



Carrot *Daucus carota*, is an edible biennial herb in the family Apiaceae grown for its edible root. Carrot is believed to have originated in Afghanistan, which remains the centre of diversity of *D. carota*. Some of the major insect pests, which are limiting the production of carrots, are aster leafhopper, flea beetle, aphid, carrot weevil, carrot rust fly and cutworm. The information regarding insect pest of carrot is scanty. Therefore, this information will be valuable asset for scientific community.

Aster leafhopper :

Description: The aster leafhopper is a noxious pest of carrot because it transmits the aster yellow phytoplasma disease. Adult leafhoppers are olive green, wedge shaped and about ½ inch long. They are polyphagous in nature. Adults have six spots on the black of the head. Nymphs are similar in shape to the adults, but are cream coloured and lack of fully developed wings. Adults are extremely active and jump, crawl or fly when they get disturb. Nymphs are less active but crawl rapidly (Seaman, 2014; Delahaut and Newenhouse, 1998).



Biology: Adult female lay eggs in the leaves of susceptible plants. Nymphs hatch 5-7 days later mature within 20-30 days. They are generally completed 2-5 generations per year. This insect overwinters in the egg stage in northern locations and in the adult stage in warmer climates. Because the generations overlap and are initiated by both overwintering eggs and migrating leafhoppers, it is difficult to discern the generations (Capinera, 2008).

Nature and symptoms of damage: Both nymphs and adults feed by inserting piercing and sucking the plant to extract sap. If a leafhoppers feed on an infested plant, it ingests the aster yellow pathogen. When the leafhopper moves to another plant to feed, it transmits the pathogen in its saliva. In carrots, disease symptoms appear about 3 weeks later. Symptoms may appear as early as 10 days after infection or as late as 40 days after infection (Seaman, 2014; Delahaut and Newenhouse, 1998).

Management: Aster leafhopper may effectively be controlled by excluding them from the carrot planting with floating row covers. Place yellow sticky card in the field early in the spring when plants are newly sprouted. Remove weeds from the field edges as these may be reservoir for the pathogen.

Flea beetle :

Description: Flea beetle is an occasional pest of carrot. Its larvae are delicate and threadlike with white bodies and brown head capsules. They have characteristically large hind legs, which makes them excellent jumpers (Delahaut and Newenhouse, 1998).



Biology: Flea beetles overwinter as adults in leaf litter, hedgerows, windbreaks and wooden areas. The beetles become active when temperature reaches 50° F and emerge in late April. Feeding on weeds and volunteer plants until the new crop emerges. Adult lay eggs in the soil at the base of host plants in May. Eggs hatch in 7-14 days and larvae feed on various plant parts until full grown. The larvae pupate in

Table 1 : Insect pests of carrot

Common name	Scientific name	Family	Order
Aster leafhopper	<i>Macrostelus quadrilineatus</i> (Fobes)	Cicadellidae	Hemiptera
Flea beetle	<i>Systema blanda</i> (Melsheimer)	Chrysomelidae	Coleoptera
Willow carrot aphid	<i>Cavariella aegopodii</i>	Aphididae	Hemiptera
Green peach aphid	<i>Myzus persicae</i> (Sulzer)		
Carrot Weevil	<i>Listronotus oregonensis</i> (LeConte)	Curculionidae	Coleoptera
Carrot rust fly	<i>Psila rosae</i> (Fabricius)	Psilidae	Diptera
Cutworm	<i>Agrotis</i> spp.	Noctuidae	Lepidoptera

earthen cells for 11-13 days before emerging as adults. They have two generations per year.

Nature and symptoms of damage: They make small holes or pits in leaves that give the foliage a characteristic “shothole” appearance; Young plants and seedlings are particularly susceptible; plant growth may be reduced (CABI, 2008).

Management: Early planting will help to avoid the population of flea beetles while the plants are small and vulnerable, enclosing seed bed with floating row cover to get protection from laying by adults, application of a thick layer of mulch to prevent beetles reaching surface, applications of diamotocoeus earth or oils such as neem oil are effective control methods for organic growers and application of insecticides containing carbaryl, spinosad, bifenthrin and permethrin can provide adequate control of beetles.

Willow carrot aphid :

Description: Willow carrot aphid is the main aphid pest of carrot crops. Distinguishing features include the presence of cornicles, which project backwards from the body of the aphid and will generally not move very quickly when disturbed; willow carrot aphid will also attack turnip, parsley and celery (CABI, 2008). The green peach aphid is slender, dark green to yellow, and has no waxy bloom. The wingless form of the green peach aphid is pale green. The winged form has a black head and thorax. It is primarily an early year pest and transmits virus diseases (Seaman, 2014; Delahaut and Newenhouse, 1998).



Biology: Most species of aphids have similar life cycles. Aphid females give birth to live offspring all year without mating. When vegetable crops are not available, aphids live on a wide variety of weed hosts. In summer and fall, aphids may produce winged females and later winged males. They mate and produce eggs for overwintering, especially in colder climates. Otherwise, the adult aphids overwinter on crops, weeds or trees. There may be as few as two generations or as many as 16 generations each year, depending on the species and climate.

Nature and symptoms of damage: Aphids feed on carrot foliage, but they are a key pest because they can transmit diseases such as motley dwarf virus. If aphid infestation is heavy it may cause leaves yellow, necrotic spots on leaves and stunted shoots; aphids secrete a sticky, sugary

substance called honeydew, which encourages the growth of sooty mold on the plants.

Management: Use tolerant varieties, sanitation for curbing the spread of the viruses, ploughing all crop residues under as soon as harvest, use of reflective mulches such as silver colored plastic can deter aphids from feeding, use of predators such as green lacewing larvae, lady beetles, and syrphid fly larvae prey on this aphid, use of insecticidal soaps or oils such as neem or canola oil etc. are followed to control the aphids.

Carrot weevil :

Description: Adult weevils spend overwinter in crop debris remaining in the ground; larvae feed for approximately 2 weeks before pupating in the soil; insect undergoes several generations each year. Snout nosed beetles that are about 6 mm long. Larvae are white to pinkish white C-shaped grubs with a yellow-brown head.



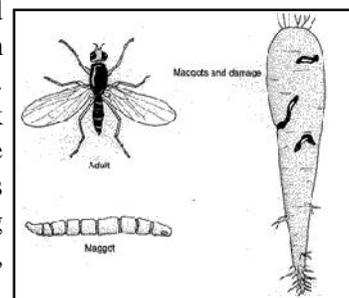
Biology: Adults lay 2-3 eggs in the petioles or crown of the carrots beginning in the first true leaf stage. Eggs hatch in one to two weeks and white in color. There are 2 generations per year (CABI, 2008; Delahaut and Newenhouse, 1998).

Nature and symptoms of damage: Their grub like larvae either tunnel down into the root or leave the stalk and bore into the side of the root from beneath the soil. Larvae may kill young plants. Damage to older plants is typically observed in the upper one-third of the root. Feeding injury may allow entry by pathogens that will cause roots to rot (CABI, 2008; Delahaut and Newenhouse, 1998).

Management: Removing of all debris from Umbelliferous crops to reduce sites where weevil can survive and persist, crop rotation, using of Azadirachtin is quite effective against carrot weevil.

Carrot rust fly :

Description: The rust fly adult is about 6-8 mm long with a shiny black thorax and abdomen, a reddish-brown head, and yellow legs. Adult insect is dark colored fly; larvae are white maggots approximately 1 cm long (David *et al.*, 2003; CABI, 2008).



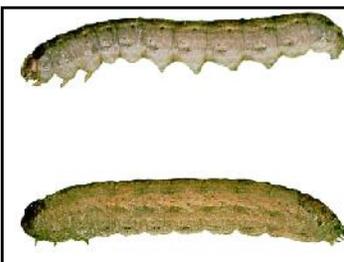
Biology: The adult female lays its eggs in the soil at the base of the carrot. Six to ten

days later the larva hatches and feeds on the carrot root. **Nature and symptoms of damage:** Their Larva feeds on the carrot root, rendering the carrots impossible to market. Carrot rust flies obtain their common name from the rust coloured frass they deposit in the superficial feeding tunnels on the carrot (David *et al.*, 2003; CABI, 2008).

Management: Use of row covers will help to protect plants from damage but they must be installed before adult fly lays eggs on plants.

Cutworm :

Description: They are the larvae of nocturnal grey moths. They tend to feed at just below the ground surface at night. Cutworms are active feeder of young foliage and stems and will cut off many young seedlings in an evening. They are large, fleshy larvae curl up into a tight C shaped when disturbed (Delahaut and Newenhouse, 1998).



Biology: Few cutworms overwinter, beginning in late May, moth migrates into the state. Female moths lay hundreds of eggs either singly or in clusters. Most eggs are laid on low growing, grassy vegetation or plant residue from previous year's crop. Once the egg hatch, the young larvae feed above ground on the tips of plants. There are three to four generations per year, but first generation is most damaging because it coincides with seedling plants.

Nature and symptoms of damage: Large larvae may destroy several plants in one evening. The larvae often

the pull the stem of the severed plant into the subterranean burrow (Delahaut and Newenhouse, 1998).

Management : Deep ploughing and stirring of soil, flooding of fields so that caterpillars are exposed to birds and other enemies. Hand picking and destruction of caterpillars found just under the damaged plant. Soil application (drenching) of chlorpyrifos @ 0.1 per cent. Poison baits containing wheat bran + carbaryl + molasses be spread on the ground to attract and kill larvae and Mixing of insecticidal dust are some of the practices to control the cutworms.

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