Apple_Apple_scab:

- Apple scab is the most common disease of apple and crabapple trees in Minnesota.
- Scab is caused by a fungus that infects both leaves and fruit.
- Scabby fruit are often unfit for eating.
- Infected leaves have olive-green to brown spots.
- Leaf loss weakens the tree when it occurs many years in a row.

Symptoms:

- Leaf spots are round, olive-green, and up to 1/2 inch across.
- Spots are velvet-like with fringed borders.
- Fruit that are infected when very young become deformed and cracked as the fruit grows.
- Leaves with many leaf spots turn yellow and drop by mid-summer.
- Infected fruit have olive-green spots that turn brown and corky with time.



Prevention:

- Remove fallen leaves to remove places where the fungus can survive the winter.
- Even with a good fall leaf cleanup, spores from nearby apple trees can travel to your property, starting the infection cycle again.
- Rake up and destroy fallen leaves before the first snowfall.
- Infected leaves can be burned, buried or composted.
- Infected leaves can be burned, buried or composted.

Apple_Black_rot:

- Black rot is occasionally a problem on Minnesota apple trees.
- This fungal disease causes leaf spot, fruit rot and cankers on branches.
- Stressed by environmental factors like drought.
- Manage black rot by practicing good sanitation, taking good care of your trees and pruning your trees correctly.
- Fungicides are rarely needed to manage black rot.

Symptoms:

- Large brown rotten areas can form anywhere on the fruit but are most common on the blossom end.
- Brown to black concentric rings can often be seen on larger infections.
- The flesh of the apple is brown but remains firm.
- Small, black spots can be seen on older fruit infections. These are fungal spore producing structures, called pycnidia.
- Some fruit mummify (shrivel and dry out) and remain attached to the tree.



Prevention:

- Prune out dead or diseased branches.
- Pick all dried and shriveled fruits remaining on the trees.
- Remove infected plant material from the area.
- All infected plant parts should be burned, buried or sent to a municipal composting site.
- Be sure to remove the stumps of any apple trees you cut down. Dead stumps can be a source of spores.

Apple_Cedar_apple_rust:

i. Cedar-apple rust is a fungal disease that affects both apple (and crabapple) trees and nearby junipers (commonly called cedar trees).

ii. It requires two hosts to complete its life cycle: apple trees and juniper trees.

iii. The disease causes unsightly lesions on leaves and fruit, reducing fruit quality.

iv. Infected leaves and fruits can weaken the tree over time if infection is severe.

Symptoms:

- Bright yellow-orange spots appear on the upper surface of apple leaves in spring.
- Spots may have raised, reddish centers and cause leaves to thicken and deform.
- Infected leaves often drop prematurely.
- Fruit develops small, yellow-orange, raised spots that may later turn brown and corky.
- On juniper (cedar) hosts, galls form on branches, which produce orange gelatinous spores in wet weather.

Prevention:

- Remove nearby cedar or juniper trees if possible, or prune them to reduce spore spread.
- Apply appropriate fungicides on apple trees in early spring before leaf expansion.
- Remove infected leaves and fruit to reduce the source of spores.
- Maintain good air circulation by proper pruning to help leaves dry quickly.
- Monitor trees regularly for early signs of infection to manage outbreaks promptly.

Apple_healthy:

- Your apple is in great health! It is showing no signs of illness or distress and is thriving in her environment.
- Her feathers are smooth and shiny, her appetite is good, and she’s active and alert.
- Regularly monitor her health and keep up with vaccinations to ensure she stays happy and healthy.



Blueberry_healthy:

- Your Blueberry is in great health! It is showing no signs of illness or distress and is thriving in her environment.
- Her feathers are smooth and shiny, her appetite is good, and she’s active and alert.
- Regularly monitor her health and keep up with vaccinations to ensure she stays happy and healthy.



Cherry(including_sour)Powdery_mildew:

- ❖ Powdery mildew is a common fungal disease that affects cherry trees, including both sweet and sour varieties.
- ❖ The fungus thrives in warm, dry conditions with high humidity.
- ❖ It primarily affects young leaves, shoots, and fruit, reducing tree vigor and fruit quality

Symptoms:

- ➢ White, powdery fungal growth appears on the surface of young leaves, shoots, and sometimes fruits.
- ➢ Infected leaves may curl, distort, and become stunted.
- ➢ Young shoots may be twisted or die back.
- ➢ Fruits may have a powdery coating, affecting appearance but rarely affecting taste.
- ➢ Severe infections can weaken the tree over time and reduce yield.



Prevention:

- Prune trees to improve air circulation and reduce humidity within the canopy.
- Remove and destroy infected shoots and leaves to prevent the spread of spores.
- Apply fungicides at early stages of shoot growth, especially in warm, dry weather.
- Avoid excessive nitrogen fertilization, which encourages tender growth susceptible to infection.
- Monitor trees regularly for early signs to control outbreaks promptly.

Cherry(including_sour)healthy:

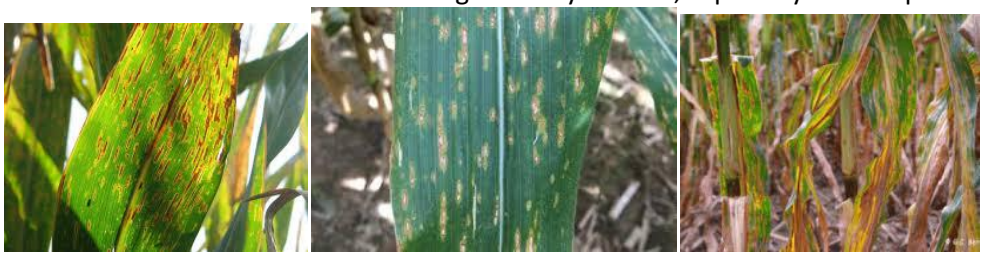
- Your Cherry is in great health! It is showing no signs of illness or distress and is thriving in her environment.
- Her feathers are smooth and shiny, her appetite is good, and she’s active and alert.
- Regularly monitor her health and keep up with vaccinations to ensure she stays happy and healthy.


Corn(maize)Cercospora_leaf_spot Gray_leaf_spot:

1. Gray leaf spot is a fungal disease caused by *Cercospora zeae-maydis* that affects maize/corn leaves.
2. The disease is more severe in warm, humid conditions and can reduce photosynthesis, leading to lower yields.
3. It primarily infects leaves but rarely affects the stem or cob directly.

Symptoms:

- Small, rectangular, gray to tan lesions appear between leaf veins.
- Lesions may expand and merge, causing large areas of dead tissue.
- Infected leaves may yellow and die prematurely, reducing overall plant vigor.
- Severe infections can cause significant yield loss, especially in susceptible varieties.



Prevention:

- Plant resistant or tolerant corn varieties when available.
- Rotate crops to prevent the buildup of fungal spores in soil.
- Remove and destroy crop residues after harvest, as spores can survive on debris.
- Ensure proper plant spacing and avoid excessive irrigation to reduce leaf wetness.
- Apply fungicides if early infection is detected and conditions are favorable for disease development.

Corn(maize)Common_rust:

- Common rust is a fungal disease caused by *Puccinia sorghi* that affects maize leaves.
- It can occur in most maize-growing regions and is more severe in cool, moist conditions.
- While it rarely kills the plant, it can reduce photosynthesis and lower yields if infections are heavy.

Symptoms:

- Small, round to oval, reddish-brown pustules appear on both leaf surfaces.
- Pustules release reddish-brown spores that spread the infection to nearby plants.
- Infected leaves may yellow and die prematurely in severe cases.
- The disease usually develops first on lower leaves and progresses upward.


Prevention:

- ❖ Plant resistant maize varieties whenever possible.
- ❖ Rotate crops to reduce the presence of fungal spores in the field.
- ❖ Remove and destroy crop residues, as spores can overwinter on debris.
- ❖ Ensure good air circulation between plants by proper spacing and row orientation.
- ❖ Apply fungicides when disease pressure is high and environmental conditions favor infection.

Corn(maize)Northern_Leaf_Blight:

- Northern leaf blight is a fungal disease caused by *Exserohilum turcicum* that affects maize leaves.
- It is common in temperate regions and thrives in cool, humid weather.
- Severe infections can reduce photosynthesis and lead to significant yield loss.

Symptoms:

- Long, gray-green to tan, cigar-shaped lesions develop on leaves.
- Lesions may enlarge and merge, causing large dead areas on the leaf.
- Infected leaves may yellow and die prematurely, weakening the plant.
- The disease usually starts on lower leaves and progresses upward.


Prevention of Gray Leaf Spot

- Plant resistant maize varieties whenever possible.
- Rotate crops to reduce the presence of fungal spores in the field.
- Remove and destroy crop residues, as spores can overwinter on debris.
- Ensure good air circulation between plants by proper spacing and row orientation.
- Apply fungicides when disease pressure is high and environmental conditions favor infection.

Corn(maize)healthy:

- Your corn is in great health! It is showing no signs of illness or distress and is thriving in her environment.
- Her feathers are smooth and shiny, her appetite is good, and she’s active and alert.
- Regularly monitor her health and keep up with vaccinations to ensure she stays happy and healthy.



Grape_Black_rot:

- Black rot is a serious fungal disease caused by *Guignardia bidwellii* that affects grapevines.
- It occurs in most grape-growing regions with warm, humid summers and can affect leaves, shoots, tendrils, and fruit.
- The disease can severely reduce both yield and fruit quality if not managed properly.
- Infections can persist from year to year in mummified berries, fallen leaves, and infected shoots.

Symptoms:

- Leaves: Circular, dark brown to black spots appear on leaves, often with a light-colored center and a darker margin. Infected leaves may shrivel, turn yellow, and fall prematurely.
- Shoots/Tendrils: Infected shoots develop black lesions that can girdle and kill the young growth. Tendrils may also become blackened and brittle.
- Fruit: Small, brown spots appear on young berries, enlarging over time. Infected berries shrivel, blacken, and harden into “mummies.” These mummified berries can remain on the vine or fall to the ground, serving as a source of inoculum for the next season.
- General: Severe infections reduce photosynthesis, weaken the vine, and lower fruit yield and quality.



Prevention:

- Remove and destroy all mummified berries, infected leaves, and shoots to reduce overwintering spores.
- Prune vines to improve air circulation, reduce humidity within the canopy, and promote faster drying of foliage.
- Apply fungicides at critical growth stages, including pre-bloom, post-bloom, and during fruit development. Follow local agricultural guidelines for timing and dosage.
- Avoid overhead irrigation that keeps foliage wet for extended periods. Drip irrigation is preferable.
- Plant resistant or tolerant grape varieties if available.
- Regularly monitor vineyards for early signs of infection to take timely management action.

Grape_Leaf_blight(Isariopsis_Leaf_Spot):

- Grape leaf blight, also called Isariopsis leaf spot, is a fungal disease caused by *Isariopsis vitis*.
- It primarily affects grapevine leaves but can also infect shoots and young berries under favorable conditions.
- The disease is common in regions with warm, humid climates, and if unmanaged, it can weaken vines and reduce both yield and fruit quality.
- The fungus survives in infected leaves and plant debris, serving as a source of infection for the following season.

Symptoms:

- Leaves: Small, circular to irregular brown spots develop on the upper surface of leaves. Over time, spots may coalesce, forming large necrotic areas.
- Leaf tissue around spots may turn yellow, and severe infections cause premature leaf drop, reducing photosynthetic capacity.
- Shoots: Infected shoots may develop dark streaks or lesions, causing stunted growth and weakening the vine.
- Fruit: Rarely, young berries may be affected, showing dark, sunken spots.
- General: Severe infection leads to defoliation, reduced vine vigor, and smaller, lower-quality grape clusters.



Prevention:

- **Sanitation:** Remove and destroy infected leaves and debris at the end of the season to reduce overwintering spores.
- **Pruning:** Properly prune vines to improve air circulation and sunlight penetration, which reduces humidity within the canopy.
- **Fungicides:** Apply fungicides during early shoot growth and continue as per recommended intervals, especially in warm, humid conditions.
- **Resistant Varieties:** Choose grape varieties with known resistance or tolerance to Isariopsis leaf spot where available.
- **Irrigation Practices:** Avoid overhead irrigation that keeps leaves wet for long periods. Drip irrigation is preferred.
- **Monitoring:** Regularly inspect vineyards for early symptoms to implement timely control measures before the disease spreads widely.

Additional Notes:

- The disease can exacerbate other fungal infections if left unchecked, increasing overall vine stress.
- Favorable conditions include warm temperatures (20–30°C) and high humidity, particularly during the growing season.
- Integrated management combining cultural practices, resistant varieties, and fungicide sprays is the most effective approach.

Orange_Haunglongbing(Citrus_greening):

- Huanglongbing (HLB), commonly known as citrus greening, is one of the most destructive bacterial diseases of citrus crops worldwide.
- It is caused by the bacterium *Candidatus Liberibacter* species and transmitted primarily by the Asian citrus psyllid (*Diaphorina citri*).
- The disease affects all citrus varieties, including sweet oranges, mandarins, lemons, and limes, and can severely reduce yield and fruit quality.
- Once a tree is infected, there is no cure, making early detection and management critical.

Symptoms:

- Leaves: Yellowing of leaf veins or the entire leaf, often in a blotchy, asymmetrical pattern. Leaves may drop prematurely.
- Shoots/Branches: New shoots may be stunted and die back.
- Fruit: Fruits are small, lopsided, and remain green even at maturity; seeds may be aborted or underdeveloped.
- Overall Tree Health: Trees gradually decline, showing reduced growth, thinning canopy, and dieback of branches.
- General: Infected trees produce fewer and lower-quality fruits, and the disease spreads rapidly if psyllids are present.



Prevention of Gray Leaf Spot

- **Vector Control:** Monitor and control the Asian citrus psyllid population using insecticides, biological control agents, or integrated pest management (IPM) techniques.
- **Sanitation:** Remove and destroy infected trees to prevent the spread of bacteria to healthy trees.
- **Quarantine Measures:** Follow local regulatory guidelines to prevent the movement of infected plant material.
- **Nutritional Management:** Proper fertilization can help maintain tree vigor but does not cure the disease.
- **Resistant Varieties:** Research is ongoing to develop HLB-tolerant or resistant citrus varieties.
- **Early Detection:** Regular scouting for symptoms and laboratory testing for the bacterium are essential for timely management.

Additional Notes:

- Citrus greening can drastically reduce yield and eventually kill trees, making it a severe economic threat in affected regions.
- Integrated management focusing on vector control, removal of infected trees, and careful monitoring is currently the most effective strategy.

PeachBacterial_spot:

- Bacterial spot is a common and serious disease of peach trees caused by the bacterium *Xanthomonas campestris pv. pruni*.
- It affects leaves, shoots, and fruit, and is prevalent in regions with warm, wet, and humid conditions.
- The disease can reduce fruit quality, yield, and overall tree vigor if not properly managed.

Symptoms:

- Leaves: Small, water-soaked spots appear on leaves, which later enlarge, turning dark brown to black. Leaf tissue around the spots may become yellow and drop prematurely. Severe infection can cause defoliation.
- Shoots: Young shoots develop elongated, dark lesions that can girdle and kill tender growth.
- Fruit: Fruit shows small, dark, sunken spots that enlarge over time, leading to scabby, cracked, and unmarketable fruit.
- General: Severe infections can weaken the tree, reduce photosynthetic capacity, and lower fruit yield and quality.


Prevention:

- **Sanitation:** Remove and destroy infected leaves, fruit, and debris to reduce overwintering bacteria.
- **Pruning:** Prune trees to improve air circulation and sunlight penetration, which helps leaves dry quickly and reduces infection risk.
- **Fungicides/Bactericides:** Apply copper-based bactericides or recommended chemical treatments during early shoot growth and throughout the wet season. Follow local guidelines for dosage and timing.
- **Resistant Varieties:** Plant peach varieties that are less susceptible to bacterial spot when available.
- **Irrigation Practices:** Avoid overhead irrigation that keeps foliage wet for prolonged periods; drip irrigation is preferable.
- **Monitoring:** Regularly inspect trees for early signs of infection to implement timely control measures.

Additional Notes:

- Warm, wet weather is highly favorable for bacterial multiplication and spread.
- The disease can be particularly severe on young trees and newly planted orchards.

Pepper,_bell_Bacterial_spot:

- Bacterial spot is a significant disease of bell peppers, caused by *Xanthomonas campestris pv. vesicatoria*.
- The disease affects leaves, stems, and fruit, reducing yield and marketability of the crop.
- Warm, wet, and humid conditions favor the spread and severity of the disease.

Symptoms:

- **Leaves:** Small, water-soaked spots appear on the leaf surface, later turning dark brown to black with a yellow halo. Severe infections may cause leaves to curl, dry out, and drop prematurely.
- **Stems and Petioles:** Lesions may form on stems and leaf petioles, potentially weakening the plant structure.
- **Fruit:** Small, dark, raised spots appear on green fruit and may enlarge as the fruit matures. Infected areas may become scabby, cracked, or sunken, reducing fruit quality and marketability.
- **General:** Severe infection can stunt plant growth, reduce fruit set, and cause significant economic losses.

Prevention and Management:

- **Sanitation:** Remove and destroy infected plant debris and weeds that may harbor the bacteria.
- **Seed and Transplant Care:** Use disease-free seeds and transplants to prevent introducing the bacteria into the field.
- **Cultural Practices:** Avoid overhead irrigation that keeps leaves wet for prolonged periods; use drip irrigation if possible. Rotate crops to reduce bacterial build-up in the soil.
- **Chemical Control:** Apply copper-based bactericides or other recommended bactericides during early growth stages and continue at regular intervals, especially during wet weather. Follow local guidelines for timing and dosage.
- **Resistant Varieties:** Plant bell pepper varieties that show resistance to bacterial spot.
- **Monitoring:** Inspect fields regularly for early symptoms and take immediate action to limit disease spread.

Additional Notes:

- Warm, humid conditions, frequent rainfall, or overhead irrigation increase the likelihood of outbreaks.
- The disease spreads easily through rain splash, contaminated tools, or handling of infected plants.
- Integrated management combining sanitation, resistant varieties, cultural practices, and chemical sprays is the most effective way to reduce losses.

Pepper,_bell_healthy:

- Your Pepper Bell is in great health! It is showing no signs of illness or distress and is thriving in her environment.
- Her feathers are smooth and shiny, her appetite is good, and she’s active and alert.
- Regularly monitor her health and keep up with vaccinations to ensure she stays happy and healthy.

Potato_Early_blight:

- arly blight is a common and destructive fungal disease of potato plants, caused by *Alternaria solani*.
- It affects leaves, stems, and tubers, and can significantly reduce yield and tuber quality if not managed.
- The disease is most severe in warm, humid conditions with frequent rainfall or overhead irrigation.

Symptoms:

- **Leaves:** Dark brown to black, concentric ringed spots (target-like) appear on older leaves first. Spots enlarge over time, and severely infected leaves may yellow and drop prematurely.
- **Stems:** Dark lesions develop on stems, sometimes girdling and weakening them.
- **Tubers:** Infected tubers develop sunken, dark, dry spots, often with concentric rings, reducing marketability.
- **General:** Defoliation and weakened stems reduce photosynthesis, leading to lower yields and smaller, poor-quality tubers.

Prevention and Management:

- **Crop Rotation:** Rotate potatoes with non-host crops (e.g., cereals, legumes) for at least 2–3 years to reduce fungal inoculum in soil.
- **Resistant Varieties:** Plant potato varieties with known resistance or tolerance to early blight.
- **Sanitation:** Remove and destroy infected crop residues after harvest to reduce overwintering spores.
- **Cultural Practices:** Avoid overhead irrigation that keeps foliage wet; ensure proper spacing between plants to improve air circulation.
- **Chemical Control:** Apply fungicides preventively at early growth stages, especially during humid and wet conditions. Follow local agricultural guidelines for dosage and timing.
- **Monitoring:** Regularly inspect plants for early leaf spots to take timely action before the disease spreads widely.

Additional Notes:

- Early blight often develops after the first 30–40 days of planting when the canopy is dense.
- Environmental conditions such as warm temperatures (25–30°C) and high humidity favor rapid disease development.



Potato_Late_blight:

- Late blight is a highly destructive fungal disease of potatoes caused by *Phytophthora infestans*.
- It affects leaves, stems, and tubers and can lead to complete crop loss under favorable conditions.
- The disease thrives in cool, wet, and humid weather, often spreading rapidly during rainy periods.

Symptoms:

- **Leaves:** Irregular, water-soaked, dark green to brown lesions appear on leaves. Lesions expand rapidly and may be surrounded by a pale green or yellow halo. White, downy fungal growth may appear on the underside of leaves in humid conditions.
- **Stems:** Dark, sunken lesions develop on stems and can girdle them, causing wilting and plant death.
- **Tubers:** Infected tubers develop firm, brown, dry rot lesions that may penetrate deep into the flesh, making them unfit for consumption or storage.
- **General:** The disease spreads quickly under favorable conditions and can destroy entire fields within days if untreated.

Prevention and Management:

- **Resistant Varieties:** Plant potato varieties that are resistant or tolerant to late blight.
- **Crop Rotation:** Rotate with non-host crops to reduce soil-borne inoculum.
- **Sanitation:** Remove and destroy infected plant debris and volunteer potato plants to minimize sources of infection.
- **Cultural Practices:** Avoid overhead irrigation that keeps foliage wet; ensure proper spacing for air circulation.
- **Chemical Control:** Apply fungicides preventively, especially during cool, wet weather. Follow recommended intervals and dosages for maximum effectiveness.
- **Monitoring:** Inspect crops regularly, particularly during periods of high humidity and rainfall, to detect early symptoms and respond quickly.

Additional Notes:

- Late blight is the disease responsible for the historic Irish potato famine due to its rapid spread and severe damage.
- Environmental factors such as temperatures between 10–25°C with high humidity or frequent rainfall accelerate disease development.

Potato_healthy:

- Your potato is in great health! It is showing no signs of illness or distress and is thriving in her environment.
- Her feathers are smooth and shiny, her appetite is good, and she’s active and alert.
- Regularly monitor her health and keep up with vaccinations to ensure she stays happy and healthy.

Soybean_healthy:

- Your Soyabean is in great health! It is showing no signs of illness or distress and is thriving in her environment.
- Her feathers are smooth and shiny, her appetite is good, and she's active and alert.
- Regularly monitor her health and keep up with vaccinations to ensure she stays happy and healthy.

Squash_Powdery_mildew:

- Powdery mildew is a common fungal disease of squash and other cucurbits, caused by *Podosphaera xanthii* or *Erysiphe cichoracearum*.
- It primarily affects leaves and stems and can significantly reduce photosynthesis, fruit yield, and overall plant vigor.
- The disease is most severe in warm, dry conditions with high humidity and poor air circulation.

Symptoms:

- **Leaves:** White, powdery fungal growth appears on the upper and sometimes lower surfaces of leaves. Infected areas may enlarge and coalesce.
- Leaves may yellow, curl, become distorted, and drop prematurely.
- **Stems:** Young stems may show powdery white patches, leading to weakened growth.
- **Fruit:** Fruit is usually less affected, but severe leaf infection can reduce fruit size and quality indirectly.
- **General:** Severe infections weaken plants, reduce flowering and fruit set, and lower yield.

Prevention and Management:

- **Resistant Varieties:** Plant squash varieties that are resistant or tolerant to powdery mildew.
- **Cultural Practices:** Space plants adequately to improve air circulation, prune to reduce canopy density, and avoid excessive nitrogen fertilization that promotes tender growth.
- **Sanitation:** Remove and destroy infected leaves to reduce fungal spores and prevent further spread.
- **Chemical Control:** Apply fungicides preventively, especially when early symptoms appear or environmental conditions favor disease development. Follow local guidelines for timing and dosage.
- **Irrigation Practices:** Avoid overhead irrigation that keeps foliage wet; water at the base of plants instead.
- **Monitoring:** Regularly inspect plants for early signs of powdery mildew to manage the disease before it spreads extensively.

Additional Notes:

- Powdery mildew can survive on plant debris and volunteer plants, serving as a source of infection for the next season.
- Unlike many fungal diseases, powdery mildew can develop under relatively dry conditions as long as humidity is sufficient.



Strawberry_Leaf_scorch:

- Leaf scorch is a common fungal disease of strawberry plants caused by *Diplocarpon earliana*.
- It primarily affects leaves and can reduce photosynthesis, plant vigor, and yield if left unmanaged.
- The disease is most severe in cool, wet, and humid conditions during the growing season.

Symptoms:

- **Leaves:** Small, purplish or reddish spots appear on leaf surfaces, which enlarge to form large, irregular, brown to black lesions.
- Leaf margins may turn reddish-brown, curl, and die back, giving the “scorched” appearance.
- Severely infected leaves may drop prematurely, reducing overall photosynthetic capacity.
- **Stems:** Rarely, lesions may appear on petioles or runners, weakening plant structure.
- **General:** Reduced leaf area and plant vigor can lead to smaller, lower-quality fruits.

Prevention and Management:

- **Resistant Varieties:** Plant strawberry varieties that show resistance to leaf scorch.
- **Sanitation:** Remove and destroy infected leaves and debris to reduce fungal inoculum.
- **Cultural Practices:** Space plants properly to improve air circulation, avoid overhead irrigation, and ensure proper drainage to reduce leaf wetness.
- **Chemical Control:** Apply fungicides at early stages of infection or during periods of high humidity, following recommended intervals and dosages.
- **Monitoring:** Regularly inspect strawberry plants for early symptoms to implement timely management.

Additional Notes:

- Cool, wet conditions favor rapid disease development and spread.
- Leaf scorch can interact with other foliar diseases, exacerbating plant stress and yield loss.



Strawberry_healthy:

- Your Strawberry is in great health! It is showing no signs of illness or distress and is thriving in her environment.
- Her feathers are smooth and shiny, her appetite is good, and she’s active and alert.
- Regularly monitor her health and keep up with vaccinations to ensure she stays happy and healthy.

Tomato_Bacterial_spot:

- Bacterial spot can be a devastating disease when the weather is warm and humid.
- Four closely related bacteria cause bacterial spot: *Xanthomonas vesicatoria*, *X. euvesicatoria*, *X. gardneri*, and *X. perforans*.
- The disease can affect all above-ground parts of tomato and pepper plants: stems, petioles, leaves, and fruits.
- Fruit spots commonly result in unmarketable fruit.

Symptoms:

- When it first appears on the leaves, bacterial spot is similar in appearance to many other tomatoes diseases.
- Tomato leaves have small (less than 1/8 inch), brown, circular spots surrounded by a yellow halo.
- The center of the leaf spots often falls out resulting in small holes.
- The leaf spots do not contain concentric rings, spots with concentric rings are likely caused by early blight.
- Pepper leaves have small (less than 1/8 inch), brown, circular spots that do not have a yellow halo and centers do not fall out.



Prevention

- Purchase high quality, certified disease-free seed if possible.
- Hot water treatment can be used to kill bacteria on and in seed.
- For growers producing their own seedlings, avoid over-watering and handle plants as little as possible. Disinfect greenhouses, tools, and equipment between seedling crops with a commercial sanitizer.
- For growers purchasing transplants, buy plants from reputable growers who start with clean seed and use good cultural practices to reduce disease.
- Space plants adequately. Space tomato plants 14-16 inches apart for single leader high tunnel tomatoes that are heavily pruned. Space plants 18-24 inches if tomatoes are grown in cages or pruned less intensively.

Tomato_Early_blight:

- Early blight is a common and destructive fungal disease of tomato plants caused by *Alternaria solani*.
- It affects leaves, stems, and fruits, and can significantly reduce plant vigor, yield, and fruit quality.
- The disease is most severe in warm, humid environments with frequent rainfall or overhead irrigation.

Symptoms:

- **Leaves:** Dark brown to black lesions with concentric rings (target-like appearance) appear on older leaves first. Lesions enlarge over time, causing yellowing and premature leaf drop.
- **Stems:** Dark, sunken lesions may develop on stems, potentially girdling young growth and weakening the plant.
- **Fruit:** Although less commonly affected, fruits can develop small, dark, sunken spots that enlarge over time, reducing marketability.
- **General:** Defoliation and weakened stems reduce photosynthesis and plant vigor, leading to lower yield and smaller, poor-quality fruits.

Prevention and Management:

- **Crop Rotation:** Rotate tomatoes with non-host crops to reduce pathogen buildup in the soil.
- **Resistant Varieties:** Plant tomato varieties that are resistant or tolerant to early blight.
- **Sanitation:** Remove and destroy infected plant debris after harvest to reduce overwintering inoculum.
- **Cultural Practices:** Avoid overhead irrigation, provide adequate spacing between plants for air circulation, and prune dense foliage to reduce humidity around leaves.
- **Chemical Control:** Apply fungicides preventively, especially during warm, humid periods or when early symptoms are detected. Follow local recommendations for timing and dosage.
- **Monitoring:** Regularly inspect plants for early leaf spots to manage the disease before it spreads extensively.

Additional Notes:

- Early blight typically develops 30–40 days after transplanting when plants have a dense canopy.
- Environmental conditions such as temperatures between 25–30°C and high humidity favor disease development.



Tomato_Late_blight:

- There are more than a dozen viruses that can infect tomatoes.
- The most common viruses in Minnesota are tomato mosaic virus (ToMV) and tobacco mosaic virus (TMV).
- Viruses can cause foliar and fruit symptoms.
- Plant viruses can only be identified by lab testing.
- There is no cure for plant viruses, management actions should be focused on preventing virus spread.

Symptoms:

- If plants are infected early, they may appear yellow and stunted overall.
- Mottled light and dark green on leaves.
- Leaves may be curled, malformed, or reduced in size.
- Spots of dead leaf tissue may become apparent with certain varieties at warm temperatures.
- Fruits may ripen unevenly.



Prevention:

- Scout plants regularly. If plants displaying symptoms of viruses are found, remove the entire plant (including roots), bag the plant, and send it to the University of Minnesota Plant Disease Clinic for diagnosis.
- There are numerous tomato varieties that are resistant to one or the other of the viruses. These are usually denoted in seed catalogs, often with the code ToMV after the variety name if resistant to tomato mosaic virus and TMV if resistant to tobacco mosaic virus.
- There are only a few varieties that are resistant to both viruses.
- Several popular rootstocks for grafted tomatoes can also confer resistance to varieties that may not normally be resistant.
- An extensive list of resistant tomato varieties can be found on the Cornell University.

Tomato_Leaf_Mold:

- Tomato leaf mold is typically only an issue in greenhouse and high-tunnel tomatoes.
- The disease is driven by high relative humidity (greater than 85%).
- Foliage is often the only part of the plant directly infected. Infection will cause infected leaves to wither and die, indirectly affecting yield.
- In severe cases, blossoms and fruit can also be infected, directly reducing yield.
- Leaf mold is caused by the fungus *Passalora fulva* (previously called *Fulvia fulva* or *Cladosporium fulvum*).

Symptoms:

- The oldest leaves are infected first.
- Pale greenish-yellow spots, usually less than 1/4 inch, with no definite margins, form on the upper sides of leaves.
- Olive-green to brown velvety mold forms on the lower leaf surface below leaf spots.
- Leaf spots grow together and turn brown. Leaves wither and die but often remain attached to the plant.
- Infected blossoms turn black and fall off.



Prevention:

- The pathogen *P. fulfa* can survive on infected plant debris or in the soil, although the initial source of the disease is often infected seed.
- The disease is spread by rain and wind, on tools and clothing, and via insect activity.
- High relative humidity (greater that 85%) combined with high temperatures encourages the spread of the disease.
- With that in mind, if growing tomatoes in a greenhouse, maintain night temps higher than outside temperatures.
- When planting, use only certified disease-free seed or treated seed.
- Remove and destroy all crop debris post-harvest.
- Sanitize the greenhouse between crop seasons.

Tomato_Septoria_leaf_spot:

- Septoria leaf spot is a common fungal disease of tomato plants caused by *Septoria lycopersici*.
- It primarily affects leaves and can lead to defoliation, reduced photosynthesis, and decreased fruit yield.
- The disease is most severe in warm, humid conditions with frequent rainfall or overhead irrigation.

Symptoms:

- **Leaves:** Small, circular, gray to tan spots with dark brown margins appear on older leaves first. Each spot may have tiny black fruiting bodies (pycnidia) visible with a magnifying glass.
- Lesions enlarge over time, merge, and cause yellowing and premature leaf drop.
- **Stems:** Occasionally, small dark spots may appear on stems and petioles, weakening young growth.
- **Fruit:** Rarely affected directly, but severe defoliation reduces fruit size, quality, and yield.
- **General:** Disease progression can lead to extensive leaf loss, weakened plants, and lower overall productivity.

Prevention and Management:

- **Resistant Varieties:** Use tomato varieties that show resistance or tolerance to Septoria leaf spot.
- **Sanitation:** Remove and destroy infected leaves and plant debris to reduce overwintering inoculum.
- **Cultural Practices:** Space plants adequately for good air circulation, prune dense foliage, and avoid overhead irrigation to keep leaves dry.
- **Chemical Control:** Apply fungicides preventively or at the first sign of infection, following recommended intervals and dosage.
- **Crop Rotation:** Rotate with non-host crops for at least 2–3 years to reduce pathogen buildup in soil.
- **Monitoring:** Inspect plants regularly for early symptoms to implement timely management and prevent spread.

Additional Notes:

- Septoria leaf spot primarily attacks older foliage, which can accelerate defoliation and reduce plant vigor.
- Environmental conditions favoring disease include warm temperatures (20–27°C) and prolonged leaf wetness.


Tomato_Spider_mites Two-spotted_spider_mite:

- Two-spotted spider mite (*Tetranychus urticae*) is a tiny arthropod pest that feeds on tomato plants, causing significant damage to leaves, stems, and overall plant health.
- It thrives in hot, dry, and dusty conditions and reproduces rapidly, leading to severe infestations if unmanaged.
- Spider mites are not fungi or bacteria, but their feeding can reduce photosynthesis, weaken plants, and lower fruit yield and quality.

Symptoms:

- **Leaves:** Small, yellow or pale speckles appear on leaf surfaces, which may coalesce to give a bronzed or scorched appearance.
- Fine webbing may be visible on the undersides of heavily infested leaves or between stems and leaves.
- Leaves may curl, dry, and drop prematurely under severe infestation.
- **Stems and Shoots:** Infested shoots may appear weak, stunted, or discolored.
- **Fruit:** Indirect damage may occur as weakened plants produce smaller and lower-quality fruits.
- **General:** Severe infestations can reduce plant vigor, delay fruiting, and significantly decrease yield.

Prevention and Management:

- **Cultural Practices:** Maintain adequate irrigation and humidity, as spider mites thrive in dry conditions. Remove dust and debris around plants to reduce favorable conditions.
- **Monitoring:** Regularly inspect leaves, especially the undersides, for early signs of mites and webbing.
- **Biological Control:** Introduce natural predators such as *Phytoseiulus persimilis*, *Neoseiulus californicus*, or ladybird beetles to control mite populations naturally.
- **Chemical Control:** Apply miticides or insecticidal soaps targeted for spider mites if infestations are severe. Rotate chemicals to prevent resistance.
- **Sanitation:** Remove heavily infested leaves and debris to reduce mite populations and prevent spread.

Additional Notes:

- Two-spotted spider mites can complete their life cycle in as little as one week under favorable conditions, leading to rapid population growth.
- Infestations are often worse in hot, dry weather and on stressed plants.



Tomato_Target_Spot:

- Target spot of tomato is a fungal disease caused mainly by *Corynespora cassiicola*.
- It affects leaves, stems, and fruits, leading to significant crop loss under warm, humid conditions.
- The disease is common in tropical and subtropical regions and spreads rapidly during extended periods of leaf wetness.
- Severe infections can weaken plants, reduce photosynthesis, and interfere with fruit development and ripening.

Symptoms:

- **Leaves:** Small, water-soaked spots begin on older leaves. These enlarge into brown lesions with light-brown centers and dark concentric rings, giving them a "target-like" or "bull's-eye" appearance.
- Lesions may become ½ inch or larger, and multiple spots may merge, causing leaf yellowing and premature leaf drop.
- **Stems:** Elongated dark lesions may appear on stems and petioles, which can weaken branches and affect nutrient flow.
- **Fruit:** Brown, sunken spots with concentric rings appear on green or ripe fruits. Lesions may expand, leading to fruit rot and unmarketable produce.
- **General:** Severe defoliation exposes fruits to sunscald and leads to reduced yields and poor fruit quality.

Prevention and Management:

- **Resistant/Healthy Seedlings:** Use disease-free seeds and certified nursery seedlings to prevent early introduction of the pathogen.
- **Cultural Practices:** Provide proper spacing to improve air circulation and reduce humidity. Avoid overhead irrigation to keep foliage dry.
- **Sanitation:** Remove infected plant debris at the end of the season, as the fungus can survive on crop residues for months.
- **Crop Rotation:** Rotate tomatoes with non-host crops for 2–3 years to reduce disease carryover in the soil.
- **Chemical Control:** Apply recommended fungicides (e.g., chlorothalonil, copper-based products, or strobilurins) starting at the first appearance of symptoms. Rotate fungicides to prevent resistance.
- **Monitoring:** Inspect plants regularly, especially lower leaves where symptoms first appear, to take timely action before the disease spreads.



Tomato_Tomato_Yellow_Leaf_Curl_Virus:

- TYLCV is a serious viral disease of tomatoes, transmitted mainly by the whitefly (*Bemisia tabaci*).
- It causes severe stunting, leaf curling, and drastic yield loss in warm, tropical, and subtropical regions.

Symptoms:

- **Leaves:** Upward curling, yellowing between veins, and thickened, brittle texture.
- **Growth:** Plants become stunted, with shortened internodes and reduced branching.
- **Flowers/Fruit:** Flower drop is common, resulting in poor fruit set and low yields.
- **General:** Early infection can cause near-complete crop failure.

Prevention and Management:

- **Resistant Varieties:** Use TYLCV-resistant or tolerant tomato hybrids.
- **Whitefly Control:** Use yellow sticky traps, insecticidal soaps, neem oil, and approved insecticides to reduce whitefly populations.
- **Cultural Practices:** Remove infected plants immediately, keep fields weed-free, and avoid planting tomatoes near older infested crops.
- **Physical Barriers:** Use insect-proof netting or row covers for young plants.
- **Sanitation:** Destroy crop residues and control alternate hosts to break the virus–whitefly cycle.

Additional Notes:

- The virus is not seed-borne; it requires whiteflies for transmission.
- Management focuses on **vector control**, **resistant varieties**, and **strict field hygiene**.

Tomato_Tomato_mosaic_virus:

- Tomato mosaic virus is a stable and highly infectious virus affecting tomatoes worldwide.
- It spreads mainly through contaminated hands, tools, clothing, and infected plant debris.

Symptoms:

- **Leaves:** Mottling, mosaic patterns of light and dark green, leaf distortion, and narrowed or fern-like leaves.
- **Growth:** Stunted plants with reduced vigor and smaller leaves.
- **Fruit:** Uneven ripening, yellow blotches, and internal brown streaks may occur.
- **General:** Infected plants produce fewer and poorer-quality fruits.

Prevention and Management:

- **Hygiene:** Wash hands and disinfect tools regularly; avoid smoking near plants as the virus can survive in tobacco products.
- **Sanitation:** Remove and destroy infected plants and clean up crop residues.
- **Resistant Varieties:** Choose tomato cultivars bred for ToMV resistance.
- **Seed Safety:** Use certified virus-free seeds and avoid saving seeds from suspect plants.
- **Cultural Practices:** Minimize plant handling to reduce mechanical transmission.

Additional Notes:

- ToMV is extremely stable and can survive in soil, tools, and dried plant tissue for months.
- Prevention through **strict hygiene and resistant varieties** is the most effective strategy.

Tomato_healthy:

- Your Tomato is in great health! It is showing no signs of illness or distress and is thriving in her environment.
- Her feathers are smooth and shiny, her appetite is good, and she’s active and alert.
- Regularly monitor her health and keep up with vaccinations to ensure she stays happy and healthy.

Grape_Esca(Black_Measles):

- Esca, also known as Black Measles, is a complex fungal disease affecting grapevines, caused by a group of wood-rotting fungi.
- It damages the vine's internal wood, disrupts water flow, and gradually weakens the plant over several years.

Symptoms:

- **Leaves:** Interveinal yellowing or reddening (depending on variety), forming tiger-stripe patterns.
- Brown or black spots ("measles") may appear on leaf surfaces during hot weather.
- **Wood:** Internal wood decay, with white rot or dark streaking in the trunk and arms.
- **Fruit:** Berries develop dark, sunken spots and may shrivel or fail to ripen properly.
- **General:** Vines show reduced vigor, poor shoot growth, and may suddenly collapse in severe cases ("apoplexy").

Prevention and Management:

- **Pruning Practices:** Prune during dry weather, avoid large cuts, and disinfect pruning tools frequently.
- **Remove Infected Wood:** Cut out and destroy affected canes or cordons to slow internal spread.
- **Vineyard Hygiene:** Remove dead vines and debris to reduce fungal inoculum in the field.
- **Balanced Nutrition:** Maintain plant health; stressed vines are more vulnerable to disease progression.
- **Chemical Control:** Some protective fungicides can help reduce infection through pruning wounds, but they do not cure internal infections.

Additional Notes:

- Esca typically develops in older vines but can occur in young plants as well.
- Management focuses on **preventing new infections**, maintaining vine vigor, and **removing infected wood** to extend the vine's productive life.



Grapehealthy:

- Your Grape is in great health! It is showing no signs of illness or distress and is thriving in her environment.
- Her feathers are smooth and shiny, her appetite is good, and she’s active and alert.
- Regularly monitor her health and keep up with vaccinations to ensure she stays happy and healthy.

Peach_healthy:

- Your Peach is in great health! It is showing no signs of illness or distress and is thriving in her environment.
- Her feathers are smooth and shiny, her appetite is good, and she’s active and alert.
- Regularly monitor her health and keep up with vaccinations to ensure she stays happy and healthy.

Raspberry_healthy:

- Your Raspberry is in great health! It is showing no signs of illness or distress and is thriving in her environment.
- Her feathers are smooth and shiny, her appetite is good, and she’s active and alert.
- Regularly monitor her health and keep up with vaccinations to ensure she stays happy and healthy.

-