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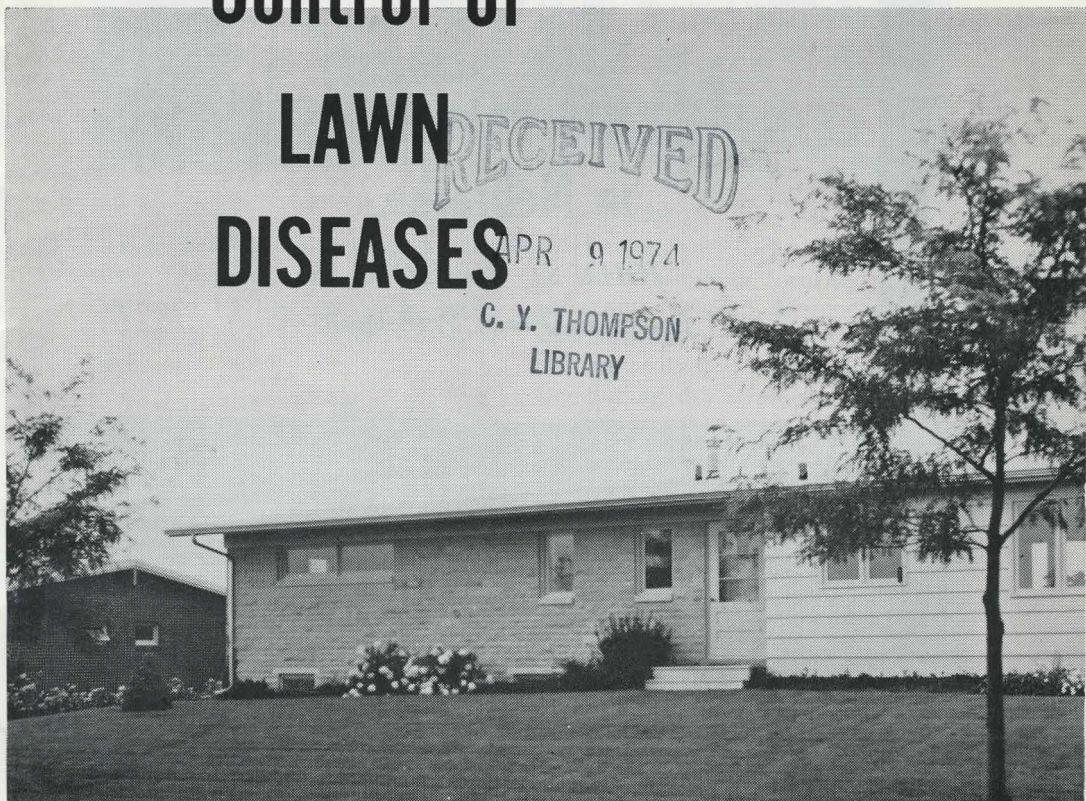
Control of

LAWN
DISEASES

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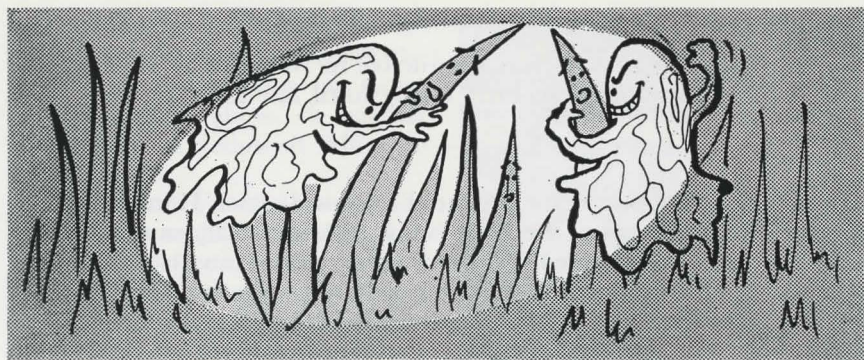
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CONTROL OF LAWN DISEASES in Nebraska

JOHN L. WEIHING
Extension Plant Pathologist

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Lawn Culture and Disease

Why is it that sometimes a beautiful bluegrass turf is suddenly destroyed by disease, while beside it a poor, ratty lawn remains healthy?

Any disease of bluegrass may spread and build up rapidly in a pure stand because every plant is susceptible. The opportunity for a disease to spread and build up is greatly restricted in lawns containing a mixture of grass species or many weeds.

This does not mean that you should not strive for a perfect lawn. There are various things you can do to offset the dangers of disease development, and allow the establishment and maintenance of beautiful blue grass lawns. You should be aware of destructive diseases and adjust your operations of lawn care so as to perform control measures automatically.

Fungi cause most of the common diseases of lawns in Nebraska. These organisms produce seeds (technically called spores) that are spread by wind, water, mowers and numerous other ways.

The fungus seeds need moisture

to cause infection. Fungus diseases of lawns are, therefore, most common and harmful during wet humid seasons, although they can be started easily by too frequent watering during dry summers.

The more frequently the grass is wet and the longer it remains wet the greater will be the chances of a disease problem. During dry periods, enough water should be applied at one time to provide adequate moisture to last a week.

In recent years it was recommended that lawns be clipped 2 to 3 inches in height and that the clippings be allowed to form a mulch several inches thick. Certain fungus parasites of grass are capable of becoming established in the deep, damp mulch. Here they grow rapidly and attack healthy grass growing through the mulch. To guard against this you should not allow mulch to accumulate more than one quarter inch deep.

Pocketed areas about the lawn where air movement is restricted are frequently problem spots. Thinning or removal of surrounding shrubbery to allow sunlight to penetrate and air flow often help.

Melting-Out (Fade-Out, Dying-Out)

This disease has become very destructive in Nebraska in recent years. It may occur any time from early spring until late fall.

Symptoms

A variety of symptoms are produced by this disease. Thinning out of grass in scattered areas of the lawn is one sign of melting-out. A general brownish undercast caused by dead grass leaves usually goes along with the general thinning out. As the disease progresses, large areas of the lawn are killed and in some instances the entire lawn is lost.

Upon close examination of the plants, you may find a spotting of the leaves. The spots may be brown or purple, or brown with a purple border. They may be round or oblong and parallel to the leaf blade.

The leaf spot stage of the disease does not cause material damage to the lawn. The most severe injury results when the leaf sheath area in the crown of the plant is infected (Figure 1). An infected leaf sheath will turn brown and die—resulting in death of the leaf blade. Under moist conditions the fungus will grow from leaf sheath to leaf sheath until all parts of the plant above ground are killed. The fungus parasite then may move down into the crown and stolons and kill the entire plant.

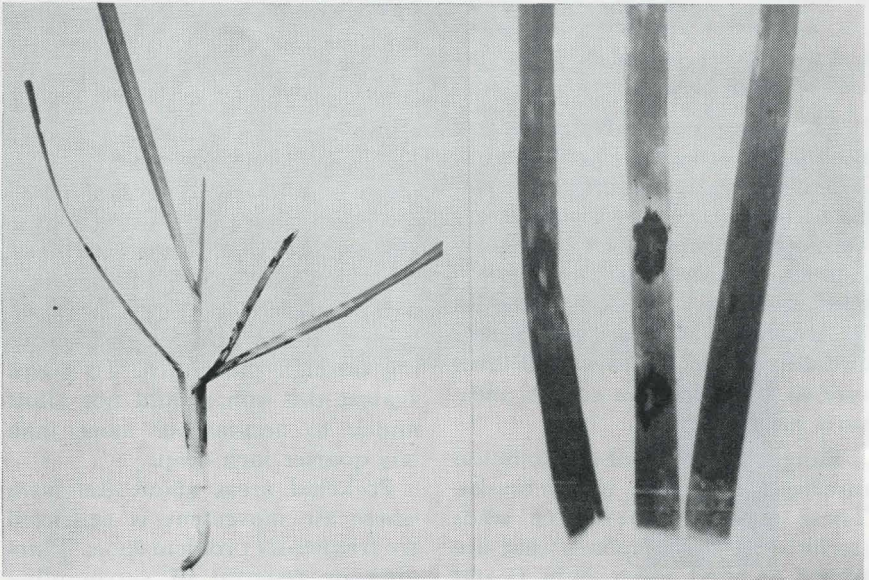


Fig. 1. Various symptoms caused by melting-out disease of bluegrass. Left picture shows leaf spot and leaf sheath infection. Right picture gives a closer view of the leaf spot symptoms.

To diagnose this disease in the spring or fall you should check the leaves and leaf sheaths for symptoms described above. A healthy leaf sheath is yellowish white to green in color.

In hot weather the disease destroys lawns much faster than during cooler periods. It may cause a sudden dying-out of large, irregularly sized areas (Figure 2). There may not be any visible symptoms or signs of the disease on the dead plants and they will appear to have died from drought.

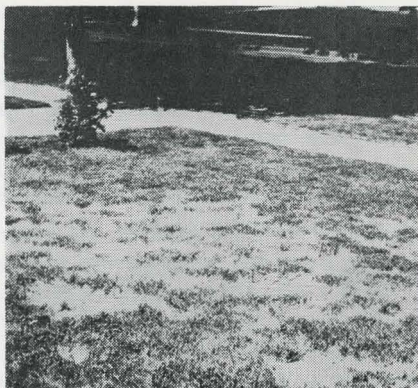


Fig. 2. A bluegrass lawn which has been ruined by melting-out disease.

Cause

Two closely related fungi (*Helminthosporium vagans* and *Helminthosporium sativum*) cause this disease. *H. vagans* is favored by cooler spring and fall temperatures whereas *H. sativum* is most destructive during the higher summer temperatures. Both organisms have the same life cycles (Figure 3).

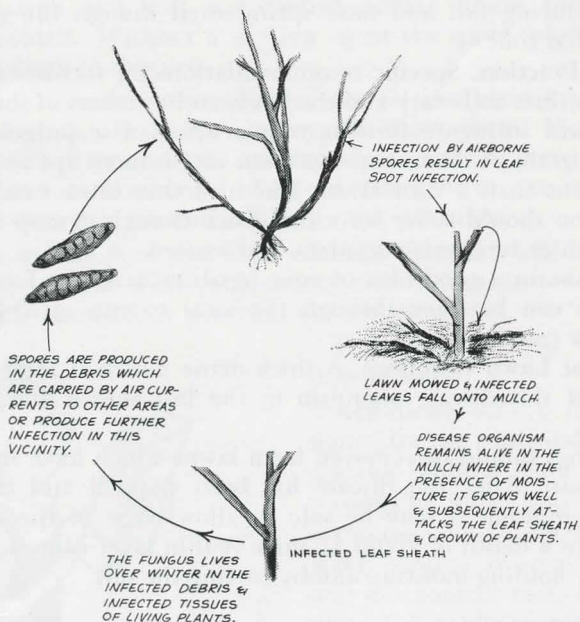


Fig. 3. This drawing shows the life cycle of the *Helminthosporium* fungi that cause melting-out disease.

Continuous moisture about the surface of the plant is necessary for the development of this disease. The organisms produce spores (seeds) which are nearly the same in appearance. These spores can be blown around by power mowers or carried to other areas by wind where they may cause infection.

Continuous moisture and proper temperatures during the next several days will allow the organism to develop rapidly in the tissues, resulting in death of many plants.

Control

Much can be done to control melting-out by correct watering and fertilizer practices and by removal of lawn clippings. However, if you wish to have a nice, lush lawn throughout the summer you may have to spray in addition to using good cultural practices.

Cultural Practices

Watering. Water your lawn not more than once a week. Each irrigation should soak the soil to a depth of 12 to 18 inches. The time of irrigation should be such that the grass will dry off quickly. Avoid keeping the grass wet for long periods of time.

In lawns where the disease has been bad in previous years and it is not financially possible to carry out a spray program, do not water the lawn in midsummer. The disease will be halted and probably will not be very destructive during fall and next spring even though the grass is well watered at that time.

Fertilizer Practices. Specific recommendations for fertilizing lawns cannot be given since soils vary and the kinds and numbers of shrubbery and trees in a yard influence fertility requirements. Use judgment in your fertilizer program. A dense and succulent turf is more apt to be damaged by melting-out than a thin lawn. But in a thin lawn weeds become a problem. You should strive for a turf thick enough to stop the invasion of weeds yet not be overly succulent and matted.

You can obtain a good idea of your fertilizer needs by having the soil tested. This can be done through the local county agricultural agent at a very low cost.

Removal of Lawn Clippings. A thick dense mulch is ideal for the development of this disease organism in the leaf sheath and crown area of the plant.

All clippings should be removed from lawns which have an active case of melting-out. After the disease has been stopped and there are no noticeable symptoms it may be safe to allow some of the clippings to accumulate to a depth of about $\frac{1}{4}$ inch. A thin layer of mulch may help your lawn by holding moisture and by cooling the soil.

Spray Program

A severe outbreak of melting-out is very hard to stop. There is such

a tremendous amount of the disease organism that the above listed protective measures will not reduce the volume of the parasite enough to stop its development. In such cases it will be necessary to spray.

When to Spray. Excellent protection against melting-out is reached by spraying approximately every three weeks from the time the grass greens up in the spring until late fall. However, such a spray program is expensive and perhaps beyond the finances of the average lawn owner.

When only a few fungicide applications can be afforded it is best they be made in the spring. Apply the first one shortly after the grass greens up, a second one three weeks to a month later and a third one a month following the second one.

If you wait until mid-summer to spray, the disease will have likely increased and caused extensive damage. At this time it is very hard to gain satisfactory control because the disease is most likely to be operating in the crowns, roots and stolons of the plants. These tissues can not be reached satisfactorily by the standard, recommended fungicides. Proper spring spraying may reduce the amount of the disease so that the lawn will progress satisfactorily throughout the rest of the growing season.

How to Spray. The chemicals should be applied with 100 to 400 pounds pressure because thorough coverage is necessary.

A wetting agent should be incorporated into the spray solution so that the foliage can be wetted easily. The fungicide chemicals are protective in action and will not control disease unless the plants are thoroughly coated. Without a wetting agent the spray solution tends to run off the plants in droplets.

There are a number of wetting agents on the market prepared for fungicide solutions. Ask your nurseryman about them. However, common household detergents are satisfactory as wetting agents for small scale use. Use one teaspoonful of liquid detergent or one tablespoonful of powdered detergent for one gallon of spray solution.

Chemicals to Use. New and more effective chemicals will be developed in the future. Check with your county extension agent each spring to see if any new chemical or practices are recommended.



Following is a list of suggested fungicides.

Acti-dione RZ—A fungicide designed for the control of many lawn diseases. Follow manufacturers directions for application.

Captan—This fungicide has given good control of melting-out but will not control rust. Apply at the rate of 2 tablespoonsfull per gallon or 2 pounds per 100 gallons of



water. Spray at a rate of at least 1 gallon per 100 square feet.

Kromad—A fungicide designed specifically for the control of many lawn diseases. Follow manufacturers directions for application.

Phaltan—Greenhouse tests indicate phaltan is promising. Use at same rates as for captan.

Phenyl mercury—(This type of chemical is sold under numerous trade names). An excellent chemical for the first two spring applications but *do not use* this chemical in the summer or if the spring temperature should rise above 80° F. because it may cause severe injury above that temperature. *Do not use* phenyl mercury on Merion bluegrass. Use 1.5 oz. of 10 per cent active phenyl mercury or equivalent in 5 to 10 gallons of water, sprayed evenly over 1000 square feet.

Tersan—A lawn fungicide. Follow manufacturers directions.

Zineb—This fungicide has given excellent control of both rust and melting-out. Apply at the rate given for Captan.

Brown Patch

Symptoms

This disease generally appears in Nebraska lawns about the first of July and continues to mid-September. It is much more serious on bent grass and fine turf lawns than on bluegrass. It causes the appearance of somewhat circular brown areas (Figure 4).

The areas vary from 1 inch to 3 feet or more in diameter. The grass in the central portion of the affected area first turns dark and then gradually turns light brown.

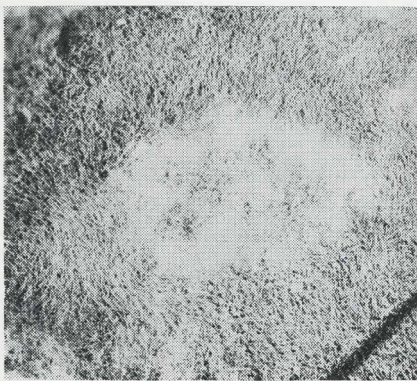


Fig. 4. If you have brown patch disease in your lawn this is what it will look like.

During humid periods the newly infected grass adjacent to the affected areas may become dark colored.

Brown patch disease is frequently confused with grub damage since both cause similar symptoms. However, grubs cause the turf to become loose and easily pulled up. They are easily detected by searching for them an inch or two below the soil surface.

Cause

Brown patch is caused by the fungus *Rhizoctonia solani*. This organism is present in most fertile soils and is capable of attacking many grasses. The fungus parasitizes the blades, sheath, crown, and even the root, resulting in their death.

It eventually forms small, hard, brown to black bodies (sclerotia) which measure about 1/16 to 1/8 inch long on the infected organs of plants or on the top one-half inch of the soil. These bodies are resistant to cold, heat, and drought. During warm, moist periods the sclerotia germinate by sending out microscopic filaments capable of penetrating and parasitizing grass plants.

At least four conditions must be fulfilled for the brown patch organism to attack the foliage.

1. The presence of the actively growing fungus in the soil or turf mats.
2. A dense growth of a susceptible grass.
3. Essentially 100 per cent humidity with dew or a film of moisture present on the foliage.
4. A sustained temperature of 70 to 90° F. for several hours.

If one of these conditions is missing, brown patch is not likely to be severe. Exact conditions which permit the fungus to attack the grass crown and roots are not yet known. It is known, however, that infection of these parts can occur at considerably lower temperatures than those for foliage infection.

Upon germination of a sclerotium the initial infection of the above ground parts takes place on the leaf sheath. The fungus eventually grows throughout the leaf sheath and blade. When moisture is present in the form of droplets the fungus will grow into the water and multiply there and spread to adjacent plants by bridging in a spider web fashion.

Under favorable conditions the fungus will spread an inch a day in this fashion. Since initial infection may spread in all directions from a single sclerotium, the diseased area increases in somewhat circular patterns as it continues to enlarge. The same type of growth pattern occurs when the infection is below the surface but proceeds at a slower rate of about 1/3 inch per day.

The fungus can be spread by distributing infected grass clippings or the tiny sclerotia during mowing operations.

Well fertilized and watered turfs are more susceptible to brown patch than poorly attended lawns since they create a more favorable environment for the development of the fungus.

Control

The sclerotia are resistant to chemicals as well as adverse weather conditions. Moisture and warm temperatures will induce the sclerotia to germinate and produce vegetative growth susceptible to fungicidal chemicals. Because of this the following procedure may be used to reduce the disease organism before it can cause damage.

In early summer, after the soil temperatures have reached 70° F:

- 1) Irrigate the grass well, then two days later apply either Calocure or Calo-clor at rates recommended by the manufacturer.

- 2) Water again the next day and two days later again apply one of the two mentioned fungicides.

- 3) Water again the following day and two days later again apply one of the fungicides.

Dr. M. C. Shurtleff, who developed this procedure, states that "three early season applications of Calocure and Calo-clor gave better control of brown patch than did 7 or 8 applications of these same chemicals applied at 2-week intervals during the brown patch season."

As for control after the disease has started, spray applications with Calocure, Calo-clor, Tersan "75," Calocure-Tersan "75" mixture, Actidione RZ or Kromad, have given best results when applied at 7 to 14-day intervals. Precautionary control methods which may be taken are:

- 1) Avoid excessive lush growth during the brown patch season by not applying heavy amounts of nitrogen fertilizer during the hot summer months.

- 2) Water during periods of rising temperatures so that the turf will be dry before nightfall.

Rust

Symptoms

This disease does not become a problem until August or September. Merion bluegrass is particularly susceptible.

Grass heavily infected with rust becomes reddish in appearance. Upon close examination of the grass blades, you will find rusty colored spots. The rusty material will rub off easily onto your fingers. Continuous heavy infection will cause many of the grass blades to die.

Cause

The dusty red material is actually spores of the rust fungus. These tiny spores are carried about by air currents. Some land on uninfested grass blades where, in the presence of moisture, they germinate and cause infection.

Control

Spray the grass at 7- to 15-day intervals with one of the following:

Acti-dione RZ, Zineb or Maneb. Follow the directions given on the container. Add enough detergent to the solution so the spray mixture will spread over the surface of the grass blades and not run off in droplets, if a wetting agent has not been incorporated with the fungicide. Good coverage of the leaf surfaces is necessary for control.

Mildew

Symptoms

A turf heavily infected with mildew looks as if it has been dusted with flour or sprayed with milk. Close examination of the grass blades reveals a thin, white, powdery-like growth. (Figure 5).

Cause

Mildew is caused by a fungus (*Erysiphe graminis*). The fungus is confined to the surface of the leaves. It sends down sucker-like structures into the leaf cells from which it obtains its nourishment. The aerial portion of the fungus produces thousands of spores which are disseminated by air currents and result in new infection.

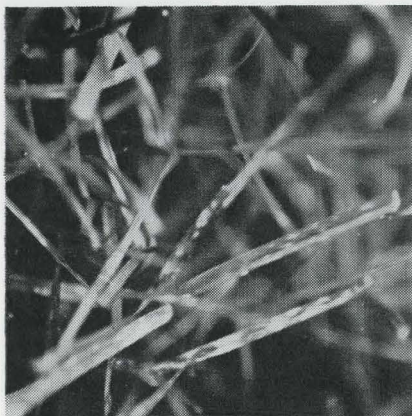


Fig. 5. The milky white substance on the leaf surfaces is powdery mildew.

Contro

The disease can be checked by spraying lawns with wettable sulfur or thoroughly dusting with finely powdered sulfur. The general grass fungicide Acti-dione is good. The products Karathane and Mildex are specific mildewcides.

Slime Mold

Symptoms

This harmless pest frequently causes considerable alarm. It commonly appears in the spring, but may also occur during mid-summer or fall. It appears as a blue-gray incrustation on the grass blades or other plants in the area (Figure 6). When it is rubbed between the fingers, it is found to be composed of a brown powdery or blue-gray mass, and easily rubs free from the grass blade.

Cause

The slime mold is not a parasite. It is a soil inhabiting organism (*Physarum* sp.). Under certain environmental conditions it grows out of the soil onto whatever is available for support and produces its spores. A well-watered, well-fertilized lawn provides an ideal environment in the soil for its growth.

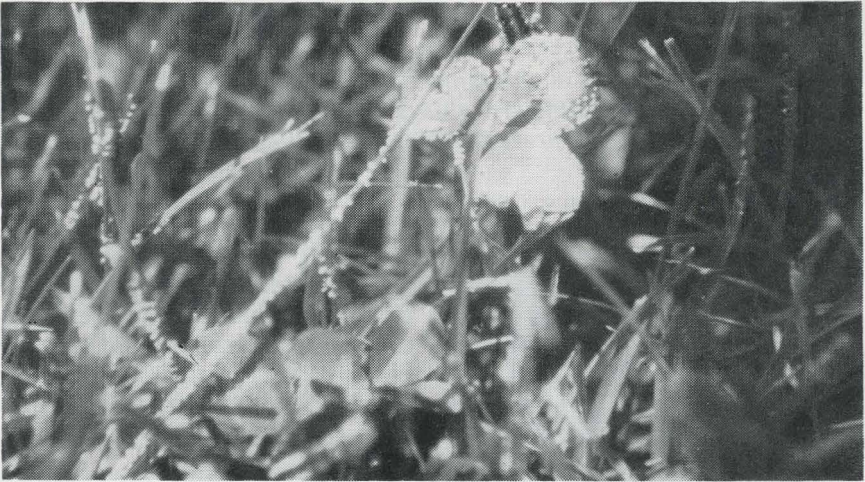


Fig. 6. Slime mold on the surface of grass and clover leaves.

Contro

If left alone, the slime mold will soon disappear. However, since it is unsightly, a home owner may wish to remove it from the grass blades. This can be done by a strong spray or with a garden rake.

Toadstools, Mushrooms, Puffballs

Symptoms

Everyone has seen toadstools, mushrooms, and puffballs of various sorts. Sometimes they are quite an annoyance.

Cause

Toadstools, mushrooms, and puffballs are various forms of fungi. These fungi are good wood rotters and therefore are commonly found developing in areas of buried tree stumps and boards.

Control

These fungi are difficult to control until all of the wood or other organic matter upon which they are feeding has been completely consumed. Temporary control may be obtained by applying Calo-clor or Calocure as given above under Brown Patch control. However, after the chemical has been dissipated, the toadstools or mushrooms will come back. It is usually best to let them go ahead and complete the decay of the material, after which they will disappear.

Fairy Ring

Symptoms

Fairy ring disease causes a rather circular ring of dead grass (Figure 7). Sometimes the ring is not complete and gives the appearance of a horseshoe. The rings vary in size from a few inches in diameter to many feet. The strip of dead grass varies from 3 to 6 inches in width. Immediately inside of the ring the grass is a darker green than that on the outside of the circle. Sometimes there will be many mushrooms or toadstools appearing in the area of dead grass.



Fig. 7. Fairy Ring.

Cause

Fairy ring is most commonly caused by a soil-borne fungus (*Marasmius oreades*) which grows very extensively and intensively in the area of the ring. It starts at a central point and grows outward equally in all directions. The part of the fungus on the inner side of the circle dies off as the fungus grows outward.

Control

Fairy ring is difficult to control, because the soil in the area in which the fungus is present becomes impervious to water. The fungus can be killed by the use of Mercuric chloride, but the problem is getting the Mercuric chloride in contact with the organism.

We suggest you make a solution of 1 to 1000 Mercuric chloride by adding a 7½ grain tablet of Mercuric chloride to one pint of water. Add a drop or two of liquid detergent to this solution so as to give greater wettability to the solution. Then use a spading fork or some other instrument to loosen the soil in which the fungus is present. Soak the area in which the fungus is present with the Mercuric chloride solution at a rate of about one pint per square foot of soil surface. Mercuric chloride is a deadly poison and corrosive to metal. Use extreme caution with children, pets, etc.

Phenyl mercury used at the concentration suggested for melting-out (page 8) and applied as a drench, as given for mercuric chloride above, will control Fairy ring.



Summary of Diseases Controlled by Various Fungicides.

Fungicide	DISEASES						
	Melting-out	Brown Patch	Rust	Mildew	Slime Mold ⁴	Toadstools, mushrooms, puffballs	Fairy Ring
Acti-dione RZ	Yes	Yes	Yes	Yes			
Calo-clor		Yes				Yes ²	Yes ²
Calocure		Yes				Yes ²	Yes ²
Captan	Yes						
Karathane				Yes			
Kromad	Yes	Yes					
Maneb			Yes				
Mercuric chloride		Yes ¹				Yes ¹	Yes
Mildex				Yes			
Phaltan	Yes						
Phenyl Mercury	Yes						Yes
Sulfur			Yes ³	Yes			
Tersan	Yes	Yes					
Zineb	Yes		Yes				

¹ Although this chemical is not mentioned for control of brown patch or the fleshy fungi in the text of this booklet, it will give control of these diseases. However, it is likely to be injurious to turfs in Nebraska because of high summer temperatures and therefore is generally not recommended.

² These chemicals are not mentioned in the text but will probably give satisfactory control for these diseases.

³ More effective in warm weather.

⁴ Remove with strong stream of water from hose.

CONTROL OF LAWN DISEASES

in Nebraska

