 30 families. Invading plants were mostly introduced and have since become naturalized in the study area. They are dominating local indigenous flora causing harmful effects on native flora. L Noteworthy species such as *Ageratum conyzoides*L.,*Stachytarpeta jamaicensis*,(L.)Vahl.*Lantana camara*L.,*Senna uniflora*,(Mill.)H.S .Irwin *Alternanthera bettzickiana*(Regel)G.Nichlson,*Emelia sonchifolia*(L.)DC ex Wight, *Gliricidia sepium*(Jacq.)Steud., *Pistia stratiotes*L. , *Parthenium hysterophorus*L., *Erigeron bonariensis*L., *Pontederia crassipes* Mart. pose significant threats to the indigenous plants. Immediate action is necessary to effectively manage these invasive and mitigate the detrimental consequences, ensuring the preservation of local ecosystem diversity and stability.

Key Words: Indore. Malwa plateau, Vindhyas, Manpur

1. INTRODUCTION:

Invasive plants, also known as non-native or alien species, have become a global concern due to their ability to rapidly colonize and dominate ecosystems outside their native range. These plants possess characteristics that enable them to outcome and display native species, resulting in significant ecological and economic impacts. Invasive alien species compete with indigenous species for nutrition, light, water, space and influence adverse effect on indigenous flora as well as fauna (Mack *et al*., 2000).They spread quickly and can displace native plants preventing native plant growth and create monocultures. The introduction and establishment of invasive plants can disrupt natural communities, alter nutrient cycling, degrade habitat quality and reduce biodiversity. They cause biological pollution by reducing plant species diversity. Alien plant species have posed severe threats to local biodiversity, ecosystem services and environment quality. (Pejchar and Mooney, 2009).

Indore district is located in the west central part of Madhya Pradesh. The geographical location Indore is at 22°43' North latitude and 75°49' East longitude. It has an area of 3898sq.km and, is situated on the Malwa plateau covering 17.41 % forest area to its total geographical area. Vindhya ranges spread in west to south-west and east to north east direction.Floristic richness in Indore is due to hilly forest in Nahar Jhabua,Choral,Khurda khurdi,Manpur hills .Forest of study area is a dry deciduous type of forest. River Chambal,Kshipra, Kanh and Gambhir originated from Indore and finally drained into Yamuna river in the north. River Choral originates near Chotijam of Indore and finally flows into river Narmda. Texture of soil is loamy and clayey. Rao and Shastry(1964) first explored the flora of Indore and reported 566 plant species which are distributed in 373 genera and 93 families. Later Solanki (1983) contributed on flora of Indore district and documented 951 plant species of angiosperms. Recent studies show that large number of exotic or invasive plants has been introduced and causing serious threats to local flora of Indore districts. (Diwanji *et al*, 2021). Urbanization, Building and Road construction and degradation of water bodies change the habitat of the local flora and made the suitable environment for spreading of noxious alien invasive plants. Literature survey (Reshi *et al*., 2017; Ninama *et al*, 2020; Wagh and Jain, 2015) reveals that there is limited available information regarding the botanical aspects invasive plants in the region. An attempt has been made to study on the invasive plants of Indore district, MP which would contribute to a more comprehensive understanding of the invasive plant species in the region and aid in the development of effective management strategies.

2. METHODOLOGY:

Field surveys were made to collect data on invasive plants during the period of 2015 to 2022. Periodic collection of plants was made from each locality to collect the invasive plants. Herbarium of plant specimens was prepared as per conventional method.(Jain and Rao,1976).Plants were identified with the help of flora (Verma *et al*,1993;Mudgal*et al*,1997;Naik,1998;Singh *et al*,2001;Samvatsar,1996;Samvasar and Dianji,2007; Diwanji *et al*,2021)and available taxonomic literature. Recent up to date nomenclature of ICBN was followed. Voucher specimens were housed in the herbarium of PMB Gujarati Science College, Indore.

To calculate invasive indicator or invasiveness index following formula was used:-

Invasiveness index or indicator = (Number of invasive plants/Number of native plants) ×100

3. RESULT AND DISCUSSION:

A total of 87 plant species has been recorded which are invaded in the study area. These species are distributed under74 genera and 30 families. Most of the invasive plant species have been naturalized in the study area and are exerting dominance over the local indigenous flora. Among the invasive plants of Indore district ,highest number of 50 plant species are reported native to Tropical American and south American origin whereas remaining are native to other regions (Table-1).Life form pattern distribution showed that 61are herbs,13 are shrubs 5 are trees,8 are climbers. Floristic analysis revealed that Asteraceae(15) is found dominant among the invasive plants of Indore district followed by Fabaceae(10), Amaranthaceae(09),Convolvulaceae(07),Euphorbiaceae(05) and others. Invasive plants of the study region were mostly introduced and naturalized in the area. Some are very noxious and harmful for indigenous native flora. *Parthenium hysterophorus* L. is an exotic species, naturalized in Indore district and it is considered as a noxious weed because of its profile seed production and fast spreading ability,allelopathic effect on other plants, strong competitiveness with crops and health hazards to human beings. *Lantana camara*L. and *Gliricidia sepium*(Jacq.)Steud were introduced as garden plants but now it has spread all over the study area even rapidly encroaching the forests.(Plate-1).*Ageratum conyzoides*L. ,*Erigeron bonainesis*L., *Cuscuta chinensis*Lam.,*Senna uniflora* (Mill.)H.S.Ilwin and Barneby,*Alternanthera bettzikiana*, (Regel)G.Nicholson ,*Chaemicrista absus* L.)H.S. Irwin &Barneby, *Solanum erianthum* D.Don., *Merremia quienquefolia*(L.)Hallier, are spreading in the study area and causing severe effect on agro crops and wild forest plants. Invasiveness index was calculated and a high index value (9.148) suggests that the study area may have a high abundance or diversity of invasive plant species compared to native plant species. It reveals higher risks of further invasion and potential effect on native ecosystem. This could indicate a greater potential for ecological impacts such as competition with native species, alteration of habitat structure or disruption of ecosystem processes.

4. CONCLUSION:

The study underscores the significant threats posed by invasive plants to ecosystems, biodiversity, and human activities. These plants possess the capacity to rapidly expand and outcompete native species, thereby disturbing the delicate equilibrium within ecosystems. The adverse effects of invasive plants encompass diminished biodiversity, alteration of habitat structure, heightened fire hazards, and economic losses in the agricultural sector. However, by implementing proactive measures such as stringent monitoring, regulation, and responsible behavior, we have the potential to prevent their introduction and curb their spread. Such actions are crucial in mitigating the detrimental consequences on ecosystems and society at large. It is imperative that we recognize the importance of addressing invasive plants as a priority, as their impact reaches far beyond individual species and can have far-reaching implications for the overall health and functioning of our natural environment.

TABLE 1: INVASIVE PLANTS OF INDORE DISTRICT,MP

S. No.	Botanical name	Family	Lifeform	Nativity
1	Acanthospermum hispidiumDC.	Asteraceae	Herb	Brazil
2	*Abutilon hirtum(*Lam.)Sweet	Malvaceae	Shrub	Tropical Asia
3	Abutilon indicum(L.)Sweet	Malvaceae	Shrub	South asia
4	*Aerva lanata* (L.) Juss	Amaranthaceae	Herb	Tropical America
5	*Ageratum conyzoides*L.	Asteraceae	Herb	Tropical America
6	*Alternanthera bettzickiana(*Regel)G.Nicholson	Amaranthaceae	Herb	South America
7	*Alternanthera philoxeroides(*Mart.)Griseb	Amaranthaceae	Herb	South America
8	*Alternanthera pungens*Kunth.	Amaranthaceae	Herb	Central and south America
9	*Amaranthus spinosus*L.	Amaranthaceae	Herb	*Topical America*

10	*Amaranthus viridis*L.	Amaranthaceae	Herb	Tropical America
11	*Antigonon leptopus*Hook & Arn.	Polygonaceae	Climber	Mexico
12	*Alternanthera sessilis*(L.)DC.	Amaranthaceae	Herb	Tropical America
13	*Argemone mexicana*L.	Papavaraceae	Herb	Tropical south America
14	*Blainvillea acmella*(L.)Phillipson	Asteraceae	Herb	Tropical America
15	*Bidens biternata (Lour.) Merr. and Sherff*	*Asteraceae*	Herb	*Tropical America*
16	*Blumea lacera*(Burm.f.)DC.	Asteraceae	Herb	*East Asia*
17	*Calotropis gigantea*(L.)R.Br.	Apocynaceae	Shrub	*Tropical Africa*
18	*Celosia argentea*L.	Amaranthaceae	Herb	*Tropical America*
19	*Chamaecrista absus*(L.)H.S. Irwin &Barneby	Fabaceae	Herb	*Tropical America*
20	*Chloris barbata*Sw.	Poaceae	Herb	*Tropical America*
21	*Cleome gynandra*L.	Cleomaceae	Herb	*Tropical America*
22	*Chrozophora rottleri (*Geis.) Juss. ex Spr	Euphorbiaceae	Herb	*Tropical America*
23	*Corchorus trilocularis*L.	Malvaceae	Herb	*Trop America*
24	*Convolvulus arvensis* L.	Convolvulaceae	Herb	*Europe*
25	*Croton bonplandianus*Baill.	Euphorbiaceae	Herb	*Temperate South America*
26	*Cryptostegia grandflora*Roxb. Ex R.Br.	Apocynaceae	Climber	*Madagascar*
27	*Cuscuta chinense* Lam.	Convovulaceae	Climber	*Mediterranian*
28	*Cyperus difformis* L.	Cyperaceae	Herb	*Europe*
29	*Cyperus iria* L	Cyperaceae	Herb	*Africa*
30	*Echinoclhoa colona(*L.)Link	Poaceae	Herb	Tropical America
31	*Echinops echinatus*Roxb.	Asteraceae	Herb	Afganisthan
32	*Emilia sonchifolia* (L.) DC. ex DC.	Asteraceae	Herb	*China*
33	*Erigeron bonariensis*L.	Asteraceae	Herb	South America
34	*Euphorbia hirta L.*	Euphorbiaceae	Herb	Tropical America
35	*Euphorbia hypericifolia*L.	Euphorbiaceae	Herb	China
36	*Evolvulus alsinoides*L.	Convolvulaceae	Herb	*Tropical America*
37	Gliricidia sepium(Jacq.)Steud	Fabaceae	Tree	Mexico
38	*Gomphrena globosa*L.	Amaranthaceae	Herb	Tropical America
39	*Imperata cylinderica(L.)*P.Beuv	Poaceae	Herb	Trpopical America

40	*Impatiens balsamina*L.	Balsaminaceae	Herb	Tropical America
41	*Hyptis suaveolens*(L.)Kuntz.	Lamiaceae	Shrub	Tropical America
42	*Ipomoea Carnea subsp. fistulosa(*Mart. Ex Choisy)D.F. Austin	Convolvulaceae	Herb	Tropical America
43	*Ipomoea hederifolia*L.	Convolvulaceae	Climber	Tropical America
44	*Merremia quienquefolia*(L.)Hallier	Convolvulaceae	Climber	TropicalAmerica
45	*Lantana camara*L.	Verbenaceae	Shrub	Tropical America
46	*Lobelia alsinoides* Lam.	Campanulaceae	Herb	Asia
47	*Lagascea mollisCav.*	Asteraceae	Shrub	Tropical America
48	*Leucaena leucocephala*(Lam.)De wit	Fabaceae	Tree	Mexico
49	*Malvastrum coromandelianum(L.)Garcke*	Malvaceae	Herb	Tropical America
50	*Martynia annua L.*	Martyniaceae	Shrub	Mexico
51	*Malachra capitata*L.	Malvaceae	Shrub	Tropical America
52	*Melochia corchorifolia L.*	Malvaceae	Herb	Tropical America
53	*Merremia quienquefolia*(L.)Hallier	Convolvulaceae	Climber	West Indies
54	*Mirabilis jalapa*L.	Nyctaginaceae	Herb	Peru
55	*Millettia pinnata*(L.) Panigrahi	Fabaceae	Tree	Tropical Asia
56	*Neanotis montholoni*(Hook.f.)W.H.Lewis	Rubiaceae	Herb	Asia
57	*Nicotiana plumbaginifolia*Viv.	Solanaceae	Herb	Tropical America
58	*Ocimum americanum* L.	Lamiaceae	Herb	Europe
59	*Oxalis corniculata* L.	Oxalaceae	Herb	*Mexico*
60	*Parkinsonia aculeata* L.	Fabaceae	Tree	Mexico
61	*Passiflora foetida*L.	Passifloraceae	Climber	Tropical south America
62	Parthenium hysterophorusL.	Asteraceae	Herb	Tropical America
63	Prosopsis juliflora	Fabaceae	Tree	*Mexico*
64	*Pistia stratiotes* L.	Araceae	Herb	Tropical America
65	*Pontederia crassipes* Mart.	Pontederiaceae	Herb	South America
66	*Portulaca oleracea*L.	Portulacaceae	Herb	Tropical America
67	*Ricinus communis*L.	Euhorbiaceae	Shrub	Africa

68	*Ruelia tuberosa*L.	Acanthaceae	Herb	Tropical America
69	*Scoparia dulcis*L.	Plantaginaceae	Herb	Tropical America
70	*Senna occidentalis* (L.)Link	Fabaceae	Shrub	Tropical America
71	*Senna siamea* (Lam.) H.S.Irwin	Fabaceae	Tree	Tropical America
72	*Senna tora* (L.)Roxb.	Fabaceae	Herb	Tropical America
73	*Senna uniflora*(Mill.)H.S.Ilwin and Barneby	Fabaceae	Herb	Tropical America
74	*Solanum erianthum*D.Don	Solanaceae	Shrub	South America
75	*Solanum nigrum*	Solanaceae	Herb	Tropical America
76	*Sonchus asper* (L.) Hill	Asteraceae	Herb	Meditrranean
77	*Spermococce hispida*L.	Rubiaceae	Herb	Tropical America
78	*Stachyterpheta jamainsis*(L.)Vahl.	Verbenaceae	Shrub	Tropical America
79	*Synandrela nodifloraL.)Gaetern*	Asteraceae	Herb	South America
80	*Tamarix ericoides* Rottler and Willd	Tamaricaceae	Shrubs	Africa
81	*Tridax procumbens* L.	Asteraceae	*Herb*	Tropical America
82	*Typha domingensis*Pers.	Typhaceae	Herb	Tropical America
83	*Verbascum chinense*(L.)Santapau	Scrophulariceae	Herb	Europe
84	*Veronica officinalis*L.	Plantaginaceae	Herb	Europe
85	*Waltheria indica*L.	Malvaceae	Herb	Tropical America
86	*Xanthium strumarium* L.	Asteraceae	Herb	Tropical America
87	*Zinnia elegans*L.	Asteraceae	Herb	Mexico

Figure 1. ***Lantana camara*L.**

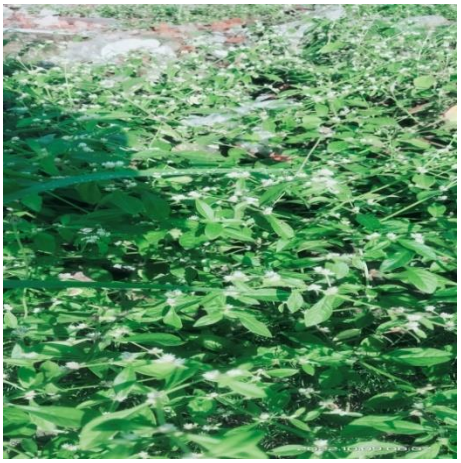

Figure 2. ***Alternanthera bettzikiana*** **(Regel)G.Nicholson**

Figure 3. *Martynia annua* L.

Figure 4.*Solanum erianthum* D.Don.

Figure 5. *Eregeron bonariensis*L

Figure 6. *Gliricidia sepium*(Jacq.)Steud.

.

Photo plate 1: Few dominating invasive plants of Indore.

5. ACKNOWLEDGEMENT:

I am thankful to Dr K.Dixit, Principal, PMB Gujarati Science College, and Indore for research and library facilities. My sincere gratitude and thanks to authority of Indore Forest division for help and cooperation during field survey.

REFERENCES:

[1.] Diwanji V.B,Solanki CM, Samvatsar S, Annigeri B S,Tiari AP,Shaikh M Sisodiya S,Surage K 2021.Flora of Central India:Indore division.Scientific publishers,Jodhpur.
[2.] Jain S K and Rao R R 1976.A hand book of field and herbarium methods.Today and Tomorrows publication.
[3.] Mack RN, Simberloff D, Lonsdale WM, Evans H, Clout M, Bazzaz FA ,2000. Biotic Invasions: Causes, Epidemiology, Global consequences, and Control. Ecol Appl 10:689–710
[4.] Naik V N,1998.Flora of Marathwara,Vol I and Vol II ,Amrut PrKASHAN,Aurangabad,Maharashtra.
[5.] Ninama R,Uike L,DamorR,2020.Exotic flora of Delmi range of Dhar district,MP,International Research world journal of multidisciplinary scientific Research,1,9-14
[6.] Oomachan M.1977.The flora of Bhopal,J K Jain brother publishers.
[7.] Pejchar L, Mooney HA. 2009. Invasive species, ecosystem services and human well-being. *Trends Ecol. Evol.* 24:497–504
[8.] Reshi I Md,Baulal Chadhar,Khare P K,Allien invasive plants of central Indian tropical dry deciduous forests of Sagar district,MP,India,2017.Indian foreser,143(2)
[9.] Samvatsar S and Dwanji VB 2007.Floral diversity Assessment and conservation with reference to Sardar sarovor Project,Bishen songh Mahendra Pal Singh, Dehradun.
[10.] Singh NP ,Khanna Kk,MudgalV,Dixit R D .2001. Flora of MP vol IIIBSI,Calcutta
[11.] Solanki CM,1983.Flora of Indore district,Ph.D thesis,DAVV,Indore,(unpublished)

[12.] SinhaBK and Shukla BK,2009.Synoptic flora of Khargone district,MPJeconomic Taxonomic Botany,31(2),687-695
[13.] Verma DM,Balkrishnan NP,Dixit RD,199.Flora of MadhyaPrdesh vol I,BSI,Calcutta.
[14.] Wagh V and Jain Ashok,2015.Invasive alien flora of Jhabua district,MP,India,Internatinal journal of Biodiverity and Conservation,7(4),227-237
[15.] Wagh V and Jain A K,2014,Status of ethnobotanical invasive plants in western Madhya Pradesh,India,South African Journal of Botany,114,171-1800