

Pheromone Technology: Needs Today for Bio-Intensive Management of Cucurbit Fruit Fly

Sunil Kumar Mandal and Sanjay Kumar

Regional Research Station, Jhanjharpur, Dr. Rajendra Prasad Central Agricultural University, Pusa (Samastipur) - 848 125

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Abstract

The melon fruit fly is a highly devastating pest of cucurbitaceous crops, causing huge losses to cucurbit growers. In spite of using hazardous insecticides, growers are bound to bear about 30-100 percent yield losses every year due to the attack of this pest. Cue-lure containing pheromonetreps were used by cucurbit growers to introduce and promote the bio-intensive management technology of fruit flies by installation of pheromone traps. The technology is found feasible, cheaper as well as easy to adopt at the cucurbit grower field. This technology is most economic and eco-friendly measure for the managing of fruit flies.

Keywords: Cucurbits, Melon fly, Pheromone traps.

Introduction:

Cucurbits, a common name given to a number of crops which mostly possess trailing habit, are extensively grown all over the tropical and subtropical countries in the world and include the largest number of summer and rainy season vegetables. Those grown in the Indian sub- continent are cucumber, melons, pumpkins and various types of guards. Several abiotic and biotic factors limit the production and productivity of cucurbits, of which melon fruit fly (*Bactroceracucurbitae* Coq.) has been the most prominent pest over the last several decades in India. The melon fruit fly damage is the major limiting factor in obtaining good quality fruits and high yield (Mote, 1975 and Rabindranath and pillai, 1986). The polyphagous fruit fly attack more than 125 cucurbitaceous and solanaceous crop plant species in tropical and subtropical regions of the world. It causes serious damage to these crops. The extent of yield losses due to infestation by melon fly may vary between 30 to 100 per cent depending upon the season. (Gupta and Verma, 1992 and Dhillon *et al*, 2005). Its abundance increases when the temperature fall below 39°C, and relative humidity ranges between 60 to 70 percent. Considering previous facts and report, it is apparent that more than 50 percent of the cucurbits are either partially or totally damaged by the fruit flies and are unsuitable for human

consumption. Although, several management options, such as para-pheromone trap, spraying of hydrolysed protein spray, spraying of ailanthus and cashew leaf extract, neem products, bagging of fruits, field sanitation, food baits, and spray of chemical insecticides (Pawar *et al*, 1991, Zaman, 1995, Satpathy and Rai, 2002, Jacob *et al*, 2007) have been in use for the management of melon fruit fly, some of them either fail to control the pest and/or are uneconomic hazardous to non-target organism and the environment (Dhillan *et al*. 2005).

The management strategies employed for the control of fruit fly by the cucurbit growers of the direct is mostly concentrated an application of synthetic insecticides. Further, indiscriminate use of insecticides has led to problems of resistance to insecticides, pest resurgence, harmful pesticide residue on fruits and environmental pollution. Since, the maggots damage the fruits internally, it is difficult to control this pest with insecticides. Therefore, there is an urgent need to explore alternative methods of control, and develop a bio-intensive management strategy for the effective and sound management of this Pest. The use of pheromone traps for the management of the fruit fly has proved to be success in reducing the pest population for the past few years, a part from being eco-friendly. Cue-lure traps have been used for monitoring and mass trapping of the melon fruit flies in the bitter gourd (Pawar *et al*, 1991 and Seewooruthum *et al*, 1998). Pheromone is a class of semi chemicals that insects and other animals release to communicate with other individuals of the same species. The pheromone, 'cue-lure' is used in cucurbits, which mimics the scent of female flies, attracts the male flies and traps them in large numbers, resulting in check of population growth early in the season. The sex attractant cue-lure traps are more effective than the food attractant tephrit-lure traps for monitoring the *B. Cucurbitae* in bitter gourd (Pawar *et al*, 1991). Cue-lure traps have been reported to attract *B. Cucurbitae* males from mid-July to mid-November, (Zaman, 1995, Liu and Lin, 1993).

Host plant:

Cucurbit fruit fly is a major pest of cucurbitaceous vegetables. Besides, it also infests guava, citrus and peach.

Distribution:

This is the most destructive fruit fly of cucurbits grown in India. It is also found in Pakistan, Verma, China, Malayasia, Japan, East Affrica, Australia, Hawaiiin Island and South-East Asia.

Identification:

The fully developed maggot is 9-10 mm in length, pale white and tapers at one end. The fly has reddish brown body with transparent and shining wings bearing yellow-brown streaks. It is 12-15 mm long and possess a conical abdomen. The eyes and head are dark brown.

Damage symptoms:

The maggots cause serious damage to vines and the developing fruits. The attacked branches dry up, as a result of its attack. The attacked fruits, get distorted and even drop from the creepers. The larvae tunnel the fruit contaminating them with frass and providing entry point for fungi and bacteria pathogens which cause the fruit to rot and become unfit for human consumption. Infested fruits show mass of white maggots in the pulp of fruit, if dissected. As such entire damaged fruit gets spoiled and appear malformed.

Bionomics:

Adult fly hibernates under the creepers and dry leaves. It becomes active in March and starts breeding with the outbreak of rains. The shiny white eggs are laid singly or in clusters of 4-12 into the flowers, stems and mature / ripening fruits with the help of sharp ovipositor of female. The eggs hatch in 2-9 days. The young maggots feed on the internal contents of fruits and become full grown in 3 to 21 days. They come out of the infested fruit and drop to the ground, where they pupate at a depth of 1.5 to 15 cm under the soil for 5-28 days. The life cycle is completed in about 15 to 90 days depending upon weather. There are several generations in a year and the peak period is during June-July. Adult period lasts for 6-9 days in the rainy season and 3-4 weeks in the winter.

Bio-intensive management strategies:**Utilization of pheromone traps:**

The sex pheromone released by one sex will trigger the behavioural pattern of other sex that facilitate in mating. Here the sex pheromone produced by female fruit fly will attract the male one. The commercial lure having parapheromone (Mimic the effect of pheromone) is chemically synthesized attracts the male flies. The attracted flies die in the trap. The sex pheromone is also used for monitoring and mass trapping of fruit flies.

The cue-lure pheromone trap can be prepared by farmers themselves or can be purchased from private agro farms.

The following are the procedure for preparations of Cue lure pheromone traps for management of cucurbit fruit fly:

Preparation of cue-lure:

- Mix Ethyl Alcohol–60 ml. + Cue-lure (P-Acetoxyphenyl butanone – 2) – 40 ml. + Dichlorvas 76 EC (DDVP) Insecticide – 20 ml (In the ratio of 6:4:2).
- Take plywood of soft board or straw board in squares of approximately 5x5x1.2cm in size.
- Otherwise take 0.5-inch-thick cotton rope and cut the rope into 2 inches size, tie the cut ends with thin wire.
- Any one of these should be soaked in cue-lure solution for 24 hours. Now the cue -lure is ready for application.
- Around 30 lures can be prepared from the above preparations and quantity.

preparations of low-cost trap:

- Take used plastic water bottle (1 Liter). Make 3 x 4 windows of 1 inch size with a knife at 3 inches from top of the bottle.
- Hang the lure inside the trap and place it in the field at least 3-4 feet above the ground level.

Recommendation of pheromone traps:

- Installed pheromone traps with cue-lure (10-12 traps / ha) along with suitable insecticides (Malathin/Dichlorvos) to attract. (Cue-lure attracts *B. cucurbita* female fly).
- The pheromone trap should be placed from onset of flowering to harvest of the crop.
- The lure needs to be replaced once in 30-40 days.
- The trap should be serviced at 15 days interval.

Impact among the growers:

This technology helps to suppress further population build-up of fruit flies with almost no probability of insecticide residue in and or/ on the fruits.

This technology decreased fruit damage (about 60-70 percent) and improve quality of cucurbits. Overall cost of insecticide application is decreased more than 10 times. Benefit is in terms of insecticide free cucurbits and safety to human health and environment.

Conclusion:

Since this technology employed is male annihilation technique / Cue-lure, the population of fruit flies will automatically decline in nearest future. This will be highly beneficial for the farming community which were otherwise employing technology. Farmer /

Grower may purchase only lure to be recharged in the homemade traps. Since, the urgent need to popularized the home made traps among the cucurbit growers for the maximum adoption of this technology at lowest cost.

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