Integrated Pest Management Strategies for Okra and Brinjal

Introduction

Among various vegetables, okra, commonly known as Lady’s finger, and brinjal are the most common and extensively grown all over the country and occupy an important place in the food basket of Indian consumers. Though okra occupies maximum area (0.43 m ha) followed by brinjal (0.39 m ha) but their productivity is very-2 low. One of the major constraints identified in their production is the increasing incidence of insect pests, diseases and nematodes, sometimes resulting in substantial yield losses. Due to their tender and supple nature and their cultivation under high moisture & input regimes, okra and brinjal are more prone to pest attack and at a conservative estimate cause about 35-40% losses. To mitigate the losses due to these pests, a huge quantity of pesticides is used in okra and brinjal and it is not unusual for the vegetable growers to give 10-12 sprays in okra and 5-6 sprays in brinjal in a season and thus the fruits, which are harvested at short intervals, are likely to retain unavoidably high level of pesticide residues which may be highly hazardous to consumers. Further, the excessive reliance on chemicals has led to the problem of resistance, resurgence, environmental pollution and decimation of useful fauna & flora. With a view to minimize all these problems and to create awareness among the farmers, Integrated Pest Management strategies for okra & brinjal have been developed and validated by the Centre.

Key pests

Leaf hoper: Nymphs and adults of leaf hopper are pale green and move diagonally. The affected leaves turn yellowish and curl. In case of heavy infestation the leaves turn brick red and crumble.

Shoot and fruit borer: When the crop is young, larvae bore into tender shoots and tunnel downwards which wither, drop down and growing points are killed. In fruits, the larvae bore inside these and feed on inner tissues which become deformed in shape with no market value.

Red spider mite: Larvae & nymphs are greenish red while adults are oval, reddish brown in colour. Mites feed on the under surface of leaves and the affected leaves gradually start curling and get wrinkled and crumpled.

Yellow vein mosaic disease: Intercrissed network of yellow veins encompassing with islands of green tissues on leaves. Later, entire leaves turn yellow. This disease, spread by white fly, is economically most important disease.

Root knot nematode: Microscopic, soil borne, vermiform pests. They feed vigorously on roots and cause galling of roots. Affected plants are weak, stunted with yellow leaves.

Leaf hopper:

**Integrated Pest Management Strategies**

- **Sowing of YVMV resistant hybrids viz.** Makhmali, Tulsi, Anupama-1 and Sun-40 etc. especially during kharif season of the crop.
- **Grow maize/sorghum on borders as a barrier/trap crop for the entry of shoot & fruit borer adults.**
- **Set up yellow sticky and delta traps for white fly etc.**
- **Erection of bird perches @ 10/acre in the field for facilitating bird predation.**
- **Give two to three sprays of NSKE @ 5% alternating with sprays of pesticides, if needed, for leaf hopper, white fly, mites and aphids etc. Leaf hopper, if crosses ETL (5 hoppers/plant), spray imidacloprid 17.8 SL @ 150 ml/ha. This will be effective in controlling other sucking pests as well.**
- **Install pheromone traps @ 2/acre for monitoring of Earias vittella moth emergence. Replace the lures after every 15-20 day interval.**
- **Release egg parasitoid Trichogramma chilonis @ 1-1.5 lakh/ha starting from 30-35 days after sowing, 4-5 times at weekly interval for shoot & fruit borer.**
- **Shoot & fruit borer, if crosses ETL, (5-3 % infestation), spray cypermethrin 25 EC @ 200 g a.i/ha.**
- **Rogue out the YVMV affected plants, if any, from time to time.**
- **Periodically remove and destroy the borer affected shoots and fruits.**
- **Need based application of chemical pesticides viz.** imidacloprid 17.8 SL @ 150 ml/ha, cypermethrin 25 EC @ 200 g a.i/ha (0.005%), quinalphos 25 EC @ 0.05% or Propargite etc. 57 EC @ 0.1 % for control of leaf hoppers, aphids, white flies, borers and mites.

Natural enemies: (Beneficial insects)

- Hadda beetle: Adults are pale brown and mottled with several black spots while grubs are yellowish in colour. Eggs are cigar-shaped, yellowish in colour and laid in groups. Grubs and adults scrap the leaves, feed on the green matter and totally skeletonise the leaves.

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Extension Folder
**Aphids:** Nymphs and adults suck the sap from the leaves and the affected plants turn yellow, get deformed and dry away. Aphids also secrete honeydew on which sooty mould grows, which hampers the photosynthetic activity.

**Shoot and fruit borer:** In the initial stages, larvae bore into shoots and the growing point is killed. Appearance of wilted, drooping shoots is the typical symptom. Later larvae bore into fruits which become unfit for consumption.

**Red spider mite:** Larvae, nymphs and adults feed on the under surfaces of leaves. Affected leaves gradually start curling and finally get shrivelled.

**Phomopsis blight and fruit rot:** On leaves, disease appears as circular brown spots. Pale, sunken spots develop on the fruit later, which enlarge and cover the entire fruit surface and the internal portion of the fruit rots.

**Little leaf:** Characteristic symptoms are smallness of the leaves, shortening of the petioles and internodes of the stem and the leaves become narrow, soft, smooth and yellow. Plant appears like a bush. Fruiting is rare.

**Sclerotinia blight:** Downwards wilting of twigs occurs from top towards main stem. Fungal growth occurs near joints in severe cases. Finally whole plant wilts.

**Root-knot nematode:** The most characteristic symptom is the formation of knots or galls on the root system. Plants show stunted growth. Affected fields have patchy growth with poorly grown, stunted plants.

### Integrated Pest Management Strategies

#### Nursery raising
- Always prepare raised nursery beds about 10 cm above ground level for good drainage to avoid damping off etc.
- Cover the nursery beds with polythene sheet of 45 gauge (0.45 mm) thickness for three weeks during June for soil solarisation which will help in reducing the soil borne insects, diseases like bacterial wilt and nematodes. However, care should be taken that sufficient moisture is present in the soil for its solarisation.
- Mix 250 gms of fungal antagonist Trichoderma viride in 3 kg of FYM and leave for about seven days for enrichment of culture. After 7 days mix in the soil in a bed of 3 sq. m.
- Seed of popular hybrids like F1-321 be sown in beds in the first week of July. Before sowing, seed be treated with T. viride @ 4 gms/kg. Weeding should be done from time to time and infected seedlings should be rogued out from the nursery.
- Don’t apply pesticides just before harvesting.
- Don’t apply more than the recommended dose of the pesticide.
- Apply pesticides only when required.

#### Main crop
- Bird perches @ 10’/ acre should be erected for facilitating field visits of predatory birds.
- Delta and yellow sticky traps @ 2-3/ acre should be installed for hoppers, aphids and white fly etc.
- Give 2 to 3 sprays of 5 % NSKE against sucking pests. Sprays of NSKE also bring down the borer incidence significantly. Neem oil (2%) application is also helpful in reducing borer infestation, though marginally. If incidence of leaf hopper and other sucking insect pests is still above ETL then apply imidacloprid 17.8 SL @ 150 ml/ha.
- Pheromone traps @ 5/ acre should be installed for monitoring and mass trapping of shoot & fruit borer Leucinodes orbonalis. Replace the lures with fresh lures after every 15-20 day interval.
- Release egg parasitoid T. brasiliensis @ 1 – 1.5 lakh/ ha for shoot & fruit borer, 4-5 times at weekly interval.
- Apply neem cake @ 250 kg/ ha (in two splits) in soil along the plant rows at 25 and 60 DAT for reducing nematodes and borer damage. Don’t apply neem cake when there is heavy wind velocity or temperature is above 30°C.
- Clipping of borer damaged shoots and collection & destruction of damaged fruits i.e. clean cultivation helps in management of borer and phomosis disease effectively.
- If the borer incidence crosses ETL (5% infestation), apply cypermethrin 25 EC @ 200 g a.i/ha (0.005%) or carbaryl 50 WP @ 3 g/litre of water or endosulfan 35 EC @ 0.07%.

#### Natural enemies (Beneficial insects)

- Release egg parasitoid.
- Give 2 to 3 sprays of 5 % NSKE against sucking pests. Sprays of NSKE also bring down the borer incidence significantly.
- Neem seed kernel 25 kg, make a 5% solution and spray.
- For one ha: 25 kg kernel
- 500 litres water + 5 kg detergent

#### Do’s
- Timely sowing
- Field sanitation
- Always use freshly prepared neem seed kernel extract (NSKE).
- Apply pesticides only when required
- Wash okra & brinjal fruits before consumption

#### Don’t
- Don’t apply more than the recommended dose of the pesticide
- Don’t repeat the same pesticide consecutively
- Don’t apply mixture of pesticides
- Don’t apply highly hazardous insecticides like monocrotophos in vegetables
- Don’t apply pesticides just before harvesting
- Don’t consume produce till 3-4 days after application of pesticide.

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