

RGA Gardening Fact Sheet #10: *Garden Plant Diseases*

Gardening enhances our personal and community space. All plants, from trees to flowers, beautify our living area, provide edible food and offer environmental benefits ranging from the oxygen we breathe to creating summer shade to cool our homes. By growing plants, we better appreciate our natural environment and the ecological relationships between soil, water and climate. Gardening helps the young to the young-at-heart understand the responsible use and protection of our natural environment, as well as the impact we have on the “big picture” of environmental stewardship.

With support from the Conexus Credit Union’s (CCU) Community Investment Program, the Regina Garden Associates (RGA) at the Regina Floral Conservatory aim to promote environmental stewardship through a series of gardening fact sheets, teaching appreciation of growing plants and basic gardening practices to the general public. Visit the Regina Floral Conservatory often and continue learning about gardening through our fact sheets.

conexus
Credit Union



Regina Garden Associates Inc.

Defining Garden Plant Diseases

Broadly defined, plant disease is any problem with a plant such that it results in a reduced appearance or yield. Plant diseases can be either non-infectious, where disease transmission to another plant is not possible, versus infectious, when an organism is capable of movement and infecting another plant. Non-infectious plant diseases result from non-living causes including environmental conditions like hail, temperature, flooding, lighting, wind, nutritional deficiency or toxicity. Infectious plant diseases occur when a suitable environment, a susceptible host plant and a pathogen are present. Of the pathogens, fungal organisms are the primary cause of infectious plant diseases. Secondary pathogen sources are viruses, bacteria and phytoplasmas.

This garden fact sheet focuses on some of the common infectious plant diseases of Saskatchewan’s lawns and gardens, how to apply integrated pest management techniques, and outlines options to reduce the use of pesticides.

Pathogens of Fungi, Bacteria, Viruses and Phytoplasmas

Plant fungi are parasitic organisms that live on plant material and reproduce by spores. Transmission of spores occurs with air, soil, water, seeds and contaminated tools and equipment. Bacteria comprise small one celled organisms capable of reproducing rapidly and spreading by insects, animals, infected plant material, water splash and contaminated tools and equipment. Phytoplasmas are bacteria lacking a cell wall and are spread by insects like aphids and leafhoppers. Viruses are small organisms comprising a molecule with a protein coating. Viral plant diseases are transmitted primarily by piercing-sucking insects like aphids. Virus infected plants can include seeds which upon dispersal further spread disease.

Signs and Symptoms of Infectious Plant Diseases

Gardeners can identify signs of plant disease by any visible portion of a pathogen. While viruses cannot be seen to the visible eye, fungi and bacteria are visible. Examples include the fungal organism of a powdery mildew. Similarly, examples of bacteria include water-soaked lesions on plant leaves and the bacterial ooze from a canker.

Gardeners can also identify a plant disease symptom which is the visual response of a plant to a disease. This is typically a change in the plant growth. The visual symptoms can appear to overlap between a virus, bacteria and fungus pathogen as follows:

- **Fungal Disease:** blight, cankers, damping off, downy mildew, powdery mildew, leaf spots, mold, rust, smut, and wilt.
- **Bacterial Disease:** blight, cankers, galls and tumours, leaf spots, soft rot, and vascular wilt.
- **Viral Disease:** cankers, dwarfing, mosaic leaves, ring spots, and yellowing.
- **Phytoplasma Disease:** yellowing and dwarfing.

CONTACT US: 1450B Fourth Avenue
Regina SK S4P 3C8

306.781.4769
info@reginafloralconservatory.ca

VISIT US: 1450B Fourth Avenue, Regina

Our Pride in Bloom

www.reginafloralconservatory.ca



Choosing Integrated Pest Management

Adopted by horticulture, integrated pest management or IPM is a strategy to plan and manage a variety of methods to reduce pest populations to an acceptable level. A pest can be animal, plant or other organism including virus, bacteria or fungus. For managing plant diseases, IPM focuses on (1) prevention (2) regular monitoring, (3) identification of the disease and its biology, (4) assessment of the need, (5) use of a combination of management methods and (6) evaluation and adjustment in gardening practices. The methods focus on prevention, and where materials are used, they are selected and applied to be least harmful to humans and the environment. Prevention is first priority and examples include the maintenance of a healthy lawn through appropriate watering, fertilization, overseeding and aeration. Regular monitoring of the garden and lawn is essential throughout the growing season. Plant diseases on a host plant should be identified by signs and symptoms plus their source as a virus, bacteria or fungal pathogen. When we understand the disease, then it is reasonable to consider whether there is a practical need to act. If yes, what are the options for managing? Acting promptly is essential, followed by evaluating the results, and then adjusting how we garden in the future.

Options to Prevent and Manage Plant Diseases

1. Plant cultivars/varieties that are resistant to specific fungal and bacterial diseases and/or if not available choose alternative species. Purchase from a Garden Centre that can verify source of grower and the plant's relative disease resistance.
2. Healthy plants are less vulnerable to disease entry and this can be achieved through a combination of lower density plantings with good air circulation; even watering and appropriate fertilization. Regular pruning will make for a strong structure in trees and shrubs. Further, reduce potential for a plant's winter injury. For trees and shrubs, this can be through a combination of good site placement, shade barriers, and mulching.
3. Reduce the potential for infectious plant disease transmission through water splash. Avoid overhead watering in favour of drip line irrigation with ground mulch. Defer garden work when it is wet and wait until the foliage and soil is drier.
4. Prevent infectious plant disease transmission through tools and equipment. Regularly clean garden tools and equipment. Sterilize pruning tools between cuts of diseased plant parts. Do not compost diseased plant material, but rather bag and dispose.
5. Aphids and leafhoppers are sucking insects that prove to be vectors for transmission of infectious plant diseases. Limit this risk by using row covers in the vegetable garden. Remove weeds in the garden as they act as habitat for insects. Encourage natural aphid-eating insects like parasitic wasps and lady beetles. Avoiding the use of broad-spectrum insecticides will increase the survival and expansion of lady beetle populations in the garden. Where aphids build up on individual plants, directed spray from a water hose is effective in washing off these insects. There are less toxic organic options for chemical insect control, including spot spraying of insects with insecticidal soaps and horticultural vegetable oils. Diatomaceous earth can also be applied to individual plants.
6. When disease is detected, remove by pruning out diseased plant parts or, if there is no cure, then remove the entire plant and replace with an alternative or a disease resistant cultivar/variety.
7. Consider less toxic copper-based fungicides as a preventive tool. Specifically, Bordeaux (also called Bordo), is a mixture of copper sulfate and hydrated lime which are effective for fungal control. Another option is a biological control using the bacteria of *Bacillus subtilis*, sold under the brand Serenade®, to control fungal diseases like powdery mildew.
8. Remove all plant waste, including tubers at vegetable harvest and in fall/spring clean-up of flower/shrub planting beds. Avoid overwintering of fungal spores in the plant waste.

Common Plant Diseases in Saskatchewan: Fungus

Common Name

Photo

Cause / Appearance / Impact

Prevention / Management Options

Snow Mould
(Grey & Pink)



With delayed spring melt mould grows in patches on lawn surface. Spores naturally occur in soil. Grey mould only infects grass leaves while pink mould additionally infects grass roots. Impact is reduced photosynthesis, weakened growth with slow recovery.

In spring, accelerate snow melt by spreading piles. In fall, rake up leaves and other organic plant material that will host the mould.

Avoid summer fertilization after August 15 and thereby reduce potential for lush growth. Apply compost, improved drainage and keep a healthy lawn mowing at 3 in (8 cm) and reduce thatch.

Common Plant Diseases in Saskatchewan: Fungus (cont.)

Common Name	Photo	Cause / Appearance / Impact	Prevention / Management Options
Fairy Ring		In lawns, rings of expanding dark green grass and dead grass are present along with mushrooms which are the fungal fruiting body. Occurs in lawns where soil fungi are decomposing wood. Growth of fungus prevents root access to water and causes grass to die.	Manage with deep soil aeration to improve water penetration. Fertilize and water lawn. Remove the dead grass and soil layer of 2 in (5 cm) below then add topsoil and re-sod or seed. To reduce disease transmission of the fungus spores, clean tools and avoid contact with non-diseased lawn.
Powdery Mildew		Under high temperatures and moist conditions, mould grows on surfaces of plant leaves, stems and grass. Result is reduced area for photosynthesis, weakened plant growth and reduced fruit yield. Spores disperse by wind and overwinter on diseased plants.	Air circulation is important and can be improved by reducing plant density. Remove and dispose of all diseased plant materials immediately. To avoid wetting plant foliage use drip irrigation to water and mulch to conserve moisture. Avoid excessive nitrogen fertilization. Plant mildew resistant varieties of plants.
Black Knot		Fungus infects native and ornamental woody trees of <i>Prunus</i> genus including: chokecherry, cherry, mayday pincherry and plum. When temperatures exceed 16°C (61°F) spores spread in spring by wind and water splash. Spores enter young growing shoots then they form a fruiting body called a gall or knot which progressively enlarges with spores and blackens. Knots disfigure and ultimately cause branch death.	Prior to March 1 or after flowering, prune out infected branches by cutting 4-6 in (10-15 cm) below the knot. Dispose of branches and sterilize tools between cuts. Spray trees with a lime sulphur in the spring prior to bud break. Plant resistant varieties of trees (no chokecherries or mayday trees are resistant) or choose alternative trees.
Black Spot		Black Spot fungus is characterized by irregular dark spots with yellowing of adjoining leaf tissue. Rose leaves and stems are susceptible. Spores are dispersed by wind under warm moist spring conditions. Reproduction period is very short and risk is significant leaf loss and weakening of the rose shrub. Spores overwinter in the fallen plant debris and canes.	Grow hardy disease-resistant cultivars of roses. Avoid overhead watering and keep rose foliage dry. Use drip line irrigation to water and mulch to conserve soil moisture. Plant roses in a site with good air circulation and full sun exposure. Immediately remove and dispose of all diseased plant materials. Apply less toxic fungicides for prevention every 7-10 days through the spring and summer. Spray the foliage with a potassium bicarbonate fungicide and alternate with an acidic lime sulphur spray. Alternative is copper salts spray and a sulphur dusting of the leaves.
Early Blight (Leaf or Target Sport)		Fungus infects <i>Solanaceae</i> family comprising tomatoes, potatoes, peppers and eggplant. Higher incidence occurs in warm, humid and wet conditions. Stressed plants are most vulnerable. Fungus observed first on foliage then fruit and death follows. It presents as brown spotting with concentric rings. Fungus overwinters on diseased plants and in seeds. Transmission is by wind, rain, insects and foliage contact with soil.	Plant resistant tomato varieties and promote healthy growth by fertilization and regular watering. Space plants for good air circulation. Stake plants to reduce foliage contact with the soil. Water earlier in the day to ensure plants dry readily and avoid working in the garden when wet. Harvest potatoes when mature and avoid wounds. Following harvest, remove and dispose immediately all plant debris and tubers. Rotate crops every 3-4 years.

Common Plant Diseases in Saskatchewan: Virus

Common Name

Photo

Cause / Appearance / Impact

Prevention / Management Options

Hosta Virus X



Virus infects Hostas and is spread by sap from an infected to a healthy plant. Contaminated tools or hands spread the sap and virus. Appearance has blue or green spots on the gold portion that creates a mottled or lumpy look. Brown spots and twisted leaves are also common. The disease is not considered fatal.

There is no cure and upon identification, diseased plants should be removed and destroyed. Tools should be sterilized and cleaned.

Common Plant Diseases in Saskatchewan: Bacteria

Common Name

Photo

Cause / Appearance / Impact

Prevention / Management Options

Fireblight



Bacteria infect lush growth of *Rosacea* family including apple, pear, cherry, raspberry, saskatoon, mountain ash, spirea and cotoneaster. Appearance initially is dark green water soaked spots on plants tissue and progresses to scorched, black leaves; a crook formed at end of young stems and bacterial ooze from stem cankers. Bacteria overwinter in cankers and are distributed by insects, wind, rain and pruning equipment. Fireblight progressively weakens a plant, causes dieback and death.

Prune out infected branches and cankers about 6 in (15 cm) below the sign of infection. Disinfect pruning tools between cuts. Replace diseased plants with resistant varieties. Minimize succulent vegetative growth by avoiding fertilizing with high nitrogen levels. Chemical sprays have limited effect and the replacement of a diseased plant is a better alternative.

Common Plant Diseases in Saskatchewan: Phytoplasma

Common Name

Photo

Cause / Appearance / Impact

Prevention / Management Options

Aster Yellows



This is a viral-like disease affecting a large group of ornamental and vegetable plants like aster, marigold, chrysanthemum, coneflower, petunia, snapdragons, tomato and carrots. Transmission is principally by sap feeding leafhopper insects that carry the phytoplasma. Cool, wet summers favour incidence. Primary symptoms are yellowing of leaves, retention of green veins and curled leaves. Flowers may be deformed. This disease is not fatal, but infection is for life.

As there is no cure, early identification and removal of plant is important. Plant less susceptible plant species like geranium, nicotiana, verbena and salvia. As plantain and dandelion are prone to the disease, weed removal may reduce potential for spread.

Other Resources

Online

City of Regina website – Common Pests, Weeds and Diseases
<https://www.regina.ca/residents/tree-yard/control-pests/control-pests-common/>
University of Saskatchewan, College of Agriculture and Bioresources, Garden Line – Diseases and Pests
<http://agbio.usask.ca/community-resources/gardenline/diseases-and-pests.php>

References

Penner, Lyndon. 2014. *The Prairie Short Season Yard*. Brush Education Inc., 244 pp.
Williams, Sarah and Hugh Skinner. 2011. *Gardening Naturally – A Chemical Free handbook for the Prairies*. Coteau Books, Regina, Saskatchewan, 248 pp.