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LOW COST MANAGEMENT PRACTICES TO TACKLE MELON FRUIT FLY INFESTATION IN CUCURBITS

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Cucurbits are cucumber, muskmelons, watermelons, squashes, gourds and pumpkins are common to be cultivated all over world but the sustainable production is lowering down. Because of these crops were infested by a variety of insects pests from seedling until harvest. In cucurbits one of the most destructive and economic threat pest all over world is melon fruit fly (*Bactrocera cucurbitae* Coquillett.) to ensure healthy cucurbit production. Fruit flies of the tephritidae family are a globally important group of agricultural pests that target a wide range of fruits and vegetables (White and Elson-Harris, 1994). The extent of loss varies between 30 and 100 per cent, depending upon the cucurbit species and season (Dhillon *et al.* 2005). The infestation increases at temperature around 32⁰C with relative humidity range between 60% to 70%. It prefers to infest young, green and soft skinned fruits.

Now a days demand of consumer for cucurbits are being increased so that sustainable production should be occur. In order to achieve continuous production of healthy cucurbits, lot of resources are going to invested to reduce losses caused by insect pest and should be kept at minimum by using some management practices those should be Sustainable, economically feasible and environmental friendly measures play important role for management of this pest.

Fruit fly

It is a polyphagous pest remains active throughout the year on one or the other host and it completes 8 to 10 generations in a year. Adult flies are reddish brown in color they feed on honey dew and juice of ripe injured fruits. Adult female fly thrust around 50-100 eggs as group into tender fruits with the help of sharp ovipositor. The egg hatch in 1-9 days and the maggot bore into the pulp forming galleries. The full grown larvae came out by

making one or two exit hole and fall down by hopping movement on soil for pupation. The larvae pupate in the soil at depth of 0.5 – 15 cm and the adults get pupate out in 6-15 days.

Nature of Damage

The adult females lay eggs with the help of its hard and sharp ovipositor, they prefer to lay the eggs in soft tender fruit tissues. After two days emerged maggots start feeding inside the fruit by making galleries. Young larvae leave the necrotic region and move to healthy tissue, where they often introduce various pathogens and hasten fruit decomposition. Once they laid egg it's difficult to manage this pest.

Damaging Symptoms

The damaged regions become watery and brown colored fluid oozes out from the puncture, which becomes slightly concave with seepage of fluid, and transforms into a brown resinous deposit. This reduces the market value of the produce. The fruit subsequently rots or becomes distorted.

- Aborted flowers beneath the crops in the field.
- Maggots feed on the pulp of the fruits
- Deformed and hollow of fruits.
- Damaged fruits turn yellow in colour.
- Necrosis (black or brown colour) lesions around the ovipositional stings
- Oozing of resinous fluid from fruits
- Distorted and malformed fruits
- Premature dropping of fruits and also unfit for consumption

Management Practices

a) Sowing time, method of sowing and spacing

To produce quality fruits of cucurbits and to mitigate the infestation early sowing should be practiced. This may be attributed to seasonal cycle of melon fruit fly. Melon fruit flies remain inactive in the form of leks, among litters/in the form of pupae in the soil. In the month of March, when temperature increases the hibernating population starts to emerge and shows little activity, while, its peak activity starts in the month of April/May-July. However early sowing by Feb 15 and 45 cm plant spacing was comparatively better as this resulted in a

higher marketable yield/plant (Gogi *et al.*, 2014). Hang sowing method (HSM) is best method for sowing cucurbits (Bitter gourd) has been recorded (Gogi *et al.*, 2014) due to the fact that there was proper ventilation and more fruits were directly exposed to sun; hence these fruits are not preferred for oviposition. Similarly, in the HSM more marketable fruits and yield per plant is attributed due to the fact in this method least number of fruits come in contact with the soil; hence deterioration of fruits due to scavenger like *Drosophila melanogaster* (Dhillon *et al.*, 2005) or other factors is avoided, which results in more marketable yield.

b. Bagging

The bagging of fruits was done (Fig.1 a) by using polythene bags or any other durable cheaply available material and make holes with an ordinary pin for proper aeration of fruits. Wrapping materials can be newspaper, paper bags (Fig.1 b) or Polythene sleeves in the case Long/thin fruits (Sarker *et al.*, 2009). The bagging has to be done during morning hours; the pollinated female flowers were bagged by hand at two days after anthesis and left for seven days. The mouth of the bag was wrapped and closed by thread near peduncle of the fruit. After 7 days, the polythene bags were removed. This system also provides physical protection from mechanical injuries (scars and scratches) and in some cases, reduced fungal spots on the fruits. It minimizes the fruit fly infestation and increases the net return by 40 to 50% and this is also found to be as a superior method in controlling the damage by fruit fly (Amin *et al.*, 2008).



Fig.1 a) Bagging



b) Bagging Material

c. Field sanitation

This method is to break the reproduction cycle and minimize pest intensity. To achieve this various ways are there, among one the most effective method in fruit fly management is removal and destruction of infested fruits. Growers need to remove all infested and unharvested fruits from plant and bury them deep into the soil. Burying damaged fruits 0.46 m deep in the soil prevents adult fly eclosion and reduce population increase Klungness *et al.*,2005).

d. Soil disturbance

Plowing (raking) and ground flooding are two methods for disrupting the life cycle of fruit flies by disturbing the soil. Because the pupal stage of fruit flies is found in soil. There is no likelihood of adult emergence and egg laying on fruits if this stage is damaged. The fall plowing after harvesting to a depth of at least 30 cm and flooding the fields are the recommended methods. As a result, some of the pupae are eaten by birds. In the spring the flies do not flies out of the pupae, found in deeper layers of soil.

e. Pheromone lure or Cue lure Traps:

The principal of this particular technique is to deny female flies the resources they needed for lay eggs, such as protein food (protein bait control) or pheromone lures, which eliminate males. The number of commercially produced attractants (cue lure®, Eugelure®, Flycide®) are available in the market and can be used efficiently in management of this pest. For trapping male flies, installation of old used water bottle baited with cue-lure saturated wood blocks (ethanol/ cue-lure/carbaryl in a ratio 8:1:2) at 25 traps/ha prior to flowerinitiation is quite effective.



Fig.2 a) Cue lure trap



b) Trapped flies

Conclusion

Today's pest management still makes extensive use of chemical pesticides. Chemical pesticides continue to be the mainstay of pest management today, which disturbs the balance between pests and their natural enemies and pollutes the environment. It also encourages pest recurrence and resistance. These vegetables contain long-lasting insecticide residues that pose serious risks to both human health and the environment. The melon fruit fly can be controlled or repressed locally at growers' fields, taking into account the pests and crop value. Any combination of available options, such as fruit bagging, field cleaning, and cue-lure traps.

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