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Sustainable Integrated Pest Management for Tomato



Despite all the planning and preparation that goes into planting a garden, insects and diseases can frustrate even the best gardeners.

Zambia Agribusiness Society

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Introduction

Integrated Pest Management (IPM) is the coordinated use of pest and environmental information with available pest control methods to prevent unacceptable levels of pest damage by the most economical means and with the least possible hazard to people, property, and the environment. IPM is a sustainable approach to pest management that uses knowledge of pest, crop and environmental conditions to select the best combination of the following IPM tactics:

- Cultural control – modifying farming practices to decrease pest problems
- Biological control – use of beneficial organisms to regulate pests
- Chemical control – use of chemical pesticides appropriately
- Physical control – killing pests directly or by disrupting their environments

Tomato Pests and Their Control

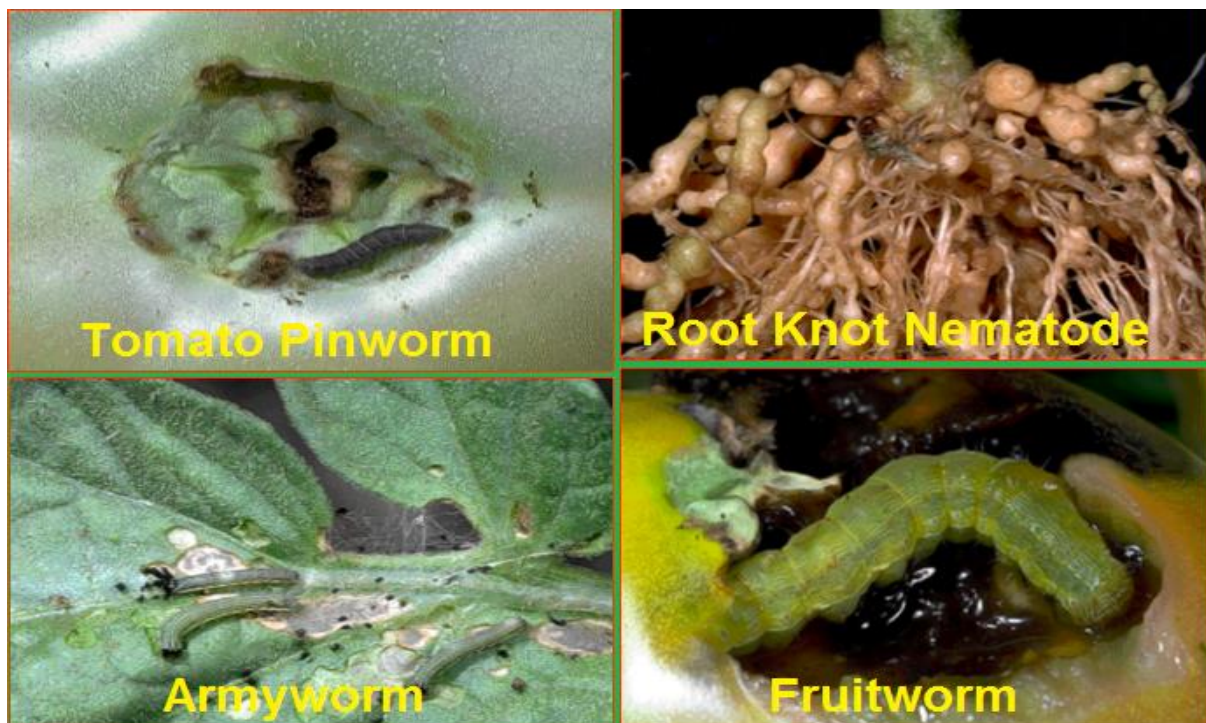


Figure 1. Insects - Nematodes Affecting Tomatoes

Cutworms. Green or brown caterpillars that curl into a C shape when disturbed. They eat young plants at the soil line at night, and can leave a healthy seedling cut off entirely and lying on the ground.

Controls: Eliminate weeds around garden beds at least two weeks before planting. Hand-picking cutworms at night may help, or you can protect seedlings with cardboard collars or one or more toothpicks (inserted close and parallel to the stem).

Aphids. Affect tomatoes, especially vigorously growing ones.

Controls: A handful of aphids won't hurt a healthy tomato plant, but if new leaves are curling or the shoots are coated in aphids, crushing aphids by hand or blasting them off with a strong jet of water will control them.

Hornworms. Are voracious eaters of tomato plants and fruit. They are large (1” to 4”) green caterpillars with a prominent horn on the tail end; they will eat leaves, small stems, and fruit, sometimes stripping young plants entirely. The mature caterpillars drop to the ground and pupate in the soil over the winter.

Fruitworms, also known as corn earworms, are about an inch long, pale green or brown, sometimes striped. They burrow under the stem end of tomato fruit to create messy warrens full of brown frass.

Controls: Hand-picking caterpillars in the early evening, when they are most active, is quite effective.

Rototill or thickly sheet-mulch beds to destroy pupae between seasons. *Bacillus thuringiensis* or *spinosad* sprays, both organic, can help with control. General predators, such as praying mantises or wasps, also reduce populations.

Stinkbugs are an annoyance to tomato growers, as their feeding can cause corky white patches under the skin of ripe tomatoes. These patches don't peel easily when cooking or canning the fruit.

Controls: Hand-pick stinkbugs or snip them with garden shears; a bucket of soapy water held under them can help, as they often drop when disturbed. Eliminate weeds around garden beds at least two weeks before planting. Insecticides are not recommended.

Snails and Slugs can be a problem, especially if plants are on or near the ground. They rarely bother foliage on mature tomatoes, but they can eat large chunks of ripening fruit if they have easy access.

Controls: Keep tomato plants and especially fruit off the ground by using cages or staking.

Tomato Diseases and Their Control



Figure 2. Fungal and Bacterial Pathogens of Tomatoes

Early Blight is a common leaf spot caused by the fungus *Alternaria solani*. Dark brown spots with broad yellow haloes appear on the leaves, and concentric rings can be found in the spots under bright light.

Stems and fruit can also be infected. It often progresses from the bottom of the plant upward. Cool humid weather or overhead irrigation encourage Early Blight, which is spread by splashing water and germinates on moist leaves.

Controls: Avoid getting water on the leaves whenever possible, change the locations where you plant your tomatoes, mulch well around each plant, and clear away all dead or infected plant material at the end of each season. Picking off infected leaves may slow the progression of the disease until the weather is more favourable.

Speck and Spot are bacterial diseases with similar symptoms, causing small black specks or patches on leaves, stems, and fruit. They can be distinguished from Early Blight by the water-soaked appearance of the spots, and the fact that the spots don't cross the larger veins. Like Early Blight, these bacterial diseases are spread by water, and they can overwinter in soil and on debris from the previous season.

Controls: Prevent and control these diseases as you would Early Blight, above. Bacterial spots stop spreading in dry, warm weather. Chemical controls are usually not needed.

Late Blight is caused by *Phytophthora infestans*, a fungal disease most famous for the Irish potato famine. It is just as serious in tomatoes, causing dark green to purple-brown water-soaked spots that grow quickly on leaves and stems. The underside of infected leaves will sometimes have whitish powdery spores. Fruit turns brown but stays firm. The fungus thrives during periods of high humidity and mild temperatures (60-78° F). Once it gets going, it can kill a plant very rapidly and spread to other tomatoes, peppers, or potatoes.

Controls: Avoid sprinkler irrigation, very dense planting, or other things which keep humidity high.

Remove volunteer potatoes or tomatoes, and clean up debris at the end of the season. Mulching may help prevent initial infection.

Fusarium Wilt is caused by a soil-borne fungus (*Fusarium oxysporum*) which infects the roots and stems of tomatoes. Leaves yellow and wilt without spots, sometimes only on one side of the plant, and brownish streaks creep up the inside of the main stem and into the branches. Symptoms are worst in warm weather, especially as the first fruits are getting large. It is usually fatal to infected plants.

Controls: *Fusarium* can survive a long time in the soil, and it is spread by shoes, garden tools, and anything else which moves soil around. The typical solution in an infected garden is to grow resistant varieties (look for an F or FF on the variety label); no systematic resistance trials have been done for heirloom varieties. Cleaning up all tomato debris, including old roots, and solarizing the soil may help.

Verticillium Wilt (*Verticillium dahliae*) is similar to *Fusarium Wilt*, and it can be difficult to tell them apart, though *Verticillium* prefers cool temperatures rather than warmth.

Controls: Management is the same as for *Fusarium Wilt*; resistant varieties carry a V on the label.

Powdery Mildew can appear in late summer or fall as the nights cool, but it rarely causes much damage.

Irregular yellow blotches with a faint coating of white powder form on the leaves, and eventually cause brown dead patches.

Controls: No control is necessary on mature plants, but in the case of young or severely affected plants, sulphur dust provides good control.

Summary

Pesticides and application costs are nearly 25% of tomato grower's expenses. Despite all the planning and preparation that goes into planting a garden, insects and diseases can still frustrate even the best gardeners.

References

[Pests and Diseases for Home Gardeners](#)

[Precautions & Application Tips on Specific Pesticides](#)