



## Aphids

### Identity:

There are many species of aphids that occur in the world some of which include the following:

*Aphis craccivora* (groundnut aphid), *Aphis gossypii* (cotton aphid), *Aphis fabae* (black bean aphid), *Aphis spiraecola*, *Acyrtosiphum pisum* (pea aphid), *Brevicoryne brassicae* (cabbage aphid), *Cinara cupressi* (cypress aphid), *Diuraphis noxia* (russian wheat aphid), *Lipaphis erysimi* (false cabbage aphid), *Melanaphis sacchari* (sorghum aphid), *Myzus persicae* (green peach aphid), *Pentalonia nigronervosa* (banana aphid), *Rhopalosiphum maidis* (maize aphid) & *Sitobion avenae*, *Toxoptera aurantii*, *Toxoptera odinae* (mango aphid) *Toxoptera citricidus* (citrus aphid) (CABI,2016; infonet Biovision,2016; Muthomi J.W et al,2009 ;CABI,2016; infonet Biovision, 2016).



Green peach aphid nymphs and adults

**Taxonomic Position:** Class: Insecta, Order: Hemiptera, Family: Aphididae

### Hosts/species affected

African Nightshade, Amaranth, Bananas, Beans, Cabbage/Kale, Brassicas, Citrus plants, Cocoa, Cotton, Cowpea, Cucumber, Eggplant, Green gram, Groundnut, Maize, Mango, Okra, Papaya, Passion fruit, Peas, Peppers, Pigeon pea, Potato, Pumpkin, Roses, Sesame, Soybean, Sorghum, Spider plant, Spinach, Sweet potato, Tea, Tomato, Watermelon, Wheat, Zucchini/Courgette. It affects both food crops and ornamentals. (Infonet Biovision, 2016)

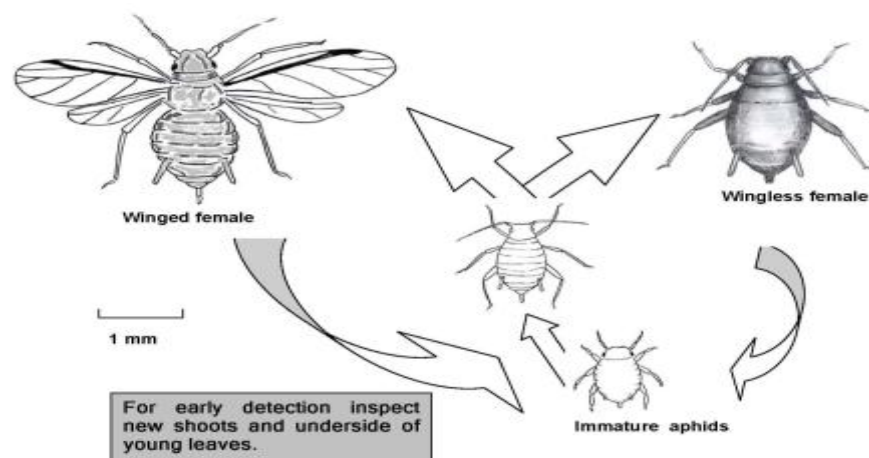
### Growth stages affected

- Vegetative growing stage
- Flowering stage
- Fruiting stage.

### Biology and Ecology

Aphids have complicated life cycles. Females can reproduce with or without mating. Female aphids may lay eggs or give birth to wingless offspring, known as nymphs. In the warm parts of the world, as in the tropics, no male aphids are produced and female aphids do not lay eggs but give birth to small nymphs. A female can produce from 20 to over 100 nymphs. Young aphids grow quickly, becoming adults in about one week and start to reproduce. Thus the numbers increase rapidly under favourable conditions. Aphids live in clusters (known as colonies) on

leaves and stems. Initially they are present on tender parts of the plant (young shoots and leaves), but as their number increases they can cover the whole plant. As the colony grows winged aphids are produced which fly away looking for new plants to start a new colony. Warm and dry weather is particularly favourable for rapid increase of aphid numbers (infonet Biovision, 2016)



**Figure 1.** General life cycle of aphids without egg stage (Photo by A.M. Varela, ICIPE)

**Adults:** Are small, 1 to 4 mm long, soft-bodied insects with two long antennae that resemble horns. Most aphids have two short cornicles (horns) towards the rear of the body. The mouthparts are needle-sharp, resembling tiny straws. Their body colour varies from black, green, red, yellow, pink, white, brown, greyish, or purple. Adults of the same species may be wingless or winged (with two pair of wings). Winged aphids are usually dark in colour. Wingless forms are the most common; winged aphids are produced when they need to migrate, for example under overcrowded conditions with limited food source or when environmental conditions are unfavourable (infonet Biovision, 2016).



**Figure 2.** Purplish black adults and reddish purple nymphs of the black bean aphid, *Aphis fabae*.  
Photo by Jack Kelly Clark

**Nymphs (immature stages):** Are young aphids, they look like the wingless adults but are smaller. They become adults within 7 to 10 days along each side of the body. The head is brown or green and mottled. The fully-grown caterpillars drop from the plant and burrow into the soil to pupate (infonet Biovision, 2016).

**Eggs:** Aphid eggs are yellow or green in color turning black as they develop. They are elliptical (0.02 in. long and 0.01 in. wide). Once developed they are shiny-black. The eggs are usually laid in the crevices of bud, stems, and barks of the plant. Aphids usually do not lay eggs in warm parts of the world. (Kuhar et al, 2016)

### Symptoms on Affected Plant Parts

Curled leaves, abortion of flowers, stunted growth and dieback.

Sooty black mould infestations. Black ants with aphid infestations.

ants are also associated with other honeydew-producing insects such as mealybugs, scales and whiteflies (infont Biovision, 2016).



**Figure 7:** Aphid Eggs  
Photo by forums2.gardenweb.com



**Figure 6..**Aphid Eggs  
Photo by www.noordinaryhomestead.com

becomes evident in heavy are very common in plant However, sooty moulds and

### Means of movement and dispersal

Adults can migrate over long distances, borne by wind. Movement in international trade is mainly on ornamental plants and on cut flowers, in vegetables and ornamentals.

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### Impact

The economic damage due to aphids varies with the stage of plant development, with most damage caused if aphids infest the growing points (Mayeux, 1984). Their feeding may cause rolling, twisting or bending of leaves. Heavily attacked leaves can turn yellow and eventually wilt. Aphids feeding on flower buds and fruits may cause malformed flowers and fruits. Aphids excrete a sugary, sticky liquid called honeydew that accumulates on leaves and branches causing a fungal growth turning leaves and branches black. Heavy coating with honeydew and sooty moulds may reduce photosynthesis, affecting plant growth and yield (infont Biovision, 2016). Major yield losses result when secondary spread within the crop occurs due to aphid vectors (Evans, 1954) which transmit plant viruses (Muthomi J.W et al, 2009), injecting them into the plant as they feed. These viruses can cause molting, yellowing, or poor yields in various garden vegetables and ornamentals. In a study in Niger in 1981, yields in groundnut crops were 1350 kg/ha following low aphid infestations, compared with 183 kg/ha following high infestations of aphids carrying GRV (Mayeux, 1984).

### Phytosanitary significance

Most aphids are widely spread in many parts of the world. However, their phytosanitary significance comes from the fact that they transmit viruses like Potato Virus S-Andean and Plum pox Virus, which are of quarantine importance. These viruses appear in EPPO A1 list whose main vector is aphids. (Scott W.S, 2016; EPPO, 2016; Bode O. & Weidemann H.L, 1971

## **Detection and inspection**

Look for groups of round, green (some may be light green, others dark green, almost black) insects on the underside of young leaves, on shoots and buds. It is difficult to see the detail of the body with the naked eye. The aphids are often present where ants exist due to the presence of honeydew.

## **Management**

**Monitoring and Decision Making:** It is particularly important to scout crops during the critical periods of seedling and shoot growth and during flowering and fruiting. To monitor aphid populations, examine the undersides of the leaves and the bud areas for groups or colonies of aphids. Presence of ants may indicate presence of aphids. Early detection of aphids is important as they can multiply rapidly. Therefore, the crop should be scouted regularly. Yellow sticky traps are useful for monitoring the arrival of winged aphids to the crop. The presence and abundance of natural enemies should also be recorded (infonet Biovision, 2016).

## **Cultural Control:**

- Do not plant down-wind from crops with aphids. Some aphids have wings, but they are not strong fliers, and are more likely to be blown in the wind onto new crops ( Tsatsia H. & Jackson G., 2015)
- Remove weeds from within and also outside the crops
- Inspect crops often and regularly; remove leaves heavily infested with aphids by hand
- Mulch the crop (Tsatsia H. & Jackson G., 2015).
- Often a forceful spray of water or water-soap solution, even on large street trees, when applied with appropriate equipment, will provide sufficient control
- Collect, burn or bury the remains of crops after harvest (Tsatsia H. & Jackson G., 2015).

## **Habitat management**

### **Intercropping and trap crops**

**Use of trap crops:** some crops are particularly attractive to pests and can be used to trap them and protect the main crop. Monitoring of the trap crops is very important. They should be destroyed when they become severely infested, and before they are killed by the pest, or have completed their lifecycle, as the pest may move from the trap plants to the main crop. Trap crops can be planted around the field to be protected, or interspersed among the rows. Use tall barrier crops, windbreaks and bare land to reduce the numbers of aphids entering the crop. Anise, chives, garlic, onions, radish, and parsley are reported as good companion crops (Elwell and Maas, 1995; KIOF). Onion, chives, garlic and Mexican marigold repel aphids. The Kenya Institute of Organic Farming (KIOF) recommends leaving a few plants of Mexican marigold between the crops.

**Mixed cropping:** Mixed cropping is in general beneficial to natural enemies, since it provides food and shelter. Depending on the plants used and the pattern of cropping, mixed cropping may help disrupt the lifecycle of pests and maintain their population below the economic threshold level. An example of a good intercrop in cabbage production is onions (infonet

Biovision, 2016); Control of black bean aphid after intercropping with taller maize (Ogenga-Latigo et al., 1993); Reduction of cotton aphid populations in potatoes intercropped with onions (Potts M.J, Gunadi N, 1991)

### **Crop rotation**

This may help to reduce aphid infestations; particularly of aphid species that are host specific (they feed and develop only on one or few plant species).

### **Botanicals**

Several botanical products have been useful for the control of aphids: water traps, sticky board traps, chilli, ash, castor oil, petroleum oils and insecticidal soaps (Elwell and Maas, 1995). Neem extracts can control early infestations of some aphids, but they are not efficient against all aphid species. For a reliable and satisfactory control neem extracts must be applied at an early stage of aphid attack. Usually repeated spot sprays of affected plants are necessary to achieve control. Therefore, test the extract on few plants before going into full scale spraying. Neem products have in general no or low negative effect on natural enemies.

### **Chemical control**

There are many active ingredients approved for the control of aphids in Kenya for different crops. Please refer to the PCPB website for the entire list of approved chemicals. The list also states the crops covered by each chemical. The PCPB website is on [www.pcpb.or.ke](http://www.pcpb.or.ke).

### **Biological pest control**

The most important aphid predators are predatory bugs (e.g. *Anthocoridae*, *Miridae*, *Nabidae*), carabid beetles (*Carabidae*), soldier beetles (*Cantharidae*), predatory gall midges (*Cecidomyiidae*), lacewings (*Chrysopidae*), ladybird beetles (*Coccinellidae*), hoverflies (*Syrphidae*) & Gnat. In addition, parasitic wasps (parasitoids) and entomopathogenic fungi are often involved in the control of aphid populations. Parasitized aphids can be easily recognized. They turn brown and hard and remain stuck to the plant surface. They are known as "mummies". Avoid use of pesticides toxic to natural enemies. If pesticides must be used, selective biopesticides that target specific pests should be preferred to broad-spectrum pesticides (that kill a wide range of insects including natural enemies). It is important to control ants feeding on honeydew produced by aphids. They disturb natural enemies giving protection to the aphids. Ploughing and flooding the field destroy ant colonies and expose eggs and larvae to predators and sunlight (Elwell and Maas, 1995).

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