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Control of Green House pests

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Abstract

Insect pests are the major threats to production and productivity of greenhouse crops worldwide. Presence of warm, humid conditions and abundant food under protected structures provide a stable environment and habitat for pest development. Protected cultivation/Greenhouse technology has been in use for crop production for more than fifty countries all over the world. China is believed to have adopted a plastic greenhouse concept to a great extent. Japan, with about 42,000 ha. (hectare) under plastic and glass cover land holdings with shorter growing seasons in Holland and Japan have been the reason behind adopting Protected cultivation /greenhouse for intensive crop production.

Keywords: Heating, cooling, insect, pest fumigation, green house and control

1. Introduction

Protected cultivation is the modification of the natural environment to achieve optimum plant growth. Protected cultivation of high value vegetables and cut-flowers has shown tremendous potential during the last decade or so. In terms of area of fruit and vegetable crops under protected cultivation, China ranks first (27, 60, 000 ha), while India stands at seventh (25,000 ha) worldwide ^[1].

Greenhouse vegetable crops grown all over the world are vulnerable to various diseases and pest attacks as the protected crops provide stable and favorable microclimates for development of pest populations, which often limit the success of this crop production system ^[2]. The losses caused due to pests in greenhouse crops like tomato, okra, capsicum, gerbera, carnation, cucumber, lettuce, beans, etc. are tremendous. Crop losses are mainly due to arthropod pests like mites, whiteflies, thrips, leaf-miners, aphids and diseases caused by virus, fungi, bacteria, nematodes etc. Among these various, insects are of much importance and need to be managed properly so as to prevent the crop losses and increase yields. Modifications can be made to both the aerial and root environments to increase crop yields, extend the growing season and permit plant growth during periods of the year not commonly used to grow in open field crops.

2. Types of greenhouse pests

The pests which affect crops in greenhouses are similar to those that attack plants in open-field. In the greenhouse, they enjoy all the comforts of the protected space, including easy access to food and shelter from the harsh environmental conditions; as such, their rate of multiplication and the severity of their attack on the crop can be more devastating.

3. Specific greenhouse pests

Several insects and mites seem to be a habitual problem to greenhouse farmers. Although the pests are similar the control is often times different, one large difference being, all the pesticides used in open field are not automatically recommended for use within greenhouses, making finding a suitable pesticide difficult at times. The most important pests attacking tomato, sweet pepper, cucumber and lettuce in the Caribbean are ^[3]:

- Spider mites
- Aphids
- Whiteflies.
- Thrips
- Beetles
- Caterpillars
- Leafminers
- Brown Stinkbug

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- Snails and Slugs
- Mealy bugs
- Nematodes

4. Spider Mites

These are minute sap-sucking pests that infest the underside of leaves when conditions are hot and dry. The upper surface of the leaves becomes mottled. Spider mites are very common in tropical greenhouses.

Prevention and sanitation is critical to control. Many mite infestations start through the introduction of infested planting material, mites are also very small and can enter the greenhouse through most conventional nets. Rainfall and sprinkler irrigation are detrimental to mites as they aid in control and delaying build-up of the population. Mites like dry, hot conditions.

When miticides are used they need to be applied three times at five day intervals, due to the very short life cycle of the mites. Within the five days an attempt is made to kill all the adults and the immature stages.

5. Aphids (Greenflies, Whiteflies, Blackflies)

Aphids are one of the most serious pests of green house-grown crops. They feed on the lower surface of young tender leaves found at the growing tips. Aphids have needle like piercing- sucking mouth parts which they use to puncture the plant tissue and suck out plant juices^[4].

Insecticide applications to control aphids often must be repeated to manage infestations. Usually two to three applications spaced at three-to seven-day intervals, depending on the severity of an infestation, are necessary. Insecticide products need to be alternated for aphid control to delay development of resistance

6. Whiteflies

Whiteflies infest a wide range of greenhouse crops. The green house white fly is a tropical species that has become very established worldwide in greenhouses. Greenish larvae suck sap from the underside of leaves and deposit sticky honeydew. The Whitefly is a very active flyer with four wings and a body looking like it was dusted with very fine white powder.

6.1 Whiteflies are very difficult to control because

1. In bushy plants, spray penetration is difficult and because all stages of the developing whitefly reside underneath the leaf, making spray contact with the insect very difficult.
2. Whiteflies are covered with a waxy material which reduces the ability of sprays to stick to their bodies.
3. Since whiteflies suck juices from plants and do not chew on plant tissues, only systemic insecticides are consumed by whiteflies.
4. Only adults and crawlers move and come into contact with spray residues.
5. Immature whiteflies must be hit directly with contact insecticides in order to kill them.

7. Thrips

Thrips are tiny insects that fly or jump from leaf to leaf and damage flowers and foliage. Their size ranges from 1mm to less than 2.5mm in length. Cucumbers and tomatoes are favorite plants for Thrips. They can enter the greenhouse on boxes, tools and equipment which come from infected areas

as well as the wing adult flying into the greenhouse^[5].

Secure the entire greenhouse so the Thrips cannot enter. Check and sanitize all tools, equipment, clothing, etc., which are to enter the greenhouse.

There is a shortage of registered pesticides for Thrips as they have become resistant to many available pesticides. Sprays have to be directed towards the underside of leaves, flower, buds, young fruits and leaf axils. Predator mites and some pirate bugs are very effective Thrips predators.

8. Beetles

They feed on foliage and new shoots leaving small holes in the foliage. The larvae feed on the underground parts of the plants, normally discolouring the calyx and causing fruit to drop. They can be controlled by running a sweep net across the tops of plants to collect foraging adults and by the use of Pheromone traps.

9. Caterpillars

Caterpillars, the larval/immature stage of moths and butterflies, eat young leaves and sometimes spin webs that distort leaves. They may eat the entire leaf or parts of it, leaving the mid-vein. The adults (moths) enter greenhouses through doors, vents and side walls (which are usually open) and lay eggs that hatch into caterpillars. These caterpillars have chewing mouthparts and will feed on a variety of plants. If left unchecked, caterpillars can severely damage a crop. Pest control materials are directed primarily at the caterpillar stage. Control is by spraying contact insecticide or, hand-picked if the infestation is not severe

10. Leafminers

The vast majority of leafminers are moths belonging to the Lepidoptera family. A leafminer is the larval stage of an insect that lives in and feeds within the tissues of the leaves themselves. The precise pattern formed by the feeding tunnel is very often diagnostic for which kind of insect is responsible.

11. Brown Stink Bug

Adults are approximately 17mm long and are shades of brown on both the upper and lower body surfaces. They are the typical "shield" shape of other stink bugs, almost as wide as they are long. To distinguish them from other stink bugs, look for lighter bands on the antennae and darker bands on the membranous, overlapping part at the rear of the front pair of wings. They have patches of coppery or bluish-metallic colored punctures (small rounded depressions) on the head and pronotum.

The name "stink bug" refers to the scent glands located on the dorsal surface of the abdomen and the underside of the thorax. Feeding on fruits results in a characteristic distortion referred to as "cat facing," that renders the fruit unmarketable as a fresh product. Typically, stink bugs will emerge from 73 cracks under or behind baseboards, around windows and door trims, and around exhaust fans or lights in ceilings.

Control is by sealing these openings with caulk or other suitable materials to prevent the insects from crawling out. Spraying insecticides, directed into cracks and crevices, will not prevent the bugs from eventually emerging and is not a viable or recommended treatment.

12. Snails and Slugs

They chew irregular holes with smooth edges in leaves and

flowers and can clip succulent plant parts including fruit and young plant bark. Control by handpicking can be very effective if done thoroughly on a regular basis. Copper barriers, such as copper foil, are effective because the copper reacts with the slime that snails and slugs secrete, causing a disruption in their nervous system.

13. Mealybugs

Mealybugs are insects in the family Pseudococcidae, unarmored scale insects. Mealybug females feed on plant sap, normally on leaves, roots or other crevices, resulting in a distorting, stunting, and yellowing of the foliage.

Cultural control includes dislodging of mealybugs with water and soap sprays, practising good sanitation by checking new plants carefully and disposing of infested plants. Biological control includes the use of lady beetle, green lacewings (predators) and a wasp parasite, *Leptomastix dactylopii*. Insecticidal sprays may be applied if mealybug populations are heavy.

14. Nematodes

Plant parasitic nematodes (*Meloidogyne* spp.), are small microscopic roundworms that live in the soil and attack the roots of plants. Crop production problems induced by nematodes, therefore, generally occur as a result of root dysfunction, reducing rooting volume and foraging and utilisation efficiency of water and nutrients. In addition to the direct crop damage caused by nematodes, many of these species have also been shown to predispose plants to infection by fungal or bacterial pathogens or to transmit virus diseases, which contribute to additional yield reductions

In most cases, greenhouse problems with soil borne nematodes arise from planting of infected seed or planting stock. At present, no chemical or nonchemical management tactics are available that can resolve nematode problems within the greenhouse once introduced into the crop. As a result, nematode-free transplants should be used to exclude nematodes and to expedite plant establishment and crop production

Other cultural measures that reduce nematode problems in the greenhouses include rapid destruction of infested crop root systems following harvest. Discarding infected potted plants will help to prevent spread of nematode damage.

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