

Pest Management of Hemp in Enclosed Production

Cannabis Aphid

(*Phorodon cannabis*)

Damage and Diagnosis. Cannabis aphid is a pale-colored insect that occurs on leaves and stems. Pale yellow forms predominate; less commonly they may be light green. Pale pink and light brown may occur indoors following shift to short day lighting and are regularly present outdoors late in the season.

Cannabis aphid may produce both wingless and winged forms; some dark spotting occurs on winged forms. Wingless forms lack this patterning but may have pale striping running along the top of the body.

Cannabis aphid feeds on fluids of the plant phloem, which it extracts through its "piercing-sucking" mouthparts. Very little, if any, injury occurs to cells from this feeding, so there are no symptoms on leaves of white flecking or surface scarring such as is produced by spider mites or thrips.

Damage is caused by the loss of plant fluids. When high numbers of aphids are present and sustained this can cause reductions in plant vigor that can result in slowed growth, wilting, and leaf yellowing. However, in outdoor production numerous natural enemies are normally present (e.g., lady beetles, syrphid flies, green lacewings) that suppress aphid populations before significant damage is done. Natural enemies of cannabis aphid will normally not be present when the plant is grown indoors, unless they are purposefully introduced (See Biological Control section, below).

As cannabis aphids feed, they also continuously excrete a sticky fluid, known as **honeydew**. This is produced in the form of tiny droplets which drop onto leaf surfaces below where it can be noticed as small shiny spots. This excreted honeydew can be an excellent diagnostic sign for detecting cannabis aphid infestations.

As cannabis aphids grow they must periodically shed their external "skin" (exoskeleton) and as they produce a new and larger exoskeleton for the next, larger life stage. These "**cast skins**" will collect around colonies of aphids and often drop onto leaves below an aphid colony. Along with honeydew, the cast skins can be an excellent diagnostic sign for detecting cannabis aphid infestations.

Note on virus transmission: Some specific kinds of aphids can transmit some specific viruses to some specific plants. However, primary viruses described from *Cannabis* are types that are "mechanically transmitted". These viruses are spread through wounds, such as are produced when plants are cut or by roughly handled. Viruses that are mechanically transmitted cannot be transmitted from plant to plant by aphids or other insects.

With better understanding of the viruses affecting cannabis, in the future it may prove that there are some viruses that may be transmitted from plant to plant by this insect.

Biology Notes. The only host plants on which cannabis aphid is known to develop are species of *Cannabis*.

Under normal conditions cannabis aphid normally reproduces asexually (without males and fertilization). Only females are present and they hatch their eggs internally giving live birth to genetically identical daughter aphids. As aphids feed and develop, they will periodically molt, discarding their old exoskeleton (cast skin) while growing into a new, larger one. Cannabis aphids may become mature adults within a week or two after birth. (Development is always strongly related to temperature.) Adult females may give birth to perhaps 1-5 young per day for their remaining life, which likely will normally be short, perhaps a 3-4 week maximum. Outdoors, where natural enemies are present, aphid survival will average a much shorter period.

Two forms of this aphid may be produced, wingless or winged. Normally wingless forms are produced, particularly if the host plants are in good condition and the aphids are not overcrowded. However, some percentage of the population instead produces wings, and these are the forms that can disperse over long distances and will most readily colonize new plants. Large numbers of winged cannabis aphids have been observed on outdoor grown hemp crops in September and it is possible that shortening day lengths are a trigger to produce a shift to increased percentage of winged forms.

Winged stages of aphids are relatively weak fliers and will largely be carried by wind speeds more than about 3 mph. By controlling air flows aphids aphid movement in a greenhouse can largely be controlled - with aphids collecting in areas when winds flow and aphids being prevented from areas where headwinds are too strong.

In outdoor production there is a significant change in the life history late in the season, triggered by declining day length. In September and October, some of the aphids will be males, all of which develop wings. Also at this time there are sexual form females produced, with which the males then mate. After mating these forms (known as oviparae) will then lay eggs on stems and flower buds. These eggs remain dormant through winter and are likely the only stage that survives outdoors in Colorado between growing seasons. The eggs remain on the old plant debris and hatch the following spring. If the eggs are immediately adjacent to where young volunteer *Cannabis* plants are growing then they will start infestations in the new growing season.

Cannabis aphid can also produce sexual forms and eggs indoors if lighting shifts to short day lengths. It is not known how long eggs survive indoors at sustained warm temperatures and what would trigger their hatching.

It is suspected that the normal form of this aphid, which reproduces asexually and does not produce eggs are those that are pale yellow. Colored forms – pale pink, brown or green – are possibly sexual forms, including the egg producing oviparae.

Management of Cannabis Aphid

Monitoring. Careful plant inspections can be very useful in detection of cannabis aphid. The presence of honeydew droplets on leaves, often with some cast skins, can identify plants that are possibly infested. A subsequent inspection of the plants can then often locate living stages, if present.

Yellow sticky traps can be used to capture winged aphids, which can be useful to detect changes in abundance of the aphids and determine when winged forms may be dispersing through the crop. However, it will require some experience and a bit of magnification to identify winged aphids from some other kinds of similarly sized insects that can occur in the crop, notably fungus gnats and the tiny wasps that are parasites of aphids.

Biological Controls. There are a great many natural enemies of aphids and in outdoor plantings these can be expected to naturally colonize aphid infested plants and provide control so that high populations of aphids on plants are sustained for only short periods. However, when plants are grown indoors these natural enemies are usually absent and must be introduced.

Some of the more effective insects that can be purchased and introduced into greenhouses for control of aphids include green lacewings (normally sold as eggs), aphid predator midge, and convergent lady beetle. (**Note:** Convergent lady beetles are field collected and upon introduction into a greenhouse often start in a semi-dormant condition. It may take a few weeks before they will lay eggs that then result in the presence of lady beetle larvae, which are the stage that feeds most heavily on aphids and can best provide aphid control.)

There are also a few types of parasitic wasps that attack aphids. These lay their eggs in a developing aphid and the young wasps consume the host aphid internally. Aphids parasitized by these wasps become bloated, discolor to a light brown color and die stuck to the plant; these are known as **aphid mummies** and the adult wasps ultimately cut their way out through the back. Among the parasitic wasps used to control aphids that are commercially available are *Aphidius colemani*, *Aphidius ervi*, and *Aphidius matricariae*. Parasitic wasps have been observed to attack cannabis aphid but the species has not been determined.

Sources of biological controls organisms can be found at the Hemp Insect Website in the [Miscellaneous Section](#).

[On outdoor grown hemp there is a fairly robust complement of natural enemies attacking cannabis aphid in Colorado and these were found to build populations that could effectively control the aphids present in the late-season outbreaks. Most important were convergent lady beetle (*Hippodamia convergens*) and multicolored Asian lady beetle (*Harmonia axyridis*), but at least four other lady beetle species were common in Colorado hemp fields. Three species of green lacewing were present, with *Chrysopa oculata* and *Chrysoperla plorabunda* the most common. At least four species of hover fly (Diptera: Syrphidae) and *Aphidoletes aphidimyza* were also observed feeding on cannabis aphids in hemp fields. Parasitism by braconids (Hymenoptera: Braconidae) and infection with entomopathogenic fungi has been observed but only infrequently. Numerous other generalist predators of insects (e.g., *Orius insidiosus*, *Nabis alternatus*, *Geocoris punctipes*) are present in Colorado hemp and likely predaceous on cannabis aphid.]

Insecticides. The insecticides that are allowed to be used in production of *Cannabis* crops in Colorado are regularly updated by the [Colorado Department of Agriculture](#). (Note: In the absence of federal regulation of pesticides on this crop, the permitted use of any pesticide on any *Cannabis* crop is determined on a state-by-state basis. A few states (e.g., Colorado, Washington, California) have lists of pesticides that are allowed within the state; most states do not have such lists and therefore no registered pesticides of any kind are permitted.

A few of the insecticides allowed for use on cannabis do have potential for control of aphids. These include sprays of products that contain the active ingredients pyrethrins, insecticidal soaps (potassium salts of fatty acids), and azadirachtin.

Also allowed on cannabis are a few fungi (entomopathogenic fungi) that cause infection in aphids and other insects. One of these is *Isaria fumosorosea*, sold as Ancora, Preferal, and PFR-97. Another is *Beauveria bassiana*; presently allowable pesticides (in Colorado) that contain *Beauveria bassiana* (Botanigard Maxx, Xpectro OD) are all combination mixtures with pyrethrins. Relatively high humidity is very important in the effectiveness of all fungi used to control insects.

Eradication of Cannabis Aphid. Since *Cannabis* species plants are the only known hosts for cannabis aphid, in areas with cold winters, such as Colorado, the species is very unlikely to survive outdoors between growing seasons, particularly where fields are rotated and volunteer plants eliminated in spring. Normally year-round survival of this insect will only occur only where there is continuous production of cannabis in protected indoor sites.

Aphids also require living hosts on which they can feed to even survive for short periods. Both winged and wingless forms will starve to death within a few days in the absence of food. Therefore removal of all cannabis plants from a growing area can be expected to result in causing all remaining aphids to die out in a very few days.

If eggs are produced, they should be laid on *Cannabis* plants. Removing plant debris after harvest should remove the aphid eggs.

Once facilities have been cleared of cannabis aphid the only likely means of re-infestation is through the introduction of *Cannabis* plant material containing live aphids. Strict sanitation practices that ensure all introduced plant material is completely free of aphids should be done before any new plant material is introduced. To further ensure that cannabis aphid is not present, new plant material should be maintained separately for a quarantine period of several weeks and thoroughly inspected during this period for any evidence that the insect is present (e.g., honeydew droplets on leaves, cast skins on leaves, live aphids on plants or winged stages in sticky traps).

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