PEG. The principle of minimum virus solubility at and near its isoelectric point is used in virus precipitation by acidification. The virus precipitated with acetic acid gave almost typical UV absorption spectrum (figure 1) as compared to potyviruses. The ratio of absorption at 260 nm and 280 nm of 1.29 indicated that the virus contained about 5% nucleic acids[3]. Flexuous filamentous particles measuring c.730 nm long (figure 2) were observed, a characteristic feature for the members of potyvirus group[4].

Pergularia mosaic virus resembles members of potyvirus group in its shape and length, thermal inactivation point (58°C for 10 min), dilution end point (1:200), and longevity *in vitro* (30 hr at 30–35°C and 23 days at 10–15°C). It resembles a potyvirus of milkweed vine virus in particle morphology and physical properties but the host range of milk weed vine virus is limited to 6 genera in the Asclepiadaceae[5], whereas the present virus has the host range outside the Asclepiadaceae[1]. The present virus was precipitated without losing its infectivity by 4% PEG + 0.2 M NaCl as of many potyviruses. Hence the present virus is a member of potyvirus group.

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SPODOPTERA LITURA AS A BIOCONTROL AGENT OF *EICHHORNIA CRASSIPES*

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WATER hyacinth infestation is an alarming problem to water reservoirs. Kerosene burners to laserbeams[1] have been conceived as a means of control to eradicate this weed. Chemical control of this weed by means of herbicides, weedicides and fungicides has proved to be expensive and toxic to the environment, hence natural control of the weed has gained importance.

Biological control of water hyacinth necessitated a search for natural enemies because of its long-term benefits[2]. A biocontrol agent once established, becomes an integral part of the environment and as such is considered to be a self-renewable source[3]. Bennett[3] has listed many of the polyphagus pests as natural enemies to water hyacinth. In this paper authors report the observations on another polyphagous pest, *Spodoptera litura* which has been found to infest water hyacinth in the natural environment.

Field surveys showed that stands of *Eichhornia crassipes* (water hyacinth) were heavily infested by the larvae of *S. litura*. The damaged plants from the fields were collected and brought to the laboratory to assess the extent of damage and to study the life cycle of the insects. Parallel experiments with laboratory maintained cultures of *S. litura* were also run by introducing these insects to small areas of water hyacinth plants. The adult moths were released into cages of about 4.5 ft in length, 3 ft width and 4 ft height containing hyacinth plants. The cages were covered with polythene net on all sides leaving a provision to catch the adults and larvae. The adults were observed to oviposit on fresh foliar leaves. The eggs hatched into 1st instar larvae within three days. The newly hatched larvae caused superficial damage to the leaves, but as they grew in size they fed voraciously and tunnelled into the petioles and entered into the prepupal stage after 12–14 days. At this stage, feeding was totally stopped and the dormant larvae pupated in the tunnels and underwent an incubation period of five days before they emerged into adults. Adults were collected for further rearing and the damage caused by the larvae were assessed and the results are presented in the photographs.

Since field observations revealed extensive damage by *S. litura* on water hyacinth, experiments were designed to study its life history and its role as a biocontrol agent. Some investigators[1,2,4] have shown that the lepidopteron pests like *Sameodes albiguttalis*, *Arzama densa* and *Acigona infusella* also caused considerable damage on water hyacinth. Our studies revealed that the larval stages of this lepidopteron moth caused 20–25% damage (figure 1).

The sites of these larval attacks were good sources for secondary fungal infections which were studied for their pathogenicity[5]. It is known that pathogenic and

Figure 1. *Spodoptera* larva chewing its way into the petiole of *Eichhornia crassipes*.

Figure 2. *Spodoptera* pupating in the petiole of *Eichhornia crassipes*.

saprophytic fungi generally need damaged or punctured surface to start their growth and establish their colonies abundantly. It was observed that other insect larvae damage only leaf surfaces, whereas *S. litura* caused damage not only to the leaves but also to the petioles (figure 2). The tunnel lesions caused by *S. litura* were found to run from the base of the leaf to extreme end of the petiole (figure 3). Therefore, it is suggested that this pest could be used for integrated weed control program in the absence of other specific or exotic biocontrol agents. The extent of damage caused by *Spodoptera* to water hyacinth however was only half the damage caused on cotton or

Figure 3. Extent of damage on water hyacinth by *Spodoptera* larvae.

castor leaves which are the moth's favourite feed. But the pupae incubating in tunnels caused extra-damage in water hyacinth plants when compared to castor and cotton plants. Our studies also showed that the life cycle of *S. litura* in field conditions were shorter than the laboratory conditions (laboratory cultures), the differences in period between the laboratory bred and field bred insects was found to be 6 days. But since this pest is polyphagus in habitat, caution is required to consider their extensive use as biocontrol agents.

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