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Spartial Distribution Of *Neochetina Eichhorniae* (Coleoptera: Curculionidae) On Water Hyacinth

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Abstract

Twenty adults of Neochetinaeichhorniae Warner were released on water hyacinth which was kept in a 5 litres water container, screened by a 30 cm diameter x 180 cm high cylinder wire cage covered at the top with a piece of white cloth. Five replicates were set-up. The set-up was kept in an outdoor screened cage on the grounds of the Department of Zoology, University of Ibadan, Ibadan Seven day later , the number of N. eichhorniae Warner found on the different parts of the water hyacinth at a particular time (12:00 hours)of the day was recorded for five days. The insects were found to aggregate more around the rhizomes and the roots of water hyacinth. These are regions of the water hyacinth that were in contact with the medium. The number of insects found dead increases as the days increased.

Keywords: Neochetinaeichhorniae, Distribution, Spatial, Replicate, Water hyacinth, Rhizome, Insect

1.0 Introduction

In virtually all areas where water hyacinth occurs as an aggressive alien element in fresh-water ponds, reservoirs, water ways and others the plant causes a number of problems to man. Dense and large masses of the weed impede fishing and the flow of water in irrigation systems. It prevents the free movement of boats and other navigation vessels. It reduces the volume of available fresh water by increasing losses through evapo-transpiration (Gopal and Sharma,1981).It competes with agricultural crops in cultivated areas. It impairs the quality of water, causes serious disruptions to other aquatic life including fish and plankton. It provides suitable habitat or food or both for molluscan and insect vectors disease like schistosomiasis and malaria (Seabrook,1962). It promotes silting and gradaul drying up of stagnant water bodies, and serves as alternative hosts of destructive organisms like crop pests and pathogens (Andres and Bennett, 1975).The weed can do all these because it is dispersed in a number of ways. The plant may be carried from one water body to another by flood, waves, or currents. The weed catches on the sides and bottoms of ships and boats and in this way it is carried passively from one region to another and even upstreams. Biological control of water hyacinth was first given serious attention in the United States in the1960's. At that time a snail (*Marusasp*) and the West Indian Manatee *(Trichechusmanatus*) were even considered as possible biological control agents (Subramanian, 1987). In 1968, Perkins of the U.S department of Agriculture was assigned the task of determining if there were any insects on water hyacinth in its native range that might be useful as biological control agent. This led to concerted efforts on the biological control of water hyacinth. Perkins (1973a; 1974) found that *Neochetinaeichhorniae Warner* did not attack beneficial plants and then subsequently introduced it unto United State (Perkins 1973b); he made early observations of the biology of *N.eichhorniae*and *N.bruchi. Deloach* (1976) and Perkins and Maddox(1976) tested the host specificity of *N. bruchi*and found that it was safe to introduce. Water hyacinth (*Eichhorniacrassipes*) was reported to have infested Nigeria's freshwater lagoons through Ogun and Lagos State (Badagry Creek) in 1984 and from the neighboring Benin Republic (Adekoya, 1995). By 1987, it had spread to the waterside fishing villages prompting the Ogun State Government's financed manual clearing by the fishermen, which was successful. This led to the desertion of some fishing villages eventually. Two successive diagnostic survey teams working for the Ogun State Agricultural Development Programme (OGADEP), Abeokuta in April and June 1991 respectively found the encumbrance of water hyacinth

at their fishing canal in Ado-Odo/Ota Local Government Area of Ogun State to have attained severe proportions on the livelihood of the fisher folk. A formal appeal for assistance through the use of the herbicidal (chemical) method of the control came from the fishing community of the OGADEP management in July 1991. The Ogun State Agriculture Development Programme subsequently commissioned the Department of Plant Science, Obafemi Awolowo University, Ile-Ife to carry out an assessment survey of water hyacinth infestation in Ogun State (Akinyemiju 1993). Based on the pilot demonstration of the herbicidal control of water hyacinth at Ere, in Ado-Odo/Ota Local Government Area of Ogun State and similar ones conducted in Nigeria and elsewhere in the world, the principle of the herbicidal control of the water hyacinth in Nigeria was recommended on a nation-wide scale. However, the use of chemicals (herbicides) is known to impact negatively on the ecosystem. Therefore, the objective of this work is to employ a biological control method which is known not to have any negative effect. The deposition*of Neochetina eichhorniae* on water hyacinth is therefore determined.

2.0 Materials And Method

Calculating the herbivore loads i.e. the number of adult *N. eichhorniae* per plant organ, twenty adults of *Neochetinaeichhorniae* were released on water hyacinth kept in a 5-litre water container, screened by a 30cm diameter x 180 cm high cylinder wire cage covered at the top with a piece of white cloth. Five replicates were set-up. The set-up was kept in an outdoor screened cage on the grounds of the Department of Zoology. University of Ibadan, Ibadan. The insects were left on the water hyacinth for seven days before recordings were taken. The number of *N. eichhorniae* found on the different parts of the water hyacinth at a particular time (1200 hours) of the day was recorded for 5 days. The temperature of the environment was recorded using a mercury – in glass bulb thermometer.

3.0 Results

On the first day,a total of 46 adult *Neochetina eichhorniae*from the five replicates were seen alive on the rhizome . Eighteen *N.eichhorniae*were seen on the roots, seven of them were on the petioles with only two seen on the leaves. On the second day, 24 *N.eichhornae* were seen on the rhizome, 25 of them were seen on the roots, 12 of these weevils were seen on the petioles and 10 on the leaves. On the third day, the rhizomes had 18 weevils, roots had 28 weevils and the petiole and the leaves had 10 weevils each on them. On the fourth day, 25 weevils were seen on the rhizome, 20 weevils were seen on the roots while the petiole had 5 weevils and the leaves had 4weevils. On the fifth day, 17 weevils were seen on the rhizomes, 23 weevils were on the roots, 3 weevils were seen onthe roots, 3 weevils were seen on the petiolesand 5 weevils on the leaves. The data for each day was the addition of all insects on each segment of the water hyacinth in the five replicates. Some of the insects were found dead in the set-up. The number of dead insects increased on daily basis. On the first day, it was 27, second, third, fourth and fifth day were 29,34,46 and 52 respectively Table 1.

4.0 Discussion

The results of the study revealed that adults of *Neochetinaeichhorniae* aggregated more on the

Table 1: Showing the distribution of *N.eichhorinae* on different parts of water hyacinth

Days	Rhizomes	Roots	Petioles	Leaves	Dead insects	Total
1	46	18	7	2	27	100
2	24	25	12	10	29	100
3	18	28	10	10	34	100
4	25	20	5	4	46	100
5	17	23	3	5	52	100

rhizomes and roots of the water hyacinth. *N. eichhorniae*preffered the rhizomes and roots of water hyacinth because these parts of the plant is always in contact with aquatic medium which is the only medium in which these weevils can survive. The feeding action of the adults and the newly hatched larvae on tissues of the plant result in the cutting of the rhizomes of the water hyacinth which renders the petiole and the leaf parts on the plant to wilt and consequently the whole plant rot away. Stark and Goyer(1983) reported that adult *N.eichhorniae* move rapidly from positions on the leaves and petioles to the base of the plant when exposed to light. In this experiment the insects aggregate more around the rhizome, which is the base of the plant. The waterhyacinth plants were eaten up at the base and cut into two causing rotting and thereby controlled.

As the adults and the larvae burrow and feed within the roots and rhizomes a great deal of damage to the plant occurred. The feeding galleries often become water-logged and necrotic and they were evident as long, brown lines visible on the outside of the rhizome. When several of these galleries converge at the rhizome base, the extensive damage to the vascular tissues caused the leaf to wilt. In extreme cases, the larval gallery collapses causing a sunken line of scar-like tissue. As the larvae mature and enter the stem, the damage caused is relatively superficial. Moreover, when many larvae are present, this damage becomes substantial and causethe stem to fragment and the shoot to fall apart. Also, when large numbers of the larvae are present, the chance of one reaching the apical bud increases. Since this is the growing point of the shoot, if it is destroyed , the shoot dies.

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