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MAJOR INSECT- PEST OF CUCURBITACEOUS CROPS AND THEIR MANAGEMENT

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1. Fruit fly

It is a major pest of bittergourd, snakegourd, melons, coccinia, etc.

Biology:-

Female flies lay eggs on delicate fruits. Sharp ovipositor creates cavity, 12 cylindrical eggs are laid in evening, and gooey substance cements and waterproofs it. 14-54 days, female lays 58-95 eggs. Eggs last 1-9 days.

Maggot: Apodus, acephalous, dirty white, writhing maggots are thicker at the back and taper towards the front. Summer larvae last 13 days, winter three weeks. Mature maggots jump to ground, choose a spot, enter soil, and pupate.

Pupa: Barrel-shaped. 69-day pupal period.

Adult: Flies hatch in the morning and mate at night. Reddish brown adults have speckled wings and lemon yellow thorax patterns. Year-round activity. In summer, adults wake up from hibernation. 14-day life span.

Symptoms of damage:-

Only maggots can cause damage by feeding on almost ripe fruits, which causes the fruits to become riddled and pollutes the pulp.Maggots create lesions on the fruit by boring into it and feeding on the pulp. The secondary bacterial infection causes the rotting of the fruit.When it comes to melons, the damage is more severe. Also susceptible to attack are fruits in their immature stages. These kinds of fruits do not mature. The premature falling off of fruits is caused by the infestation. The rotting of fruits as a result of secondary bacterial infection During the monsoon season, the damage is far worse.

Management:-

The implementation of field sanitation

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practises involves the gathering and subsequent burial of fallen fruits. The practise of bagging fruits during their growth stages has been found to effectively reduce fruit fly infestation, resulting in a notable increase in net returns ranging from 40 to 58%. In order to deter oviposition by adult insects, it is recommended to deploy fly traps equipped with a lure in the designated area. The lure may consist of a 1% concentration of Methyl Eugenol, Citronella oil, vinegar, Acetic acid, or Lactic Acid. In order to effectively manage flies in cucurbit fields, it is recommended to employ the use of maize plants as trap crops. The latest addition to the integrated pest management (IPM) programme for the control of Bactrocera cucurbitae is the introduction of a newly discovered parasitoid species, Fopius arisanus. The achievement of male sterile technique is facilitated by means of irradiation, chemo-sterilization, or genetic manipulation, which are employed to eliminate this pest. The efficacy of chemical methods in controlling B. cucurbitae is limited. Never the less, many pesticides, including Dichorvos, Phosphamidon, and Endosulfan, shown moderate efficacy in controlling B. cucrbitae.

2. Red pumpkin beetle

These insects infest bittergourd, snakegourd, melons, pumpkin, coccinia etc.

Biology:-

Egg: 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.

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Grub: Grubs are creamy white with darker oval shield at back. Grub period is 13-25 days.

Pupa: Pupation takes place in an earthen cocoon. Pupal period is 7-17 days.

Adult: 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. There are 5 to 8 generations/year. These insects are responsible for the infestation of bittergourd, snakegourd, melons, pumpkins, and coccinia, among other vegetables.

Symptoms of damage:-

Creamy, yellow larvae eat roots, stems, and soil-touching fruits. Saprophytic fungus

may prevent root and stem rot. Adult beetles devour leaf lamina by scraping off chlorophyll and producing net-like pores. Grubs harm roots. The first generation is the most injured because the cotyledon stage causes the most damage. Infested plants may shrink, young and smaller fruits may dry up, and older fruit may become unfit for human consumption. Infestation causes 35%-75% seedling losses. This bug can cause 30-100% field losses.

Management:-

Seedlings should be subject to biweekly monitoring in order to assess the presence of infestations. During the early phase, it is advisable to gather the beetles and afterwards eliminate them. It is advisable to conduct regular monitoring of mature plants, and in cases where defoliation is very pronounced, appropriate treatment measures should be implemented. Preventive procedures, such as the incineration of aged vegetation and the cultivation techniques of ploughing and harrowing, are implemented subsequent to crop harvest to eliminate adult insects, larvae, and pupae. Employ the technique of utilising a controlled release of water to ensnare mature individuals within traps. The utilisation of neem oil cake as a soil amendment has been found to be efficacious in the eradication of insect larvae. In a study conducted by it was observed that the application of the Entomopathogenic fungus Beauveria bassiana was highly effective in reducing the red pumpkin beetle, as previously reported by Utilise pupal parasites, specifically Opius fletcheri and Opius compensans, for application. The successful suppression of damage can be achieved with the use of carbaryl at a concentration of 0.1% .

3. Epilachna beetle

Also known as the Hadda beetle, It is possible to find spotted beetles all the way from East Asia to Australia and South Asia. They consume a wide variety of foods, although their primary diet consists of eggplant, cucumbers, potatoes, and kidney beans, among other vegetables. These beetles are regarded as one of the most problematic families of insects that can cause damage to aubergine. In addition, they feed on various species of the Solanaceae plant genus, including S. nigrum, S. xanthocarpum, S. torvum, Datura sp., Physalis sp., and Withania somnifera.

Biology:-

The eggs that have recently been laid exhibit a coloration ranging from pale-yellow to orange-yellow. They possess an elongated

shape and are typically seen in clusters consisting of 5 to 45 eggs. The dimensions of an egg are roughly 1.3mm in length and 0.6mm in breadth. The newly hatched larvae or grubs exhibit a length of roughly 1.6mm and display a light yellow hue. The larvae possess a soft body structure and are adorned with six longitudinal rows of robust, branching spines along their dorsal surface. The pupa exhibits a yellow coloration, lacks a spinal structure, and possesses a comparable size and morphology to that of the fully developed adult. The mature specimen exhibits an elliptical shape, with a length measuring approximately 6-7mm. The recently matured adult exhibits a straw or cream-yellow hue, and shortly following maturation, 28 black dots of varying dimensions manifest on the upper half of the body. The entire body is adorned with a dense layer of fine, abbreviated hairs. As individuals mature, their pigmentation deepens gradually over time, ultimately resulting in an orange-brown hue with a subtle bronze undertone. Adult males exhibit a significantly smaller physical stature compared to adult females.

Symptom of damage:-

Both the grub and the adult have mouthparts that are used for chewing. In order to extract the chlorophyll, they scrape it from the epidermal layers of the leaves. The feeding process creates a typical window that looks like a ladder. After they have dried out and fallen off, the windows will leave holes in the leaves. Skeletonization is the production of a papery structure on the leaf, and it occurs when a severe infestation causes multiple windows to merge together and contribute to the formation of this structure.

Management:-

The beetles are strong fliers, so crop rotation to distant fields tends to limit colonization and populations .The pest population can be suppressed effectively, by regular killing and picking of eggs, grub and adult, if cropped area is small. Larvae and adults can be shaken down in container of kerosinized water early in the morning. The weekly foliar sprays of aqueous kernel cxtracts at concentration of 25, 50and 100g/L and neem oil applied with an ultralow-volume sprayer at 10 and 20L/ha significantly reduced feeding by this beetle in squash and cucumber. The pest can be killed by spraying Zythiol 50EC @2ml per liter of water.

4. White fly

Biology:-

These are small insects about 1-1.5 mm long. The body and wings of adult flies are covered with fine whitish powdery wax. *B.tabaci* usually holds its wings flatter over the back, touching the abdomen or slightly overlapping .Eggs are whitish in color and gradually changes to brown color,

approximately 0.2mm in length. Larva is yellow-white and 0.3-0.6 mm long. Pupa is flat irregular oval shape and 0.7 mm long.

Females can lay around 300 eggs. Eggs are hatched in 8-10 days. On hatching, the first instars or 'crawler' is flat, oval and scale-like, and is the only mobile larval stage. It moves to a suitable feeding location on the lower leaf surface where it molts and becomes sessile throughout the remaining nymphal stage. The first three nymphal stages last for 2-4 days each (depending on temperature). The forth nymphal stage is termed the puparium. Pupation lasts for about 6days and changes to adult.

Nature of Damage-

Both adult and nymph suck the cell sap, disturb the photosynthesis process due to the growth of the sooty mould on the honeydew excreted by the insects, stunt the plant growth and transmit plant viral disease. Furthermore, the honey dew goes bad and grows a mold known as black sooty. It also deforms leaves, buds, and flowers and consequently lowers both the quantity and quality of production.

Infected plants shows the following symptoms: vein yellowing, inter-vein yellowing, leaf yellowing, yellow blotching of leaves, yellow mosaic of leaves, leaf curling, leaf crumpling, leaf vein thickening, leaf enations, leaf cupping, stem twisting, plant stunting.

Management:-

Crop rotation, floating row covers, cover crops, non-infested transplants and good field sanitation to prevent the buildup of white flies. Delayed planting or host free periods may decrease severity of attack as temperature and rainfall influence whitefly population dynamics Yellow sticky traps can be used to detect and monitor the activity of whiteflies in the field.The important predators affecting whiteflies are beetle (coccinellidae), true bugs, lacewings, mites and spiders . The dusty lacewings have been considered one of the most important predators of *B. tabaci* . Neem-based pesticides formulations containing azadirachtin have been reported to control young nymphs, inhibit growth and development of older nymphs, and reduce egg lying by adult whiteflies. Whiteflies are usually difficult to control by using chemical as the adults at immature stage reside on the underside of leaves. A soil application of neonicotinoid insecticides (imidacloprid or thiamethoxam) at planting effectively controls whiteflies.

5. Aphid

Biology:-

Aphids are diminutive in size, measuring approximately 3mm in length. They possess a pliant physique, characterised by a

pear-shaped morphology, and are equipped with elongated appendages such as legs and antennae. The Green peach aphid (Myzus persicae) exhibits a green coloration, whereas the Melon aphid (Aphis gossypii) displays a brown hue. Typically, adult aphids exhibit a lack of wings, although it is worth noting that a majority of species also manifest winged morphologies, particularly in instances of elevated population densities or during the transitional periods of spring and autumn. These organisms produce a substance that is white or grey in colour and has a waxy consistency, which envelops their entire body, resulting in a woolly or waxy visual characteristic.

The majority of aphid species engage in asexual reproduction. Aphids have the ability to generate many generations within a single year. The majority of aphid species engage in asexual reproduction, wherein adult females produce living juvenile aphids known as nymphs, without the need for mating. Nymphs consistently lack wings and undergo repeated moulting events, shedding their exoskeletons, over the course of a week to reach adulthood. The green peach aphid is capable of completing one generation and reproducing over 20 generations annually in warm climes, with each generation taking approximately 10-12 days to develop.

Nature of damage:-

The nature of damage refers to the characteristics and attributes of harm or injury inflicted onto an object, system, or organism. It encompasses the specific qualities, extent, and consequences

Aphids have the ability to infest a wide range of plant species. When leaves are subjected to aphid infestation, initial signs of damage manifest as localised yellow discolorations, predominantly observed on the ventral surfaces of leaves. Subsequently, the affected leaves may undergo desiccation and exhibit wilting symptoms. Aphids have mouthparts that are specifically adapted for penetrating plants and extracting sap, so making leaves, twigs, stems, or roots susceptible to their attacks. Aphids attack nearly all species of plants.

The deposition of honeydew has the potential to result in indirect harm. Honeydew refers to the viscous and saccharine excretion generated by aphids through the consumption of plant sap. The presence of honeydew can serve as an attractant for various insects, including ants, which are known to consume this sugary substance. The accumulation of honeydew deposits on the plant can serve as a growth substrate for sooty moulds as well. Sooty moulds are a group of black fungi consisting of a complex of many fungal species.

Management:-

According to the implementation of crop rotation among different families can effectively mitigate the prevalence of insect pests that are peculiar to particular crops. The implementation of floating row coverings or reflective mulches has the potential to effectively prevent the presence or deter the activity of aphids. The utilisation of aluminium foil mulches has been seen to exhibit repellent properties against aphid populations, resulting in a decrease in their abundance on seedlings and small plants. Additionally, the implementation of such mulches has been found to mitigate the transmission of aphid-transmitted viruses in vulnerable vegetables, including summer squashes, melons, and other susceptible crops. The presence of natural enemies, such as predators, parasitoids, and diseases, can exert a substantial influence on aphid populations through the mechanism of biological control. Aphids are preyed upon by many kinds of Syrphid Fly and ladybird beetles. Several well-known parasitoids of aphids include Aphidius colemani, Aphidius matricariae, and Lysiphlebus.