



A Review on Integrated Insect Pest and Disease Management in Okra

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Okra *Abelmoschus esculentus* L. (Moench), is an economically important vegetable crop grown in tropical and sub-tropical and warm temperate regions around the world. It is grown as kitchen garden crop as well as on large commercial farms. It has been cultivated commercially in India, Pakistan, Bangladesh, Burma, Afghanistan, Iran, Turkey, Western Africa, Yugoslavia, Japan, Malaysia, Brazil, Ghana, Ethiopia, Cyprus and the Southern United States.

In India; it is cultivated in summer season in north India and also as a winter crop in Maharashtra, Gujarat, Andhra Pradesh, Karnataka and Tamil Nadu. It fails to grow in the high hills and areas which experience very low temperatures.

It contains an important source of vitamins C, calcium, potassium (IBPGR, 1990), proteins, carbohydrates and plays a vital role in human diet .

There are several constraints in the cultivation of okra. Many of the pests occurring on cotton are also found on okra crop. As high as, 72 species of insects have been recorded on okra of which, the sucking pests comprising of leafhopper, *Amrasca biguttula biguttula* , whitefly, *Bemisia tabaci* and mite, *Tetranychus urticae* cause significant damage to the crop. Leafhopper, a polyphagous, pest has been a serious pest on okra causing heavy loss during these years. High population of leafhopper significantly sucks cell sap usually from ventral surface of the leaves and inject toxic saliva into plant tissues, turning the leaves to yellowish and curl upward . Whitefly (*B. tabaci*) nymphs and adults remove significant amount of cell sap from the leaves to reduce the plant vigour. They are responsible for transmitting yellow vein mosaic virus also. Red spider mites scratch the leaf tissues and lap the oozing out sap. Heavy webbing caused by the mite make it difficult to control.

Among the vegetable crops grown in India, Okra is an important crop grown throughout the year. Fruit and shoot borer, *Earias vittella* is the key pest of okra and requires regular control measures to produce a profitable crop. The avoidable losses in yield and fruit damage due to this pest have been estimated from 36-90%.

Incidence of the Insect pest on okra

Insect pests reported to infest okra in Ghana include flea beetles (*Podagrica sp.*), cotton stainer (*Dysdercus superstius*), white fly (*Bemisia tabaci*), and green stink bug (*Nezera viridula*) among others. Flea beetles (*Podagrica sp.*) are more dangerous among the insect pest. The feeding activity of *Podagrica sp.* causes damage comprising of characteristic perforations of leaves, and irregular holes reduce the photosynthetic surface area of the leaves leading to a great reduction of yield in okra.

IPM in okra: Sardana et al. evaluated impact of IPM programmes to lessen pest infestation on okra and tested different IPM modules including bio-intensive, cultural and chemical treatments provided optimum control of pests. Botanical insecticides like Neem pesticides, microbials like *Bacillus thuringiensis*, *Metarrhizium anisopliae*, *Beauveria bassiana* and

Verticillium lecanii and bio agents like spiders, Chrysoperla and Trichogramma should be integrated for financial control of insect in okra variety Arka Anamika harbored lesser population of jassids with minimum leaf injury. Broad usage of insecticides resulted in issues like pest resistance, resurgence, pesticide residues, destruction of beneficial fauna and environmental pollution.

Incidence of disease on okra

There are many reports on the occurrence of several pests and diseases on okra. Insect pest infestation is one of the most limiting factors for accelerating yield potential of okra. The crop is susceptible to damage by various insects, fungi, nematodes and viruses at various growth stages of crops. Some of the important insects are fruit and shoot borer, aphids, white flies, ants, etc. The list of commonly occurring disease on okra in mentioned in table 2 The common viruses which infect okra are *Yellow vein mosaic virus* (YVMV), *Okra mosaic virus* (OkMV) and *Okra leaf curl virus* (OkLCV). The most serious viral disease of okra is caused by *yellow vein mosaic virus* (YVMV) universally faced by all okra growers.

Table 2: List of commonly occurring diseases on okra

Common disease	Scientific name	Susceptible crop stage
Powdery mildew	<i>Erysiphe cichoracearum</i>	Vegetative
Damping-off	<i>Pythium vexans</i>	Seedling– early vegetative
Pod spot	<i>Alternaria</i> sp	Fruit setting
Anthraxnose	<i>Colletotrichum</i> spp	Flowering/Fruiting
Leaf Spot	<i>Pseudocercospora abelmoschi</i>	Vegetative stage
Yellow Vein Mosaic	<i>Yellow vein mosaic virus</i>	Early vegetative-harvest
Okra Leaf Curl	<i>Okra leaf Curl virus</i>	Vegetative- harvest
Okra mosaic	<i>Okra mosaic virus</i>	Vegetative -harvest
Okra Enation Leaf Curl Disease	<i>Okra enation leaf curl virus</i>	Vegetative -harvest

In 1924; First time Kulkarni reported YVMD is caused by the Yellow vein mosaic virus from India. Later it was reported from the other part of the world. This disease was characterized by the several group of scientist time to time from different parts counties for degrees of chlorosis, yellowing of veins and small leaves, student growth, yellowing of veinlets and distorted fruits Yield Losses ranges between 50 to 94% if the incidence of the Yellow Vein Mosaic disease 100%.

Management of the Disease

In order to increase the production and productivity of okra; there are need of integrated and efficient management of these diseases. Incidence or severity of disease of Okra depends on the environmental condition and susceptibility of the species of okra YVMV disease of okra is most reported by various groups of scientists among begomoviruses. Wild relative germplasms such as *Abelmoschus angulosus* are complete resistant to the YVMV. Apart from this, wild ssp. Manihot and genotype IC1542 showed symptomless resistance.

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