

II. Pest Surveillance

Weekly monitoring through pest scouting with the help of monitoring device like pheromone traps, colored sticky traps should be practiced. For field scouting 300 fruits in 100 plants/ acre in a cross diagonal pattern through zig zag manner is required to be observed for counting of each and every type of insects. Pest monitoring for fruit flies using Cue-lure traps should be done regularly from fruiting stage onwards. If 95% plants are found free from insect pests then the field will be considered fit for export.

III. Integrated Pest Management strategies

- Collection and destruction of dropped fruits and infested fruits on plant helps in management of fruit fly.
- Rake the soil around the plant to expose fruit fly pupae for natural enemies.
- Mulching around the plant helps in avoiding fruit fly larvae entering the soil for pupation and exposing them for natural predation.
- Placing of Cue-lure traps helps in both monitoring and management of fruit fly.
- Conservation of pupal parasitoid like *Opis fletcheri* helps in long term management of fruit fly.
- Spraying of botanicals like NSKE 5% augur well with IPM.
- Need based spraying of approved insecticides for both fruit fly and thrips.



Biodiversity in natural enemies: Parasitoids



Biodiversity in natural enemies: Predators

CIB&RC Recommended pesticides against Bitter Gourd insect pests				
Pests/Pesticides	Dosage			Waiting Period (days)
	a.i (gm)	Formulation (gm/ml)	Dilution (Litre)	
Fruit borers & Caterpillars				
Chlorantraniliprole 18.5% SC	20-25	100-125	500	7
Red Spider mite				
Dicofol 18.5% EC	250-500	1350-2700	500-1000	15-20

Important activities for pest free Bitter gourd production for export



Cue-lure traps

For more details please contact:

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Integrated Pest Management (IPM) in Bitter Gourd (*Momordica charantia*) for export purpose



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Bitter gourd is one of the most popular vegetables in Southeast Asia, largely exported to Europe and other countries. Native to China or India, the fast-growing vine is grown throughout Asia and is becoming popular worldwide. It is a member of the cucurbit family along with cucumber, squash, watermelon, and muskmelon.

I. Identification of important pest

1. **Fruit Fly (*Dacus cucurbitae* and *Dacus dorsalis*):**

The female fly oviposits on soft fruits. Cavity is made by sharp ovipositor and 12 cylindrical eggs are laid in the evening time and exuding gummy substance covers, cements and makes it water proof. Female lays 58-95 eggs in 14-54 days. Egg period is 1-9 days. The maggots are apodus (leg less), acephalous, dirty white, wriggling creatures, thicker at posterior end and tapering at the other to a point. Larval period is 13 days in summer and about three weeks in winter. Mature maggots come out and jump to ground and select suitable place, enter soil and pupate. Adults are reddish brown with lemon yellow markings on thorax with spotted wings. It is active throughout the year.



Eggs



Egg laying pin holes



Maggots



Egg laying by Adult fly

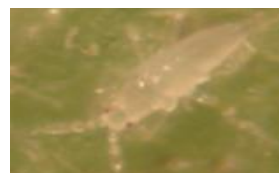
2. **Thrips (*Thrips palmi*):**

Adults are pale yellow or whitish in color, but with numerous dark setae on the body. A black line, resulting

from the juncture of the wings, runs along the back of the body. The slender fringed wings are pale. The hairs or fringe on the anterior edge of the wing are considerably shorter than those on the posterior edge. They measure 0.8 to 1.0 mm in body length, with females averaging slightly larger than males. Unlike the larval stage, the adults tend to feed on young growth, and so are found on new leaves. Adult longevity is 10 to 30 days for females and seven to 20 days for males. Development time varies with temperature, with mean values of about 20, 17, and 12 days at 15, 26, and 32°C. Females produce up to about 200 eggs, but averaging about 50 per female. Both mated and virgin females deposit eggs.



Egg



Larva



Adult



Thrips in Bittergourd

3. **Red pumpkin beetles (*Aulacophora foveicollis*):**

Brownish elongate eggs are laid in the soil and each female may lay about 150 to 300 eggs singly or in groups of 8-9 near the base of plants. Egg period is 5-8 days. Grubs are creamy white with darker oval shield at back. Grub period is 13-25 days. Pupation takes place in an earthen cocoon. Pupal period is 7-17 days. *Raphidopalpa foveicollis* has reddish brown elytra; *A.intermedia* has blue black elytra; and *A. cincta* has grey elytra with black border. Total life cycle takes 26-27 days. Beetles are more

destructive. They bite holes on leaves and also feed on flowers. There are 5 to 8 generations/year.



Adult



Damage symptoms

4. **Cucumber Moth (*Diaphnai indica*):**

Adults have translucent whitish wings with broad dark brown borders. The body is whitish below, and brown on top of head and thorax as well as the end of the abdomen. There is a tuft of light brown "hairs" on the tip of the abdomen, vestigial in the male but well-developed in the female.

External feeding on leaves and fruits produces characteristic symptoms. Early symptoms of infestation are the development of lace-like patches of networks of intact small leaf veins. Damage is most serious in the early stages of fruit formation, when the pests feed on and puncture the skin of young fruit, particularly where they touch leaves or the soil, but well developed fruits with hard rinds may escape attack.



Larva



Pupa



Adult



Damage symptoms