

BETTER INCOME FROM PEST AND DISEASE- FREE TOMATOES

Research Note 33

June 2024

ABOUT THIS NOTE

The tomato (*Solanum lycopersicum*), a key vegetable in Bangladesh, is a rich source of vitamins A and C and contains powerful antioxidants. To ensure good yields and a healthy crop, farmers must use robust seedlings.

An annual herbaceous plant belonging to the Solanaceae family, the tomato is cultivated for its nutritious fruit. However, its cultivation is frequently challenged by various pests and diseases that damage leaves, stems, and fruits. This guide offers a concise overview of the major pests and diseases affecting tomatoes, highlighting their symptoms, the damage they cause, and providing cultural and biological control strategies for effective management.

Integrated pest and disease management is an ecosystem-based strategy that focuses on long-term prevention of pests and diseases or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Chemicals are used only after pest or disease monitoring indicates their need according to established guidelines.



Above: Tomato plants; photo: Bharathi Parupalli

INTEGRATED PEST AND DISEASE MANAGEMENT BUNDLES FOR TOMATO

Sl. No.	Common name of pest and disease	Scientific name	Plant part mainly affected
1	Damping off/seedling rot	<i>Pythium spp., Rhizoctonia solani, and Fusarium spp</i>	Seedlings
2	Root knot nematode	<i>Meloidogyne incognita and M.javanica</i>	Roots
3	Whitefly	<i>Bemisia tabaci</i>	Leaf
4	Serpentine leaf miner	<i>Liriomyza trifolii</i>	Leaf
5	Tomato leaf curl disease	<i>Tomato leaf curl virus (ToLCV)</i>	Leaf
6	Tomato mosaic virus-tobamoviruses	<i>Tomato mosaic virus (ToMV)</i>	Leaf
7	Aphid	<i>Aphis gossypii</i>	Leaf and stem
8	Early blight disease of tomato	<i>Alternaria solani</i>	Leaf, stem and fruit
9	Bacterial spot of tomato	<i>Xanthomonas campestris</i>	Leaf, stem and fruit
10	South American tomato leaf miner	<i>Phthorimaea absoluta</i>	Leaf and fruit
11	Late blight disease of tomato	<i>Phytophthora infestans</i>	Leaf and Fruit
13	Tomato fruit borer	<i>Helicoverpa armigera</i>	Fruit
14	Fusarium Wilt	<i>Fusarium oxysporum</i>	Whole plant
15	Tomato Bacterial Wilt	<i>Ralstonia solanacearum</i>	Whole plant

GENERAL CULTURAL PRACTICES TO CONTROL INSECT PESTS AND DISEASES OF TOMATO

- Select pure, high-quality certified seed free of disease, weed seeds and insect damage.
- If the seedlings are bought from commercial nurseries, select healthy and disease-free seedlings.
- When growing the seedlings, avoid seed bed and grow them in preferably coco peat.
- Transplant at proper time with optimum number of seedlings, enabling the greatest ground coverage, thus deterring weeds.
- Maintain a field free from weeds by manual/mechanical weeding, including the irrigation and drainage channel, to avoid alternate hosts of pests and diseases.
- Employ crop rotation to help eliminate crop-associated pests; especially avoid any solanaceous (such as eggplant, potato) plants as the previous crop of tomato.
- Scout the field from the seedling stage for any infestation of pests and diseases and ensure no routine application of chemicals before any symptoms of pests and diseases are noticed.
- When treating pest/diseases during harvest time always consider the recommended preharvest interval.

Please note this publication focusses on cultural and biological control measures. For advice on the best option of chemical control measures (including dosage and application method) please contact the nearest Upazila/ District Agricultural Extension Office/Sub Assistant Agriculture Officer.

CAUTION: When spraying chemicals, please follow the recommended pre-harvest interval without fail!

DAMPING OFF or SEEDLING ROT (*Pythium* spp., *Rhizoctonia solani*, and *Fusarium* spp.)

Stage of crop damage: Seedlings

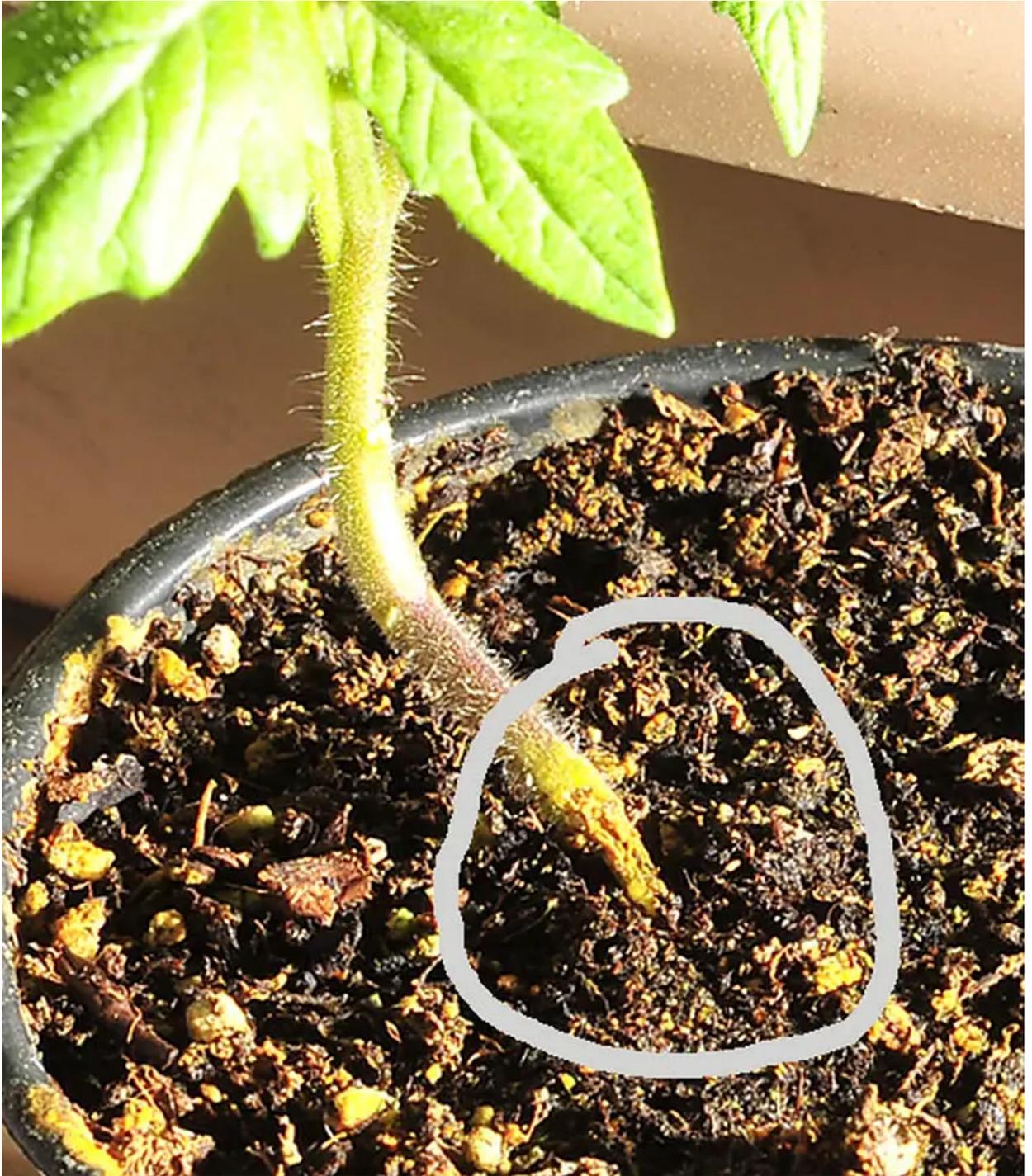
Symptoms of damage	Integrated control measures	
	Cultural control	Biological control
<ul style="list-style-type: none"> Starts with water-soaked spots at the base area of tomato plants close to the surface. After this, the seedling droops and then dries up and dies because roots and the base of the plant get rotten by water-soaked spots. Fungus, like white thread, is seen at the base of the fallen plants. Seedlings that grow from seed are infected both above and below the soil/growing medium. 	<ul style="list-style-type: none"> While producing the seedlings, do not over wet the medium. Clean the germination trays well with a disinfectant. Improve the drainage system of the seed bed to prevent it from getting wet. Disease affected seedlings should be promptly removed from the trays and burned. 	<ul style="list-style-type: none"> Treat 100 grams of seed with 3-4 grams of <i>Trichoderma viride</i>. Before transplantation, dip the seedling roots in <i>Trichoderma viride</i> solution for 30 minutes and transplant immediately. To make the solution, 100 grams of <i>T.viride</i> powder should be mixed in 10 liters of water.

Note:

Always wear personal safety clothing when spraying/using pesticides.

Always read the label carefully before spraying/using pesticides and apply the correct dosage accordingly

DAMPING OFF or SEEDLING ROT (*Pythium* spp., *Rhizoctonia solani*, and *Fusarium* spp.)



Above: Infected seedling with root rot

PC: [https://www.tomatodirt.com/damping-off.html#gallery\[pagegallery\]/0/](https://www.tomatodirt.com/damping-off.html#gallery[pagegallery]/0/)

ROOT KNOT NEMATODE (*Meloidogyne incognita* and *M. javanica*)

Stage of crop damage: Roots of plant at any growth stage

Symptoms of damage	Integrated control measures	
	Mechanical/cultural control	Biological control
<ul style="list-style-type: none"> • Infected plants exhibit stunted growth compared to healthy plants. • Leaves may turn yellow, wilt, or exhibit signs of nutrient deficiency due to impaired root function. • The most characteristic symptom of root knot nematode infection is the formation of galls or knots on the roots. • Severe infestations can lead to a significant reduction in fruit yield and quality. 	<ul style="list-style-type: none"> • Plant healthy, vigorous, and disease-free seedlings. • Rotate tomato crop with crops such as maize, wheat, beans and cucurbits. Do not grow potato and eggplant after or before tomato. 	<ul style="list-style-type: none"> • Amend the soil with <i>Trichoderma</i> based Tricho-compost @ 2-2.5 t/ha (500-600 kg per bigha) 5-7 days before transplantation of seedlings or at the time of final land preparation. • Apply bio-fungicide <i>Trichoderma</i> powder (3-5 gm/liter of water) after transplanting the seedlings. Around 50 liters of solution will be needed for one bigha land.

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ROOT KNOT NEMATODE (*Meloidogyne incognita* and *M. javanica*)



Above: Severe Infection on the roots; photo: Ravishankar Manickam, World Vegetable Center

WHITEFLY (*Bemisia tabaci*)

Stage of crop damage: Attacks the leaves.

Symptoms of damage	Integrated control measures	
	Nursing/Cultural control	Biological control
<ul style="list-style-type: none">• Both adults and nymphs suck the plant sap and reduce the vigor of the plant.• In severe infestations, the leaves turn yellow and drop off.• When the population is high, the adults secrete large quantities of honeydew, which favors the growth of sooty mould on leaf surfaces and reduces the photosynthetic efficiency of the plants.	<ul style="list-style-type: none">• Set up yellow sticky traps @ 20-25 per hectare (2 or 3 per bigha) as soon as the seedlings are transplanted. The height of the traps should be adjusted as the plant grows to ensure the traps are just above the plant's height.• Rotate tomato crop with crops such as maize, wheat, rice, gourds, beans, pulses to break the life cycle of whiteflies.• Regularly prune and remove affected plant parts, especially the lower leaves that may harbor whitefly eggs and nymphs. Dispose of pruned materials away from the growing area.	<ul style="list-style-type: none">• Spray Entomopathogens like <i>Beauveria bassiana</i>/<i>Metarhizium anisopliae</i> @ 1 x 10⁸cfu/ml.• Apply D-Lemonin 5% SL or Phyto Clean @ 1 ml/liter of water or Matrine 0.5% @ 1.5 ml/liter of water.• By minimizing the chemical sprays, encourage the presence of natural predators such as ladybugs, lacewings, and predatory beetles. These insects feed on whiteflies and can help keep their populations in check.

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WHITEFLY (*Bemisia tabaci*)



Above: Crowding of whiteflies on tomato leaf; photo: [Whiteflies & Southeastern Horticulture Growers Should Know | Crop Science US \(bayer.us\)](https://www.bayer.us/whiteflies)

SERPENTINE LEAF MINER (*Liriomyza trifolii*)

Stages of crop damage: Attacks the leaves

Symptoms of damage	Integrated control measures	
	Nursing/Cultural control	Biological control
<ul style="list-style-type: none">• Tunneling of the larvae damages leaves resulting in reduced photosynthesis and yield.• Heavy infestation can kill plants.	<ul style="list-style-type: none">• Install yellow sticky traps and light traps to attract adults @20-25 per hectare (2 or 3 per bigha).• Replace the traps with new ones once in two weeks.• Pruning and removing severely infested leaves can help reduce the overall population.• Plant aromatic herbs or flowering plants, such as marigold and basil, that may repel leaf miners.	<ul style="list-style-type: none">• Conserve natural enemies like Mirid bugs, spiders and beetles that invade on the larvae, by reducing the number of chemical sprays.• Apply neem oil or neem seed extract as a foliar spray. These organic insecticides can help control leaf miners without harming beneficial insects. To prepare the extract, soak one kilogram of half-broken neem seed kernels in 10 liters of water for 12 hours. Filter the water to obtain the neem seed kernel extract.

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SERPENTINE LEAF MINER (*Liriomyza trifolii*)



Above: Infected leaves; photo: Ravishankar Manickam, World Vegetable Center

TOMATO LEAF CURL DISEASE (Caused by tomato leaf curl virus)

Stage of damage: Any time starting from transplantation

Symptoms of Damage	Integrated Control Measures	
	Nursing/ Cultural Control	Biological Control
<ul style="list-style-type: none"> Folds like waves are created on the leaves of the affected plants and the leaves curl violently. Older leaves become thick and wrinkled. Extra branches emerge on the plants. Plants lose their flower and fruit bearing capacity. 	<ul style="list-style-type: none"> Install yellow sticky traps @ 20-25 per hectare (2 or 3 per bigha) just after transplanting to attract white flies that carry the virus from plant to plant. Destroy the affected plants. In locations where virus is a recurrent problem, use TLCV resistant varieties, if available. Procure virus free seedlings from the nursery. 	<ul style="list-style-type: none"> Vectors/disease carrying insects (white fly) need to be controlled. Spray neem seed kernel extract or neem oil @ 8-10 ml in a liter of water to control white flies. To prepare the extract, soak one kilogram of half-broken neem seed kernels in 10 liters of water for 12 hours. Filter the water to obtain the neem seed kernel extract.

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TOMATO LEAF CURL DISEASE (Caused by tomato leaf curl virus)



Above: Tomato plant infected by Leaf Curl disease; photo: Ravishankar Manickam, World Vegetable Center

TOMATO MOSAIC VIRUS (TMV)

Stages of crop damage: Affects leaves at all plant growth stages.

Symptoms of damage	Integrated control measures	
	Nursing/Cultural control	Biological control
<ul style="list-style-type: none">• This virus causes mosaic pattern on the leaves coupled with curling of the young leaves and shoots.• Severely affected leaves are distorted or they may have necrosis along the main veins accompanied by wilting and leaf drop.• Affected fruit is small and may be disfigured with chlorotic or necrotic areas.• Fruit set may be severely reduced in the affected plants.	<ul style="list-style-type: none">• Follow the rotation of tomato crop with other crops such as maize, mustard, wheat, pulses.• Provide moderate irrigation.• Remove and destroy the infected plants.• Sanitize the tools and equipment to prevent spread of virus from infected to healthy plants.• Install sticky traps @25-30 traps/hectare (2 or 3 per bigha) with lures to control thrips that carry the virus.	<ul style="list-style-type: none">• Green lacewings, minute pirate bugs, mites, and certain parasitic wasps help to control plant-feeding thrips that carry virus. To conserve and encourage naturally occurring populations of these beneficials, avoid persistent chemical pesticides.

Note:

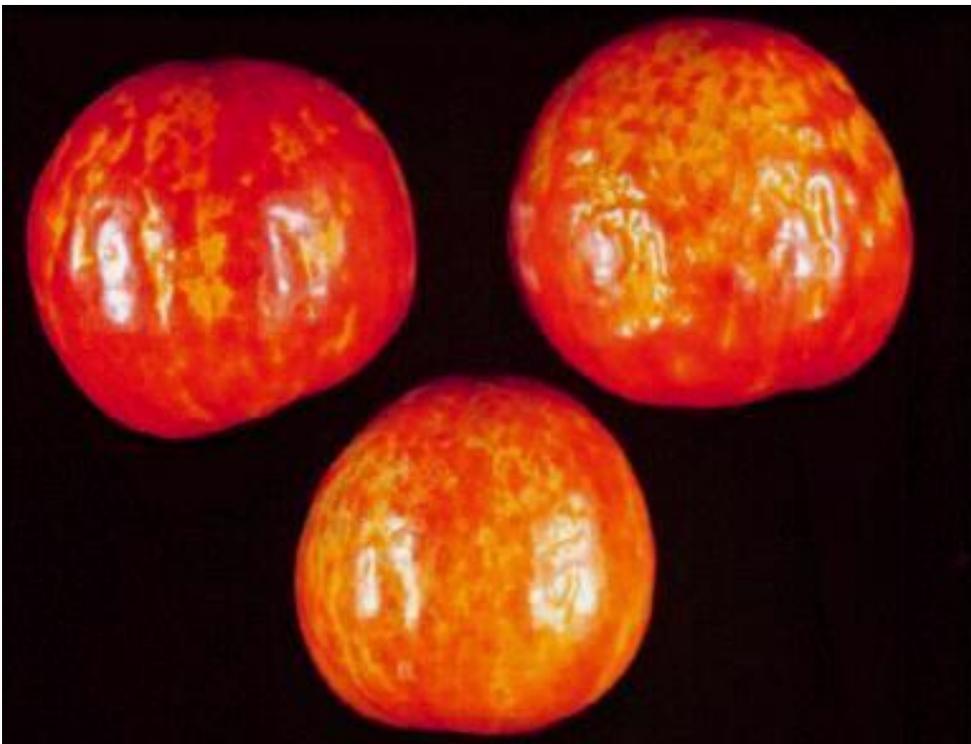
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TOMATO MOSAIC VIRUS (TMV)



Above: Infected leaves; photo: Ravishankar Manickam, World Vegetable Center



Above: Tomato mosaic virus infected fruits; photo: <https://atinadiffley.com/dear-valerie-cigars-and-tobacco-mosaic-virus/>

TOMATO APHID (*Aphis gossypii*)

Stages of crop damage: Attacks leaves, young tips and stems, fruits, and buds of the plant.

Symptoms of damage	Integrated control measures	
	Mechanical/cultural control	Biological control
<ul style="list-style-type: none">• This insect attacks leaves, stems, fruits and buds and feeds on sap.• The attack of this insect causes the leaves to shrivel, the growth of the plant is disrupted, and the yield is reduced.	<ul style="list-style-type: none">• Yellow colored polythene or paper smeared with soyabean oil can be used as insect trap. About 20-25 such traps can be installed per hectare (2 or 3 in one bigha).• Water mixed with detergent (5 gm/liter) should be applied.	<ul style="list-style-type: none">• By confining to minimum chemical sprays, take necessary steps to increase the useful/beneficial insects like Ladybird, syrphid fly, lacewing, as these insects eat aphid.• Neem seed extract should be used @ 10ml/liter of water. Around 50 liters of solution should cover one bigha. To prepare neem seed extract, soak one kg of half broken neem kernels in 10 liters of water for 12 hours and then filter.

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Above: Farmers Kitchen Garden; Haryana; Photo: CIMMYT

TOMATO APHID (*Aphis gossypii*)



Above: Damaged leaf infested by Aphid; photo: <https://www.hipchickdigs.com/2012/07/battling-aphids/>

EARLY BLIGHT OF TOMATO (*Alternaria solani*)

Stages of crop damage: Leaves, Stem and fruits throughout the plant growth

Symptoms of damage	Integrated control measures	
	Nursing/Cultural control	Biological control
<ul style="list-style-type: none"> • Often observed in the field as small brownish-black lesions on the older foliage. • The tissue surrounding a spot may become yellow and when spotting is abundant the entire leaf may become yellow. • The spots enlarge rapidly and form circular lesions with pronounced concentric rings and light centers. • The fruit lesions attain considerable size, occasionally involving the entire fruit, and usually have concentric rings. • In severe infestation the disease may cause heavy defoliation resulting in reduced fruit number and size and marketable fruit 	<ul style="list-style-type: none"> • Planting healthy, vigorous, and disease-free seedlings. • Avoid water stagnation in the field. • Do not grow tomato season by season in the same field. 	<ul style="list-style-type: none"> • Apply bio-fungicide Oligo-saccharine 3% SL or <i>Trichoderma</i> powder (3–5 gm/liter of water) after the visible appearance of symptoms • Application of fungicides containing active ingredient copper at the first signs of disease can be effective against early blight disease of tomato.

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EARLY BLIGHT OF TOMATO (*Alternaria solani*)



Above: Early blight symptom on leaves; photo: Ravishankar Manickam, World Vegetable Center



Above: Early blight on fruits; photo: <https://www.purdue.edu/hla/sites/cea/wp-content/uploads/sites/15/2018/10/JannaBeckerman9-5-18.pdf>

BACTERIAL SPOT (*Xanthomonas campestris*) var. vesicatoria

Stages of crop damage: Transmitted through seeds, it affects leaves, stem and fruits in all stages of the plant

Symptom of damage	Integrated control measures	
	Nursing/Cultural control	Biological control
<ul style="list-style-type: none"> • Characterized by a sunken irregular brown spot on the fruits, stems, and leaves 	<ul style="list-style-type: none"> • Use clean seeds and well-decomposed farmyard manure/compost; restrict weed growth and keep irrigation and drainage channels free from weeds. • Remove and destroy infected plant material, including leaves, fruits, and debris, to reduce the source of inoculum. • Avoid excessive nitrogen fertilization, as this can promote succulent growth that is more susceptible to bacterial spot. 	<ul style="list-style-type: none"> • Treat seeds with <i>Trichoderma</i> powder @ 3-4 grams per 100 grams of seed. • Apply <i>Pseudomonas</i> spp. to the soil or as foliar spray for the antagonistic effects against bacterial spot pathogens. Follow the dosage on the pack.

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BACTERIAL SPOT (*Xanthomonas campestris*) var. *vesicatoria*



Above: Bacterial spot-on leaf; photo: <https://www.cabidigitallibrary.org/doi/full/10.1079/cabicompendium.108936>



Above: Bacterial spot-on fruits; photo: https://farmersvoiceafrica.org/sites/default/files/2020-12/TOMATO%20PRODUCTION_0.pdf

SOUTH AMERICAN LEAF MINER (*Phthorimaea absoluta*)

Stages of crop damage: Attacks the leaves and fruits.

Symptoms of damage	Integrated control measures	
	Nursing/Cultural control	Biological control
<ul style="list-style-type: none"> The most distinctive symptoms of damage are blotch shaped mines on the leaves where larvae only feed on mesophyll tissues, leaving the epidermis intact. Fruits show small pin holes on the surface and larval tunnel / mine in the endocarp region. Damage due to larvae on fruits causes malformations and allows fungal diseases to enter, leading to rotting fruit before or after harvest. 	<ul style="list-style-type: none"> Install yellow sticky traps and pheromone traps @ 20-25 per hectare (2 or 3 per bigha). Remove and destroy leaves that show signs of leaf miner activity. Regular monitoring and proactive identification of larvae is crucial. In areas susceptible to this pest, plant resistant varieties. 	<ul style="list-style-type: none"> Conserve natural enemies like Mirid bugs and parasitic wasps that invade on the larvae, by restricting the number of chemical sprays. <i>Bacillus thuringiensis (Bt)</i>, is effective against the larvae. <i>Beauveria bassiana</i> kills the larvae. It can be applied as a biological insecticide at the dosage mentioned on the pack. Matrine 0.5% @ 1.5 ml/ liter of water can be sprayed to manage this pest.

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SOUTH AMERICAN LEAF MINER (*Phthorimaea absoluta*)



Above: Infestation on tomato leaf; photo: Ravishankar Manickam, World Vegetable Center



Above: Infestation on tomato fruit ; photo: Ravishankar Manickam, World Vegetable Center

LATE BLIGHT DISEASE OF TOMATO (*Phytophthora infestans*)

Stage of crop damage: Any stage after planting

Integrated control measures		
Symptoms of damage	Nursing /cultural control	Biological control
<ul style="list-style-type: none"> Initially, small, water-soaked lesions develop on the lower surface of leaves. In foggy and cloudy weather, lesions rapidly expand and turn brown or black, with a characteristic fuzzy white or gray mold growth on the underside of leaves. As the disease intensifies, similar symptoms show up on stem and green fruits of the plant. Within 3-4 days of disease symptoms, plants are scorched, and the disease spreads in an epidemic way. Gray olive-colored spots are seen on the green fruit which spread to the whole fruit. In wet weather, white cottony mycelium (fungi) can be seen on the ruptured part of the fruit. 	<ul style="list-style-type: none"> Planting healthy, vigorous, and disease-free seedlings. Water stagnation in the field should be avoided. Do not grow tomato, potato, eggplant in the same field repeatedly. Rotate with other crops. 	<ul style="list-style-type: none"> A lower incidence of this disease has been observed with the use of <i>Trichoderma viride</i>. Mix 5 grams of <i>Trichoderma</i> powder per liter of water and spray on the plants, ensuring thorough coverage. Biochemicals such as chitosan can also be used as per recommendation to avoid negative effects. In severe incidence, spray Copper hydroxide @ 2 g/liter of water.

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LATE BLIGHT DISEASE OF TOMATO (*Phytophthora infestans*)



Above: Leaf infected by Late blight disease; photo: Ravishankar Manickam, World Vegetable Center



Above: Late blight affected ripe tomato; photo: Ravishankar Manickam, World Vegetable Center

TOMATO FRUIT BORER (*Helicoverpa armigera*)

Stage of crop damage: Green and ripe fruits

Symptoms of damage	Integrated control measures	
	Nursing /cultural control	Biological control
<ul style="list-style-type: none">• The grown-up larvae prefer to feed on the reproductive parts such as floral buds, flowers, and young fruits.• The larvae make holes in these parts and feed by thrusting their heads inside.• Severely damaged fruits rot and fall down.• Partially damaged fruits may become deformed.	<ul style="list-style-type: none">• Ensure deep ploughing in summer to expose larvae and pupae of fruit borer.• Before transplanting, flood the field to reduce the number of pupae.• Grow marigold as trap crop (1 row of marigold for 7 rows of tomato).	<ul style="list-style-type: none">• Install pheromone traps with Helilure at 15-20 per hectare (1 or 2 per bigha). Replace the lures regularly at 3-4 weeks interval.• Spray neem seed extract at 10 ml/liter of water. To make the extract, soak one kilogram of half- broken neem seed in 10 liters of water for 12 hours and filter the extract.• Apply botanical pesticide <i>Celestrus angulatus</i> 1% EW at 2–2.5 ml/liter of water or <i>Bacillus thuringiensis</i> @1 gm/liter of water.

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Above: Ripe tomato for sale in market; photo: Ravishankar Manickam; World Vegetable Center

TOMATO FRUIT BORER (*Helicoverpa armigera*)



Above: Symptom of damage by Tomato fruit borer; photo: Ravishankar Manickam, World vegetable Center



Above: Larva inside the fruit; photo: Ravishankar Manickam, World vegetable Center

FUSARIUM WILT OF TOMATO (*Fusarium oxysporum*)

Stages of damage: Seedlings and growing plants

Symptoms of damage	Integrated control measures	
	Mechanical/Cultural control	Biological control
<ul style="list-style-type: none"> ▪ Firstly leaves, tips, branches droop towards the side of the plant. Gradually whole plant droops. ▪ Drooping leaves turn yellow and fall off. ▪ Brown spots will be seen on the base and roots of plants. ▪ Rotting at the root of the plant. ▪ The yield of affected fields decreases. 	<ul style="list-style-type: none"> • Use nitrate- based nitrogen fertilizers (calcium nitrate) instead of ammonium-based nitrogen fertilizers (urea). • Cultivate disease resistant varieties; For example - BARI Tomato 14, BARI Tomato 15, BARI Tomato 18, BARI Tomato 19. • Rotate tomato for 3-4 years with crops other than potato, eggplant. • Pick up and burn infested plants and garbage from the field 	<ul style="list-style-type: none"> • Amend the soil with <i>Trichoderma</i> based <i>Tricho</i>-compost @ 2-2.5 t/ha 5-7 days before seedling transplanting or at the time of final land preparation. • Apply bio-fungicide <i>Trichoderma</i> powder (3-5 gm/liter of water) after observing any of the symptoms. Around 50 liters of solution will be needed for one bigha land.

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FUSARIUM WILT OF TOMATO (*Fusarium oxysporum*)



Above: Whole plant affected by Fusarium Wilt; photo: <https://indianfarmingguide.wordpress.com/2020/05/05/fusarium-wilt-fungus/>



Above: Wilt affected base of Tomato plant;
photo: <https://hyg.ipm.illinois.edu/article.php?id=594>

TOMATO BACTERIAL WILT (*Ralstonia solanacearum* bacteria)

Stages of damage : Any time starting from transplantation

Symptoms of damage	Integrated control measures	
	Nursing/ cultural control	Biological control
<ul style="list-style-type: none"> • In the daytime, during sunshine the tender leaves wilt. When the sun goes down, the plant gets better. • The entire plant droops and dies later. • If the stems of the infected plants are kept in water, the water becomes cloudy. 	<ul style="list-style-type: none"> • Destroy the infected plants as soon as they are noticed. • Follow crop rotation with crops such as maize, mustard, wheat. • Reduce irrigation. Irrigate lightly once in seven days during dry weather and once in 10 days during damp weather. • Test the soil. If the soil pH is less than 6.5, apply lime @ 400-500 Kg/ha (100 to 120 kg per bigha). • Ensure a well-drained field. Avoid low lying are if the field is slopy. 	<ul style="list-style-type: none"> • In the fields where bacterial wilt has been recurrent, <i>Bacillus subtilis</i> strain R31 can be applied to control the disease. it's crucial to follow the product label instructions and recommendations. • Drench soil and plant near the root zone with antibiotic Streptocycline @4 gm in 15 liters of water. Repeat at an interval of 7 to 10 days till fruit formation.

Note:

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TOMATO BACTERIAL WILT (*Ralstonia solanacearum* bacteria)



Above: Bacterial wilt infected plant; photo: Donald https://www.lsuagcenter.com/portals/our_offices/departments/plant-pathology-crop-physiology/plant_disease_clinic/disease_image_gallery/herbs_vegetables/tomatoes/bacterial-wilt)



Above: Bacterial ooze from the infected stem; photo: <https://ncsupdicblog.blogspot.com/2011/07/>

WHAT ARE THE COMMON SAFETY MEASURES TO FOLLOW WHEN USING PESTICIDES?

Pesticide is a poison. When purchasing or spraying it, always follow these safety measures to the letter:

- Wear protective clothing (a plastic, non-porous coverall, protective headgear including goggles and respirator, gloves and gumboots) while spraying.
- NEVER attempt to clean the nozzle by blowing into it.
- NEVER smoke or eat while spraying. NEVER put any food materials in empty pesticide containers (e.g. a drum, bottle or mug).
- NEVER wash a pesticide sprayer in a pond or other waterbody.
- Keep pesticides in a cool, dry place

and out of the reach of children. Keep pesticides away from food to avoid contamination and volatilization.

- ALWAYS wash any exposed skin (e.g. face, hands/arms, feet/legs) thoroughly after using any pesticide.
- Don't spray into the wind, or when the weather is rainy or cloudy.
- To avoid over-application of the pesticide, never let the machine leak.
- Do not touch anyone else, particularly children, after using pesticides and before washing.
- Contact a doctor immediately if you become sick after using pesticides. This could be because you have followed the incorrect method of use.



Figure: Full safety protection to be used when spraying pesticides and herbicides.

HOW DO YOU CALIBRATE A KNAPSACK SPRAYER?

Preparation:

Rinse and fill the tank with water; remove, clean and replace nozzles and strainers; start the pump and check for leaks; apply pressure and check if nozzles work properly.

Determine speed:

Measure off a convenient distance e.g. 50 m and, with a watch determine how long it takes to walk the measure distance. It is useful to walk the distance several times until the walking speed is fairly constant. Select a walking speed that you can maintain through the working day.

Determine the width of application (swath):

With a single nozzle lance put the nozzle at spraying height (about 50 cm above the ground), apply pressure and turn on the sprayer, measure the width of the area being covered. The swath of multiple nozzle booms can be calculated by as follows:

Distance between nozzles x number of nozzles; or in a similar way as described for a single lance.

Determine discharge rate:

Fill the tank to a defined mark, apply pressure and start spraying and walking from the starting point at the previously selected walking speed, after the 50 m mark, return while spraying continuously. Immediately after spraying for 100 m (50m x 2), measure the remaining water in the tank with a measuring cylinder. Alternatively, if you have access to an accurate weighing scale, the sprayer can be weighed before and after application to estimate the amount of liquid sprayed. Remember that 1 litre=1 kg.

Calculate amount of chemical per-knapsack sprayer:

(a) Area sprayed (m²) = swath (m) x walking distance (m)

(b) Discharge rate (litres/ha) = {[water in the tank before spraying (litres) - water in tank after spraying (litres)] ÷ area sprayed (m²)} x 10 000

Amount of per-knapsack sprayer (litres). When we know the discharge rate/ha of the sprayer we can calculate the number of spray tanks (usually 15-20 litres) needed to cover 1 ha. With the recommended herbicide dose rate (litres/ha) we can now calculate the amount of herbicide to put in each tank = [Recommended rate (litres/ha) ÷ Discharge rate (litres/ha)] x tank capacity (litres)

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LIST OF BIOPESTICIDE MANUFACTURERS IN BANGLADESH

To assist farmers in obtaining high-quality bio-pesticides from reliable sources, a comprehensive list of manufacturers has been compiled. For detailed information on specific bio-pesticide suppliers, farmers are encouraged to contact their nearest Agriculture Office.

- Ispahani Agro Limited
- Russell IPM BD Limited
- ACI Limited
- Haychem (Bangladesh) Limited
- NAAFCO (Private) Limited
- Zhengbang Agricultural BD Co. Ltd.
- Petrochem (Bangladesh) Limited
- Auto Crop Care Limited
- SNS Agrotech
- GME Agrotech
- Agritech 69 Limited
- ACP Bangladesh
- Integrated Crop Solution (BD) Ltd.
- Oroni International Limited
- TBS Agro Ltd.
- Eon Agro Industries Ltd.
- Agrisel Bangladesh Co. Ltd.
- Raduga Agrocom
- Chemist Crop Care Ltd.
- Protistha Agro Industries Ltd.
- Alpha Agro Ltd.
- Chens Crop Sceince BD Ltd
- Leading Agro Ltd.
- Agromine Pvt. Ltd.
- Tata Crop Care Co.
- Purbita Agro Ltd.
- Fair Agrochemicals Services Ltd.
- Antegear Agro Chemicals
- Agro Winner Ltd.
- Crop Solutions
- Padma Agro Sprayers Co.
- Chemist Crop Care Ltd.
- S I Agro International
- Bismillah Corporation Limited
- Team Agrosience
- Indo-Bangla Agro Tech Ltd.
- Sena Agro care
- Compass Corporation

Source: Plant Protection Wing, Department of Agricultural Extension, Dhaka, Bangladesh (Last update: December 2023)



INITIATIVE ON

Transforming Agrifood
Systems in South Asia

ABOUT TAFSSA

TAFSSA (*Transforming Agrifood Systems in South Asia*) is a CGIAR Regional Integrated Initiative to support actions that improve equitable access to sustainable healthy diets, improve farmers' livelihoods and resilience, and conserve land, air, and water resources in South Asia.

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Note: Generative A.I. was used to improve the grammar of this document.