



Insect Pests of Okra and their Management

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INTRODUCTION

That Okra (*Abelmoschus esculentus* L.) is one of the most common and widely grown vegetable in Pakistan. It considered as African tropical vegetable, many countries are cultivating okra crop in the world. Okra crop is known by in various names as okra, bhindi, ladyfinger and Quin ambo. Okra seeds are good source of protein, vegetable oil and rich in vitamin A and B, phosphorus and iodine, which play viral role in human diet. Okra is a powerhouse of valuable nutrients, soluble and insoluble fiber, which helps to lower serum cholesterol, risk of heart disease, keeps the intestinal tract healthy and decrease colorectal cancer. Okra crop is suffering from number of biotic and abiotic factors, including insect pests and diseases. It is attacked by a number of phytophagous insects, diseases and mites during different growth stages. Number of insect pest from sowing to harvesting such as Aphid, Jassid, Whitefly, Thrip, Spotted bollworms and Mites. Whitefly, *Bemisia tabaci* (Genn.) is the most important insect pest of okra crop. These pests are damaging crop by sucking the sap directly and by transmitting a large number of viral diseases indirectly. Jassid found a very damaging sucking insect pest of many crops in the majority areas of the growing countries of the world and has been found damaging many crops in the world. It has been observed that, both adults and nymphs cause damage while sucking sap of plants. Due to sucking the color becomes grayish or by injecting toxic saliva into the plant tissues of okra crops and fall down (Crinkling) which is the characteristic feature of jassid attack.

Shoot and fruit borer (*Earias vittella*):

Identification: The *E. vittella* moths measure about 2.5 cm across the wings and have a narrow light longitudinal green band in the middle of forewing. The full grown dull-green caterpillars are 2 cm long having tiny stout bristles and a series of longitudinal black spots on the body.

Life-history: The female moth lay 200-400 eggs at night, singly on flower buds and tender leaves of okra. Eggs are sky blue in colour. The eggs hatch in 3-4 days and the caterpillar passes through 6 stages, becoming full-grown in 10-16 days. They pupate either on the plants or outside the infested fruit or on the ground in a boat shaped cocoon among the fallen leaves and moths emerge within 8-14 days. The entire life cycle is completed in 17-29 days.

Damage: The incidence of fruit borers usually occurs during humid conditions after the rainfall. The adult female lays eggs individually on leaves, floral buds and on tender fruits. Small brown caterpillars bore into the top tender shoots and tunnel downwards the main axis which wither, droop down and growing points are killed and later on they bore into the fruits and feed within. Affected fruits become unfit for consumption.

Management: The infested fruits and shoots should be removed regularly and buried deep in the soil. Spraying with quinalphos 25 EC (2 ml/litre of water) or carbaryl (4 g/litre of water) effectively controls the pest. Before spraying all the affected plant parts should be removed.

Okra fruit borer (*Helicoverpa armigera*):

Identification:

It is stoutly built, large brown or yellowish-brown moth, about 20 mm long and dark specks that make V- shaped marks on the forewings and a conspicuous black spot in the centre. The hind wings are light and dull-coloured with black border. The larva measures 35-45 mm long and is greenish with dark broken grey lines along the sides of the body.

Life-history: The female lay eggs singly on the tender parts of the plants. A single adult female can lay 300-500 eggs in 4-7 days. The incubation period of eggs is 3-6 days. The larval period is 13-18 days. The full-grown larva pupates in soil. The pupal period last for 8-15 days.

Damage: The young larvae on hatching feed on foliage for some times and later bore into the fruits with their bodies hanging outside.

Management: Spray carbaryl 50WP 2 g/lit or profenophos 0.05 per cent or *Bacillus thuringiensis* var. *kurstaki* 2 g/lit. Collect and destroy the infected fruits and grown-up larvae. Do not spray insecticides after maturity of fruits. Apply nuclear polyhedrosis virus (HaNPV) @250-500 larval equivalent/ha.

Leaf roller (*Syllepta derogata*):

Identification: Moths are yellowish-white, with black and brown spots on the head and the thorax. They measure about 28-40 mm across the spread of wings and have a series of dark brown wavy lines on the wings.

Life-history: The female moth lay 200-300 eggs singly on the underside of the leaves. The incubation period of eggs is 2-6 days. The larval period is 15-35 days. They pupate either on the plant, inside the rolled leaves or among the plant debris in the soil. The pupal duration last for 6-12 days. The adult live for a week. The life cycle is completed in 23-53 days.

Damage: The larvae feed on okra leaves. In severe infestation, the plants may be completely defoliated. Young larvae feed on the lower epidermis of leaves while older larvae roll up the leaves from edges towards the mid-rib.

Management: Control measures adopted for shoot and fruit borer will take care of the infestation of leaf roller.

Blister beetle (*Mylabris pustulatus*):

Identification: The adult is about 2.0-2.5 cm in length and bears red or reddish orange and black alternating bands on the forewing (elytra).

Life-history: Each female lays about 100-2000 eggs depending on the quality of the food they ingest. The eggs are usually laid in the soil. Upon hatching, the grub feeds on soil-dwelling insects, including pests, and do not cause any damage to the crop. The grubs have several instars, with two or more different forms of larva. The mobile first instar grub is known as triungulin because it has three-

clawed legs. During later instars, it becomes less active, and then pupates.

Damage: The adult is the destructive stage. As the insects feed on the plants' reproductive parts, they can cause significant yield losses.

Management: Pick off beetles by hand (wear gloves or use insect nets) and destroy. Spray thiodicarb 0.09 per cent controls the pest.

Leafhopper (*Amrasca biguttula biguttula*):

Identification: Adults are small having wedge shaped body measuring about 3 mm long and greenish yellow in colour having a black spot on each forewing and a black spot on the vertex.

Life-history: The females lay about 15 yellowish eggs on the underside of the leaves, embedding them into the leaf veins. The eggs hatch in 4-11 days and give rise to nymphs which are wedge-shaped and are very active. They suck cell-sap from the underside of the leaves and pass through six stages of growth in 7-21 days. On transformation into winged adults, they live for 5-7 weeks, feeding constantly on the plant juice.

Damage: This pest attacks the crop at its early stage of growth. Small, greenish leaf hoppers; nymphs and adults are found on the underside of the leaves. The adults and the nymphs suck the cell sap from the leaves. As a result, the leaves curl upwards along the margins and have a burnt look which extend over the entire leaf area. The affected plants show a stunted growth.

Management: Spray 750 ml oxydemeton methyl 25EC or 625 ml of dimethoate 30EC or 100 ml of imidacloprid 17.5SL in 500 litres of water per ha. At the time of sowing smear, the seed with imidacloprid 75WS or thiamethoxam 30FS @ 5g/kg seed.

Whitefly (*Bemisia tabaci*):

Identification: Adults are winged, they are 1.0-1.5 mm long and their yellowish bodies are slightly dusted with white waxy powder. They have two pairs of pure white wings and have prominent long hindwings.

Life history: The females lay stalked eggs singly on the underside of the leaves,

averaging 80-110 eggs per female. The eggs hatch in 3-5 days during summer, 5-33 days in winter. The nymphs feed on cell sap and grow into three stages to form the pupae within 9-14 days in summer and 17-81 days in winter. In 2-8 days, the pupae change into whiteflies. The total lifecycle completed in 14-100 days depending on weather conditions.

Damage: The milky white minute whiteflies and nymphs suck the cell sap from the leaves. The affected leaves curl and dry. The affected plants show a stunted growth. Whiteflies are also responsible for transmitting yellow vein mosaic virus (YVMV). Interwoven network of yellow veins encompassing with islands of green tissues on leaves. Later, entire leaves turn yellow. This disease, spread by whitefly, is economically most important disease.

Management: 4-5 foliar sprays of imidacloprid 17.5SL (0.002%) or dimethoate (0.05%) or metasystox (0.02%) at an interval of 10 days effectively controls the whitefly population.

Aphid, (*Aphis gossypii*):

Identification: The adults are small, greenish brown and soft-bodied insects found in colonies on the tender parts of the plants and under surface of the leaves. The adults exist in both winged and wingless forms.

Life-history: The winged and wingless females multiply parthenogenetically and viviparously. In a day, a female may give birth to 8-20 nymphs. The nymphs moult four times to become adults in 7-10 days.

Damage: The damage is caused both by the nymphs and adults by sucking plant sap. Severe infestation results in curling of leaves, stunted growth and gradual drying and death of young plants. Black sooty mould develops on the honey dew of the aphids which falls on the leaves. Dry condition favour rapid increase in pest population and younger plants are more susceptible than older ones.

Management: Chemical control measures are same as in case of leafhopper.

Solenopsis mealy bug (*Phenacoccus solenopsis*):

Identification: The adult female is yellowish in colour, oval in shape and covered with white mealy powder. The female adults are wingless; however, male adults are having one pair of wings. The nymphs are pale yellow with reddish eyes, which are later on covered with white mealy mass.

Life history: A female lays 300-700 eggs usually in an ovisac beneath her body. The eggs hatch in few minutes to 2 days. The newly emerged nymphs (crawlers) crawl out and start feeding on tender parts plants. The female mealy bug passes through three nymphal instars in 12-17 days. The male mealy bug passes through four nymphal instars in 14-18 days. The longevity of adult female is longer (14-19 days) as compared to male which is shorter (1-3 days). The total life cycle of female is completed in 25- 38 days whereas of male in 17-24 days.

Damage: Both nymphs and adults suck the sap from leaves, flower buds, petioles, twigs, fruits and even from the stem of the plants. The insect heavily sucks the sap from the plant and renders it weak, feeble and dehydrated. In severe cases development of sooty mould takes on honeydew produced by mealy bugs. The sooty mould reduces the photosynthetic ability of the plants. The fruits infested with mealy bugs reduces the marketability of the fruit.

Management: In case of severe infestation, spray 1.25 litres of profenophos 50EC or 2.0 litres of quinalphos 25EC or 625 g of thiodicarb 75WP in 500 litres of water. To check the spread of mealy bug, remove regularly the weeds growing adjacent to road sides, pathways, water channels and waste lands. The hymenopterous parasitoid, *Aenasius bambawalei* is very effective against mealy bug; as high as 70-80 per cent parasitization has been reported in certain areas. Avoid spray of insecticides if parasitized mealy bug mummies are observed.

Dusky cotton bug (*Oxycarenus hyalinipennis*):

Identification: The adults are 4-5 mm in length, dark brown and have dirty white transparent wings. The young nymphs have a rotund abdomen and, as they grow older, they resemble the adults, except for being smaller and having prominent wing pads instead of wings.

Life-history: The cigar shaped eggs are laid on plant. Initially, they are whitish turning pale and finally becoming light pink before hatching. The eggs are usually laid in groups. The egg and nymphal periods respectively vary from 6-10 days and 30-50 days.

Damage: The nymphs and adults suck the sap from immature seeds, whereupon these seeds may not ripen, lose colour and remain light in weight.

Management: Same as in case of leafhopper.

Red cotton bug (*Dysdercus koenigii*):

Identification: The adult insect is about 1.5 cm long, the male slightly shorter than the female. The body is predominantly red with transverse white marking on the ventral surface. The forewings are half (anterior) reddish brown with a black dot each and half black the hindwings, black. The eyes, antennae and legs are blackish.

Life-history: The eggs are laid in clusters of 80-100 in cracks of the soil or dry leaves near the plants. The nymphs hatch out in about 7 days and become adults in 40-85 days. The red coloured nymphs are marked by a row of 3 black spots in the middle of the abdomen and 3 white spots on either margin of it.

Damage: Both nymphs and adults suck the leaf and fruit sap. The plants become weak and stunted, the leaves and fruits may curl up.

Management: Same as in case of leafhopper.

Red spider mite (*Tetranychus urticae*):

Identification: They are minute in size, and vary in color (green, greenish yellow, brown, or orange red) with two dark spots on the body.

Life-history: Eggs are round, white, or cream-colored; egg period is two to four days. Upon

hatching, it will pass through a larval stage and two nymphal stages (protonymph and deutonymph) before becoming adult. The lifecycle is completed in one to two weeks. There are several overlapping generations in a year. The adult lives up to three or four weeks.

Damage: The infestation of mites is mostly observed during the warm and dry periods of the season. Nymphs and adults suck cell sap and whitish grey patches appear on leaves. Affected leaves become mottled, turn brown and fall. Under severe infestation the top canopy of the plant is covered by webbing of mites. The mite infested plants can be identified from the distance by the characteristic mottling symptom produced on the upper surface of the leaf.

Management: Spraying with wettable sulphur 80WP (2 g/ litre of water) or dicofol 18.5EC (2.5 ml/litre of water) or spiromesifen 22.9SC 400 ml in 500 litres of water effectively control the mites.

Root-knot nematode (*Meloidogyne incognita*):

The root-knot nematode enters the roots causing characteristic root knots or galls. The aerial symptoms consist mainly of stunted plant growth and yellowing of leaves. Nematode attack in the seedling stage leads to pre- and post-emergence damage resulting in reduced crop stand.

Management: Cultural control methods such as rotation with non-host crops such as cereals, fallowing and deep ploughing 2-3 times in summer months is recommended. Application of Nemaon (30 litres/ha) with irrigation before sowing is recommended to protect the seedling in its early stage of plant growth.

Integrated pest management practices

- Sowing of YVMV resistant cultivars viz. parbhani kranti, makhmali, tulsi, Anupama-1, Varsha Uphar, Hisar Unnat, Arka anamika, Hisar Naveen and Sun-40 etc. especially during kharif season of the crop.

- Seed treatment with imidacloprid 70WS or thiomethoxam 30FS @ 5gm/ kg of seed.
- Grow maize/sorghum on borders as a barrier to prevent the entry of shoot & fruit borer adults.
- Set up yellow sticky and delta traps for whiteflies.
- 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, against leafhopper, whitefly and mites etc.
- Install pheromone traps @ 5/ acre for monitoring of *Earias vittella* moth emergence. Replace the lures after every 30-40 days 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, *Earias vittella* if crosses ETL (5 % infestation), spray cypermethrin 25 EC @ 200 g a.i/ha or spinosad 45SC @ 0.3 ml/lit or emamectin benzoate 25WG @ 0.4 gm/lit is effective against.
- 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 17.8SL @ 150 ml/ha, cypermethrin 25EC @ 200 g a.i/ha (0.005%), quinalphos 25EC @ 0.05% or propargite 57 EC @ 0.1 % for control of leafhoppers, whiteflies, borers and mites.
- Removal and destruction of alternate weed hosts near the surrounding field.