

LESSON 9: MAJOR INSECT PESTS

9.1. Introduction



The major quarantine pests identified recently on cut flowers include bollworms (*Helicoverpa armigera*, *Spodoptera* spp.), leaf miner (*Liriomyza* sp.), white flies (mainly *Bemisia tabaci*), thrips (mainly western flower thrips – *Frankliniella* spp.), and fruit flies (Otieno, unpubl.). The greenhouse provides a modified environment which, in many ways, favours the proliferation of cut flower pests and diseases. During certain times of the year, day temperatures in the greenhouse may soar upto 26° -33°C which reduces the regeneration cycle for many pests.

9.2. Lesson Objectives



At the end of the lesson students will be able to

1. Identify the major pests in different orders
2. Describe the lifecycle of insect pests in the various orders

9.3. Major orders in the class Insecta

Some of the orders in the class insecta include those listed below. They include;

- Orthoptera
- Homoptera
- Isoptera
- Lepidoptera
- Hymenoptera
- Thysanoptera
- Hemiptera
- Coleoptera
- Diptera
- Acari

9.4. THYSANOPTERA

Thrips can be the most damaging crop pests because of their habits and characteristics, which include concealing and secretive habits, small size, tendency to colonize widely, ability to multiply rapidly, ability to cause direct and indirect damage and ability to spread fungal and viral diseases. About 11 species of the genus *Thrips* have been reported in Africa but the most common are *T tabaci* and *T simplex* morison. In Kenya, *T tabaci* was first recorded on pyrethrum, *chrysanthemum* spp. in 1937. The species also attacks vegetable and flower crops. Thrips cause damage through perforation of plant tissues using their sharp mandibular stylets, injection of toxic saliva, sucking up their cellular contents, and entry of air into the cells giving rise to silvering symptoms and browning- lowering flower quality, disease penetration and infection as a result of injury, and transmission vectors of tospoviruses (impatiens necrotic spot virus, iris yellow spot tospovirus).

Family thripidae

Common name: thrips

Major species of thrips attacking crops in africa are;

- African bean flower thrips (*megalurothrips sjostedti*)
- Coffee thrips (*Diarthrothrips coffeae*)
- Blossom or cotton bud thrips (*Frankliniella schultzei*)
- Black tea thrips (*Heliothrips haemorrhoidales*)
- Banana thrips (*Hercinothrips bicintus*)
- Citrus thrips (*Scirtothrips aurantii*)
- Cacao or red banded thrips (*Selenothrips rubrocintus*)
- Tomato thrips (*Ceratothripoides brunneus*)
- Cereal thrips (*Haplothrips* spp)
- Tea thrips (*Scirtothrips kenyensis*)
- Onion thrips(*Thrips tabaci*)
- Western flower thrips (*Frankliniella occidentalis*)

9.5 Host plants

Thrips are polyphagous (feeds on a wide variety of crop species) species. They are suitable pests of curcubitaceae and solanaceae. The crops infested by thrips include beans, cabbage, chilli, Chinese cabbage, cowpea, cucumber, eggplant, lettuce, melon, okra, onion, pea, pepper, potato, pumpkin, squash, tomato and water melon. Other crops infested include avocado, carnation, chrysanthemum, citrus, cotton, hibiscus, mango, peach, plum, soybean, tobacco among others.

9.6. Life cycle

Eggs

Eggs are deposited in leaf tissue, in a slit cut by the female. One end of the egg protrudes slightly. The egg is colorless to pale in color, and bean shaped in form. The egg hatches into larva within 4 days.

Larvae

The larvae resemble the adults in general body form though they lack wings and are smaller. Larvae feed in groups, particularly along the leaf midrib and veins, and usually on older leaves. Larva takes 4 days to complete their development. At the completion of the two larval instars, the insect usually descends on the soil or leaf litter where it constructs a small earthen chamber for a pupation site.

Pupa

This is a non-feeding stage. There are two pupal instars. The pre-pupal instar is nearly inactive and pupal instar is inactive. The pre-pupae and pupae resemble the adults and larvae form, except that it possesses wing pads. The pupal development takes three days.

Adult

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 0.88 to 1.0 mm in body length, with females slightly larger than males. Unlike larvae, the adults feed on young foliage. Adult longevity is 10 to 30 days for females and 7 to 20 days for males. Females can lay up to 200 eggs, but an average of 50 per female.

The life cycle of thrips ranges from 20 to 80 days at 30°C and 15°C respectively. They multiply rapidly during hot and dry season.

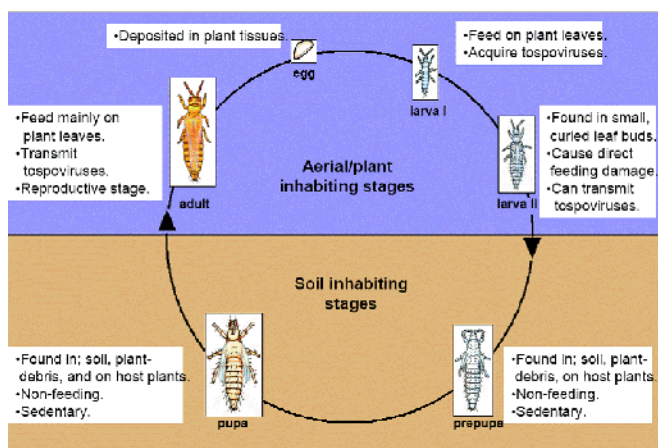


Figure 6: Life stages of thrips

9.7. Damage

Thrips cause severe injury to infested crops. Leaves become yellow, white or brown, and then crinkle and die. Heavily infested fields sometimes acquire a bronze color. Damaged terminal growth may be discolored, stunted and deformed. Feeding usually occurs on foliage, but on pepper, a less suitable host, flowers are preferred to foliage. Because melon thrips prefer foliage, they are reported to be less damaging to cucumber fruit than western flower thrips (*Frankliniella occidentalis*). Fruits may also be damaged where they have scars, deformities and abortion takes place.

In addition to direct injury, thrips are capable of inflicting some strains of tomato spotted wilt virus and bud necrosis virus.

Affected plant stage

Flowering stage, post-harvest, seedling stage, vegetative growing stage.

Affected plant parts

Growing points, inflorescence, leaves.

Symptoms by affected plant part

- Growing points: dead heart
- Inflorescence: lesions, abnormal color, abnormal forms
- Leaves: lesions, abnormal color, abnormal forms.

9.8 Management and control

The pest can be controlled through:

> Sampling

Check the young foliage for the presence of larvae and adults. The nymphs tend to be clustered on foliage inhabited by adults several days earlier. Use sticky and water pan traps to sample the adults. The sticky traps should be preferably blue, yellow or white in color, which thrips are attracted to.

> Insecticides

Foliar insecticides are frequently applied for thrips suppression, but at times it has been difficult to attain effective control. Various foliar and drench treatments, alone or combined with oil have achieved some success though it is usually not advisable to apply insecticides if predators and parasitoids are present. However, eggs, which occur in the foliar tissue and pupae, which are found in the soils are relatively insensitive to insecticide application.

> Cultural techniques

Several cultural practices apparently affect thrips abundance. They include use of physical barriers such as fine mesh and row cover material can be used to restrict entry by thrips into greenhouses, and to reduce the rate of thrips settling on plants in the field. Use of mulch interferes with the colonization of crops by winged thrips. Heavy rainfall is thought to decrease thrips numbers.

Irrigation

Tillage

Planting date

Intercropping

Crop rotation

> **Biological control**

Natural enemies, especially predators are important in the suppression of thrips. The most important are the predatory thrips (*Amblyseius spp*), minute pirate bug *Orius spp* and the lady beetles ground beetles, lacewings, hoverflies and spiders.

The parasitoid *Ceraninus menes* assists in the control of thrips.

Pathogens such as the fungi *Entomophthora*, *verticillin lecanii*, *Beauveria bassiana* and *Metarhizium anisopliae* can be used in control of thrips.

9.9.0 Thrips species

9.9.1 Frankliniella and Megarulothrips sjostedti

Common name: flower thrips

Scientific name: megarulothrips sjostedti Trybom

Host crops include flowers of beans, peas cowpeas and groundnuts.

It is a serious pest during the dry season. A small slender yellow-black insect found concealed in flowers and jump when disturbed. They suck sap from the young pods resulting in currying of the pods and leaving silvery marks. Under heavy infestation the pest may cause abortion of the flowers. Eggs are laid on the flowers.

Control

Endosulfan

Diazinon

Common name: onion thrips

Scientific name: *thrips tabaci*

Host crops: onions

The pest may attack pyrethrum where it feeds on the flowers while on onions it feeds on the leaves. It causes silvering and withering of leaves. The damage starts from the tips of the leaves and extends downwards. Leaf damage may reduce yields and especially in hot dry season and in irrigation schemes. This is especially so because of the high transpiration rates and also due to the destruction of the chloroplast which results in low photosynthetic rates.

The eggs are very small and are inserted into the soft tissues of leaves. The complete life cycle could be 3 weeks.

The male is very rare. Reproduction is entirely parthenogenetic. The egg is inserted by the female in soft tissue; it is slightly protuberant and visible to the naked eye. The female lives for 12 to 17 days and lays 30 eggs on average, after a feeding period of a few days.

The aerial life of the nymphs lasts 10 to 14 days, at the end of which it falls to the ground and burrows down to a few cm depth. The pre pupal period takes 2 days while the pupal period is between 4 to 7 days.

Control
Carbaryl
Diazinon

9.9.3 Cotton bud thrips (*Frankliniella schulzei*)

Common name; cotton bud thrips
Scientific name; *frankliniella schulzei*
Host crops; cotton, beans, groundnuts
Alternative hosts: polyphagus pest on many crops and flowers
Distribution: East Africa and sudan

Damage

- It is a pest of agricultural economic importance. Adults and nymphs feed on flowers and on leaves of many plants especially legumes.
- They rasp the cells of the upper surface of young leaves while they are still in the bud and these leaves become distorted. Seedling growth is retarded by several weeks
- Can reduce yields by 90%.
- Mature plants are less affected
- Vector of tomato spotted wilt virus on groundnut.

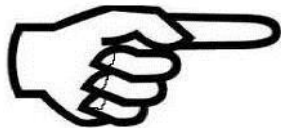
Life cycle

Females lay eggs in leaf tissues. They hatch into nymphs that are pale coloured and wingless and found under curled leaves. There are 3 nymphal instars before pupation. Pupation takes place in the soil. Adults are pale brown, dark brown or black, with paler bands across the abdominal segments and 1-1.5mm long. Life cycle of 2-3 weeks, so that in hot, dry condition damage may be apparent quite suddenly.

Control

Use systemic and contact insecticides such as BHC dusts and sprays, malathion, phorate dust and dimethoate sprays.

Summary



Pesticides can be ineffective against thrips due to their small size and their tendency to hide in buds or curled leaves where pesticides may not reach. Their eggs are laid in protected slits in leaves, or on the stem or leaf and nymphs develop underground.

Activities



Collect a number of flowers from different crops (cowpea, beans and tomatoes), dissect them and count the number of thrips in each flower.
Get a number of onion leaves, tap them on a white paper and count the number of thrips. Using the specimens collected; distinguish between the different species of thrips.