**1. Tomato Bacterial Spot**

**Symptoms:**

* Water-soaked spots on leaves, stems, and fruit
* Spots are small, dark, and irregular, often with yellow halos
* Leaves may yellow, die, and drop prematurely
* Fruits develop scabby, rough lesions, leading to reduced marketability

**Survival and Spread:**

* **Primary**: Bacteria survive in plant debris, on seeds, and in contaminated soil.
* **Secondary**: Spread by rain splash, wind, or contaminated tools and equipment.

**Favorable Conditions:**

* Warm, wet weather, especially with heavy rain and wind
* Humid conditions above 75°F (24°C) promote bacterial growth and spread.

**Integrated Pest Management Strategies:**

1. **Use disease-free seeds and transplants** to prevent initial infection.
2. **Improve air circulation** by spacing plants well and pruning excess foliage.
3. **Avoid overhead watering** to minimize water splash on leaves.
4. **Apply bactericidal sprays** like copper-based products to reduce spread.
5. **Rotate crops** and avoid planting tomatoes in the same location for 1-2 years.
6. **Remove and destroy infected plant debris** to reduce bacterial survival.

**Organic Strategies:**

* Use disease-free seeds, prune foliage for air circulation, and copper sprays.

**2. Tomato Early Blight**

**Symptoms:**

* Dark, concentric rings on older leaves, creating a "bullseye" pattern
* Lower leaves affected first, gradually spreading upwards
* Lesions may merge, causing extensive blighting and defoliation
* Fruits may develop sunken, leathery spots near the stem end.

**Survival and Spread:**

* **Primary**: Fungus survives in plant debris, on seeds, and in soil.
* **Secondary**: Spread by rain splash, wind, insects, or contaminated tools.

**Favorable Conditions:**

* Warm temperatures (80-85°F or 26-29°C) and high humidity
* Frequent rain or overhead irrigation favors fungal spread.

**Integrated Pest Management Strategies:**

1. **Remove and destroy infected plant material** to reduce fungal inoculum.
2. **Rotate crops**: Avoid planting tomatoes or related crops in the same location for 2-3 years.
3. **Space plants adequately** to improve airflow and reduce humidity around foliage.
4. **Apply fungicidal sprays**, such as chlorothalonil, mancozeb, or copper-based fungicides.
5. **Avoid overhead irrigation**; water plants at the base.

**Organic Strategies:**

* Rotate crops, remove plant debris, and apply copper-based sprays.

**3. Tomato Healthy**

* **No symptoms of disease**.
* Plants exhibit vigorous growth with bright green foliage.
* Fruits develop without any visible blemishes or lesions.
* Proper care practices such as regular watering, balanced fertilization, and pest management contribute to the plant's healthy state.

**4. Tomato Late Blight**

**Symptoms:**

* Water-soaked, irregular-shaped lesions on leaves, stems, and fruit.
* Leaves develop dark, brownish-black spots with a greenish edge.
* Infected stems and fruit show dark, greasy spots that may lead to complete rot.
* White mold may appear under moist conditions, especially on the underside of leaves.

**Survival and Spread:**

* **Primary**: Spores survive in infected plant debris and in soil.
* **Secondary**: Spread by rain splash, wind, or contaminated tools and equipment.

**Favorable Conditions:**

* Cool, wet, and humid conditions, especially temperatures between 50-75°F (10-24°C).
* Prolonged periods of leaf wetness or high moisture from rain or dew favor the disease.

**Integrated Pest Management Strategies:**

1. **Remove and destroy infected plant material** as soon as symptoms appear.
2. **Use disease-resistant varieties** of tomatoes to minimize susceptibility.
3. **Improve air circulation** by proper spacing and pruning to reduce moisture buildup.
4. **Avoid overhead watering** and water at the base to reduce leaf wetness.
5. **Apply fungicides** such as chlorothalonil or copper-based fungicides at the first sign of disease.
6. **Rotate crops** for 3-4 years, and avoid planting tomatoes near potatoes as they share the same disease.

**Organic Strategies:**

* Use resistant varieties, remove infected material, improve air circulation, and apply copper-based fungicides.

**5. Tomato Leaf Mold**

**Symptoms:**

* Pale green to yellow spots appear on the upper leaf surface.
* On the underside, a velvety olive-green or gray mold forms.
* In severe cases, leaves may turn brown, curl, and fall off.
* Fruit infection is rare but may result in leathery, brown lesions.

**Survival and Spread:**

* **Primary**: Fungus survives in plant debris or in contaminated greenhouse structures.
* **Secondary**: Spread by wind, rain splash, or contaminated tools.

**Favorable Conditions:**

* High humidity (over 85%) and temperatures between 68-77°F (20-25°C).
* Poor air circulation in greenhouses or crowded fields.

**Integrated Pest Management Strategies:**

1. **Remove and destroy infected leaves** to reduce fungal spread.
2. **Ensure proper ventilation** in greenhouses and space plants adequately for air circulation.
3. **Avoid overhead watering** and keep foliage dry.
4. **Apply fungicidal sprays** such as copper-based products or chlorothalonil.
5. **Use disease-free seeds** and rotate crops to reduce infection risk.

**Organic Strategies:**

* Use proper ventilation, space plants, avoid overhead watering, and apply copper-based sprays.

**6. Tomato Septoria leaf:**

**Symptoms**

* Less vigorous plant are usually affected
* Small, round to irregular spots with a grey center and dark margin on leaves
* Spots usually start on lower leaves and gradually advance upwards
* Spots coalesce and leaves are blighted
* Complete defoliation of affected leaves
* Stems and flowers are sometimes attacked
* Fruits are rarely attacked

**Survival and spread**

* Primary: Mycelium or conidia in pycnidia in infected plant debris or on solanaceous weeds
* Secondary: Conidia through rain splash or wind and also by slimy conidia sticking on to hands and clothing of tomato pickers

**Favourable conditions**

* Poor vigour of plants due to nutrient inadequacy or in late season
* High humidity or persistent dew at 25 °C
* Moist weather with intermittent shower.

**Integrated Pest Management Strategies**

* 1. Remove diseased leaves. If caught early, the lower infected leaves can be removed and burned or destroyed. However, removing leaves above where the fruit has formed will weaken the plant and expose the fruit to sunscald. At the end of the season, collect all foliage from infected plants and dispose of or bury it. Do not compost diseased plants.
* 2. Improve air circulation around the plants. If the plants can still be handled without breaking them, stake or cage the plants to raise them off the ground and promote faster drying of the foliage.
* 3. Mulch around the base of the plants. Mulching will reduce splashing soil, which may contain fungal spores associated with debris. Apply mulch after the soil has warmed.
* 4. Do not use overhead watering. Overhead watering facilitates infection and spreads the disease. Use a soaker hose at the base of the plant to keep the foliage dry. Water early in the day.
* 5. Control weeds. Nightshade and horsenettle are frequent hosts of Septoria leaf spot and should be eradicated around the garden site.
* 6. Use crop rotation. Next year do not plant tomatoes back in the same location where diseased tomatoes grew. Wait 1–2 years before replanting tomatoes in these areas.
* 7. Use fungicidal sprays. If the above measures do not control the disease, you may want to use fungicidal sprays. Fungicides will not cure infected leaves, but they will protect new leaves from becoming infected. Apply at 7 to 10 day intervals throughout the season. Apply chlorothalonil, mancozeb, or a copper-based fungicide, such as copper hydroxide, copper sulfate, or copper oxychloride sulfate. Follow harvest restrictions listed on the pesticide label.

**Organic Strategies**

Strategies 1, 2, 3, 4 and 6 are strictly organic approaches. Using an appropriate organic herbicide (or removal by hand) would be a viable organic approach to Strategy 5.

**Pesticide Disclaimer:**

Always follow the product's label and ensure the product is effective against septoria. Not following the pesticide label before usage is a violation of federal law.

**7. Tomato Spider Mites**

**Symptoms:**

* Tiny, yellow, or white speckling on leaves, which eventually turn bronze.
* Fine webbing on the underside of leaves in severe infestations.
* Leaves may dry up, curl, and drop, leading to defoliation.
* In extreme cases, plants may be stunted or die.

**Survival and Spread:**

* **Primary**: Spider mites overwinter in plant debris or surrounding vegetation.
* **Secondary**: Spread by wind, infested plants, or contaminated tools.

**Favorable Conditions:**

* Hot, dry weather conditions, especially when temperatures exceed 85°F (29°C).
* Dusty environments favor spider mite population growth.

**Integrated Pest Management Strategies:**

1. **Regularly inspect plants for mites** and use a strong water spray to dislodge them.
2. **Improve plant health** by watering adequately to reduce mite infestations.
3. **Apply miticides** or insecticidal soap to control severe infestations.
4. **Encourage natural predators**, such as ladybugs or predatory mites.
5. **Avoid chemical insecticides** that may kill beneficial predators.

**Organic Strategies:**

* Use strong water sprays, encourage natural predators, and apply insecticidal soap.

**8. Tomato Target Spot**

**Symptoms:**

* Small, brown to dark lesions with concentric rings resembling a target.
* Lesions begin on lower leaves and spread upwards.
* Affected leaves turn yellow, wither, and die, often leading to defoliation.
* Fruit lesions are sunken, brown, and sometimes with concentric rings, causing fruit rot.

**Survival and Spread:**

* **Primary**: Fungus survives in infected plant debris or in the soil.
* **Secondary**: Spread by rain splash, wind, or contaminated tools.

**Favorable Conditions:**

* Warm, humid conditions, particularly when temperatures range between 77-86°F (25-30°C).
* Prolonged periods of wetness from dew or rain favor fungal growth.

**Integrated Pest Management Strategies:**

1. **Remove and destroy infected plant debris** to minimize the source of infection.
2. **Use disease-free seeds and transplants** to prevent initial infection.
3. **Rotate crops** every 2-3 years, avoiding the planting of tomatoes in the same location.
4. **Avoid overhead watering** to minimize leaf wetness and splash dispersal.
5. **Apply fungicidal sprays** such as chlorothalonil, mancozeb, or copper-based products.

**Organic Strategies:**

* Use crop rotation, remove infected debris, and apply copper-based sprays.

**9. Tomato Mosaic Virus**

**Symptoms:**

* Mottled, light and dark green patches on leaves.
* Leaves may appear fern-like, wrinkled, or reduced in size.
* Stunted plant growth and reduced fruit size and quality.
* Fruits may develop mottling or uneven ripening.

**Survival and Spread:**

* **Primary**: Virus persists in plant debris, seeds, or contaminated surfaces.
* **Secondary**: Spread by contaminated tools, hands, clothing, or insects.

**Favorable Conditions:**

* The virus is favored by wounds or abrasions on plants through which it can enter.
* Spread is facilitated by frequent handling or pruning of plants without proper sanitation.

**Integrated Pest Management Strategies:**

1. **Use certified disease-free seeds** and transplants to prevent introduction.
2. **Disinfect tools and hands** when handling plants to prevent mechanical transmission.
3. **Remove and destroy infected plants** to prevent further spread.
4. **Control insect vectors**, such as aphids, that may spread the virus.
5. **Rotate crops** every 1-2 years to reduce the risk of virus reintroduction.

**Organic Strategies:**

* Use certified seeds, remove infected plants, disinfect tools, and rotate crops.

**10. Tomato Yellow Leaf Curl Virus**

**Symptoms:**

* Severe stunting of plants with leaves curling upwards.
* Leaves become yellow, thick, and brittle, especially around margins.
* Flowers may drop prematurely, reducing fruit production.
* Fruit set is significantly reduced or may fail entirely.

**Survival and Spread:**

* **Primary**: Virus is carried by the whitefly (Bemisia tabaci).
* **Secondary**: Spread occurs through whitefly feeding on infected plants and then transmitting the virus to healthy plants.

**Favorable Conditions:**

* High whitefly populations, particularly in warm, humid environments, accelerate virus spread.
* Overcrowded conditions where whiteflies can easily move from plant to plant.

**Integrated Pest Management Strategies:**

1. **Control whitefly populations** by using insecticidal soap, neem oil, or appropriate insecticides.
2. **Use reflective mulches** to repel whiteflies and reduce their spread.
3. **Remove and destroy infected plants** immediately upon detection.
4. **Use virus-resistant tomato varieties** to reduce susceptibility to the disease.
5. **Rotate crops** to minimize virus buildup in the field.

**Organic Strategies:**

* Use insecticidal soap or neem oil for whitefly control, and plant resistant varieties.