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A STUDY ON INVASIVE / INTRODUCED SPECIES OF VINOBA BHAVE UNIVERSITY CAMPUS (JHARKHAND)

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ABSTRAACT

Invasive and introduced species are crucial to any ecosystem. On one hand, they are sometimes important for various types of uses made by human being while on other hand they sometimes inflict adverse effect on local biodiversity. Some small constructed ecosystem like Vinoba Bhave University got many indigenous species as well as a number of introduced and invasive species. It is very-very important to document all those invasive and introduced species and to have an ecological study of those plants. Investigation was carried out with this intention and a detailed survey of introduced species was taken up to prepare a document for further studies.

Key words: Invasive species, Introduced species, Ecosystem, Vinoba Bhave University campus

INTRODUCTION

Invasive species, also known as alien species are those plant which are not native to the location in question and are introduced, accidentally or deliberately by human intervention. Such species are very important and crucial for native ecosystem because their response to local ecosystem is not known in the beginning. They often compete with local vegetation for nutrition and often cost them heavily. Several examples are their where invasive plants over dominated and almost completely wiped out local species. A classical example is of *Lantana camera* which was introduced as garden plant and was introduced from North America, later it spread in almost all part of India and almost eroded an important local herb *Dichanthium annulatum*. Hence, it is always advisable to be serious about invasive species. Vinoba Bhave University, apart from being an important educational institution is a unique mix up of natural and man made ecosystem.

The campus of Vinoba Bhave University, Hazaribag is situated about 6 km away from district head quarter on NH -33. Vinoba Bhave University lies between 24° 1′ 11″ to 24° 1′ 17″ North Latitude and 85° 22′ 10″ to 85° 22′ 35″ East Longitude. The total area of this campus is about 67.17 acre (271827.35 Sq.m) and a well constructed boundary is around the campus .The total constructed area is 19.34 acre (78279.55Sq.m). Open area of land runs in 47.83 acre (193547.79 Sq. m.). Nearly 72.21% of the total area is under green cover with 2654 trees belong to different species. Apart from that Diverse group of plants like, Bryophytes, Pteridophytes

and Gymnosperm are also being maintained in the campus. Most of the plant in this campus are planted. Apart from that some endangered species are also being maintained in the campus Botanical garden, two artificial water bodies are also present in the campus. The water bodies which are rather new in age and contain some algae and Hydrophytes as well as Keeping above facts in the mind, the present study was under taken to eneumerate invasive species of Vinoba Bhave University Campus, Hazaribag.

Site of study



Fig of map of University campus

Methodology: - The present study was carried out in Vinoba Bhave University campus, Hazaribag Jharkhand state of India. An extensive field survey was conducted from February 2018 to September 2021 to record and collect the various planted and naturalized plant species growing in the main campus of Vinoba Bhave University. During the survey, visits were made to every nook and corner of the big University campus to search the plants species. Field trips were arranged in such a way as to collect the plant in flowering and fruiting stage. Nativity of collected plants were studied with the help of various extensive review of literature on global invasive species. (Cox 1999, Heywood 1989, Moony and Drake 1987, Drake et al 1989, Randall et al 1997, Huxel 1999, Jenkins 1999, Londsdle 1999, Elton 2000, Mcneely et al 2001,) and of India and their spread based on history, species origin, species behavior and field observation. The nativity of the species is provided based on earlier worker (Mathew 1969) Maheshwari and Paul 1975, Sharma and Pandey 1984, Hajra and Das 1982, Saxena 1991, Pandey and Parmar 1994, Reddy et al -2000, Reddy and Raju 2002, Negi and Hajra 2007,. The

identity and origin of the plant species was established by the floristic key of Hooker (1875-1887) Cooke (1901-1908) Good (1947) Baily (1968) and Raizada (1976)

RESULT AND DISCUSSION

Altogether 129 invasive/introduced plant species were recorded from Vinoba Bhave University campus. These species represented Fabaceae, Euphorbiaceae, Malvaceae, Asparagaceae, Asteraceae, Asphodelaceae, Apocynaceae, Amaranthaceae, Annonaceae, Araucariaceae, Papaveraceae, Nyctaginaceae, Crassulaceae, Marantaceae, Myrtaceae, Cannaceae, Caricaceae, Lauraceae, Cucurbitaceae, Commelinaceae, Cycadaceae, Poaceae, Solanaceae, Araceae, Verbenaceae, Pontideriaceae, Convolvulaceae, Heliconiaceae, Lamiaceae, Bignoniaceae, Cupressaceae, Cyperaceae, Onagraceae, Nymphaeaceae, Cactaceae, Oxalidaceae, Phyllanthaceae, Lamiaceae, Plumbaginaceae, Polygonaceae, Porellaceae, Potamogetonaceae, Ranunculaceae, Commelinaceae, Rosaceae, Plantaginaceae, Pedaliaceae, Malvaceae, Aizoaceae, Typhaceae, Violaceae, Zamiaceae, families. Detail enumeration of species with their family, local name, Origin e.t.c. are presented in table 1.

Table 1: Exotic Flora of Vinoba Bhave University campus, Hazaribag

Sl. No.	Botanical name	Family	Habit	Local name	Remarks	Native region
1.	Acacia auriculiformis	Fabaceae	Tree	Sabuni		Australia
2.	Acalypha indica	Euphorbiaceae	Herb	Copperleaf		North America
3.	Adansonia digitata	Malvaceae	Tree	Kalpataru	Medicinal	Africa
4.	Agave americana	Asparagaceae	Shrub	Murabba		Mexico
5.	Agave sisalana	Asparagaceae	Shrub	Sisal	CR	Southern Mexico
6.	Ageratum conyzoides	Asteraceae	Herb	Uchanti		Tropical America especially Brazil
7.	Aloe vera Linn.	Asphodelaceae	Herb	Gritkumari		Oman
8.	Allamanda sp.	Apocynaceae	Shrub	Alamanda	Medicinal and Ornamental	Americas
9.	Alternanthera philoxeroides	Amaranthaceae	Herb	Silhanti		Temperate region of South America
10.	Amaranthus viridis (Hook)	Amaranthaceae	Herb	Chaulai bhaji		Southern United State & Mexico

11. Amarenthes spinosus		Sl. No.	Botanical name	Family	Habit	Local name	Remarks	Native region	
12. Anacyclus pyrethrum	•	11.	Amarenthes spinosus	Amaranthaceae	Herb	Cholai		-	
13. Annona squamosa Annonaceae Tree Sarifa Tropical Americas & West Indies 14. Araucaria columnaris Araucariaceae Tree X mas Gymnosperm New Caledonia 15. Argemone mexicanal Papaveraceae Herb Shailkanta America 16. Asparagus retrofractus Asparagaceae Climber Shailkanta America 17. Bidens pilosa Asteraceae Herb Myana Americas 18. Boerhavia diffusa Nyctaginaceae Creeper Punarwa Tropics 19. Bougainvillea spectabilis Nyctaginaceae Shrub Gomamental Brazil 20. Bryophyllum pinnatum Crassulaceae Herb Haijat Medicinal Madagascar Herb Haijat Medicinal Madagascar Veset Indies 21. Caesalpinia Pabaceae Tree Pepocock Americas & West Indies 22. Cajanus scarabaeoides Fabaceae Climber Vankulthi Madagascar Rio de Janeiro state in Brazil 24. Calendula officinalis Asteraceae Herb Genda Southern Europe 25. Callistemon citrina Myrtaceae Tree Bottle brush Cana South America 26. Canna indica Cannaceae Shrub Cana Tropics of the	-	12.	Anacyclus pyrethrum	Asteraceae	Herb	Akarkara	Medicinal		
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Sl. No.	Botanical name	Family	Habit	Local name	Remarks	Native region
28.	Cassia alata	Fabaceae	Shrub	Lollipop		New
20	Carria and an	Echanaa	C1 1.	Cott:		Tropics
29.	Cassia sophera	Fabaceae	Shrub	Coffi		Bangladesh
30.	Cassia tora	Fabaceae	Herb	Chakod		Central America
31.	Catharanthus alba	Apocynaceae	Herb	Sadabahar	Medicinal	Madagascar
32.	Catharanthus roseus	Apocynaceae	Herb	Sadabahar		Madagascar
33.	Chenopodium album	Amaranthaceae	Herb	Bhatua		North America
34.	Chlorophytum comosum	Asparagaceae	Herb	Musli		South Africa
35.	Cineraria longipes	Asteraceae	Herb			Southern Africa
36.	Cinnamomum zeylanicum	Lauraceae	Tree	Dalchini	Medicinal and Spices	Sri Lanka
37.	Coccinia grandis	Cucurbitaceae	Climber	Kundri		Tropical Africa
38.	Commelina erecta	Commelinaceae	Creeper	Kankawa	/01	North America
39.	Crotalaria pallida	Fabaceae	Shrub	san	C	Central and Tropical America
40.	Cycas circinalis	Cycadaceae	Tree	Cycas	Gymnosperm	Sri Lanka
41.	Cycas revoluta	Cycadaceae	Tree	Cycas	Gymnosperm	Southern Japan
42.	Cynodon dactylon (L.) Pers.	Poaceae	Herb	Dubra		Eastern Africa
43.	Dactyloctenium aegyptium	Poaceae	Herb	Cowfoot		Africa
44.	Dahlia pinnata	Asteraceae	Shrub	Dahlia		Mexico and Central America
45.	Datura stramonium	Solanaceae	Shrub	Datura	Medicinal	North America

Sl. No.	Botanical name	Family	Habit	Local name	Remarks	Native region
46.	Delonix regia	Fabaceae	Tree	Radhachur		Madagascar
47.	Dieffenbachia sp	Araceae	Herb		Medicinal and Ornamental	New World Tropics (Mexico)
48.	Dracaena reflexa	Asparagaceae	Shrub			Madagascar
49.	Duranta repens	Verbenaceae	Shrub	Nilkanta		Mexico, South America
50.	Eichhornia crassipes	Pontideriaceae	Aquatic	Jalkumbhi	Hydrophyte	South America
51.	Eupatorium odoratum	Asteraceae	Shrub	Rutush		Americas
52.	Euphorbia heterophylla	Euphorbiaceae	Herb			Tropical and Subtropical America
53.	Euphorbia hirta	Euphorbiaceae	Herb	Dudhi		Tropical region of Americas
54.	Euphorbia milii	Euphorbiaceae	Herb	Milli	Medicinal and Ornamental	Madagascar
55.	Euphorbia tirucalli	Euphorbiaceae	Herb	Peteroplant	Ornamental	Tropical and Southern Africa
56.	Evolvulus alsinoides Linn.	Convolvulaceae	Herb	Shankhpushpi		South America
57.	Gomphrena globosa	Amaranthaceae	Herb	Gul- makhmal		Central America
58.	Helianthus annuus	Asteraceae	Shrub	Surjmukhi		Western US
59.	Heliconia bracteata	Heliconiaceae	Shrub	Van kela		Tropical America
60.	Wrightia antidysenterica	Apocynaceae	Shrub	Kurchi		Sri Lanka
61.	Hyptis suaveolens(L.)	Lamiaceae	Herb	Bantulsi		Tropical

Poit. region of Mexico Mexico Tropical America Central and South America Central and America Central and America Central and America Central America Central America Central and South America Central America Central and South Ame	Sl. No.	Botanical name	Family	Habit	Local name	Remarks	Native region
62. Ipomoea fistuloxa Convolvulaceae Shrub Theter Tropical America Central and South America Central and South America Central and South America Central and South America Central America Central America Central America Central America Central America America Shrub Bagrandi Central America Central America America Mexico Central America America Mexico Central America Central America America Central America America Central America Central America Central America America Central America Central America Central America Central America Central America America Central Central America Central America Central Centr		Poit.					region of
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74. Medicago minima Fabaceae Herb Vilaiti Mediterranean	73.	Maranta leuconeura	Marantaceae	Herb	Tikkor		Tropical
74. Medicago minima Fabaceae Herb						Spices	Forest
	74	Madiagas minima	Echacasa	Цать	Vilaiti		Mediterranean
	/4.	меассадо тіпіта	гарасеае	nerb	gawuth.		Basin

Sl. No.	Botanical name	Family	Habit	Local name	Remarks	Native region
						South and
75.	Mimosa pudica	Fabaceae	Herb	Lajwanti	Medicinal	Central
						America
				Fruit salad	Madianaland	Southern
76.	Monstera deliciosa	Araceae	Herb		Medicinal and Ornamental	Mexico,
				tree	Ornamentar	Panama
						Eastern
77.	Nymphaea pubescens	Nymphaeaceae	Aquatic	Saluk	Hydrophyte	North
						America
						Contiguous
78.	Oenothera drummondi <mark>i</mark>	Onagraceae	Shrub			United
						States
79.	Oplismenus	Dagaga	Conne	Basket		Evensio
19.	undulatifolius	Poaceae	Grass	grass		Eurasia
						Tropical
80.	Opuntia dillenii	Cactaceae	Herb	Nagfani		and
00.	Opiniia aitienii	Cactaceae	Ticio	Nagram		Subtropical
	300					Americas
81.	Oxalis corniculata L.	Oxalidaceae	Herb	Amruii		Southern
01.	Oxalis contential E.	Grandaceae	Ticio	11111011		Africa
82.	Oxalis latifolia	Oxalidaceae	Herb	Tin pati	3	Mexico
83.	Parthenium	Asteraceae	Herb	Gajarghas		American
05.	hysterophorus	Asteraceae	Ticio	Oujurgiius		Tropics
84.	Pedilanthus	Euphorbiaceae	Shrub	Petroplant	Medicinal/	Southern
04.	tithymaloides	Euphororaceae	Siliub	retropiant	Ornamental	Florida
85.	Pennisetum purpureum	Poaceae	Crass	Dinanath		Tropical
83.	Fenniseium purpureum	Poaceae	Grass			Africa
86.	Philodendron xanadu	Araceae	Herb			Brazil
						North-South
						America to
87.	Phyla nodiflora	Verbenaceae	Herb			Southern
						United
						States
88.	phyllanthus amarus	Phyllanthaceae	Herb	Bhumi		Tropical

Sl. No.	Botanical name	Family	Habit	Local name	Remarks	Native region
				awla		America
89.	Physalis minima	Solanaceae	Herb			Tropical America
90.	Pimenta dioica	Myrtaceae	Tree	All – spice tree	Medicinal and Spices	West Indies
91.	Plectranthus amboinicus	Lamiaceae	Herb	Van Ajwain		Kenya to South Africa
92.	Plumbago zeylanica	Plumbaginaceae	Shrub	Chitrak	Medicinal	Hawaiian Islands
93.	Polygonum glabrum	Polygonaceae	Shrub	Pukur Mul		North America and Eurasia
94.	Polypodium sp.	Polypodiaceae	Fern		Pteridophyte	Western North America
95.	Porella sp.	Porellaceae	Bryo- phyta			Eurasia and Northern America
96.	Potamogeton nodosus	Potamogetonaceae	Aquatic	Kalay Pata	Hydrophyte	North America
97.	Psidium guajava	Myrtaceae	Tree	Amrud	Fruit	Mexico and America
98.	Ranunculus sceleratus	Ranunculaceae	Herb	Jal dhania		North America
99.	Rauvolfia tetraphylla	Apocynaceae	Shrub	Sarpgandha		Mexico and Central America
100.	Rhoeo discolour	Commelinaceae	Herb	Moses in the cradle	Medicinal and Ornamental	Belize
101.	Rosa sp.(pink, yellow, red, white, hybrid)	Rosaceae	Shrub	Gulab		Europe, North America
102.	Roystonea regia	Arecaceae	Palm	Royal palm	Palm	South

Sl. No.	Botanical name	Family	Habit	Local name	Remarks	Native region
			Tree			Florida &
						Cuba
103.	Sasa palmate	Poaceae	Grass	Japani bans	Medicinal and Ornamental	Japan
104.	Scirpus rubrotinctus	Cyperaceae	Grass	Motha		North America
105.	Scoparia dulcis	Plantaginaceae	Herb	Bandhaniya	Medicinal	New Tropics
106.	Sesamum indicum	Pedaliaceae	Shrub	Til		Sub- Saharan Africa
107.	Sida acuta	Malvaceae	Shrub	Bala		Central America
108.	Sida rhombifolia	Malvaceae	Herb	Bariyar		North America
109.	Solanum nigrum	Solanaceae	Herb	Makoi		Eurasia
110.	Sonchus oleraceus	Asteraceae	Herb	1		Europe
111.	Spilanthes indica	Asteraceae	Herb	Brajdanti	Medicinal	Africa
112.	Stachytarpheta indica	Verbenaceae	Shrub	Hathisud	CRI	Tropical Americas
113.	Stevia rebaudiana	Asteraceae	Herb	Madhu Tulsi	Medicinal	Paraguay
114.	Swietenia mahagoni	Meliaceae	Tree	Mahagoni	Medicinal and Timber	Florida
115.	Synedrella nodiflora	Asteraceae	Herb			South America, Mexico
116.	Syngonium podophyllum	Araceae	Herb	House plant	Ornamental	Mexico to Ecuador
117.	Syzygium aromaticum	Myrtaceae	Tree	Laung	Medicinal and Spices	Manuka Island
118.	Tagetes patula	Asteraceae	Herb	Genda		Mexico
119.	Tecoma stans	Bignoniaceae	Shrub			West Indies
120.	Thevetia neriifolia	Apocynaceae	Tree	Pila kaner	Medicinal and Ornamental	Mexico

Sl. No.	Botanical name	Family	Habit	Local name	Remarks	Native region
121.	Thuja orientalis	Cupressaceae	Tree	Mayuri		Canada
122.	Tradescantia virginiana	Commelinaceae	Herb		Medicinal and Ornamental	Southern Canada to Northern Argentina
123.	Trianthema portulacastrum	Aizoaceae	Herb			Africa
124.	Tridax procumbens	Asteraceae	Herb	Jharmakhna		Tropical Americas
125.	Typha sp.	Typhaceae	Aquatic	Hoogla, Kam	Hydrophyte	America
126.	Viola sp.	Violaceae	Herb			Eastern North America
127.	Zamia sp.	Zamiaceae	Shrub		Gymnosperm	Georgia
128.	Zinnia acerosa	Asteraceae	Grass			South West United States
129.	Zinnia palustris	Asteraceae	Grass	Wild rice	CR	South West United States

Some important and dominant exotic plant species of the Vinoba Bhave University Campus are *Zamia sp., Tridax* procumbens, Thuja orientalis, Thevetia neriifolia, Tagetes patula, Syzygium aromaticum, Sasa palmate, Roystonea regia, Rosa sp., Ranuncalus sceleratus, Psidium guajava, Pimenta dioica, Mimosa pudica, Lantana camara, Juniperus sp., Jacaranda mimosifolia, Hyptis suaveolens, Eichhornia crassipes, Duranta repens. Datura stamonium, Cycas circinslis, C ycas revoluta, Commelina erecta, Cinnamomum zeylanicum, Carica papaya, Calendula officinalis, Biden pilosa, Araucaria columnaris, Annona squamosa, Aloe vera and Parthenium hysterophorus.



As mentioned earlier, invasive and introduced species are often, highly competitive so far local vegetation is concerned. Local vegetation develop a system of co-existance duse several years. Introduced species on the other hand are highly demanding so far nutrition—and water is concerned .Several previous workers like Mooney and Hobbs (2020), Mudgal and Hazra (1999), Hazra et al. (1982), Elton (2000), Lal et. al. (2012), Tomar et. al. (2008), and Mukherjee (2015), Mukherjee and Kumar (2017) have studied in detail, the impact of invasive species. It is there for important to study in detail, the ecology of Vinoba Bhave University campus with special reference to invasive /introduced species. Any undesirable impact of such alien species will have effect on whole of Hazaribag ecology.

CONCLUSION

The study reveals that the Vinoba Bhave University campus is rich in exotic flora, represented mostly by ornamental plants, edible fruits trees, vegetable crop plants and weed plants. The flora of American origin dominates the exotic floristic composition of Vinoba Bhave University campus. The Fabaceae, Asteraceae and Poaceae are the dominant families of invasive floristic composition of V B U campus Hazaribag.

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