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Eco-friendly Management Strategies Use against Leaf Webber and Capsule Borer in Sesame

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SUMMARY

Antigastra catalaunalis (Sesame leaf webber and capsule borer) is one of the divesting sesame pests in India. The crop begins to attack from the seeding stage until the pod's maturity and almost damages all parts of the plant (shoot, leaf, flower and pod). Severe attacks at the early stage of the crop can result in complete crop failure, especially in rain-fed areas. The pest is often regulated by the application of synthetic chemicals. High manufacturing costs, impacts on non-targets and health risks would result solely from dependence on synthetic chemicals. Some of the eco-friendly methods that might help deter and handle this pest efficiently rather than control it are recommended in this paper.

INTRODUCTION

Sesame (*Sesamum indicum* Lin.) is one of the oldest oilseed crops grown in India, known as the 'queen of oil seeds.' India ranks first in the region under cultivation, comprising 30% of world output, and the main sesame cultivation states are Rajasthan, Maharashtra, Gujarat, Madhya Pradesh, Andhra Pradesh, Karnataka, Uttar Pradesh, West Bengal, Orissa, Punjab and Tamil Nadu. It is also grown in Kerala, Himachal Pradesh, North Eastern Hill States and Pondicherry in Assam, Bihar, Haryana, Jammu and Kashmir. Among the different production constraints, insect pests are crucial. The most significant pests in India are pests such as leaf webber and capsule borer (Antigastra catalaunalis), gall midge (*Asphondylia sesami*), sphingid moth (*Acherontia styx*), leaf hopper (*Orosius albicinctus*) and white fly (*Bemisia tabaci*). Of these, *Antigastra catalaunalis* (Lepidoptera: Pyralidae), sesame leaf webber and capsule borer, is the infamous sesame pest and causes up to 90% losses (Ahuja and Bakhetia, 1995).

Biology

Adult moths with orange-brown forewings and light yellow transparent hind wings are tiny in size. On the under surface of the apex of the tender leaves or on flowers, a female laid about 15-300 greenish minute eggs. Depending on the temperature, the egg stage lasted for 2 to 7 days and the larvae were fully grown in 10 to 11 days under 5 instars. Pupation, in a thin transparent cocoon, takes place within the webbing, under fallen leaves or in soil cervices. The pupal period lasted, depending on the weather, for 4 to 19 days. The adult life period was 6 to 8 days. The completion of the overall cycle was 67 days in the winter and 23 days in the summer.

Nature/Extent of Damage

The leaf Webber and pod borer strike all parts of the sesame plant except the root and by webbing top leaves it feeds on the tender foliage and bores into the shoots and capsule as well. Singh (1983) recorded 10 to 71 percent infestation of plants and 10 to 43.5 percent infestation of capsules, resulting in yield loss of 8.9 to 71.5 percent; 66.31 percent loss of seed per capsule (Kumar and Goel, 1994). The larvae roll the leaves of the host plant in a sort of nest made by weaving the leaves together, feeding on the tender shoots and the leaves. It also brings in the plant's green pods; the seeds are therefore entirely or partially lost. Right from the beginning of development, pest attacks both the summer and *Kharif* crops and if the infestation occurs at a very early stage, the plants die without producing any branch or shoot, and two to three plants could be killed by a single caterpillar in a week.

If infestation occurred at a later stage, the infested shoot remains without further growth. The development of flowers ceased at the flowering stage beyond the point of infestation and the larval bored into green pods during the pod forming, partially and entirely destroying the pod material. The intensity of damage observed varies with the cultivar and plant with greater number of leaf trichomes chosen for egg laying by adult moth (Karuppaiah and Nadarajan, 2013) and the intensity of locule damage in susceptible varieties has also been found to be high (Karuppaiah and Nadarajan, 2011).

Strategies for Management

Control by Cultural method

During June and July, seeding the crop would avoid the damage of the leaf Webber and delayed sowing contributed to a significantly higher level of damage to leaves, flowers and pods and poor yield (Patra, 2001). In *Kharif* crop, pest load was found to be less compared to late sown. Pigeon pea intercropping (Nath et al., 2002) and black gram, green gram, cluster bean, sorghum and pearl millet (Ahirwar et al., 2009; Ahuja et al., 2009) found that the damage to the leaf Webber was substantially reduced.

Control by Mechanical method

Furthermore, the selection and removal of infested sections of plants minimizes caterpillar damage. The population build-up would be decreased where necessary by the manual selection and removal of larvae.

Control by Biological method

Conservation of existing natural enemies (spiders, coccinellid beetles, predatory stink bugs, preying mantids, black ant) and parasitoids (braconids and Ichneumonids) by ETL-based application of botanical insecticides and safer chemicals (2 webbed leaves / sq. m or 10 percent damage). Increased release of parasitoids viz., Trathala flavoorbitalis (Behera, 2011) and species of Apanteles and predators such as *Chrysoperla carnea* will also reduce the growth of the population.

By bio-pesticides Application

1 percent neem oil spray or 5 percent Neem Seed Kernel Extract at the early stage of infestation. The use of bio-inoculants (Azospirillum) induces insect resistance among the treated plants and, by increasing phosphorus and potassium levels in the plants, reported minimum leaf damage (Anandh *et al*., 2010) (Selvanarayanan, 2013).

IPM Module

The *Antigastra catatlaunalis* infestation is reduced from 24.79 to 13.04 by a module comprising sesame intercropped with green gram and spray of 9 ppm Azadirachtin at flowering stage (Ahuja *et al*., 2009).

CONCLUSION

As it damages all the stages of the crop, the leaf Webber and capsule borer are capable of causing substantial yield loss. Therefore, the Single Control Strategy cannot provide satisfactory control and better control can be given by integrated strategies, which would be more economical and ecologically sustainable. For the effective management of this potential pest, periodic field monitoring and ETL-based application of the prescribed botanicals and synthetic chemicals at the right time at the right dose will be more fitting.

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