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Studies on Invasive Alien Aquatic species in Jajpur District of Odisha, India

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ABSTRACT

The present paper deals with the documentation of invasive alien aquatic species diversity in Jajpur district of Odisha. Floristic studies have been conducted during 2019-2021 in different aquatic or wetland habitats of Jajpur district. Extensive as well as intensive floristic studies in these areas have been conducted, voucher specimens were collected, identified and preserved in the form of herbarium following standard method. The result revealed that there are 47 aquatic plant species under 35 genera and 27 families. Among these, 22 species are marshy, 14 species are amphibious, 05 species are free floating and 06 species are fixed floating plants. Most of the species are the native of Tropical America and Tropical Africa and few of them are from other countries.

Key words *: Alien, Aquatic, Invasive, Ecosystem, Nativity*

Introduction

Jajpur district in the state of Odisha covers an area of 2899 sq.km.. The district lies between 85 ^{0}40′ E to 86^0 44′ E longitude and 20^0 30′N to 21^0 10′ N latitude. The district is located in the deltaic region in the close proximity in the Bay of Bengal. The climate of the district is nearly similar with other coastal district though it does not touches the boundary of the Sea. The soil of the district is loamy, sandy and clay type. The district has rapid increase in industry and rich mining activity. The important rivers flowing through this district are Brahmani, Baitarani and their tributaries. The riverine plains of the district also receive water and sediments from the Mahanadi river system through the river Birupa. Being rain fed these rivers remain almost dry during summer season. The estimated wetland area of the district is 15714 ha (Anonymous, ISRO, 2010). The aquatic or wetland habitat of the district are river, pond, tank, ditches, marshes, swamps and flood plains.

Plants which are adapted morphologically and anatomically to waterlogged habitat are called aquatic or wetland plant. These plants are the important biotic components which play the role of producer in aquatic ecosystem and as such maintain ecological balance in nature. Majority of the aquatic plants grows faster and interfere the growth of other plants called weed. These plants are also used in food, fodder, fuel, medicine, water detoxification and other miscellaneous uses.

According to Convention in Biological Diversity (1992), invasive alien species are the non-native species in an ecosystem which disturb the ecosystem function. Their growth leads to decline or complete elimination of the native species through competition, predation and pathogen transmission. These

plants possess some special characters like tolerance to abiotic factors, easy seed dispersal, aggressive root system, long flowering and fruiting period for which they can easily spread in an ecosystem. Social mobility and global transportation of ornamental and forage plants pave way for rapid spread of alien plants (Randall and Marinelli, 1997). Due to higher rate of infestation many aquatic species become invasive (Richardson *et al*., 2000). Infestation of invasive species is so rapid and uncontrolled resulting in a great loss of global biodiversity (Mooney and Hobbs, 2000). They distrub the composition of ecosystem by changing mineral cycling (Mc. Neely *et al.* 2001).

Review of Literature

Invasive alien flora in India have been studied by different workers in different regions (Reddy, 2008; Wagh and Jain, 2015; Chandrasekar, 2012; Singh and Mohammed, 2015; Mukherjee and Kumar, 2017; Jha and Prasad, 2019). Adhikari and Babu (2008) studied 178 wetland plants in Uttarakhand along with their nativity. Invasive alien plant species have been studied by some investigators in the state of Odisha (Haines, 1921-1925; Mooney, 1950; Saxena and Brahmam, 1994-1996; Nayak and Satpathy, 2015, 2016). However, there is no records on aquatic invasive alien plants species in Jajpur district.

Materials and Method

Several field trips have been conducted in different seasons of the year during 2019-2021 to different aquatic and wetland habitats of Jajpur district to document the diversity and distribution of aquatic invasive alien plant specimens. The plant species are collected and photographs are taken. The collected plant specimens were identified, processed, dried and herbarium specimens are prepared by following standard method. Voucher specimens of the collected plant species have been deposited in the herbarium of Dhenkanal Autonomous College, Dhenkanal. These plants have been classified on the basis of their habitat. Their native place also have been collected from different literatures.

Results and Discussion

The floristic survey revealed that, 47 plant species belonging to 35 Genera and 27 Families have been reported from different aquatic habitats of Jajpur district of Odisha (Table 1). Out of these, monocot flora are composed of 16 species under 12 genera and 07 family, while dicot flora are composed of 28 species under 23 genera and 17 family, Pteridophytes are composed of 03 species under 03 Genera and 03 Families. The monocot and dicot species ratio is 0.57, genus ratio is 0.52 and family ratio is 0.41 (Table 2). Nativity of alien invasive aquatic plant species have been studied from different literature. It is observed that, most of the species are the native of Tropical America(19 species) followed by Tropical Africa (07 species) and other countries represent less in number (Table 3).

From the present investigation it has been observed that, the family Asteraceae(06 Species) is the most dominant family which is followed by Poaceae (05 Species) and Cyperaceae, Onagraceae, Pontederiaceae (3 species each); Amaranthaceae, Polygonaceae, Convolvulaceae, Fabaceae, Araceae(2 Species each). Other 17 families are represented by one species each.

Distribution of plants in different aquatic habitats have been represented in Figure 1. It indicates that, marshy plants represents highest number of species (22 species), followed by amphibious (14 species), free floating (5 species) and fixed floating(6 species).

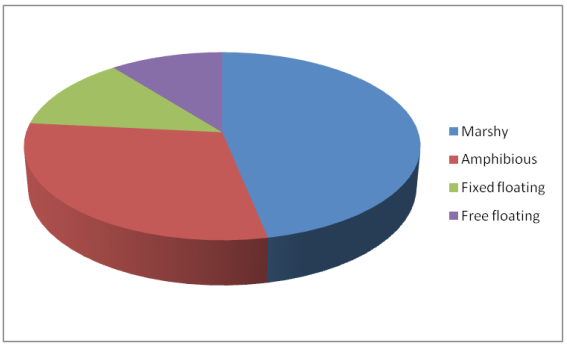

Fig. 1. Habitat Wise Distribution of Invasive Alien Aquatic species

Conclusion

From the above investigation it has been concluded that,the invasive alien species in aquatic habitats of Jajpur district is a serious threat to aquatic ecosystem. They migrates from their native places and successfully establishes in different aquatic habitats due to suitable conditions. They interfere the growth of native plants and compete with them which leads to loss of native aquatic biodiversity. Ultimately the

Table 1. List of Invasive alien aquatic species in Jajpur District of Odisha

Sl.No	Name of the plant	Family	Nativity	Habitat
01	*Aeschynomene americana* L.	Fabaceae	Trop. America	Amphibious
02	*Alternanthera philoxeroides* (Mart) Griseb	Amaranthaceae	Trop. America	Amphibious
03	*Alternanthera sessilis* (L.) R.Br.ex Dc.	Amaranthaceae	Trop. America	Amphibious
04	*Azolla pinnata* R.Br.	Azollaceae	Trop. Africa	Free floating
05	*Brachiaria distachya* (L.) Stapf	Poaceae	Trop. Australia	Marshy
06	*Cardiospermum halicacabum* L.	Sapindaceae	North America	Marshy
07	*Centella asiatica* (L.) Urban	Apiaceae	Trop. Region	Marshy
08	*Cleome rutidosperma* DC.	Capparaceae	Trop.America	Marshy
09	*Commelina benghalensis* L.	Commelinaceae	Trop. Gerontia	Marshy
10	*Colocasia esculenta* (L.) Schott	Araceae	Trop. Asia	Amphibious
11	*Corchorus aestuans* L.	Tiliaceae	Trop. America	Marshy
12	*Cynodon dactylon* (L.) Pers.	Poaceae	Trop. America	Marshy
13	*Cyperus difformis* L.	Cyperaceae	Trop. America	Marshy
14	*Cyperus rotundus* L.	Cyperaceae	Trop. Africa	Marshy
15	*Cyperus triceps* Endl.	Cyperaceae	Trop. Gerontia	Marshy
16	*Echinochloa colona* (L.) Link	Poaceae	Trop.S. America	Marshy
17	*Echinochloa crusgalli* (L.) PBeauv.	Poaceae	Trop.S. America	Marshy
18	*Eclipta prostrata* (L.) L.	Asteraceae	Trop. America	Marshy
19	*Eichhornia crassipes* (Mart.) Solms-Laub.	Pontederiaceae	Trop. America	Free floating
20	*Emilia sonchifolia* (L.) DC.	Asteraceae	Trop. America	Marshy
21	*Enydra fluctuans* Lour.	Asteraceae	Asia	Amphibious
22	*Euphorbia hirta* L.	Euphorbiaceae	Trop. America	Marshy
23	*Grangea maderaspatana* (L.) Poir	Asteraceae	Trop. Africa	Marshy
24	*Hygrophila auriculata* (Schum.) Heine	Acanthaceae	Trop. Africa	Amphibious
25	*Ipomoea aquatica* Forssk.	Convolvulaceae	Trop.Gerontia	Fixed floating
26	*Ipomoea carnea* Jacq.	Convolvulaceae	Trop. America	Amphibious
27	*Lippia javanica* (Burm.f.) Spreng.	Verbenaceae	Africa	Marshy
28	*Ludwigia adscendens* (L.) Hara	Onagraceae	Trop.America	Fixed floating
29	*Ludwigia octovalvis* (Jacq.) Raven	Onagraceae	Trop. Africa	Fixed floating
30	*Ludwigia perennis* L.	Onagraceae	Trop. Africa	Fixed floating
31	*Marsilea quadrifolia* L.	Marsileaceae	Australia	Amphibious
32	*Monochoria hastata* Solms-Laub.	Pontederiaceae	Trop.America	Amphibious
33	*Monochoria vaginalis* (Burm.f.) Presl	Pontederiaceae	Trop.America	Amphibious
34	*Nymphaea nouchali* Burm.f.	Nymphaceae	Africa	Fixed floating
35	*Oxalis corniculata* L.	Oxalidaceae	Europe	Marshy
36	*Pistia stratiotes* L.	Araceae	Trop. America	Free floating
37	*Polygonum glabrum* Willd.	Polygonaceae	Trop. Region	Amphibious
38	*Polygonum hydropiper* L.var. flaccidum Steward	Polygonaceae	Australia	Amphibious
39	*Saccharum spontaneum* L.	Poaceae	Trop.W.Asia	Marshy
40	*Salvinia molesta* D. Mitch	Salviniaceae	Brazil	Free floating
41	*Scoparia dulcis* L.	Scrophulariaceae	Trop. America	Marshy
42	*Sesbania bispinosa* (Jacq.) W.F.Wight	Fabaceae	Trop. America	Amphibious
43	*Sphaeranthus indicus* L.	Asteraceae	Trop. Africa	Marshy
44	*Spirodela polyrhiza* (L.) Schleiden	Lemnaceae	Europe	Free floating
45	*Trapa natans* L.	Trapaceae	Europe	Fixed floating
46	*Tridax procumbens* L.	Asteraceae	Trop.C.America	Marshy
47	*Typha angustata* Bory and Chaub.	Typhaceae	Trop. America	Amphibious

Table 2. Floral statistics of Invasive alien aquatic species

Taxa	Monocotyledons	Dicotyledons	Total no. of Angiosperms	Pteridophytes	Grand Total
Species	16	28	44	03	47
Genera	12	23	35	03	38
Families	07	17	24	03	27

Table 3. Nativity of Invasive alien aquatic species

Sl. No.	Nativity		Number of species
1.	Tropical America	:	19
2.	Tropical Africa	:	07
3.	Tropical Gerontia	:	03
4.	Europe	:	03
5.	Tropical Region	:	02
6.	Tropical South America	:	02
7.	Australia	:	02
8.	Africa	:	02
9.	Tropical Central America	:	01
10.	Tropical Asia	:	01
11.	Tropical West Asia	:	01
12.	North America	:	01
13.	Brazil	:	01
14.	Tropical Australia	:	01
15.	Asia	:	01

socioeconomic status of local people is also affected. Therefore more research is needed to promote conservation of native aquatic biodiversity in this region.

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