

Integrated Pest Management of Apiaceae Crops in North India

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Abstract

Apiaceae family includes Carrot (*Daucus carota*), coriander (*Coriandrum sativum*) and celery (*Apium graveolens*) medicinal vegetable. These are very economically winter season crops widely cultivated for their nutritional, medicinal and culinary significance. These crops are vulnerable to a variety of insect pests that affect both aerial and subterranean plant parts, thereby compromising yield, quality and market acceptability. This article provides a comprehensive overview of major insect-pests affecting these crops, highlighting detailed identification of their various developmental stages and integrated pest management (IPM) strategies that prioritize sustainability and ecological safety.

Introduction

Carrot, coriander and form an essential part of diversified agro-ecosystems and are cultivated in regions with cool to moderate climates. These are very popular culinary combination, with both the vibrant orange root vegetable

and the fragrant, citrusy herb playing distinct yet complementary roles in various dishes. Carrots, rich in beta-carotene and vitamins, offer a sweet, earthy base, while coriander and celery provide a refreshing, herbaceous counterpoint. The leaves (cilantro) and seeds are both used in cooking, with the leaves offering a fresh, vibrant taste and the seeds providing a warm, nutty spice. Their flavours and textures combine to create a balanced and flavourful experience, whether in soups, stews, or salads. These crops require well-drained loamy soils, rich in organic matter and optimal agronomic practices for healthy growth. However, several insect pests hinder their successful cultivation, inflicting both direct and indirect damage. Integrated Pest Management (IPM) strategies for Apiaceae crops (like carrots, celery, parsley, etc.) in North India focus on minimizing pesticide use through a combination of cultural, biological, and chemical control methods. The core principle is to understand pest life cycles and their interaction with the crop and environment to implement targeted control measures.

Insect-pests

Pest	Identification	Damaging symptom	Management	Reference
Carrot Rust Fly (<i>Psila rosae</i>)	The adult fly is approximately 4–5 mm long, shiny black with a reddish head and clear wings. It exhibits a slow, hovering flight close to the soil surface. Eggs are laid near the base of host plants. The larvae (maggots) emerge which are creamy-white, legless, and taper at one end and it pupates in the soil	The larvae tunnel through carrot and celery roots, creating serpentine, rust-colored galleries. These feeding sites often serve as entry points for secondary pathogens, leading to root rot, that reduces root quality and marketability. Severely infested roots may become discolored, malformed	<ul style="list-style-type: none"> • Use fine-mesh row covers to restrict oviposition • Delay sowing to avoid peak egg-laying periods. • Monitor the pest population using yellow sticky traps. • Crop rotation with non-host plants. • Apply Neem-based formulations. • Make efforts to enhance the population natural enemies. 	Dekker, 2022; Kiwicare, 2020, BBC Gardeners' World, 2019, (e-nema GmbH, 2021; PNW Handbooks, 2023).
Aphids (<i>Myzus persicae</i> , <i>Cavariella aegopodii</i>)	The wingless adults are globular, green to pale yellow in color, while winged forms have a slender black thorax and transparent wings. Aphids reproduce rapidly through parthenogenesis under favorable condition.	Both adults and nymphs cell sap from tender leaves and shoots, leading to chlorosis, curling, and stunted plant growth. These aphids are also act vector for many diseases. The excretion of honeydew encourages the	<ul style="list-style-type: none"> • Do clean cultivation by removing alternate hosts • Encouraging the population natural enemies like ladybird beetles, green lacewings 	CABI, 2023, PNW Handbooks, 2023, (Singh & Sharma, 2022; FAO & ICAR, 2021)

		growth of sooty mold, which further interferes with photosynthesis.	<ul style="list-style-type: none"> • Apply neem oil sprays or insecticidal soaps. 	
Cutworms (<i>Agrotis spp.</i>)	These are nocturnal pests. The larvae are grey to brown, smooth-skinned, and measure. They curl into a characteristic “C” shape when disturbed and are often found near the soil surface or plant base. Pupae are reddish-brown, cylindrical. Adult moths have mottled grey to brown forewings.	Larvae are most destructive during the seedling stage of the crop. They cut seedlings at or just below the soil surface and may feed on crown roots. This results in patchy emergence, plant wilting and seedling death. Night-time feeding and early morning collapse of plants are indicative of cutworm infestation	<ul style="list-style-type: none"> • Follow deep summer ploughing to expose overwintering larvae and pupae. • Installation of light traps to monitor adult moth activity. • Enhance the population of NE and predatory birds. • Collect and destroy the previous crop ruminants. • Apply recommended insecticides as soil application in the evening time. 	FAO & ICAR, 2021, (Singh & Sharma, 2022).
Leaf Miners (<i>Liriomyza spp.</i>)	These are small, yellow and black flies. Eggs are inserted under the leaf epidermis and are invisible to the naked eye. The larvae are legless, yellowish-white. Pupae are brown, oval, and typically form in soil or on the plant surface.	The feeding activity of larvae creates irregular, serpentine mines on leaves and reduces photosynthetic activities. Severely mined leaves may wither, curl, or dry up,	<ul style="list-style-type: none"> • Remove and destroy the infested leaves to interrupt the pest's life cycle. • Follow crop rotation • Apply neem-based sprays and microbial insecticides like <i>Beauveria bassiana</i> 	Reitz et al., 202 (PNW Handbooks, 2023, Reitz et al., 2021; Singh & Sharma, 2022.

Conclusion: The apiaceae crops are susceptible to a diverse range of insect pests that cause significant economic damage and reduce produce quality. By adopting an integrated pest management approach that emphasizes early detection, ecological sustainability, and minimal chemical use, growers can effectively mitigate pest-related risks. Ultimately, the integration of preventive and responsive pest management practices ensures higher productivity, improved crop quality, and long-term viability of root and leafy vegetable cultivation. This will be more helpful to the vegetable growers and vegetable processing industry for getting higher economic returns

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