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BIODIVERSITY AS INFLUENCED BY THE INVASIVE ALIEN WEED GREATER CLUB RUSH *(SCIRPUS GROSSUS* L.F) IN WETLAND RICE ECOSYSTEM

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Abstract: Greater club rush (*Scirpus grossus* L.f.), locally known as *kora* is a very large aquatic or marshy herb infesting vast tracts of wetland rice fields in Kerala state. A field study was conducted in a wetland rice ecosystem of Thiruvananthapuram district with the objective of assessing the diversity of flora and fauna associated with a thick infestation of the aquatic weed. The results of the study revealed that the thick growth of the weed was the habitat of a number of rare birds small animals. The presence of magnificient birds like purple moorhen(*Gallinula Chloropus)* locally known as *Neelakozhi* ,weaver birds, brown headed gull, black drongo, little cormorant etc. which inhabits among the large *kora* plants trample the rice seedlings and do much harm to those individual farmers who try to take up rice cultivation in areas adjacent to the kora infested areas. Associated animals like bandicoot rat, snakes etc. created havoc to the neighborhood farmers and their rice crop. When the thick growth of greater club rush was completely removed from the field, other weed species that were probably dominant before the invasion emerged out and established and there was an enhancement in floral diversity. The data from the studies indicated that the alien invasive weed threatened the wetland flora diversity considerably while it provided habitat for specific wild life species.

The accumulation of materials in wetlands makes them particularly vulnerable to invasion, while at the same time supply invaders with the resources they need to form monotypes. From the data on associated weeds before and after the experiment, it was clear that when the invasive weed was removed from the area, other weed species which were probably dominant before the invasion had started emerging out from the probable weed seed bank left in the field. Earlier researchers have also observed that weed invasion threatened wetland biodiversity, leading to a decline in both species and habitat diversity.

Throughout the world, communities of emergent hydrophytes provide habitat for wildlife. Macrophytes provide a refuge for small animals against predation, change in the nutrient dynamics of the system, and prevent re-suspension of the sediments and attract large number of birds than lakes without vegetation.

Key words: Biodiversity, Rice ecosystem, Invasive weeds, Flora, Fauna, Wild life species.

INTRODUCTION

Greater club rush (*Scirpus grossus* L.f.), locally known as *'kora'* is a very large marshy herb infesting vast tracts of wetland rice fields in Kerala state. Throughout the world, communities of such emergent hydrophytes provide habitat for various wildlife species. There are reports from world over that the plants in the genus *Scirpus* provide food and cover for many aquatic birds and animals. Domestic animals including cattle, horses, sheep, and swine also eat these bulrushes. At the same time, invasion of such alien weeds are known to threaten wetland biodiversity leading to a decline in both species and habitat diversity. Diverse natural communities can shift to species poor vegetation when either water supply or the nutrient regimes change in response to human activities and the invasive species establish and completely outcompete natural species. The present study was conducted with the objective of assessing the diversity of flora and fauna associated with a thick infestation of the aquatic weed. The impact of the weed removal on the flora biodiversity of the wetland ecosystem was also assessed during the one year field study.

MATERIALS AND METHODS

The investigation was conducted in a wetland rice field (*Padasekharam)* viz., Punchakkari padasekharam, in Nemom Panchayath, Thiruvananthapuram district, Kerala state thickly infested with the greater club rush

during the period from February 2010 to January 2011. The farmers of the field had abandoned rice cultivation in the locality for the past five years due to the weed infestation. The flora and fauna diversity in the infested field was observed visually and recorded for a period of one year. Simultaneously an area of one hectare was cleared of the weed completely using systemic herbicides and the flora that established in the cleared field was recorded periodically.

RESULTS AND DISCUSSION

The results of the study revealed that there were only four plant species growing associated with the thickly growing greater club rush (Table 1). However when the field was completely cleared off the thick weed growth, there was substantial increase in the floristic diversity. When observed towards the end of the study period, there were eleven weed species growing in the field (Table 2). According to Aaronn *et al.* (2000), diverse natural communities can shift to species poor vegetation when either water supply or the nutrient regimes change in response to human activities and the invasive species establish and subsequently outcompete natural species.

Sainty *et al.* (1998) and Zedler (2004) have proposed that the accumulation of materials in wetlands makes them particularly vulnerable to invasion, while at the same time supply invaders with the resources they need to form monotypes. From the data on associated weeds before and after the experiment, it was clear that when the invasive weed was removed from the area, other weed species which were probably dominant before the invasion had started emerging out from the probable weed seed bank left in the field. Earlier researchers have also observed that weed invasion threatens wetland biodiversity, leading to a decline in both species and habitat diversity. It could be inferred that when the monotype weed was removed, dormant seeds of other plant species that were probably dominant before the invasion emerged out and established, resulting in increased flora diversity.

However, the thick weed growth was found to provide habitat for a number of rare birds and small animals. Birds like purple moorhen, weaver birds, indian crane, sparrow etc. found their nesting place among the tall thick growth,

Table 1. Flora diversity found associated with a thick growth of greater club rush

Sl. No.	Scientific name	Common name/ Vernacular name	Family
1.	*Monochoria vaginalis*	Neelolppalam	Pontederaceae
2.	*Ludwigia perennis*	Neergrampu	Onagraceae
3.	*Ipomoea aquatica*	Swamp morning glory	Convolvulaceae
4.	*Marsilia quadrifolia*	Naalilakodian	Marsiliaceae

Table 2. Weed flora observed in the in the experimental site after the removal of greater club rush

Sl. No.	Scientific name	Common name/ Vernacular name	Family
1.	*Echinocloa crusgalli*	Kavada	Poaceae
2.	*Echinochloa colona*	Kavada	Poaceae
3.	*Panicum repens*	Torpedo grass	Poaceae
4.	*Cyperus difformis*	Thalekettan	Cyperaceae
5.	*Limnocharis flava*	Nagappola	Limnocharitaceae
6.	*Monochoria vaginalis*	Neelolppalam	Pontederiaceae
7.	*Ludwigia perennis*	Neergrampu	Onagraceae
8.	*Ipomoea aquatica*	Swamp morning glory	Convolvulaceae
9.	*Salvinia molesta*	African payal	Salviniaceae
10.	*Azolla pinnata*	Azola	Azollaceae
11.	*Marsilia quadrifolia*	Naalilakodian	Marsiliaceae

Table 3. Macro fauna observed in the experimental site

Sl.No.	Scientific name	Common name/ Vernacular name	Family
	BIRDS		
1.	*Larus brunnicephalus*	Brown headed gull	Laridae
2.	*Chroicocephalus ridibundus*	Black-headed Gull	Laridae
3.	*Anas acuta*	Northern Pintail	Anatidae
4.	*Anas querquedula*	Garganey	Anatidae
5.	*Larus ichthyaetus*	Pallas's Gull	Laridae
6.	*Microcarbo niger*	Little cormorant	Phalacrocoracidae
7.	*Gallinula Chloropus*	Purple moorhen	Rallidae
8.	*Mesophoyx intermedia*	Median Egret	Ardeidae
9.	*Dicrurus macrocercus*	Black drongo	Dicruridae
10.	*Centropus sinensis*	Crow pheasant	Cuculidae
11.	*Acridotheres tristis*	Indian myna	Sturnidae
12.	*Ploceus philippinus*	Baya weaver	Ploceidae
13.	*Grus leucogeranus*	Indian crane	Gruidae
14.	*Passer domesticus*	Sparrow	Passeridae.
	ANIMALS		
1.	*Rattus rattus*	House rat	Muridae
2.	*Bandicota sp.*	Bandicoot rat	Muridae
3.	*Kerivoula picta*	Painted Bat	Vespertilionidae
4.	*Ascaphus truei*	Tailed Frog	Ascaphidae
5.	*Ptyas mucosus*	Oriental rat snake	Colubridae

while associated animals like bandicoot rat, snakes, painted bat, tailed frog etc. created havoc to the neighborhood farmers and their rice crop (Table 3). Evidently this plant provided a refuge for small animalsagainst predation. change inthe nutrient dynamics of the system and attracted large number of birds and animals into wetland ecosystem.

CONCLUSIONS

The results of the study indicated that the infestation of the alien invasive weed greater club rush (*Scirpus grossus* L.f) threatened the wetland flora diversity considerably while it provided habitat for specific wild life species. Earlier researchers have also observed that weed invasion threatened wetland biodiversity, leading to a decline in both species and habitat diversity. When an invasive weed is removed from an area other weed species that were probably dominant before invasion started emerging from the probable weed seed bank left in the field. Thus the ecosystem which was monopolized by the invasive weed changed from monotype to a highly diversified microflora. Similar was the case with macrofauna also. In the present case, within a decade, the weed had invaded a major share of the wetland rice ecosystems. Invasions of such alien plant species into various habitats are considered a global threat to biodiversity and ecosystem functioning have been altered due to these invasions.

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