

Apple scab (caused by *venturia inaequalis*)

Cause:

- A **fungus** named *venturia inaequalis*.
- Thrives in **cool, wet** spring weather.
- Overwinters in **fallen leaves** and fruit, releasing spores in spring which infect new leaves and fruit.

Reason for spread:

- **Poor sanitation** (fallen leaves not removed).
- **High humidity and wet conditions.**
- **Dense tree canopies** that reduce airflow.
- **Susceptible apple varieties** not resistant to the fungus.

symptoms:

- **Leaves:**
 - Olive-green to dark brown **velvety spots**.
 - Leaves may **curl, yellow**, and **fall off early**.
- **Fruits:**
 - Dark, sunken **scabby lesions**.
 - Cracked, **deformed fruit** with poor market quality.
- **Twigs (occasionally):**
 - Small, dark lesions near the buds.

remedies / control measures:

1. Cultural control:

- **Rake and destroy** fallen leaves and infected fruits in fall.
- **Prune** trees to improve **air circulation** and **sunlight penetration**.
- **Choose resistant varieties** (e.g., liberty, enterprise, or freedom apples).

2. Chemical control:

- Apply **fungicides** (e.g., **captan, mancozeb, or myclobutanil**) at bud break and continue as needed during the season.
- Always follow local agricultural guidelines and usage instructions.

3. Biological control:

- Use bio-fungicides like **bacillus subtilis** or **trichoderma spp.** To inhibit fungal growth.

4. Organic methods:

- Use **sulfur-based sprays** in organic orchards.
- Apply **compost teas** or **neem oil** as a preventive measure.

Apple scab (apple_scab)

Cause

- Caused by the **fungus *venturia inaequalis***.
- The fungus thrives in **cool, wet** conditions.
- It overwinters in **fallen leaves and infected fruit**, releasing spores in spring.

Reason for spread

- **Poor sanitation**, such as leaving infected leaves and fruits on the ground.
- **High humidity and frequent rainfall**, which create ideal conditions for fungal growth.
- **Dense tree canopies**, reducing airflow and increasing moisture retention.
- **Susceptible apple varieties** that lack resistance to the disease.

Symptoms

- **Leaves**: olive-green to dark brown **velvety spots**, curling, yellowing, and premature leaf drop.
- **Fruits**: dark, sunken **scabby lesions**, cracked, and deformed fruit with poor quality.
- **Twigs (occasionally)**: small, dark lesions near the buds.

Remedies / control measures

cultural control

- Rake and **destroy fallen leaves** and infected fruits.
- **Prune trees** to improve **air circulation and sunlight exposure**.
- Choose **resistant apple varieties** like *liberty, enterprise, and freedom*.

chemical control

- Apply **fungicides** like *mancozeb, captan, or myclobutanil* at **bud break** and continue as needed.

biological control

- Use **bio-fungicides** like *bacillus subtilis* or *trichoderma spp*. To suppress fungal growth.

organic methods

- Use **sulfur-based sprays** as a natural alternative.
- Apply **neem oil** or **compost tea** to prevent infections.

Apple cedar rust (apple_cedar_apple_rust)

Cause

- Caused by the fungus *gymnosporangium juniperi-virginianae*.
- Requires **both apple and cedar trees** to complete its lifecycle.
- Thrives in **wet, humid** conditions during spring.

Reason for spread

- **Nearby cedar or juniper trees** act as alternate hosts for the fungus.
- **Moist conditions** in spring help fungal spores spread.
- **Wind-borne spores** from infected cedar trees infect apple trees.
- **Poor orchard sanitation** increases disease prevalence.

Symptoms

- **Leaves:** yellow-orange spots that enlarge and turn reddish-brown, often with a dark center.
- **Fruits:** deformed apples with orange or brown lesions.
- **Twigs:** swelling and gall formation on cedar trees.
- **Cedar trees (alternate host):** brown, gelatinous spore-producing galls in spring.

Remedies / control measures

cultural control

- Remove **nearby cedar or juniper trees** (or prune infected branches).
- Choose **resistant apple varieties**, such as *liberty, enterprise, and redfree*.
- **Prune infected areas** on apple trees to reduce fungal spread.

chemical control

- Apply **fungicides** (e.g., *mancozeb, myclobutanil, or propiconazole*) at **bud break** and repeat as needed.

biological control

- Use **bio-fungicides** containing *bacillus subtilis* to prevent infection.

organic methods

- Spray **neem oil** or **sulfur-based fungicides** early in the season.
- Use **compost tea** to improve tree resistance.

Healthy apple tree (apple___healthy)

Cause

- A healthy apple tree results from **proper care, disease prevention, and optimal growing conditions.**

Reason for healthy growth

- **Good soil quality** with proper drainage and nutrients.
- **Adequate sunlight** (at least 6–8 hours per day).
- **Proper pruning** to improve airflow and reduce disease risk.
- **Regular watering** without over-saturation.
- **Pest and disease management** to prevent infections.

Symptoms of a healthy tree

- **Leaves:** bright green, free from spots or discoloration.
- **Fruits:** firm, well-formed, and free from blemishes or deformities.
- **Bark:** smooth and free from cracks, cankers, or lesions.
- **Growth:** steady new branch growth each year.

Remedies / best practices to maintain health

cultural practices

- Use **well-draining soil** rich in organic matter.
- **Prune trees annually** to remove dead or diseased branches.
- **Mulch around the base** to retain moisture and suppress weeds.

nutrient management

- Apply **balanced fertilizers** (e.g., 10-10-10 npk) during the growing season.
- Monitor for **nutrient deficiencies** (yellowing leaves may indicate nitrogen deficiency).

pest and disease prevention

- Regularly **inspect for pests** like aphids, mites, and codling moths.
- Apply **preventive fungicides** only if needed.
- Ensure **proper spacing** between trees to improve airflow.

organic methods

- Use **compost tea** to boost soil microbial health.
- Apply **neem oil** or **insecticidal soap** for pest control.
- Encourage **pollinators** like bees by planting companion flowers nearby.

Healthy blueberry plant (blueberry—healthy)

Cause

- A healthy blueberry plant results from **proper care, optimal growing conditions, and effective pest and disease management.**

Reason for healthy growth

- **Well-draining, acidic soil** (ph between 4.5–5.5).
- **Adequate sunlight** (at least 6–8 hours per day).
- **Consistent watering** to maintain moist but not soggy soil.
- **Regular pruning** to remove dead wood and improve air circulation.
- **Proper fertilization** using acidic fertilizers like ammonium sulfate.

Symptoms of a healthy plant

- **Leaves:** deep green, firm, and free from spots or discoloration.
- **Fruits:** plump, evenly colored, and sweet.
- **Branches:** strong, well-spaced, and free from cracks or lesions.
- **Growth:** steady new branch and leaf development each season.

Remedies / best practices to maintain health

cultural practices

- Use **acidic, well-draining soil** with good organic matter.
- **Mulch around the base** to retain moisture and suppress weeds.
- **Prune annually** to encourage new growth and prevent overcrowding.

nutrient management

- Apply **acidic fertilizers** (e.g., ammonium sulfate or sulfur-based fertilizers).
- Monitor for **nutrient deficiencies** (yellow leaves may indicate iron deficiency).

pest and disease prevention

- Regularly **check for pests** like aphids, mites, and fruit worms.
- Ensure **proper spacing** between plants to prevent fungal infections.
- Remove **fallen leaves and debris** to reduce disease risk.

organic methods

- Use **compost tea** to enhance soil health.
- Apply **neem oil or insecticidal soap** for pest control.
- Encourage **pollinators** like bees to improve fruit production.

Cherry powdery mildew (cherry_(including_sour)___powdery_mildew)

Cause

- Caused by the fungus *podosphaera clandestina*.
- Thrives in **warm, dry conditions** with high humidity.
- Spreads through **windborne spores**, infecting young leaves and fruit.

Reason for spread

- **Dense tree canopies** that trap humidity.
- **Poor air circulation** in orchards.
- **Warm, dry weather followed by humidity**.
- **Infected plant debris** left in the orchard.

Symptoms

- **Leaves**: white or gray powdery coating, curling, and distortion.
- **Fruits**: small, rough patches of powdery growth, reducing quality.
- **Twigs & shoots**: stunted growth and weakened branches.

Remedies / control measures

cultural control

- **Prune trees** to improve airflow and reduce humidity.
- **Remove infected leaves and debris** from the orchard.
- **Choose resistant cherry varieties** when possible.

chemical control

- Apply **fungicides** such as *sulfur, myclobutanil, or triflumizole* at early signs of infection.

biological control

- Use **bio-fungicides** containing *bacillus subtilis* to suppress fungal growth.

organic methods

- Apply **neem oil** or **potassium bicarbonate** sprays as preventive treatments.
- Use **milk sprays (diluted with water)** as a natural antifungal agent.

Healthy cherry tree (cherry_(including_sour)___healthy)

Cause

- A healthy cherry tree results from **optimal growing conditions, proper care, and disease prevention.**

Reason for healthy growth

- **Well-draining soil** with proper nutrients.
- **Adequate sunlight** (at least 6–8 hours per day).
- **Regular watering** without over-saturation.
- **Proper pruning** to improve airflow and promote strong growth.
- **Protection from pests and diseases** to prevent infections.

Symptoms of a healthy tree

- **Leaves:** dark green, firm, and free from spots or curling.
- **Fruits:** plump, bright-colored, and evenly ripened.
- **Branches:** strong, well-spaced, and free from cracks or cankers.
- **Growth:** consistent new leaf and shoot development each season.

Remedies / best practices to maintain health

cultural practices

- Plant in **well-draining, loamy soil** with good organic matter.
- **Mulch around the base** to retain moisture and suppress weeds.
- **Prune annually** to remove dead branches and improve sunlight penetration.

nutrient management

- Apply **balanced fertilizers** (e.g., 10-10-10 npk).
- Monitor for **nutrient deficiencies** (yellow leaves may indicate iron deficiency).

pest and disease prevention

- Regularly **inspect for pests** like aphids, mites, and cherry fruit flies.
- Use **preventive fungicides** if needed to protect against fungal infections.
- Ensure **proper spacing** between trees for airflow.

organic methods

- Apply **neem oil or insecticidal soap** for pest control.
- Use **compost tea** to boost soil and plant health.
- Encourage **pollinators** like bees for better fruit production.

Cercospora leaf spot / gray leaf spot in corn (corn_(maize)___cercospora_leaf_spot_gray_leaf_spot)

Cause

- Caused by the fungus *cercospora zeae-maydis*.
- Thrives in **warm, humid conditions**, especially with prolonged leaf wetness.
- Overwinters in **crop residues**, spreading through windborne spores.

Reason for spread

- **High humidity and moisture** on leaf surfaces.
- **Dense planting**, leading to reduced airflow.
- **Infected crop residues** left in the field.
- **Continuous maize cultivation** without crop rotation.

Symptoms

- **Leaves:**
 - Small, rectangular **grayish-brown lesions** that enlarge over time.
 - Lesions may merge, causing large **blighted areas**.
 - Severe infection leads to **premature leaf death**.
- **Stalks:**
 - Weakened stalks due to reduced photosynthesis.
- **Yield loss:**
 - Reduced grain fill and overall productivity.

Remedies / control measures

cultural control

- **Rotate crops** with non-host plants (e.g., soybeans or wheat).
- **Plow under infected residues** to reduce fungal spores.
- **Plant resistant hybrids** to reduce disease impact.

chemical control

- Apply **fungicides** like *strobilurins* (*azoxystrobin*) or *triazoles* (*propiconazole*) at early infection stages.
- Follow **integrated disease management** strategies for best results.

biological control

- Use **biological fungicides** containing *bacillus subtilis* to suppress fungal growth.

organic methods

- Improve **soil health** with organic compost and mulch.
- **Spray neem oil** or **copper-based fungicides** as preventive measures.
- Optimize **plant spacing** to reduce moisture buildup.

Common rust in corn (corn_(maize)_common_rust)

Cause

- Caused by the fungus *puccinia sorghi*.
- Thrives in **cool, humid conditions** (60–75°f or 15–24°c).
- Spreads via **windborne spores**, often from southern regions.

Reason for spread

- **High humidity and prolonged leaf wetness** promote infection.
- **Wind-dispersed spores** travel long distances.
- **Susceptible corn varieties** increase risk.
- **Continuous maize cropping** without rotation.

Symptoms

- **Leaves:**
 - Small, raised **reddish-brown pustules** (spore-producing structures).
 - Pustules later turn **black as spores mature**.
 - Severe infections cause **leaf yellowing and premature death**.
- **Yield loss:**
 - Reduced photosynthesis due to leaf damage.
 - Poor kernel development and lower grain quality.

Remedies / control measures

cultural control

- **Plant resistant corn hybrids** to reduce infection risk.
- **Rotate crops** (avoid continuous maize planting).
- **Improve air circulation** by maintaining proper plant spacing.

chemical control

- Apply **fungicides** like *azoxystrobin*, *pyraclostrobin*, or *propiconazole* at early disease stages.
- Use **systemic fungicides** for long-term protection.

biological control

- Use **biological fungicides** containing *bacillus subtilis* or *trichoderma spp*. To inhibit fungal growth.

organic methods

- Use **neem oil or sulfur-based sprays** for fungal suppression.
- **Increase soil organic matter** to boost plant immunity.
- Remove and **destroy infected plant debris** to reduce spore spread.

Northern leaf blight in corn (corn_(maize)___northern_leaf_blight)

Cause

- Caused by the fungus *exserohilum turcicum*.
- Thrives in **cool, humid conditions** (64–81°F or 18–27°C).
- Spreads through **windborne spores** and survives in **infected crop residues**.

Reason for spread

- **Prolonged leaf wetness** (rain, heavy dew, irrigation).
- **Dense plant canopies** that reduce airflow.
- **Continuous maize cropping** without rotation.
- **Infected plant debris** acting as a spore source.

Symptoms

- **Leaves:**
 - Large, **elongated tan lesions** (2–6 inches long) with **cigar-like shape**.
 - Lesions may **merge**, causing large necrotic areas.
 - Severe infection leads to **leaf blight and plant death**.
- **Yield loss:**
 - Reduced photosynthesis, affecting kernel development.
 - Lower grain quality and reduced overall yield.

Remedies / control measures

cultural control

- **Plant resistant hybrids** to minimize infection.
- **Rotate crops** (avoid planting corn in the same field yearly).
- **Plow under infected crop debris** to reduce fungal spores.
- **Improve field drainage** and plant spacing to enhance airflow.

chemical control

- Apply **fungicides** like *azoxystrobin*, *pyraclostrobin*, or *propiconazole* at early infection stages.
- Use **systemic fungicides** for long-term protection.

biological control

- Use **bio-fungicides** containing *bacillus subtilis* or *trichoderma spp*. To suppress fungal growth.

organic methods

- Apply **neem oil** or **sulfur-based fungicides** as preventive treatments.
- Use **compost and organic mulches** to improve soil health and plant immunity.
- Remove and **destroy infected leaves** to reduce fungal spread.

Healthy corn (corn_(maize)___healthy)

Cause

- No disease or pest infestation.
- Proper growth conditions and management practices.

Reason for healthy growth

- **Optimal environmental conditions** (adequate sunlight, water, and temperature).
- **Proper crop rotation** to prevent disease buildup.
- **Balanced soil nutrients** (adequate nitrogen, phosphorus, potassium).
- **Effective pest and disease management** (resistant varieties, monitoring).

Symptoms of healthy corn

- **Leaves:**
 - Dark green, smooth, and free from spots or lesions.
 - No curling, yellowing, or wilting.
- **Stalks:**
 - Strong, upright, and free from rot or discoloration.
- **Ears & kernels:**
 - Well-developed, uniform kernels with no mold or discoloration.

Practices to maintain healthy corn

cultural practices

- Use **high-quality seeds** suited for local conditions.
- **Rotate crops** to prevent soil-borne diseases.
- **Ensure proper plant spacing** for good airflow.

soil & nutrient management

- Conduct **soil tests** to apply appropriate fertilizers.
- Maintain **organic matter** through compost and cover crops.

pest & disease prevention

- **Monitor fields regularly** for early signs of pests or disease.
- Use **biological controls** like *trichoderma spp.* For fungal prevention.

irrigation & water management

- Use **drip irrigation or sprinklers** for even water distribution.
- Avoid **overwatering** to prevent root diseases.

Black rot in grapes (grape__black_rot)

Cause

- Caused by the fungus *guignardia bidwellii*.
- Thrives in **warm, humid conditions** (75–85°F or 24–29°C).
- Spreads through **rain splashes, wind, and infected plant debris**.

Reason for spread

- **Poor vineyard sanitation** (infected leaves and fruit left on vines or ground).
- **High humidity and excessive moisture** on leaves and fruit.
- **Dense vine canopies** that reduce airflow and trap moisture.
- **Infected pruning tools** and equipment spreading spores.

Symptoms

- **Leaves:**
 - **Small, circular brown spots** with dark borders.
 - Spots may enlarge, causing **leaf blight and defoliation**.
- **Fruits:**
 - Brown, **shriveling lesions** that expand over time.
 - Infected grapes **dry out and turn black** ("mummification").
- **Stems & tendrils:**
 - **Dark, sunken cankers** that weaken vines.

Remedies / control measures

cultural control

- **Prune vines properly** to improve airflow and reduce humidity.
- **Remove and destroy** infected leaves, grapes, and pruning debris.
- **Avoid overhead irrigation** to keep foliage dry.
- **Use resistant grape varieties** when available.

chemical control

- Apply **fungicides** like *mancozeb*, *myclobutanil*, or *captan* before bloom and after fruit set.
- **Spray at regular intervals** (every 7–14 days during wet conditions).

biological control

- Use **bio-fungicides** like *bacillus subtilis* or *trichoderma spp.* To suppress fungal growth.

organic methods

- Apply **sulfur-based or copper-based fungicides** as preventive treatments.
- Use **compost and organic mulches** to boost plant health.

Esca (black measles) in grapes (grape__esca_(black_measles))

Cause

- Caused by a **complex of fungi**, primarily *phaeoacremonium spp.*, *phaeomoniella chlamydospora*, and *fomitiporia mediterranea*.
- Thrives in **warm, dry climates** and spreads through **infected pruning wounds**.

Reason for spread

- **Infected pruning tools** transferring fungal spores.
- **Open pruning wounds** allowing fungal entry.
- **Vineyard stress** (drought, poor soil conditions, overcropping).
- **Infected nursery stock** carrying the fungus.

Symptoms

- **Leaves:**
 - Irregular **yellow or red-brown streaks** between veins (tiger stripe pattern).
 - Leaves may **dry out and drop prematurely**.
- **Fruits:**
 - Berries develop **brown to black spots** with a "measles-like" appearance.
 - Affected grapes may **shriveled and fall off**.
- **Wood (trunk & vines):**
 - **Internal wood decay** with dark brown streaking.
 - Severe cases lead to **sudden vine collapse**.

Remedies / control measures

cultural control

- **Prune during dry conditions** and **seal wounds** with wound protectants.
- **Remove and destroy infected vines** to prevent fungal spread.
- **Sanitize pruning tools** between cuts to stop cross-contamination.

chemical control

- Apply **fungicidal trunk sprays** to protect pruning wounds.
- Use **sodium borate** to slow fungal colonization in infected vines.

biological control

- Use bio-control agents like *trichoderma spp.* To suppress fungal activity.

organic methods

- Apply **copper-based fungicides** as a preventive measure.
- Maintain **healthy vine vigor** with proper irrigation and fertilization.

Leaf blight (*isariopsis* leaf spot) in grapes (grape_leaf_blight_(isariopsis_leaf_spot))

Cause

- Caused by the fungus *isariopsis clavigpora*.
- Develops in **humid, wet conditions** and spreads through **wind, rain, and infected plant debris**.

Reason for spread

- **Frequent rain or overhead irrigation** that keeps leaves wet.
- **Dense vine canopy** with poor airflow, increasing humidity.
- **Infected fallen leaves** acting as a source of spores.
- **Poor vineyard sanitation** leading to fungal buildup.

Symptoms

- **Leaves:**
 - Small, **brownish-black spots with irregular shapes**.
 - Spots may merge, forming **large necrotic areas**.
 - Leaves may **turn yellow and drop prematurely**.
- **Fruits** (in severe cases):
 - May develop **small, dark lesions**, leading to poor quality.
- **Vines & shoots:**
 - Mild infections cause no major damage, but severe cases **weaken vine growth**.

Remedies / control measures

cultural control

- **Prune vines properly** to improve airflow and reduce humidity.
- **Remove and destroy infected leaves** to stop fungal spread.
- **Avoid overhead irrigation** to keep leaves dry.

chemical control

- Apply **fungicides** like *mancozeb, chlorothalonil, or copper-based sprays* before infection periods.
- Repeat sprays **every 7–14 days** during humid conditions.

biological control

- Use bio-fungicides like *bacillus subtilis* or *trichoderma spp.* For fungal suppression.

organic methods

- Use **sulfur-based fungicides** as a preventive measure.
- Apply **compost and organic mulches** to enhance plant immunity.

Healthy grape plant (grape___healthy)

Cause of health

- Proper **care and management** with good agricultural practices.
- **Disease-free environment** with minimal fungal or bacterial infections.
- **Balanced nutrition**, adequate water, and proper pruning.

Reasons for good health

- **Well-drained soil** rich in organic matter.
- **Optimal watering** without over-saturation.
- **Good air circulation** through proper pruning and spacing.
- **Regular pest and disease monitoring** to prevent infections.

Symptoms of a healthy grape plant

- **Leaves:**
 - Vibrant **green color**, free from spots or discoloration.
 - Strong, **firm texture** without curling or yellowing.
- **Fruits:**
 - Uniform size, **juicy and plump** with no visible blemishes.
 - Even **color development** based on grape variety.
- **Vines & shoots:**
 - Sturdy, **disease-free stems** with no cracks or lesions.
 - Proper growth pattern with **no signs of wilting or stress**.

Maintenance & prevention measures

cultural practices

- **Prune vines annually** to improve air circulation.
- **Mulch around the base** to retain moisture and prevent weeds.
- **Remove fallen leaves and debris** to prevent fungal buildup.

nutrient management

- Apply **balanced fertilizers** (npk 10-10-10) as needed.
- Use **organic compost** for soil enrichment.

pest & disease control

- **Monitor regularly** for pests like aphids and mites.
- Use **organic neem oil or insecticidal soaps** for pest control.

optimal growing conditions

- Ensure **6–8 hours of sunlight** daily.
- Maintain soil **ph between 5.5–6.5** for best growth.

Huanglongbing (citrus greening) in oranges (orange_huanglongbing_citrus_greening))

Cause

- Caused by **bacteria** (*candidatus liberibacter spp.*).
- Spread by **asian citrus psyllid (diaphorina citri)**.

Reason for spread

- **Infected psyllids feeding on citrus trees.**
- **Grafting infected plant material onto healthy trees.**
- **Lack of disease-resistant citrus varieties.**
- **Warm climates with abundant vector populations.**

Symptoms

- **Leaves:**
 - Yellowing (chlorosis) with **blotchy, asymmetrical patterns**.
 - Leaves may become **thick and curled**.
- **Fruits:**
 - **Small, misshapen, and bitter-tasting.**
 - Uneven ripening with **green patches** even when mature.
 - Increased **premature fruit drop**.
- **Tree health:**
 - **Slow decline in growth**, leading to tree death.
 - **Sparse canopy** with twig dieback.

Remedies / control measures

cultural control

- **Remove and destroy infected trees** to prevent spread.
- **Monitor psyllid populations** and remove them manually if possible.
- **Use disease-free certified seedlings** when planting new trees.

chemical control

- Apply **systemic insecticides** like **imidacloprid** to control psyllids.
- Use **copper-based bactericides** to slow bacterial spread.

biological control

- Introduce natural predators like **tamarixia radiata** to reduce psyllid populations.

organic methods

- Apply **neem oil or insecticidal soaps** for psyllid management.
- Use **companion planting** with repellent plants to deter psyllids.

Prevention strategies

- **Implement strict quarantine measures** in infected areas.
- **Prune infected branches** to reduce bacterial load.
- **Promote tree vigor** with proper fertilization and irrigation.

Bacterial spot in peaches (peach_bacterial_spot)

Cause

- Caused by the bacterium *Xanthomonas arboricola* pv. *Pruni*.
- Thrives in **warm, humid conditions** and spreads through **rain, wind, and infected plant debris**.

Reason for spread

- **Rain splash and wind** spreading bacteria from infected leaves and fruits.
- **Infected nursery stock** or contaminated pruning tools.
- **Overhead irrigation** keeping foliage wet for long periods.
- **Poor air circulation** due to dense tree canopies.

Symptoms

- **Leaves:**
 - Small, **water-soaked spots** turning **dark brown to black**.
 - Spots may have **yellow halos** and lead to **leaf drop**.
- **Fruits:**
 - Dark, **pitted spots** with sunken centers.
 - Lesions may **crack and ooze**, reducing fruit quality.
- **Twigs (severe cases):**
 - Small, dark **cankers** that may lead to twig dieback.

Remedies / control measures

cultural control

- **Prune trees properly** to improve airflow and reduce humidity.
- **Remove and destroy infected leaves and fruit** to prevent reinfection.
- **Use resistant peach varieties** like *contender* and *harcrest*.

chemical control

- Apply **copper-based bactericides** (e.g., copper hydroxide) in early spring.
- Use **antibiotics like streptomycin** (if allowed) for severe infections.

biological control

- Use **beneficial bacteria** like *bacillus subtilis* to suppress bacterial growth.

organic methods

- Apply **neem oil or sulfur sprays** to reduce bacterial spread.
- Use **compost and organic fertilizers** to boost plant immunity.

Prevention strategies

- **Avoid overhead irrigation**; use drip systems instead.
- **Disinfect pruning tools** with bleach or alcohol between uses.
- **Apply mulch** around trees to prevent soil splash infections.

Healthy peach tree (peach___healthy)

Cause of health

- Proper **care and maintenance** with good agricultural practices.
- **Disease-free environment** with minimal bacterial or fungal infections.
- **Balanced nutrition**, proper watering, and regular pruning.

Reasons for good health

- **Well-drained soil** with optimal nutrients.
- **Adequate watering** (avoid overwatering or drought stress).
- **Proper pruning** for airflow and sunlight exposure.
- **Regular monitoring** to prevent pests and diseases.

Symptoms of a healthy peach tree

- **Leaves:**
 - Vibrant **green color**, free from spots or yellowing.
 - Strong, **firm texture** without curling or browning.
- **Fruits:**
 - **Uniform size and shape**, with smooth, blemish-free skin.
 - Even **color development**, juicy, and sweet-tasting.
- **Branches & twigs:**
 - **Strong and disease-free**, with no cracks or lesions.
 - Proper growth pattern with **no signs of wilting or dieback**.

Maintenance & prevention measures

cultural practices

- **Prune trees annually** to improve air circulation.
- **Remove fallen leaves and fruit** to prevent disease buildup.
- **Space trees properly** to reduce humidity and disease risk.

nutrient management

- Apply **balanced fertilizers** (npk 10-10-10) for healthy growth.
- Use **organic compost** to improve soil fertility.

pest & disease control

- **Monitor regularly** for pests like aphids and borers.
- Use **neem oil or insecticidal soaps** as preventive measures.

optimal growing conditions

- Ensure **full sunlight exposure** (6–8 hours per day).
- Maintain soil **ph between 6.0–6.5** for best growth.

Bacterial spot in bell peppers (pepper,_bell__bacterial_spot)

Cause

- Caused by the bacterium *Xanthomonas campestris* pv. *Vesicatoria*.
- Spreads through **infected seeds, rain splash, and contaminated tools**.

Reason for spread

- **Warm, humid weather** (25–30°C) with frequent rain.
- **Overhead irrigation** leading to prolonged leaf wetness.
- **Contaminated seeds or transplants** introducing the bacteria.
- **Poor air circulation** in densely planted fields.

Symptoms

- **Leaves:**
 - Small, **water-soaked spots** that turn **dark brown with yellow halos**.
 - Severe infections cause **leaf drop**, reducing yield.
- **Fruits:**
 - Dark, **raised scabby spots**, sometimes surrounded by a yellow ring.
 - Fruits may become **deformed and cracked**, leading to secondary infections.
- **Stems:**
 - Dark streaks or lesions in severe infections.

Remedies / control measures

cultural control

- Use **disease-free seeds** and transplants.
- **Rotate crops** (avoid planting peppers/tomatoes in the same area yearly).
- **Prune plants** for better airflow and reduce moisture retention.

chemical control

- Apply **copper-based bactericides** (e.g., copper hydroxide, copper sulfate).
- Use **streptomycin-based sprays** in nurseries (if permitted).

biological control

- Use **biocontrol agents** like *Bacillus subtilis* to suppress bacterial spread.

organic methods

- **Spray neem oil** to reduce bacterial populations.
- Use **compost tea or garlic extract** as natural protectants.

Prevention strategies

- **Avoid overhead watering**; use drip irrigation instead.
- **Disinfect tools and hands** after handling infected plants.
- **Apply mulch** to prevent soil splashes from spreading bacteria.

Healthy bell pepper plant (pepper,_bell____healthy)

Cause of health

- Proper **care and maintenance** with good agricultural practices.
- **Disease-free environment** with minimal bacterial or fungal infections.
- **Balanced nutrition**, proper watering, and regular pruning.

Reasons for good health

- **Well-drained soil** with optimal nutrients.
- **Adequate watering** (avoid overwatering or drought stress).
- **Proper pruning** for airflow and sunlight exposure.
- **Regular monitoring** to prevent pests and diseases.

Symptoms of a healthy bell pepper plant

- **Leaves:**
 - Vibrant **green color**, free from spots or yellowing.
 - Strong, **firm texture** without curling or browning.
- **Fruits:**
 - **Uniform size and shape**, with smooth, blemish-free skin.
 - Even **color development**, juicy, and sweet-tasting.
- **Stems & roots:**
 - **Strong and disease-free**, with no cracks or lesions.
 - Proper growth pattern with **no signs of wilting or dieback**.

Maintenance & prevention measures

cultural practices

- **Prune plants properly** to improve air circulation.
- **Remove fallen leaves and fruit** to prevent disease buildup.
- **Space plants properly** to reduce humidity and disease risk.

nutrient management

- Apply **balanced fertilizers** (npk 10-10-10) for healthy growth.
- Use **organic compost** to improve soil fertility.

pest & disease control

- **Monitor regularly** for pests like aphids and whiteflies.
- Use **neem oil or insecticidal soaps** as preventive measures.

optimal growing conditions

- Ensure **full sunlight exposure** (6–8 hours per day).
- Maintain soil **ph between 6.0–6.8** for best growth.

Early blight in potato (potato_early_blight)

Cause

- Caused by the **fungus alternaria solani**.
- Spreads through **infected soil, plant debris, wind, and water splashes**.

Reason for spread

- **Warm, humid weather** (24–30°C) with frequent rain.
- **Overwatering or overhead irrigation** keeping leaves wet for long periods.
- **Poor crop rotation** (planting potatoes or tomatoes in the same field yearly).
- **Nutrient deficiencies**, especially **low nitrogen or potassium levels**.

Symptoms

- **Leaves:**
 - Small, **dark brown spots** with **concentric rings** (bullseye pattern).
 - Leaves **turn yellow, wilt, and drop early**, reducing yield.
- **Stems:**
 - Dark, **elongated lesions** on lower stems.
 - Can lead to **plant collapse in severe cases**.
- **Tubers (potatoes):**
 - Dark, **sunken lesions** on potato skin.
 - Can cause **secondary bacterial infections**, leading to rot.

Remedies / control measures

cultural control

- Use **disease-free certified seed potatoes**.
- **Rotate crops** (avoid planting potatoes/tomatoes in the same area yearly).
- **Remove infected plant debris** and keep the field clean.
- **Water at the base** (avoid overhead irrigation).

chemical control

- Apply **fungicides** like **chlorothalonil, mancozeb, or azoxystrobin**.
- Spray **copper-based fungicides** before symptoms appear in high-risk areas.

biological control

- Use **biocontrol agents** like *bacillus subtilis* or *trichoderma spp*. To suppress fungal growth.

organic methods

- Apply **neem oil or sulfur-based sprays** to slow fungal spread.
- Use **compost tea or baking soda solution** as a preventive measure.

Prevention strategies

- **Avoid overhead watering**; use drip irrigation instead.
- **Plant resistant varieties** if available.
- **Apply mulch** to prevent soil splashes from spreading spores.

Late blight in potato (potato_late_blight)

Cause

- Caused by the oomycete pathogen *phytophthora infestans*.
- Spreads through infected tubers, plant debris, wind, and water splashes.

Reason for spread

- Cool, wet weather (15–25°C) with high humidity.
- Overhead irrigation or prolonged leaf wetness.
- Dense plant canopies reducing airflow.
- Infected potato tubers carrying spores to new crops.

Symptoms

- Leaves:
 - Large, dark brown to black water-soaked lesions.
 - White fungal growth (spores) visible on the underside of infected leaves.
 - Leaves curl, wilt, and die rapidly.
- Stems:
 - Dark, greasy-looking lesions, causing stems to collapse.
- Tubers (potatoes):
 - Irregular, firm, brownish-black lesions on the skin.
 - Internal decay with a brown, mushy texture.

Remedies / control measures

cultural control

- Use disease-free seed potatoes to prevent initial infection.
- Rotate crops (avoid planting potatoes/tomatoes in the same area yearly).
- Remove and destroy infected plant material immediately.
- Space plants properly to improve airflow and reduce humidity.

chemical control

- Apply fungicides like chlorothalonil, mancozeb, or metalaxyl at early signs of infection.
- Copper-based fungicides can help slow the spread.

biological control

- Use biocontrol agents like *bacillus subtilis* to suppress fungal growth.

organic methods

- Neem oil or bicarbonate sprays can reduce fungal spread.
- Apply compost tea to strengthen plant immunity.

Prevention strategies

- Avoid overhead irrigation; use drip irrigation instead.
- Plant resistant varieties like ‘defender’ or ‘sarpo mira’.
- Monitor weather conditions and apply fungicides preventively in wet seasons.

Healthy potato (potato___healthy)

Cause

- **No disease or pest infestation** affecting the plant.
- **Optimal growing conditions** with proper care.

Reason for healthy growth

- **Well-drained, fertile soil** rich in organic matter.
- **Balanced watering** (avoid overwatering or underwatering).
- **Proper spacing** to ensure good airflow.
- **Crop rotation** to prevent soil-borne diseases.
- **Use of disease-resistant potato varieties.**

Symptoms of a healthy potato plant

- **Leaves:**
 - **Dark green, vibrant, and firm** with no spots or discoloration.
 - **No curling, wilting, or yellowing.**
- **Stems:**
 - **Strong and upright** with no lesions or dark patches.
- **Tubers (potatoes):**
 - **Smooth, firm skin** with no cracks or rot.
 - **Uniform size and color** depending on variety.
- **Roots:**
 - **Well-developed, white, and free of decay.**

Best practices for maintaining healthy potato plants

cultural practices

- **Use certified disease-free seed potatoes.**
- **Rotate crops** and avoid planting potatoes in the same area yearly.
- **Remove weeds** that compete for nutrients and harbor pests.

watering & nutrition

- **Water deeply** but avoid excess moisture to prevent root rot.
- **Use organic compost** or fertilizers rich in nitrogen, phosphorus, and potassium.

pest & disease prevention

- **Regularly inspect plants** for early signs of disease.
- **Apply natural remedies** like neem oil to deter pests.
- **Encourage beneficial insects** like ladybugs to control aphids.

Healthy raspberry (raspberry—healthy)

Cause

- **No disease or pest infestation** affecting the plant.
- **Optimal growing conditions** with proper care and maintenance.

Reason for healthy growth

- **Well-drained, nutrient-rich soil** with good organic matter.
- **Adequate sunlight** (at least 6–8 hours per day).
- **Proper air circulation** to prevent fungal infections.
- **Regular pruning** to encourage new growth and fruiting.
- **Use of disease-resistant raspberry varieties.**

Symptoms of a healthy raspberry plant

- **Leaves:**
 - **Bright green, firm, and free of spots or curling.**
 - **No signs of yellowing, wilting, or powdery residue.**
- **Stems & canes:**
 - **Strong and upright** with no lesions, cracks, or discoloration.
 - **New growth appears healthy and vigorous.**
- **Fruits:**
 - **Plump, bright red, and evenly colored** depending on the variety.
 - **No shriveling, mold, or unusual deformities.**
- **Roots:**
 - **Firm and well-developed**, with no signs of rot or disease.

Best practices for maintaining healthy raspberry plants

cultural practices

- **Plant raspberries in well-drained soil** with good organic matter.
- **Space plants properly** to allow air circulation and reduce fungal infections.
- **Mulch around the base** to retain moisture and suppress weeds.

watering & nutrition

- **Water consistently** (about 1–1.5 inches per week) without over-saturating the soil.
- **Fertilize with balanced nutrients** (phosphorus and potassium-rich fertilizers for fruiting).

pest & disease prevention

- **Monitor for signs of pests** like aphids and spider mites.
- **Prune dead or diseased canes** to encourage healthy growth.
- **Encourage natural predators** like ladybugs and lacewings.

Healthy soybean (soybean___healthy)

Cause

- **No disease, pest, or nutrient deficiency** affecting the plant.
- **Optimal growing conditions** with proper care and management.

Reason for healthy growth

- **Well-drained, fertile soil** rich in organic matter.
- **Adequate sunlight** (at least 6–8 hours per day).
- **Balanced watering** to avoid drought stress or root rot.
- **Crop rotation** to prevent soil-borne diseases.
- **Use of disease-resistant soybean varieties.**

Symptoms of a healthy soybean plant

- **Leaves:**
 - **Bright green, firm, and symmetrical.**
 - **No yellowing, spots, or curling.**
- **Stems:**
 - **Strong and upright**, with no lesions or discoloration.
- **Pods:**
 - **Evenly developed, firm, and well-filled with seeds.**
 - **No shriveling, cracking, or fungal growth.**
- **Roots:**
 - **Well-developed, white, and free from nodules or rot.**

Best practices for maintaining healthy soybean plants

cultural practices

- **Plant in well-drained soil** with proper spacing to reduce competition.
- **Rotate crops** to prevent disease build-up in the soil.
- **Use mulching** to retain moisture and suppress weeds.

watering & nutrition

- **Water regularly**, ensuring consistent moisture during flowering and pod formation.
- **Use balanced fertilizers** (rich in nitrogen, phosphorus, and potassium).

pest & disease prevention

- **Monitor regularly for pests** like aphids and soybean cyst nematodes.
- **Apply natural remedies** like neem oil or introduce beneficial insects.
- **Ensure proper ventilation** to prevent fungal infections.

Squash – powdery mildew (squash____powdery_mildew)

Cause

- **Fungal infection** caused by *podosphaera xanthii* or *erysiphe cichoracearum*.
- Thrives in **warm, dry conditions** with high humidity.
- Spreads through **windborne spores** and plant-to-plant contact.

Reason for spread

- **Overcrowded plants** reducing air circulation.
- **Dry, warm weather** with high humidity at night.
- **Infected plant debris** left in the field.
- **Poor ventilation** in greenhouses or dense plantings.

Symptoms

- **Leaves:**
 - White, **powdery fungal patches** on the upper surface.
 - Leaves **turn yellow, curl, and dry out**.
- **Stems:**
 - White, powdery growth that can spread to petioles.
- **Fruits:**
 - May have **reduced growth** and be of **poor quality**.

Remedies / control measures

cultural control

- **Ensure proper spacing** between plants to allow airflow.
- **Remove and destroy infected leaves** to prevent further spread.
- **Practice crop rotation** and avoid planting squash in the same spot yearly.

chemical control

- Apply **fungicides like sulfur, myclobutanil, or potassium bicarbonate** when early symptoms appear.
- Spray with **neem oil** or **horticultural oils** for organic control.

biological control

- Introduce beneficial microbes like **bacillus subtilis** to suppress fungal growth.

organic remedies

- Spray with a **milk solution (1:10 ratio of milk to water)** as a preventive measure.
- Use a **baking soda solution** (1 tablespoon baking soda + 1 gallon water + a few drops of soap).

Strawberry – leaf scorch (strawberry___leaf_scorch)

Cause

- **Fungal infection** caused by *diplocarpon earlianum*.
- Spreads in **warm, humid weather**, especially after rain.
- Overwinters in **infected leaves and plant debris**.

Reason for spread

- **High humidity and poor air circulation.**
- **Overcrowded plants** creating damp conditions.
- **Lack of crop rotation**, allowing spores to persist in soil.
- **Watering from above**, keeping leaves wet for long periods.

Symptoms

- **Leaves:**
 - Small, **reddish-purple spots** that enlarge and merge.
 - **Brown, scorched appearance**, especially on older leaves.
 - Leaves **curl, dry out, and die** in severe cases.
- **Fruits:**
 - **Reduced fruit size** due to poor photosynthesis.
- **Stems & runners:**
 - May show **dark streaks** in severe infections.

Remedies / control measures

cultural control

- **Remove infected leaves** and clean plant debris.
- **Ensure proper spacing** between plants to improve airflow.
- **Water at the base** to keep leaves dry.

chemical control

- Use **fungicides** like **chlorothalonil, myclobutanil, or copper-based sprays**.
- Apply treatments **early in the growing season**.

biological control

- Introduce **bacillus subtilis** to prevent fungal growth.

organic remedies

- Spray with a **neem oil solution** to suppress fungal spores.
- Use a **baking soda mixture** (1 tsp baking soda + 1 quart water + mild soap).

Healthy strawberry (strawberry___healthy)

Cause

- **No disease, pest, or nutrient deficiency** affecting the plant.
- **Optimal growth conditions** with proper care and management.

Reason for healthy growth

- **Well-drained soil** with organic matter.
- **Adequate sunlight** (at least 6–8 hours per day).
- **Regular but controlled watering**, avoiding overwatering.
- **Balanced fertilization** with nitrogen, phosphorus, and potassium.
- **Proper spacing** to reduce humidity and increase airflow.

Symptoms of a healthy strawberry plant

- **Leaves:**
 - **Bright green, firm, and symmetrical.**
 - **No spots, curling, or yellowing.**
- **Fruits:**
 - **Plump, red, and well-formed** with no discoloration.
 - **Firm texture and sweet aroma.**
- **Roots & stems:**
 - **Strong, white roots with no rot.**
 - **Healthy runners for propagation.**

Best practices for maintaining healthy strawberries

cultural practices

- **Mulch around plants** to retain moisture and suppress weeds.
- **Remove dead leaves** to prevent fungal infections.
- **Rotate crops** to reduce disease buildup.

watering & nutrition

- **Water early in the morning** to allow drying during the day.
- **Fertilize lightly** every few weeks for consistent growth.

pest & disease prevention

- **Monitor for pests** like aphids, spider mites, and slugs.
- **Use organic insecticides** if needed (e.g., neem oil).

Tomato – bacterial spot (tomato_bacterial_spot)

Cause

- **Bacterial infection** caused by *Xanthomonas campestris* pv. *Vesicatoria*.
- Thrives in **warm, humid conditions**.
- Spreads through **infected seeds, soil, water splashes, and plant debris**.

Reason for spread

- **Overhead watering** leading to prolonged leaf wetness.
- **High humidity and poor air circulation**.
- **Contaminated seeds or transplants**.

Symptoms

- **Leaves:**
 - Small, **dark brown spots with yellow halos**.
 - Leaves turn **yellow, wilt, and drop** prematurely.
- **Fruits:**
 - Small, raised **black spots** that make the fruit unmarketable.
- **Stems:**
 - May have **dark streaks** in severe cases.

Remedies / control measures

cultural control

- Use **disease-free seeds and transplants**.
- **Avoid overhead watering**; use drip irrigation instead.
- **Remove infected plants** to prevent spread.

chemical control

- Apply **copper-based bactericides** like copper hydroxide or copper sulfate.
- Use **streptomycin** for seedlings in greenhouse settings.

biological control

- Introduce **bacillus subtilis** for bacterial suppression.

organic remedies

- Spray with **neem oil** or **baking soda solution** (1 tsp baking soda + 1 quart water).

Tomato – early blight (tomato_early_blight)

Cause

- **Fungal infection** caused by *alternaria solani*.
- Thrives in **warm, humid conditions**.
- Overwinters in **plant debris and soil**.

Reason for spread

- **High moisture levels and poor airflow.**
- **Infected plant debris** left in the field.
- **Water splashes and wind** spreading spores.

Symptoms

- **Leaves:**
 - Brown **concentric rings** forming **target-like spots**.
 - Yellowing and wilting of **older leaves first**.
- **Fruits:**
 - Dark, sunken **black spots** near the stem.
- **Stems:**
 - Dark lesions on lower stems, leading to plant collapse.

Remedies / control measures

cultural control

- **Remove infected leaves** and destroy plant debris.
- **Space plants properly** to improve airflow.
- **Rotate crops** to reduce disease persistence.

chemical control

- Apply **fungicides** like **chlorothalonil, mancozeb, or copper-based sprays**.

biological control

- Use **trichoderma harzianum** to inhibit fungal growth.

organic remedies

- Spray with **neem oil** or a **milk solution (1:10 milk to water ratio)**.

Tomato – late blight (tomato_late_blight)

Cause

- **Fungal-like pathogen** *phytophthora infestans*.
- Spreads rapidly in **cool, wet conditions**.
- Overwinters in **infected plant debris and soil**.

Reason for spread

- **Cool, wet weather** with prolonged leaf wetness.
- **Windborne spores** spreading infection over large areas.
- **Infected transplants or soil**.

Symptoms

- **Leaves:**
 - Large, **dark brown blotches** with a **water-soaked appearance**.
 - **White fuzzy growth** under humid conditions.
- **Fruits:**
 - Brown, **greasy-looking lesions** on green or ripe fruits.
- **Stems:**
 - Dark streaks leading to plant collapse.

Remedies / control measures

cultural control

- **Destroy infected plants immediately**.
- **Ensure good air circulation** by pruning.
- **Avoid overhead watering** to reduce moisture.

chemical control

- Use **systemic fungicides** like **metalaxyl, chlorothalonil, or copper-based sprays**.

biological control

- Apply **bacillus subtilis** for early disease prevention.

organic remedies

- **Spray with potassium bicarbonate solution** (1 tbsp per gallon of water).
- Use **compost teas** as a preventive measure.

Tomato – leaf mold (tomato___leaf_mold)

Cause

- **Fungal infection** caused by *passalora fulva*.
- Prefers **high humidity** and **poor ventilation**.
- Overwinters in **plant debris, soil, and greenhouse structures**.

Reason for spread

- **Overcrowded plants** leading to trapped moisture.
- **Poor air circulation** in humid environments.
- **Infected seeds or plant debris** left in the field.

Symptoms

- **Leaves:**
 - **Yellowish spots** on the upper leaf surface.
 - **Olive-green, velvety mold** on the underside of leaves.
 - Leaves **curl, dry up, and fall off**.
- **Fruits:**
 - Rarely affected, but can show **uneven ripening**.
- **Stems:**
 - May develop **dark streaks** in severe infections.

Remedies / control measures

cultural control

- **Ensure proper spacing** to improve airflow.
- **Remove infected leaves** and destroy plant debris.
- **Avoid overhead watering** to reduce moisture.

chemical control

- Use **fungicides** like **chlorothalonil, copper sulfate, or mancozeb**.

biological control

- Apply **bacillus subtilis** as a preventive measure.

organic remedies

- **Spray with neem oil** or a **baking soda solution** (1 tsp baking soda + 1 quart water).

Tomato – septoria leaf spot (tomato_septoria_leaf_spot)

Cause

- **Fungal infection** caused by *septoria lycopersici*.
- Thrives in **warm, wet conditions** and **overwinters in soil or plant debris**.

Reason for spread

- **Water splashes, rain, and wind** spread spores.
- **Overcrowded plants** with poor airflow increase risk.
- **Infected seeds or transplants** introduce the disease.

Symptoms

- **Leaves:**
 - Small, **circular dark spots with gray centers and dark brown edges**.
 - Leaves **turn yellow and drop** prematurely.
- **Fruits & stems:**
 - Rarely affected but can show **dark streaks** in severe infections.

Remedies / control measures

cultural control

- **Remove infected leaves** and dispose of plant debris.
- **Space plants properly** to improve airflow.
- **Avoid overhead watering** to reduce moisture.

chemical control

- Use **fungicides like chlorothalonil, mancozeb, or copper-based sprays**.

biological control

- Apply **trichoderma harzianum** to suppress fungal growth.

organic remedies

- **Spray with neem oil or a baking soda solution** (1 tsp baking soda + 1 quart water).

Tomato – spider mites (two-spotted spider mite) (tomato_spider_mites_two-spotted_spider_mite)

Cause

- **Pest infestation** caused by *tetranychus urticae* (two-spotted spider mite).
- Prefers **hot, dry conditions** and thrives in **dusty environments**.

Reason for spread

- **Carried by wind, animals, and contaminated plants.**
- **Overuse of pesticides** can kill natural predators, increasing mite populations.
- **Dry weather and high temperatures** accelerate reproduction.

Symptoms

- **Leaves:**
 - Tiny **yellow or white spots** on upper leaf surfaces.
 - **Fine webbing** on leaves and stems in severe infestations.
 - Leaves **curl, dry, and fall off**.
- **Fruits:**
 - Rarely affected but may appear **undersized or discolored** due to stress.

Remedies / control measures

cultural control

- **Spray plants with water** to dislodge mites.
- **Increase humidity** to slow their spread.
- **Remove heavily infested leaves.**

biological control

- Introduce **natural predators** like **ladybugs and predatory mites (phytoseiulus persimilis)**.

chemical control

- Use **miticides** like **abamectin or spiromesifen** (avoid overuse).

organic remedies

- **Neem oil spray** (1 tsp neem oil + 1 quart water).
- **Soap spray** (1 tbsp liquid soap + 1 quart water).

Tomato – target spot (tomato_target_spot)

Cause

- **Fungal infection** caused by *corynespora cassiicola*.
- Thrives in **warm, humid conditions** and **persists in plant debris**.

Reason for spread

- **Water splashes, wind, and infected transplants** spread spores.
- **High humidity and poor ventilation** encourage growth.
- **Overhead watering** increases moisture on leaves.

Symptoms

- **Leaves:**
 - Small, **dark brown circular spots** with **grayish centers** and **yellow halos**.
 - Infected leaves **turn yellow and drop**.
- **Fruits:**
 - Dark **sunken spots** may appear on infected fruits.
- **Stems:**
 - Dark lesions in severe infections.

Remedies / control measures

cultural control

- **Prune lower leaves** to improve airflow.
- **Use drip irrigation** instead of overhead watering.
- **Rotate crops** to prevent disease buildup.

chemical control

- Apply **fungicides** like **chlorothalonil, mancozeb, or copper-based sprays**.

biological control

- Use **trichoderma spp.** For fungal suppression.

organic remedies

- **Neem oil spray** to prevent fungal growth.
- **Baking soda solution** (1 tsp baking soda + 1 quart water) as a foliar spray.

Cause

- **Viral infection** caused by *tomato yellow leaf curl virus (tylcv)*.
- Spread by **whiteflies** (*bemisia tabaci*).

Reason for spread

- **Whitefly infestations** transmit the virus between plants.
- **Infected transplants or seeds** introduce the virus to new crops.
- **High temperatures and dry conditions** increase whitefly populations.

Symptoms

- **Leaves:**
 - **Yellowing and curling** of young leaves.
 - Leaves become **thick, brittle, and deformed**.
- **Plant growth:**
 - **Stunted growth** and reduced fruit production.
- **Fruits:**
 - May be **small, deformed, or absent** in severe cases.

Remedies / control measures

cultural control

- **Remove and destroy infected plants** to prevent spread.
- **Use reflective mulch** to deter whiteflies.
- **Plant resistant tomato varieties** (e.g., tylcv-resistant hybrids).

biological control

- Introduce **natural predators** like ladybugs and parasitic wasps to control whiteflies.

chemical control

- Apply **insecticides** like imidacloprid or neem oil to control whiteflies.

organic remedies

- **Neem oil or insecticidal soap sprays** to repel whiteflies.
- Use **yellow sticky traps** to monitor and reduce whitefly populations.

Tomato – tomato mosaic virus (tomato_tomato_mosaic_virus)

Cause

- **Viral infection** caused by *tomato mosaic virus (tomy)*.
- **Spread through infected seeds, tools, hands, and plant-to-plant contact.**

Reason for spread

- **Contaminated seeds, soil, or plant debris** harbor the virus.
- **Human activity (touching infected plants, tools, or gloves)** spreads the virus.
- **Insects (aphids, beetles)** can **transmit the virus** indirectly.

Symptoms

- **Leaves:**
 - **Mosaic-like light and dark green patterns** on leaves.
 - **Leaf curling, yellowing, and distortion.**
- **Fruits:**
 - **Reduced fruit size, uneven ripening, and internal browning.**
 - Fruits may **develop brown streaks or become deformed.**
- **Plant growth:**
 - **Stunted growth** with fewer fruits.

Remedies / control measures

cultural control

- **Use virus-free seeds and transplants.**
- **Disinfect tools, hands, and equipment** with a bleach solution.
- **Remove and destroy infected plants** to prevent spread.

biological control

- **No direct biological control**, but companion planting with **marigolds** can help deter virus-carrying insects.

chemical control

- **No effective chemical treatment;** focus on prevention.

organic remedies

- **Neem oil sprays** to deter aphids and beetles (potential virus carriers).
- **Rotate crops** and avoid planting tomatoes in infected soil for at least 2 years.

Tomato – healthy (tomato____healthy)

characteristics of a healthy tomato plant

- **Leaves:** dark green, free from spots, curling, or yellowing.
- **Fruits:** large, well-formed, vibrant in color, and without blemishes.
- **Growth:** strong, upright stems with consistent flowering and fruit production.

best practices to maintain healthy tomato plants

- **Proper spacing:** ensures airflow and reduces disease risk.
- **Watering:** consistently at soil level, avoiding overhead watering.
- **Soil health:** use well-draining, nutrient-rich soil.
- **Pest management:** regularly monitor and use organic repellents like neem oil.
- **Crop rotation:** avoid planting tomatoes in the same spot each year.