Turf grass problems in the Prairie Provinces

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Cover photo: Fairy rings in turf grass are a problem world wide. Advice is given on page 10.

Turf grass problems in the Prairie Provinces

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CONTENTS

GENERAL INFORMATION

- Prevent or reduce injury by establishing and maintaining vigorous stands of turf grass.
- Select species and cultivars of grass that are least susceptible to the diseases most prevalent in the region. Kentucky bluegrass and creeping red fescue are recommended for irrigated lawns and fairways, and creeping bentgrass for golf and bowling greens. For dryland lawns, crested wheatgrass mixed with a low-maintenance variety of Kentucky bluegrass or sheep or hard fescue, Russian wild ryegrass, or streambank wheatgrass may be appropriate.
- When Kentucky bluegrass is grown alone, use mixtures of winter-hardy cultivars to reduce the risk of disease epidemics. Where possible, choose dwarf varieties of Kentucky bluegrass or those that go dormant early to reduce mowing and fertilizer demands.
- Do not use creeping or colonial bentgrass in turf mixtures because they are susceptible to most diseases and tend to choke out more desirable species during the establishment of the stand.
- Seed for lawns and athletic fields should be guaranteed free from annual blue grass and bent grass.
- For recommendations on cultivar selections and advice on lawn construction and maintenance for your region, consult your local agricultural extension office.
- Cut the sod as thin as possible to ensure rapid root development. Thick sod laid on a heavy soil does not produce a satisfactory stand of grass.
- Water heavily for long intervals rather than daily with light sprinklings.
- Fertilize with nitrogen at a monthly rate of 1–2.5 kg/100 m^2 during the growing season, depending on fertility levels. Inorganic and slow-release organic fertilizers are available. Slow-release fertilizers lessen the risk of burning the grass.
- Light fertilizing during early winter after grass has gone dormant is often effective in promoting good greening in spring.
- Remove thatch and clippings, and periodically use an aerator.
- Follow directions exactly when applying pesticides or fertilizers to turf grass.
- Damage caused by improper sodding or careless use of chemicals is often confused with disease.
- For aid in identification of diseases and pests and for recommendations concerning their chemical control, consult your provincial department of agriculture, the nearest agricultural representative, or your local extension plant pathologist.

INTRODUCTION

Cultivars of Kentucky bluegrass (*Poa pratensis* L.) produce the best turf grasses for lawns under general prairie conditions where irrigation is available. Nugget, Baron, Fylking, Banff, Dormie, and Park are some cultivars that grow vigorously when established and produce a dense, durable, high-quality turf. Nugget, Banff, Dormie, and Park are also hardy and resistant to snow mold: The cultivar Merion should be avoided because it is an unhardy eastern bluegrass and is therefore susceptible to cold injury and numerous diseases, including snow mold. Mixtures of cultivars with different levels of resistance to the various diseases and to stress from cold and drought are therefore recommended.

A mixture of Kentucky bluegrasses is usually seeded in combination with creeping red fescue (*Festuca rubra* L.). Fescue is usually easily and quickly dominated by the Kentucky bluegrasses, except in very shaded areas where fescue cultivars such as Dawson and Boreal grow better.

For dry areas where supplementary water is not available, deep-rooted and drought-tolerant grasses such as crested wheatgrass (*Agropyron cristatum* (L.) Gaertn. 'Fairway') or Russian wild ryegrass (*Elymus junceus* Fisch. 'Sawki', 'Mayak', 'Swift', or 'Cabree') produce better stands. They make coarse turf grasses that stand up to heavy use.

Cultivars of creeping bentgrass (*Agrostis stolonifera* L. and *A. stolonifera f. palustris* (Huds. J. & W.)) such as Penncross or Northland make fine, tender turf grasses for golf greens and require considerable maintenance to prevent stress due to cold, moisture, and disease.

The major diseases and pests of turf grass are described briefly in the following pages in order of their importance. The relative importance of the various turf problems depends on regional differences in moisture, snow cover, and temperature.

When recommendations for other climatic regions are followed in the prairies, poor-quality turf may result, particularly when turf grasses suited to milder climates are used. Recommendations in this publication apply specifically to the Prairie Provinces and mainly concern the management of lawn-type turfs.

DISEASES

Many diseases of turf grass that are prevalent in the moister and warmer regions of Canada are rarely or never found in the Prairie Provinces. Those that occur here, however, are occasionally serious enough to ruin large areas of lawns and sports turf. Lawn owners and other turf managers are now more interested in practices that result in healthy turf.

Cold damage

Many of the turf grass species and cultivars that are selected for use in the more moderate climates lack winterhardiness and do not thrive on the prairies. Even among the most suitable species, such as Kentucky bluegrass and creeping red fescue for lawn turf and creeping bentgrass for golf greens, the cultivars vary in their ability to withstand winter stress. The main physical causes of cold damage in the prairies are cold, desiccation (freeze-drying), and mechanical injury resulting from traffic on frozen grass. An important biological cause of winter-related damage is snow mold, which is discussed in a separate section.

Description

Cold damage to turf grass is characterized by extensive browning of the turf, without signs of fungal or insect activity.

The fertility of the turf as it goes into winter, the amount and location of soil moisture, the mowing height, the amount of thatch (the dead organic matter at the base of the stand), and the occurrence of deep and persistent snow cover are factors that, separately or together, may change the winter-hardiness of a turf grass.

As winter approaches, all cool-season turf grasses start to go dormant. Dormancy is a toughening process that makes them better able to withstand low temperatures, stresses of freezing and thawing, desiccation, and snow molds. In our climate, the closer to dormancy turf grasses are when winter arrives, the hardier they are likely to be. Some grasses that produce very attractive turf when heavily fertilized and watered in summer are slow to go dormant in fall and remain green, succulent, and susceptible to winter injury. Merion Kentucky bluegrass is of this type and is not recommended for the prairies. High levels of vigor are often associated with the rapid build-up of thatch. Thatch predisposes turf to summer diseases that, in turn, reduce recovery from winter injury. If recovery is delayed, patches of dead and weakened turf may be colonized by broad-leaved weeds and weed grasses such as annual blue grass (*Poa annua* L.).

Control

Use a winter-hardy turf grass cultivar developed in the region, such as Dormie or Banff Kentucky bluegrass. Dormie goes dormant earlier than most cultivars. Mixtures of two or more Kentucky bluegrass cultivars, a polystand, may be used as insurance against the failure of one of the components. Most

commercial sod is formed from several cultivars. Polystands of Kentucky bluegrass and creeping red fescue are useful where drought or shade is likely to be encountered; however, the fescue component does reduce resistance to cold injury and snow molds.

Sow grass seed early enough to allow plants to mature and harden before the onset of severe winter weather. Seedlings should have reached at least the fourth leaf stage by then. The soil on which the turf is grown should be retentive of moisture, yet reasonably free draining. Avoid very high proportions of clay, silt, and organic matter.

Avoid sharp changes in slope and contour in lawn construction, which make thorough irrigation difficult and spring desiccation more likely. When levels are uneven, ponding and ice injury are possible in spring. Improve drainage of low-lying areas.

Control summer diseases and prevent snow mold by using appropriate cultural practices and fungicidal treatments.

Fertilize adequately in summer, but do not use excessive nitrogen after August. In sandy soils adequate phosphorus and potash are needed for tissue maturation. When in doubt, have a soil analysis done. A slow-release fertilizer may be used in late fall to promote early spring growth.

Irrigate deeply, to 15 cm at least, for long intervals rather than shallowly and frequently. In late fall, after hardening is complete, apply water until reserves of moisture are sufficient to prevent early spring desiccation.

Improve the surface conditions of the turf by dethatching and promote the surface drainage by pricking, coring, or aerifying to help snowmelt water drain away.

Beginning in the fall, gradually raise the cutting height to provide better insulation for the grass crowns. Mow until dormancy is reached.

Prevent injury from winter traffic by placing pathways and barriers in appropriate locations.

Snow molds

Winter diseases such as snow molds are more common than summer diseases in the prairies. They usually cause more serious turf grass damage than the other diseases described here or than the other causes of winter injury that have already been mentioned. Snow mold pathogens are low-temperature-tolerant, disease-producing fungi that attack every year to some extent. These pathogens can attack turf grasses at temperatures ranging from +3°C to below freezing, when grass growth is practically nil. A blanket of snow on unfrozen turf provides humid conditions very suitable for snow mold development. Continuous snow cover is generally required for snow mold damage to occur.

Several kinds of snow mold occur. With some types, masses of fungal threads called mycelia are found on irregularly shaped or circular patches of dead or injured turf after snowmelt. With other types, small, grit-like, resting structures called sclerotia are also visible. Several snow molds may occur together in a complex. Golf and bowling green turfs of creeping bentgrass and annual blue grass are susceptible to most snow molds, but Ken-

tucky bluegrass and creeping red fescue in lawn-type turf may also suffer damage from some of these fungi. Turf damaged by snow molds and by other causes often deteriorates in quality because of weed invasion.

Description

Pink snow mold or fusarium patch caused by *Gerlachia nivalis* (Ces. ex Sacc.) W. Gams & E. Muller (*Fusarium nivale* Ces. ex Sacc.) is found throughout the prairie region. In late fall and early winter, it is often the most significant low-temperature pathogen of fine turf grass in the whole region. After snowmelt in spring, the snow mold patches (Fig. 1) may turn pink or salmon-colored from the discharge of spores (Fig. 2). In the fall, during cool damp weather, the same fungus may cause brown or yellow brown, wet-looking patches.

Gray speckled snow mold is caused by several different *Typhula* species that may occur singly or in complexes. The common kinds on the prairies require long periods of snow cover to cause severe disease. The infected grass is covered with grayish mycelia speckled with small (0.5–2.0 mm), dark-colored sclerotia in, or more commonly on, plant tissues (Fig. 3). These structures allow the pathogen to survive the summer and persist in the soil. Infection may also take place by means of spores produced on tiny, club-like fruit bodies, 5–30 mm tall, present on the sclerotia in the fall (Fig. 4). Spores produced on these fruit bodies are dispersed by the wind.

Typhula incarnata Lasch ex Fr. is common in the southern prairies but is rare in Saskatchewan, Manitoba, and northern Alberta. It produces reddish brown sclerotia (Fig. 5). *T. ishikariensis* Imai is more common in other parts of the prairies and produces black sclerotia (Fig. 5).

Cottony snow mold, caused by *Coprinus psychromorbidus* Redhead & Traquair (previously known as LTB and SLTB), is common in areas where snow cover is heavy and persistent, but it is capable of causing damage in Alberta and Saskatchewan under moderate or light snow cover. Small to large, irregularly shaped patches of white, cottony mycelia at the edges of leaves (Fig. 6) are evident with snowmelt. Some strains of the fungus, namely the sclerotial low-temperature basidiomycetes (SLTB), produce small, irregularly shaped, blackish sclerotia 0.5–18.0 mm wide on diseased leaves and herbaceous debris in the damaged area of turf (Fig. 7). The fruit bodies, or sporulating structures, of this snow mold pathogen are small and inconspicuous, white to grayish, mushroom-like structures 20–50 mm tall, which develop rapidly in moist weather during the late summer and early fall and self-digest within 24 hours after reaching maturity (Fig. 8).

Snow scald, caused by *Myriosclerotinia borealis* (Bub. & Vleug.) Kohn, occurs more frequently in the northern and central regions of the prairies where snow cover is heavy and long lasting and winter temperatures are lower. Small to large patches of bleached grass (Fig. 9) damaged by this fungus bear sparse, grayish mycelia and black, irregular sclerotia (Fig. 10) in and on leaves and plant crowns. Small, saucer-shaped, sporulating structures with short stalks are produced on the sclerotia (Fig. 11).

Control

Cultural practices and turf management are very important in the control of snow mold. Select the most resistant cultivar of a winter-hardy grass species. Those that are most resistant to cold damage and desiccation are often the most resistant to snow mold. Where irrigation is available, Kentucky bluegrass alone or mixed with creeping red fescue is the most widely adapted species and provides the best turf for lawns and golf fairways on the prairies. Of the species used for golf and bowling greens, some cultivars of creeping bentgrass are very resistant to cold damage and to some of the snow molds, but nevertheless they usually need to be protected by fungicides.

Cultivar characteristics, climatic conditions, and management practices govern the nutrient reserves of turf grass and hence the severity of snow mold damage. Plants that enter the winter while growing actively are less likely to survive cold damage and snow mold attack. Allow turf grass to harden properly for the winter by avoiding excessive applications of water and nitrogen fertilizer late in the growing season. Keep mowing into the late fall and remove clippings and fallen leaves before permanent snow cover has developed. In areas of extreme cold, use cultivars that go dormant in early winter.

Chemical control of snow mold is difficult, expensive, and not always effective. Furthermore, few effective fungicides are registered for domestic use by nonlicensed applicators. Apply fungicides in the fall before a permanent snow cover develops. Where pathogen complexes are concerned, combinations of fungicides may be required. Also, repeated applications of chemicals may be necessary for satisfactory control. To control pink snow mold start these applications in late summer. Diagnose the causal agent to ensure an effective choice of fungicide. Fungicide recommendations are given in the references listed at the end of this publication. Contact the district agricultural extension office for updated recommendations.

Fairy ring

Fairy rings in turf grass caused by various fungi are a problem throughout the world. All cultivated turf grasses may be affected after 5–20 years. Low fertility and lack of moisture usually increase the severity of symptoms. For more information see Canadex leaflet 273.630-1978, *Fairy ring biology and control*, by J. D. Smith.

Description

Dark green rings of grass (Fig. 12) indicate damage by fairy ring fungi. In the case of rings caused by the common mushroom-producing fungus *Marasmius oreades* (Bolt. ex Fr.) Fr., a ring of turf may be killed. Tan-colored mushrooms with white to buff gill surfaces (Fig. 13) are found in rings during moist periods of summer and fall. A thick layer of white fungal mycelia with

a distinctive musty odor can be seen in the thatch and soil under the outer green and bare rings. This dense layer of fungal mycelia is relatively impervious to water and contributes to the death of grass in advanced stages of fairy ring development. Fully developed inner and outer green rings with a bare zone between them (Fig. 14) often appear in dry summers.

Control

Control measures are of two types: one type suppresses the ring symptoms and the other eradicates the fungus. Rings sometimes disappear for no obvious reason or may be suppressed by treatment for a year or so, after which they reappear.

Suppression — Rings are usually common and most severe where fertilizer and water supplies are inadequate. Applications of nitrogen and ample irrigation during the growing season may mask the symptoms, but these procedures do not eliminate the problem. Excessive use of organic fertilizer may aggravate the problem.

To suppress fairy rings, spike the turf with a garden fork to a depth of 25 cm at centers of 10–15 cm, starting 30 cm outside the farthest extent of the outer green zone and working inward. Motor-driven aerifiers do not penetrate deeply enough for this purpose. Add a turf-wetting agent such as Aquatrol or, in a pinch, a mild liquid dish detergent. Water the spiked portion of the ring with this agent until the spike holes are filled. Then soak the spiked area with a hose or hydrogun daily for 4–8 weeks, using plain water. Be thorough because rings that are inadequately treated may fragment and start new centers of infection. Thorough treatment may even eradicate the rings, not just suppress them. Sterilize forks and hydroguns in a solution of domestic hypochlorite bleach diluted five or six times with water, before using them on uninfected areas of lawn. Otherwise, contaminated equipment may spread the fungus. Rented lawn-maintenance equipment such as scarifiers and aerifiers may also be a source of infection for lawns.

Some commercially available lawn fungicides applied as solutions or as water suspensions to the turf surface may reduce cap production, but few tested to date have much effect on the mycelia in the soil. Success has been claimed for some of the newer systemic fungicides, but none are registered for this purpose in Canada. Collecting the mushrooms as they appear may reduce the spread of infection in your lawn by reducing spore production. This control measure, however, is not feasible on extensive areas.

Eradication — Complete eradication involves destruction of the infected lawn, followed by resodding or reseeding. Effective control of small, isolated rings may be achieved with fumigants such as formaldehyde, used for the treatment of soil for horticultural purposes. Be sure to follow the prescribed precautions when using fumigants. The partial sterilization of the soil by these materials allows fungal soil flora antagonistic to *M. oreades* to develop. The

soil is treated in place, which solves the problem of its disposal. Cultivation of the soil beneath the fairy ring improves the effectiveness of the fungicide.

During warm weather in late spring, summer, or early fall, strip the turf from 30 cm outside the outer green ring to inside the bare zone. Take care not to spill any soil on the disease-free areas of the lawn. Break up the soil within the ring by inserting a digging fork to its full depth, starting round the circumference. Use a sprinkling can to apply the fungicide to the forked soil but keep it off the unaffected turf, which would be damaged by it. Cover the treated soil with weighted polyethylene sheets to seal in the vapor for 7–10 days. Then remove the covers and stir the soil carefully with a digging fork. Wait 2–3 weeks to allow the formaldehyde gas to dissipate. Then reseed or resod the site.

Rings of *M. oreades* may die out when they encounter paths, roadways, walls, flower borders, or other cultivated soil areas. Therefore, additional pathways or flower borders across their lines of progression may assist in controlling their spread.

Another effective method of eradication is based on the fact that rings of *M. oreades* eliminate each other by mutual antagonism upon contact and that normal soil contains other fungi and bacteria that are antagonistic to *M. oreades*. This biological control method does not require the use of fungicides. It is most effective when there are many rings on a lawn. It has the great advantage that the soil is not taken off the lawn. Two slightly different techniques have been tried. The first method involves scuffing off the infested turf with a heavy-duty rotary cultivator, preferably in the fall. Wait until spring to allow the snowmelt water to soften the soil below. Then cultivate with a rotary cultivator several times to mix the mycelium-infested soil as thoroughly as possible with the surrounding soil. Level, pack, and sow the area with grass seed or resod the area with turf from a ring-free source. The alternative method involves stripping off the original turf with a turf cutter. Then thoroughly mix the soil below with a rotary cultivator before reseeding or returfing. Whichever method is employed, the chances of reinfection are greatly reduced by good turf management. Fertilize and irrigate adequately. Ensure that the soil is wetted to a depth of 15 cm and particularly avoid shallow watering.

Powdery mildew

Powdery mildew on turf grass has become more important on the prairies since the introduction of Merion bluegrass. Of all the cultivars of turf grass grown in Western Canada, it is one of the most susceptible to powdery mildew. The disease is more prevalent in sheltered, shaded, and damp areas than in the open.

Description

The disease is first recognized by a grayish white, cobweblike growth of the fungus *Erysiphe graminis* DC. ex Mérat on the upper surface of the leaves. Soon, the leaves are covered with a white or grayish powdery coating

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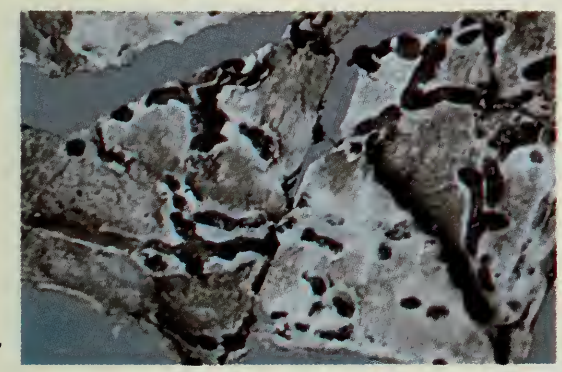

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Fig. 1. Pink snow mold (*Gerlachia nivalis*) in small patches.
Fig. 2. Salmon-colored spore masses of *Gerlachia nivalis* produced in the spring.
Fig. 3. Sclerotia of speckled snow mold (*Typhula ishikariensis* var. *canadensis* Smith & Arsvoll) on grass blades.
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Fig. 5. Reddish brown sclerotia of *Typhula incarnata* and black sclerotia of *T. ishikariensis*.
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Fig. 8. Fruit bodies of *Coprinus psychromorbidus*, found on creeping bentgrass.

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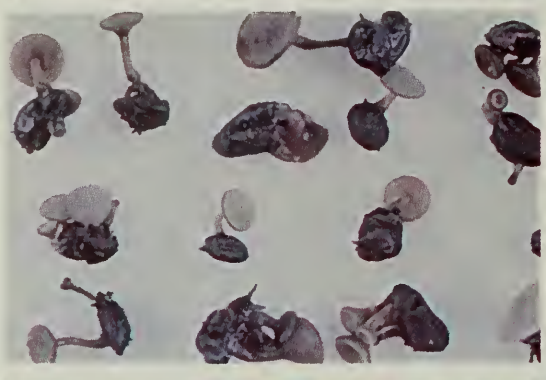

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Fig. 9. Snow scald (*Myriosclerotinia borealis*) on creeping bentgrass.
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Fig. 11. Fruit bodies of *Myriosclerotinia borealis* on sclerotia.
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Fig. 13. Fruit bodies of *Marasmius oreades*.
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Fig. 16. Leafspots caused by *Helminthosporium* species on Kentucky bluegrass.

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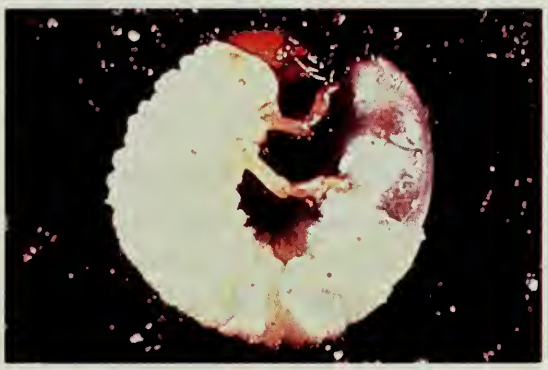

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Fig. 17. Rust pustules (*Puccinia poae-nemoralis*) on leaves of Kentucky bluegrass.
Fig. 18. Purplish green patches caused by *Rhizoctonia solani* on Kentucky bluegrass. Note the darker patch of wilted grass in the center and the crescent-shaped patch in front of the trees.
Fig. 19. Eyespot lesions caused by *Rhizoctonia solani*.
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Fig. 25. June beetle, the adult stage of white grub.
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Fig. 27. Chinch bug.
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Fig. 30. Vole damage to turf grass.

PHOTO CREDITS

Alberta Horticultural Research Centre: Fig. 22
Allen, E. A. D., University of Alberta: Fig. 21
Dernoeden, P., University of Maryland: Fig. 5
Harper, A. M.: Figs. 23, 25-27
Howard, R. J., Alberta Agriculture: Fig. 24
Lethbridge Research Station: Fig. 15
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Smith, J. Drew: Figs. 1-4, 8-12, 14, 16, 17, 19, 20, 29, 30
Traquair, J. A.: Figs. 6, 7, 18, 28

of spores (Fig. 15). Further development of the disease causes the infected leaves to turn pale yellow or orange, especially on the undersurface.

Control

Fertilize and water to maintain plant vigor. Promote air circulation and avoid planting grass in shaded, damp areas if possible. Use Kentucky bluegrass cultivars that are considered resistant in the region, such as Dormie, Sydsport, and Nugget. Use creeping red fescue in shaded localities.

Effective fungicides are available for domestic and commercial use but repeated applications may be required for satisfactory control of mildew.

Melting-out

Melting-out, or leafspot, is a serious disease in cool, humid areas, during wet periods in drier areas, or where turf is sprinkled frequently, especially in late afternoon and early evening. In the prairie region, it is a serious disease of Kentucky bluegrass. The disease is caused by various species of *Helminthosporium*. The fungus, which has blackish brown mycelia and spores, can readily be isolated and identified by a plant pathologist.

Description

This disease produces a variety of symptoms. Early signs of disease are a slight yellowing of the turf. This discoloration is followed by the appearance of well-defined, oval, yellow brown leafspots (Fig. 16). Often dark brown to purplish brown margins appear on the leaves and at the leaf bases. If the disease extends onto the rhizomes it kills the plants, resulting in gradual browning and thinning (melting-out) of the turf in large, irregular patches, particularly during dry periods.

Control

Avoid thatch buildup but maintain vigorous growth of turf. Use resistant cultivars such as Nugget or Fylking, raise the cutting height, and avoid excessive nitrogen fertilization and frequent light sprinklings.

Fungicides are available for control of melting-out but frequent applications are required.

Rust

Rust, particularly on Merion bluegrass, has caused great concern in Western Canada. Merion bluegrass is not recommended in many areas because of its susceptibility to rust fungi.

Description

Rust on turf grass is caused by several *Puccinia* species. Small, reddish, powdery pustules containing fungal spores form on the leaves and stems of the plants (Fig. 17). These pustules often become brown or black. In severe infestations, diseased plants, particularly of susceptible cultivars, may turn yellow and die. However, although rust may affect the appearance of a lawn, it usually does not seriously damage the turf. On the prairies, rust attacks usually come too late in the season to cause much injury. They are most prevalent in Merion bluegrass during the first 2 years after it is planted, but once a solid turf has formed, the disease is rarely evident.

Control

No cultivars are resistant, but avoid Merion and ensure vigorous growth of turf during the summer. Although the liberal application of nitrogen fertilizers and water may help to prevent the disease, avoid having succulent growth going into winter.

After infection, the rust pustules take about 9 days to develop. Therefore, clip frequently to prevent the disease from appearing on the upper leaves.

No fungicides are registered for rust control on turf grass in Canada.

Brown patch

Brown patch, caused by the sclerotium-forming fungus *Rhizoctonia solani* Kühn, is seldom a serious disease in the prairie region. However, the disease can be quite destructive in the southern prairies in midsummer when conditions are hot and humid, watering is light and frequent, and night temperatures are around 15°C.

Description

Circular to irregular brown patches a few centimetres to several metres in diameter appear in the turf. Often the first symptoms are water-soaked leaves that soon wither to form purplish rings or, in the case of the coarser grasses of lawns and fairways, uniformly dark gray to purplish green patches (Fig. 18). Delicate, web-like wefts of fungus mycelia can be seen on the grass in the early morning. Leaf symptoms are characterized by general water-soaked blades or blades with elongated to irregularly shaped eyespot lesions. The lesions display water-soaked centers that become bleached (chlorotic), with dark brown borders (Fig. 19). The affected patches soon become light brown and sunken. Healthy plants begin to grow back in the center of the dead patches after watering.

Control

Avoid frequent, light sprinkling in the late afternoon and early evening during hot weather. High nitrogen fertilization also predisposes turf to brown patch by encouraging lush growth. Reduce the frequency of mowing since damaged leaves are more susceptible.

Repeated and frequent applications of fungicides are necessary for effective chemical control of brown patch on turf grass.

Red thread

Red thread, caused by *Corticium fuciforme* (McAlpine) Wakef. (*Laetisaria fuciformis* (McAlpine) Burdsall), can be very severe in British Columbia but rarely causes a major problem in the prairies. Moderate damage has been reported in cooler, humid regions of Alberta. It is rarely seen in Saskatchewan. Most species of grass are attacked but fine turf is often more severely damaged.

Description

The disease can be recognized by the presence of coral or dark red, branched, antler-like threads on infected grass shoots and leaves (Fig. 20). Leaves of diseased plants are water-soaked at first. The dead leaves fade to form small or large, irregular patches of tan, blighted turf that develop a reddish brown cast.

Control

Avoid buildup of thatch and use a recommended fertilization schedule to maintain proper levels of nitrogen, phosphorus, potassium, and calcium.

Registered fungicides are available for commercial users in Canada. Apply chemicals during humid periods if red thread is diagnosed.

INSECTS AND OTHER ANIMAL PESTS

A few species of insects and other pests can injure or kill large areas of grass by feeding on roots, chewing leaves and stems, sucking juices from plants, or producing mounds and holes in turf. However, in Western Canada damage by these pests is often minor and usually overlooked. Establishing vigorous turf stands and encouraging predators are probably the best measures for controlling insects. Chemical control is usually directed at the larval, grub, or nymphal stage that feeds on the grass and causes damage. Success depends on careful diagnosis and correct timing of pesticide applications.

Because the pesticides used in chemical control may be harmful to pets and birds, they should only be used to treat severe infestations that have been diagnosed by a qualified specialist such as a plant pathologist, an entomologist, or the district agriculturist. Chemicals should be handled cautiously and applied according to instructions on the label.

Earthworms

Earthworms are commonly called night crawlers or dew worms since they come to the surface mostly at night. On turf grass they may create a problem that is serious enough to require control procedures.

Description

Earthworms (*Lumbricus* species) are pinkish or purplish and when fully grown are at least 20 cm long. Their burrowing and feeding activities are important in soil mixing and aeration, but their casts on the surface of the soil make the lawn bumpy and difficult to mow. This problem is more serious in bowling and golf greens where a smooth surface is necessary. Earthworms are associated with soils containing high levels of organic matter and are most commonly seen on the surface after a heavy rain or irrigation.

Control

Soil structure that allows good drainage assists in reducing the number and hardness of earthworm casts. The problem is usually much greater on turf grass growing on heavy soils with poor drainage. Use an aerator to break up the casts and smooth the turf. The machine can be rented or the work can be contracted out.

Effective pesticides are available, but their use can endanger birds and pets.

Sod webworms

Sod webworms, the larval stage of several species of lawn moths (*Crambus* species), have caused considerable damage to lawns in Alberta and Saskatchewan. The larvae feed on the shoots and crowns of grass. The adult stage (Fig. 21) is a white or grayish tan moth that hides in lawns and shrubbery during the day. At rest, the moths have a cylindrical appearance with their wings folded about the body. At night, they fly in erratic patterns over the grass and deposit eggs, beginning in late May. Sod webworm moths are usually disturbed by mowing, which is a good indicator of their presence in lawns.

Description

In late June and July, irregular brown patches appear on the turf. Grass that dies back from the shoots because of larvae chewing at or just above the soil is easily pulled out. The slender larvae are about 15 mm long and are gray to yellowish white with small, dark spots (Fig. 22). They are seen when the brown or dead sod is lifted. After feeding for a short time, they spin gray, silken cocoons in the soil, from which they derive the name sod webworm.

Control

Sod webworm damage can be suppressed by maintaining vigorous turf grass. Healthy stands of grass can withstand more severe feeding than poorly maintained lawns.

When infestations are severe, effective insecticides can be applied. Mow the lawn first, remove clippings, and water thoroughly. After applying the insecticide, water the lawn lightly to wash the chemical into the thatch and soil.

Cutworms

Cutworms, the larval stage of various night-flying moths (Family Noctuidae), can also cause serious damage to turf grass by chewing shoots and leaves during the night. The larvae are found in a resting, curled position near the soil surface during the day.

Description

Some species of cutworm eat only grass leaves but others cut off plants near the soil line, leaving patches of dead and brown grass. The cutworms are smooth, cylindrical, soft-bodied larvae up to 25 mm long, ranging in color from brown to gray or black with spots, stripes, or no particular markings (Fig. 23).

Control

Remove thatch to prevent or reduce damage by insect larvae that are harbored there.

Apply insecticides in wettable powder or liquid form when damage is severe.

White grubs

White grubs are the larvae of the well-known June beetle (*Phyllophaga* species). They feed on the roots and underground parts of grasses and other plants from late spring to early fall. The beetles lay eggs 3–10 mm deep in the soil in late May and June. Eggs hatch in 2–3 weeks and the white grubs feed until fall when they are 12–13 mm long. They then burrow more deeply in the soil and overwinter as larvae. White grubs can live in the soil for 2–3 years before pupating.

Description

White grub damage due to root feeding is noticeable during dry weather as wilted and brown patches of grass. The mature, second-season grubs are 25–30 mm long, bent in a characteristic crescent shape (Fig. 24). They have a hard brown head, white fleshy abdomen, and three pairs of legs. These grubs burrow 3–10 cm down into the soil to overwinter. In the spring they move up to feed on grass roots, then pupate in the summer and remain inactive until the next May when they emerge as June beetles (Fig. 25) to feed at night on trees and lay eggs in the soil.

Control

Maintaining a good stand of turf grass is an important preventive measure. Grubs are attacked by numerous predators such as birds, other insects, nematodes, and fungi; therefore, chemical control is seldom necessary. For severe infestations, wash the insecticide into the soil where grubs are feeding. One thorough treatment should be sufficient for 3–4 years.

Wireworms

Wireworms are the larvae of click beetles (Family Elateridae). They damage turf grass by feeding on roots in late spring and early summer.

Description

Wireworm damage occurs as irregular patches of dying and dead grass. Wireworms are slender, yellow to pale brown, smooth, hard-shelled larvae 25–50 mm long (Fig. 26), which can be found under the damaged sod.

Control

Wireworms are generally not a serious problem on lawn grass. Cool, moist weather restricts egg-laying activity by adult beetles and promotes high rates of mortality in eggs and young larvae.

Chemical control, if necessary, is similar to that for white grubs.

Chinch bugs

Chinch bugs (*Blissus* species) are small, soft-bodied insects that injure turf by sucking juices from leaves and stems of grasses. Adults overwinter under trees and shrubs and on the edges of lawns and flowerbeds. They move into the lawn and lay eggs in May and June. The eggs hatch and nymphs begin to feed in July and August.

Description

The first evidence of damage by chinch bugs is the presence of coppery colored patches in the turf from midsummer to late summer after several weeks of hot, dry weather. In severe infestations the grass can be killed, leaving only weedy species in the irregular, sunken patches.

The bugs are 4 mm long. They are red when young, maturing to reddish brown to gray with a characteristic white abdominal band (Fig. 27) that becomes covered by enlarging wings.

Control

Avoid accumulation of thatch, which can shelter chinch bugs and other sucking or chewing insects. Chinch bugs are flightless insects. They can sometimes be removed from turf by vigorous raking.

Repeated applications of insecticides are required to treat heavily infested turf in July and August when lawns are normally under drought stress.

Ants and anthills

Several species of ants indirectly damage turf grass by building their nest and mounds there. Some ants may feed on seed in newly planted lawns.

Description

Reddish brown ants (*Lasius* species) are found in home lawns and sports turf (Fig. 28). Their underground nests and surface mounds are seen in dry areas, and many active ants can usually be observed milling about the mounds.

The loosening and honeycombing of the soil caused by the tunneling of the ants causes it to dry further. Grass plants may be smothered by soil piled above the nest.

Control

Keep the lawn moist and rolled. Various nontoxic procedures that kill or discourage ants include leveling the hill with a spade and thoroughly drenching with water. Effective pesticides are available and should be applied according to instructions on the label as a drench in the damaged area only.

Meadow voles

These small, mouse-like rodents (*Microtus pennsylvanicus* Ord.) measure about 15 cm from nose to tail tip (Fig. 29).

Description

Voles cause localized damage to turf, making tunnels under the snow (Fig. 30) and eating the crowns, leaf bases, stolons, and rhizomes of grasses. They discard leaves and upper parts of grass shoots and make nests of grass under the snow. When the snow melts, their runs, nests, droppings, and discarded pieces of grass are unsightly and encourage snow mold diseases. Damaged turf is often slow to recover.

Control

Where attacks are common, avoid establishing lawns adjacent to tall vegetation, which traps snow and harbors the animals. Some fungicides deter their foraging, and rodent repellants may also be effective.

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