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Studies on the Insect - Pests of Brinjal and their Management in Rajasthan Regions

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Introduction

Brinjal is the one of the most popular and economically important vegetables among small-scale farmers and it is a source of cash income for resource. Among the various pests of brinjal, shoot and fruit borer were most destructive and the major limiting factor in quantative as well as qualitative harvest of brinjal fruits. Polyphagous insects like hadda beetle, ash weevils, leafhoppers and aphid also cause severe infestation. The present article gives emphasis on the identification, life cycle, nature of damage and sustainable management of major insect pests of the brinjal.

Insect pest of brinjal

- Shoot and Fruit Borer, *L. orbonalis* (Pyraustidae: Lepidoptera)
- Hadda Beetle, *Henosepilachna vigintioctopunctata* (Coccinellidae: Coleoptera)
- Grey weevil, *Myllocerus subfasciatus or M. maculosus* (Curculionidae: Coleoptera)
- Aphid, *Aphis gossypii and Myzus persicae* (Aphididae: Homoptera)
- White Fly, *Bemiesia tabaci* (Aleurodidae: Hemiptera)
- Brinjal stem borer, *Euzophera perticella* (Pyralidae: Lepidopera)
- *Leaf hopper, Amrasca biguttula biguttula* (Cicadellidae: Homoptera)
- Brinjal lace wing bug, *Urentius hystricellus or U.sentis* (Tingidae: Hemiptera)
- Red spider mite, *Tetranychus telarius* (Tetranychidae: Acarina)

Shoot and fruit borer - Fruit and shoot borer is one of the most serious pest of brinjal throughout the country.

Nature of Damage: The larva bores into tender shoots in the early stage and causes dead hearts and also bore into flower buds and developing fruits causing shedding of buds and making the fruits unfit for human consumption and marketing. The damage results in

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drooping of tender shoots and wilting in vegetative stage and holes on the infested fruits filled with excreta.

Life cycle: The adult female lays 250 eggs singly on tender shoots and developing fruits of brinjal. The pinkish larva with distributed hairs on the body and brownish head. It pupates in a tough greyish cocoon on the plant itself. The egg, larval and pupal periods occupy respectively 3-5, 15 and 6-8 days.

Management strategies:

- The damaged portions of the plants and fruits should be removed and destroyed.
- Continuous cropping of brinjal and potato in the same area encourages the pest activity and hence proper rotation should be followed.
- Variety Bhagyamathi is tolerant to the pest damage and suitable for coastal Andhra.
- Use of pheromone traps @ 10 per acre area.
- Larval parasitoids, *Pristomerus testaceus*, *Trathala flavoorbitalis*, *Microbracon greeni*, *Pseudoperichaeta sp*. suppress the population.
- Three spraying with profenofos 50 EC 2 ml/l or cypermethrin 10 EC 1ml/l at 10 day interval from 3 weeks after transplanting.
- Sprey any one of the following chemicals starting from month after planting at 15 days interval.

Insecticides	**Dose**
Azadirachtin 1.0% EC (10000 ppm)	3.0 ml/Lit.
Azadirachtin 0.03 % WSP (300 ppm)	5.0 g/Lit.
Emamectin benzoate 5 % SG	4.0 g/Lit.
Flubendiamide 20 WDG	7.5 g/10 Lit.

Hadda Beetle - Hadda Beetle are distributed from East Asia to south Asia and Australia. This is polyphagus pest and feed predominantly on cucurbits, tomato, potato and kidney bean as well as brinjal.

Nature of Damage: The grubs and adults scrape the leaves of brinjal plant. They feed on the epidermal layers of leaves which get skeletonized and gradually dry away.

Life cycle: The female lays elongate, spindle - shaped yellowish eggs in groups of 10-20 on the under surface of leaves. About 120-180 eggs laid by a female and egg period is 2-4 days.

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The yellowish spiny grubs become full grown in 10-35 days and pupate on the leaf or stem. The pupa is hemispherical, yellowish with spines on the posterior part and anterior portion being devoid of spines. Adult emerge in a weekand live for a month feeding on leaves. The total life – history takes 17-50 days depending on weather condations

Management:

- Collection and destruction of affected leaves along with the eggs, grub and adults.
- Egg parasitoid, *Tetrastichus ovularum*, larval prasitoid, *Ugamenoni* control the population of pest during March- July.
- Spray application of cypermethrin 10 EC 0.025% or 50 EC 0.05% and carbaryl 50 WP 3g/Lit. are effective to control this pest.

Grey weevil - It is the polyphagous pest occurring on a number of crops like cotton, sorghum, pearl millet and maize all over india.

Nature of damage: The adult beetles feed on leaves of brinjal and the grubs feed on roots and cause wilting and death of plants, occasionally the insect assumes serious pest on the crop.

Management:

- Collection and destruction of adult weevil.
- In endemic areas apply carbofuran 3G@ 15 kg/ha, 15 days after planting.
- Drenching 0.1% chlorpyriphos 20 EC emulsion into the soil before transplanting.
- Inter-culture of the crop regularly to prevent population build up and carryover of these weevils.

Aphid - Both the species occur in all places in all seasons. The incidence is more in cool and humid season. *Aphis gossypii* is attacking on cotton, okra, chillies and guava.

Nature of damage: Both nymphs and adult are found in large number sucking the cell sap from leaves and tender apical shoot. The under surface of the leaves crinkled and slightly curled backwards. The adults of *A. gossypii* are yellowish-green to dark green in colour while nymphs are greenish-brown and adult of *M. persicae* are usually of green colour.

Life Cycle: Aphid reproduce through parthenogenesis (development of embryo without mating with males) and are viviparous (give birth to nymphs directly rather than eggs). Both wingless and winged forms occur. Winged forms are produced predominantly under high

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population density conditions, inferior host plant quality etc. The wingless forms are more common. They possess a pair of black coloured cornicles on the dorsal side of the abdomen. Aphids mostly are found in groups. Each female produces about 20 nymphs a day, which become adults in a week.

Management:

- It is managed by release of first instar grub of *Chrysoperla carnea* @ 10,000 per hectare.
- Conservation of coccinellids and syrphids that are found to feed on the aphids will reduce the numbers considerably without any insecticidal spray.
- The ladybird beetles (*Menochilus sp. and Coccinella sp.*) and green lacewings are efficient predators of aphids.
- Inundative release of ladybird beetles @ 200 pairs per ha at fortnightly intervals can suppress the aphid population.
- Two to three sprayings at 10-12 days interval with 0.05% dimethoate 30EC or 0.01% imidacloprid 17.8 SL.
- Spray any one of the following insecticides are Dimethoate 30 EC 500ml/ha, Acetamiprid 20% SP 50 g/ha, Buprofezin 25% SC1000 ml/ha, Imidacloprid 17.8% SL 100 -125 ml/ha, Profenofos 50% EC 1000 ml/ha and Thiamethoxam 25% WG 100 g/h.

Whitefly - The whitefly is widely distributed in tropical and subtropical regions, and in greenhouses in temperate regions. *B. tabaci* is highly polyphagous and is known to feed on several vegetables including tomato, eggplant and okra, and on field crops and weeds. Hot and dry conditions favour the whitefly. This insect is active during the day and settles on lower leaf surfaces at night.

Nature of Damage: Nymphs and adults suck the plant sap and reduce the vigour of the plant. In severe infestations, the leaves turn yellow and drop off. When the populations are high they secrete large quantities of honeydew, which favours the growth of sooty mould on leaf surfaces and reduces the photosynthetic efficiency of the plants.

Life cycle: The females mostly lay eggs near the veins on the underside of leaves. Each female can lay about 300 eggs in its lifetime. Eggs are small, pear-shaped, and vertically attached to the leaf surface through a pedicel. Egg period is about 3 to 5 days during summer

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and 5 to 33 days in winter. After hatching nymphs moves on leaf surface to find a suitable feeding site. The nymphs are flattened, oval-shaped, and greenish-yellow in colour. Nymphal period is about 9 to 14 days during summer and 17 to 73 days in winter. Adults emerge from puparium through a T-shaped slit, leaving behind empty pupal cases or exuviae. The whitefly adult is a soft-bodied, moth-like fly. The wings are covered with powdery wax and the body is light yellow in colour. The wings are held over the body like a tent. The adult males are slightly smaller in size than the females. Adults live from 1 to 3 weeks.

Management:

- The field selected for brinjal or seedling production should be clean and not be located near any host plants and weeds.
- Grow eggplant seedlings in insect-proof (50–64 mesh) net houses, net tunnels, greenhouses, or plastic houses.
- Use yellow sticky traps at the rate of 1-2 traps/ 50-100 m^2 to trap the whiteflies.
- Plant fast-growing crops like maize, sorghum, or pearl millet in the border of the field to act as barriers to reduce whitefly infestations.
- Spray any one of the following insecticides are Dimethoate 30 % EC @1 ml/lit ,Thiamethoxam 25 % WG @ 4 g/10 lit. and Buprofezin 25 % SC @ 1 lit. /ha.

Brinjal stem borer - It is distributed in all over India where crop is found.

Nature of damage: It attacks on stem of pencil thickness. The entry of the caterpillar is near the ground level of the stem at leaf or branch axil and covers the hole with excreta and frass.

Life cycle: The cream-coloured eggs are laid either singly or in groups on the tender leaves, shoots, and petioles. The eggs are elongate and flat. The egg period varies from 3 to 10 days. The larva is white or yellowish white in colour with several bristly hairs and an orange-brown or red head. The larval period is about 4 to 8 weeks depending on the temperature. Larvae pupate within silken cocoons inside the feeding tunnel the stem or in the soil. The pupal period is about 1 to 2 week. The total life cycle is completed in 35-76 days and the pest has 5-6 overlapping generations in a year.

Management:

- Avoiding ratoon of the brinjal crop, uprooting and burning the infested plants before planting the new crop to avoid carryover of the pest to the next crop.

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- Use of light traps @ 1/ha to attract and kill the moths. Conserve larval parasitoids *Pristomerus testaceus, P. euzopherace* for control the pest.
- Foliar spray with dimethoate 30 EC 2g/ l or cypermethrin 10 EC 2ml/l of water is effective.

Leaf hopper - It is a polyphagous pest attacking okra, brinjal, beans, castor, cucurbits, hollyhock, potato, sunflower and other malvaceous plants.

Nature of Damage: The nymphs and adults remain on the under surface of the leaves and suck the cell sap and while feeding inject their toxic saliva. The plant become stunted, leaves crinkle, turn yellowish and become cup shaped.

Life Cycle: Adult females lay eggs along the midrib and lateral veins of the leaves. The egg period is 4 to 11 days. The nymphs resemble the adults, but lack wings. Instead, they have slightly extended wing pads. They are pale green in color. The nymphal period varies from 1 to 4 weeks depending on the temperature. The adults are wedge-shaped, pale green insects. They have fully developed wings with a prominent black spot on each forewing. The adults may live for 1 to 2 months.

Management:

- Choose tolerant or resistant cultivars like ManjariGota, Vaishali, MuktaKesi, Round Green, and Kalyanipur T3.
- Use yellow sticky traps.
- Grow okra as a trap crop along the borders of a brinjal field.
- Conserve parasitoids such as *Anagrus flaveolus* and *Stethynium triclavatum* which are effective against leafhopper.
- Spray Neem seed kernel extract (NSKE) @ 5%. Spray of 0.04% phosphamidon or 0.01% imidacloprid. Application of 5% dimathoate granules in seed furrows @ 20 kg per hectare.

Brinjal lace wing bug - The lace wing bug is distributed in the north western parts of Indian sub-continent and is common in the plains. Except for brinjal, it has not been recorded feeding on any other plant.

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Nature of Damage: The nymph and adults suck the sap from leaves and cause yellowish spots which, together turn with black scale like excreta and exuviae deposited by them. The pest is most abundant in August-September. When the attack is severe, about 50 per cent of the crop may be destroyed.

Life cycle: A female bug lays about 75 shining white nipple shaped eggs singly in the tissues on the underside of leaves. The eggs hatch in 3-12 days and the nymphs feed gregariously on the lower surface of the leaves, but fully developed nymphs are found feeding and moving about individually on the lower surface as well as on the upper surface of leaves. Nymphal period lasts in 10-23 days and full grown nymphs are pale ochraceous and are stoutly built, with prominent spines. Adult bugs are measures about 3 mm in length and are straw coloured on the dorsal side and on the ventral side. The insect passes through 8 overlapping generations in a year.

Management:

Foliar spray with methyl demeton 25 EC 2ml/l or dimethoate 30 EC 2ml/l is effective.

Red spider mite - Red spider mite emerge as a serious pest of vegetable crops including eggplant, tomato, French bean and cucumber. Low relative humidity favours the multiplication of mite and precipitation is only important abiotic factor that restricts spider mite populations. They are found in large colonies on underside of leaves protected by the silk webbing constructed by the female.

Nature of damage: They are polyphagous infesting brinjal, okra and bean. Leaves present a characteristic blotches which become whitish then brown patches appear. Later the entire affected leaf become discoloured and dried up.

Life Cycle: Eggs are globular in shape and whitish in colour. Larvae are pinkish in colour. Nymphs are greenish-red in colour. There are only 2 nymphal stages, protonymphhal and deutonymphal. Adults are ovate in shape, reddish brown in colour with 4 pair of legs. Eggs hatch in 4-7 days and larval development takes 3-5 days, protonymphal and deutonymphal stages last for 3-4 days each. Longivity of adult males and females is 4-9 and 9-18 days respectively. The females that are active during summer in northern India become active with the onset of monsoon and lay eggs parthenogenetically.

Management:

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Spraying with wettable sulphur 3-5 gm/l or dicofol 2.7 ml/l or spiromecyferan 3 ml/l or propargite 3 mi/l twice at 10 day interval are effective.