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Invertebrates Associated with *Ipomea aquatica* in Ogbe Creek, Lagos, Nigeria

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Abstract. The association of invertebrates in Ogbe creek with *Ipomea aquatica* was investigated within the period from 7th September to 30th November, 2001. 167 invertebrates comprising of 19 species were harvested from 73 weeds. *Corixa punctata* (22.16%) was the most abundant invertebrate on *Ipomea aquatica* while *Gyrinus notator* larvae (0.60%) were the least abundant. The roots sheltered the highest number of invertebrates (113), comprising of 12 species recording a species diversity of 5.36 while the stem sheltered the lowest number of invertebrates (10) comprising of 3 species with a species diversity of 2.00. The ability of *Ipomea aquatica* to harbour invertebrates was influenced by the morphological form of the plant. The root was the preferred site for the invertebrates because it was a suitable substrate for clinging and nutrient supply.

Keywords: *Ipomea aquatica*, niche, invertebrates, ecosystem

Introduction

Ipomea aquatica (Convolvulaceae) is an ecologically significant weed widely cultivated as green vegetable in China, India, Malaysia, Africa, Brazil, the West Indies and Central America (Staples, 1996). Though useful as a vegetable crop, *Ipomea* has a great nuisance value, commonly listed as a prohibited plant and noxious weed in many developed countries. Wallace and Webster (1996) considered it as the second greatest problem plant in the Philippines, where it tends to overgrow freshwater marginal areas. It forms dense floating mats of intertwined stems over water surfaces, shading out native submerged plants, competing with native emergent and successfully displacing them (Akobundu and Agyakwa 1998; Staples, 1996). Biological invaders are widespread and can alter population dynamics and community structure of native ecosystems (Jason, 2000).They are known to have a wide variety of impacts on native biota, however such impacts are often poorly understood and difficult to predict (Sax *et al.*, 2005). Some detrimental impacts of invasive species on native biota include, decline in abundance of native biota, contraction of geographic ranges and extinction of native species (Fritts and Rodda 1998; Ebenhard, 1988; Elton, 1958). They have also been known to cause changes in community structure and ecosystem functioning (Mack and D'Antonio 1998; Luken and Thieret, 1997; D'Antonio and Vitousek, 1992). However, most exotic species have not been documented to have any detrimental effect on native biota. Luc *et al.* (2003) reported that in the Lake Chivero, Zimbabwe, there was no clear support for a considerable difference in overall species diversity at sampling sites covered by plant when compared to non covered sites.

This study was carried out to ascertain the invertebrates associated with *Ipomea aquatica* in Ogbe creek, Lagos, Nigeria and to establish, if there is a preferred site by these organisms for a particular part of the weed. Understanding the assemblage of invertebrates associated with this aquatic weed is essential for predicting its impact as an invasive species on local ecosystems.

Materials and Methods

Study site. Ogbe creek is located within the University of Lagos campus between latitude 6° 30'N and longitude 3° 29'E. It covers a total area of 77410.84m^2. It is a sluggish non-tidal, eutrophic body of water that drains into the Lagos Lagoon (Nwankwo and Akinsoji, 1988). The stream is about 80 metres south of works and services department and flows along the commercial road. The stream then widens directly under the bridge along the international school road, crossing the uninhabited lawn of the school, till it gets out of the campus. Then it join another stream that runs eastward into the Lagos lagoon. The creek harbours many aquatic plants. The plants found are *Ipomea aquatica, Pistia stratiotes* (Araceae), *Azolla pinnata* (Azollaceae), *Diplazium sammatii* (Athyriaceae), *Eclipa alba* (Asteraceae) and *Cyperus difformis* (Cyperacea). The creek is presently being used as a dump site for refuse by people who live along its course.

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Sampling routine. The association of invertebrates in Ogbe creek with *Ipomea aquatica* was investigated within the period of 7th September, 2001 and 30th November 2001. A site of $10m^2$ was delimited within the creek as the sampling site within which a total of seven samplings were carried out (Table 1). A quadrant of area $1m^2$ was thrown within the delimited area and the weeds trapped within the quadrant were harvested. *Ipomea* was harvested mechanically detaching the plants at the roots and stolons with a pair of gardening shears.

Extra care was taken not to agitate the plant while cutting, so as to retain the invertebrates on the plants. Each harvested plant was placed in an 18 litre plastic bucket containing the creek water and transported to the laboratory for further analysis.

In the laboratory, each plant was put in a white rectangular tray (35 x 25 x 6.5cm) and the leaves, stems and roots were examined with the aid of forceps. All invertebrates retrieved from the respective regions were placed in 4% formalin. The invertebrates were identified to the lowest possible taxonomic levels using keys by Quigley (1977), Pennak (1953), Ward and Whipple (1950).

The diversity index and species richness of organisms found in the creek was determined as described by Margalef (1958).

$$d = \frac{S - 1}{\text{Log}_e N}$$

where:

d = community species diversity.
S = number of species.
N = total number of individuals
Log_e = natural logarithm.

The various invertebrates collected from the leaves, stems and roots were subjected to T-tests to find out if there was any significant difference between them.

Table 1. Number of *Ipomea aquatica* harvested in Ogbe creek, Lagos, Nigeria.

Sampling period	Number harvested
Sampling 1	12
Sampling 2	13
Sampling 3	15
Sampling 4	16
Sampling 5	09
Sampling 6	05
Sampling 7	03
Total	73

Results and Discussion

167 invertebrates comprising of 19 species were harvested from the 73 weeds (Table 2). The most abundant invertebrate on *Ipomea* was *Corixa punctata* (22.16%) while *Gyrinus notator* larvae (0.60%) were the least abundant.

The leaves, stems and root of *Ipomea aquatica* were colonized by different assemblages of invertebrates (Fig. 1A-C).

The roots sheltered the highest number of invertebrates (113) comprising of 12 species and recording a species diversity of 5.36, while the stem sheltered the lowest number of invertebrates (10) comprising of 3 species with a species diversity of 2.00 (Fig. 2).

The number of invertebrates found on the roots was significantly higher than those on the leaves and stem ($P < 0.01$) while the number of invertebrates found on the leaves was not significantly higher than those found on the stem ($P > 0.0\ 1$). The ability of *Ipomea aquatica* to harbour invertebrates was

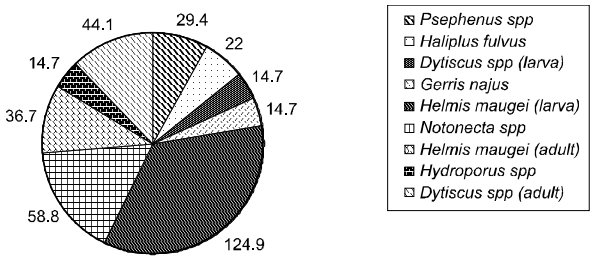

Fig. 1A. Population densities of invertebrates on leaves of *Ipomea aquatica* in Ogbe creek, Nigeria.

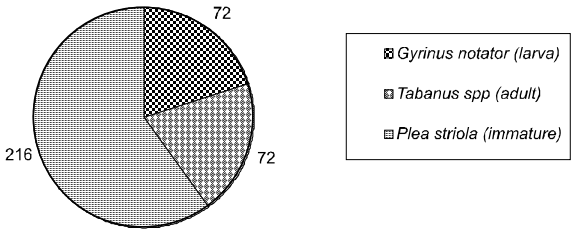

Fig. 1B. Population densities of invertebrates on stems of *Ipomea aquatica* in Obge creek, Nigeria.

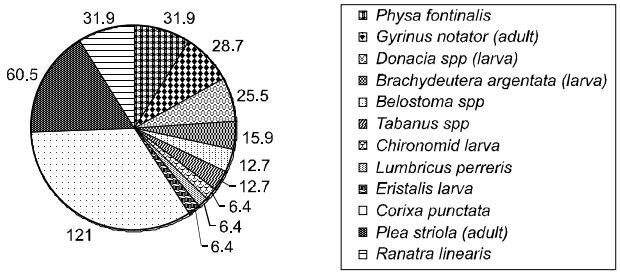

Fig. 1C. Population densities of invertebrates on roots of *Ipomea aquatica* in Ogbe creek, Nigeria.

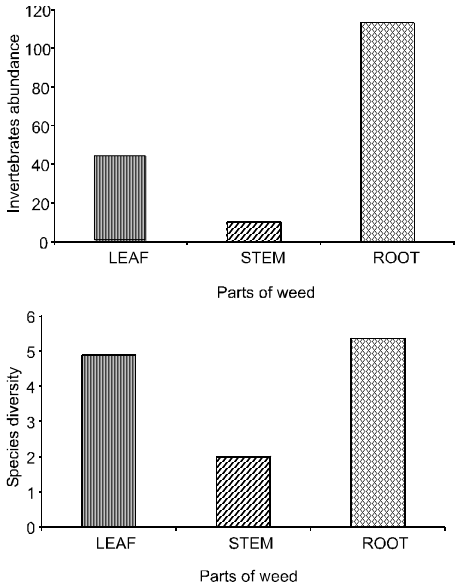

Fig. 2. Abundance and species diversity of invertebrates on *Ipomea aquatica* in Ogbe creek, Lagos, Nigeria.

Table 2. Abundance and percentage composition of invertebrates found on *Ipomea aquatica* in Ogbe creek, Lagos, Nigeria

Species	Family	Number	Percentage composition
Gyrinus notator (L)	Gyrinidae	01	0.60
Chironomid larva	Chironomidae	02	1.20
Lumbricus perreris	Lumbricoides	02	1.20
Eristalis bastardi	Syrphidae	02	1.20
Gerris najus	Gerridae	02	1.20
Hydroporus sp	Dytiscidae	02	1.20
Plea striola (L)	Pleidae	03	1.80
Psephenus	Psephenidae	03	1.80
Haliplus fulvus	Haliplidae	03	1.80
Dytiscus (L)	Dytiscidae	03	1.80
Belostoma sp	Belostomatidae	04	2.40
Helmis maugei (A)	Elmidae	05	2.99
Tabanus sp (L)	Tabanidae	05	2.99
Brachydeutera sp	Ephydridae	05	2.99
Dytiscus (A)	Dytiscidae	06	3.59
Donacia sp	Chrysomelidae	08	4.79
Notonecta	Notonectidae	08	4.79
Gyrinus notator (A)	Gyrinidae	09	5.39
Physa fortnalis	Physidae	10	5.99
Ranatra linearis	Nepidae	10	5.99
Helmis maugei (L)	Elmidae	17	10.18
Plea striola (A)	Pleidae	20	11.98
Corixa punctata	Corixidae	37	22.16
19		167	100%

Key: L = Larvae; A = Adult

influenced by the morphological form of the plant. Complexity in structure and form of aquatic weeds has always been regarded as a major factor influencing their species assemblage. Humphries (1996) found great abundance of individuals, taxonomic richness and abundance of the common taxa of phytophilous macro invertebrates in the macrophytes with the most complex structure. The presence of the weed created a new niche for the existence of animal species in Ogbe creek. Macrophytes have been known to increase the amount of habitat per area of benthos. (Humphries, 1996; Newman, 1991).

The most abundant species of invertebrates associated with *Ipomea* in Ogbe creek was *Corixa punctata.* This correlated with an earlier study by Saliu (1989), in which Hemipterans and Odonates were the most predominant invertebrates associated with *Pistia stratiotes.*

However, this was different from *Eichhorina crassipes* where detritivores most frequently oligochaetes dominated the species assemblage (Paulo *et al.,* 2001) and *Salvinia* where *Chironomid* larvae, Oligochaetes and Odonates were the abundant species (Callisto *et al.,* 2002).

The root of *Ipomea* supported the highest number and species of invertebrates compared to other parts. This was due to its ability to form a suitable substrate for clinging because of its fine division, a suitable medium for eggs and a place with good nutrient supply. Some authors have similarly reported the roots of aquatic plants as a preferred site for invertebrates (Callisto *et al.,* 2002; Paulo *et al.,* 2001). Though the presence of *Ipomea aquatica* created a new niche for the existence of invertebrate species in Ogbe creek, its impact as an invasive species on the native biota could not be predicted and may need further investigations.

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