Force of Nature

A Look At ...

Turfgrass Summer Disease

Curvularia Summer Blight

CURVULARIA, AS SEEN UNDER A MICROSCOPE,
THE ONLY ACCURATE METHOD OF IDENTIFICATION

Names Associated with Curvularia

Curvularia Summer Blight can be described as an OPPORTUNISTIC disease organism.

Curvularia is known to be caused by at least six different species.

The species *Curvularia lunata* is the most likely to be encountered.

Throughout the last forty years, the naming of Curvularia has been extremely confusing.

Turf diseases like *Curvularia*, as well as *Bipolaris* and *Drechslera*, have been given the common name of either « *Leaf Spot* » or « *Melting–Out* ».

This use of a common name was the result of the high degree of similarity between their symptoms.

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Susceptible Species

This disease can weaken or kill annual bluegrass, without affecting the nearby bentgrasses or Kentucky bluegrass.

On many golf courses, annual bluegrass is inter–mixed with patches of bentgrass or Kentucky bluegrass.

Both grasses may often remain green and undamaged, while the annual bluegrass shrivels and dies.

However, this effect can also be observed when annual bluegrass is infected by diseases such as Summer Patch.

Moreover, differences may also be observed purely because both bentgrass and Kentucky bluegrass have a superior tolerance to heat when compared to annual bluegrass.

Likely Locations

Curvularia is prevalent in locations where annual bluegrass turf is found.

It is far less common in turf comprised of other species of turfgrasses.

Golf course putting greens, tees, and fairways composed of annual bluegrass can be severely damaged by Curvularia, especially in areas exposed to a full day's worth of direct sunlight.

By contrast, greens, tees, and fairways composed of creeping bentgrass are unlikely to be damaged by Curvularia.

Additionally, fairways, rough, and approaches to greens composed of Kentucky bluegrass are also unlikely to be damaged.

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Likewise, residential and commercial lawns, parks, sod farms, and sports fields that are composed of Kentucky bluegrass, are equally IMPROBABLE TARGETS for Curvularia.

The fact that annual bluegrass is so susceptible to Curvularia may provide the turf manager with a diagnostic clue for identification.

Identification

Upon close examination of an affected plant, Curvularia is seen to BEGIN INJURING THE GRASS FROM THE TIP OF THE LEAVES. This is called « *tip die–back* ».

As the disease progresses down the leaves, it creates a pattern of injury called « *dappled* » — meaning a MOTTLING OCCURRING IN CLUSTERS.

During prolonged periods of high temperatures, Curvularia will continue to spread down the plant, damaging the stem, and eventually the crown. This is known as « *dry rot* ». This term, used by plant pathologists, provides an excellent description of what is visually observed. The stem and crown are indeed SHRIVELLED AND DEAD.

Unlike other diseases, such as CLASSIC « *Leaf Spot and Melting–Out* » that yield elliptical or oval shaped wounds, Curvularia DOES NOT PRODUCE PROMINENT LESIONS ON THE LEAVES AND STEM. Instead, it causes discoloration of NO identifiable shape and WITHOUT specific boundaries. This general damage to the leaves is referred to as « *blight* ».

Turf that is damaged by blight will DECLINE AND THIN–OUT.

During a Curvularia attack, turf colour will change from green to yellow and then to brown.

From a standing height, the overall appearance of the turf is to seem to « *crumble* » or « *melt–out* » since both leaves and stems are damaged.

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Diagnosis

Because it does not present distinct leaf lesions, Curvularia can be difficult to diagnose with the naked eye.

However, with the help of a MICROSCOPE, Curvularia is easily identified by a unique structure called a « *conidium* ».

A group comprised of many conidium is known as « *conidia* ». These conidia are readily found on the surface of infected leaves and crown tissues, numbering by the dozens.

CURVULARIA CONIDIA

A Curvularia conidium is pale brown in colour. Its shape can be described as « *abruptly curved* » or « *boomerang–shaped* ». It is divided into three or four compartments called « *septations* » or cells. One of the central cells is darker–coloured and enlarged, giving Curvularia its unique shape.

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Conditions Favouring Disease Development

The following environmental or management factors favour the development of Curvularia organisms.

They will also determine the degree and severity of the disease once Curvularia is triggered.

1. **Heat and drought conditions**
2. **Fertilization practices**
3. **Herbicide applications**
4. **Leaf wetness and irrigation practices**
5. **Mis–diagnosis of diseases and insects**
6. **Mowing height**
7. **Soil compaction and mechanical activities**
8. **Syringing practices**
9. **Thatch accumulation**

1. Heat and Drought Conditions

Annual bluegrass will be prone to infections of Curvularia while it is SUFFERING FROM STRESS, such as during an extended heat wave accompanied by drought.

Severe outbreaks can occur when day–time temperatures exceed 30 degrees Celsius (86 degrees Fahrenheit), in association with night–time temperatures over 20 degrees Celsius (68 degrees Fahrenheit).

The impact of drought conditions can be reduced with the use of wetting agents, which can reduce soil hydrophobicity, and increase water infiltration throughout the root–zone.

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As a rule, wetting agents are designed for use on a PREVENTIVE basis, usually on a monthly schedule. They may be beneficial not only to putting greens, but also to fairways.

2. Fertilization Practices

Nitrogen fertilization — An imbalanced fertilization will increase annual bluegrass's susceptibility to Curvularia. In particular, EXCESSIVE LEVELS OF NITROGEN will aggravate Curvularia attacks. However, this warning to avoid excessive nitrogen use during the summer months is NOT meant to imply that nitrogen use should be suspended entirely. The ADEQUATE level for annual bluegrass should still be provided at the usual rate of one pound of available nitrogen per one thousand square feet per growing month. It should also be noted that any program that delivers INADEQUATE spring and fall nitrogen fertilization will decrease turf tolerance to heat and drought stress, thus predisposing it to Curvularia outbreaks.

Quickly available nitrogen sources — As a preventive measure against Curvularia, quickly–available sources of nitrogen should be avoided. This is because the use of quickly–available sources can produce « *surges of growth* » that will make the turf susceptible to Curvularia. The rate of release of these sources usually varies from one to three weeks, depending on the product used. For example, the estimated period of complete nitrogen release for soluble urea (46–0–0) is two to three weeks. Urea is a component used in both granular and liquid fertilizers. To minimize the rate at which urea is made available to turf, the fertilizer used must contain a HIGH PERCENTAGE OF SLOW–RELEASE NITROGEN.

Slow–release nitrogen sources — During the summer months, any granular fertilization program should include a HIGH LEVEL of slow–release nitrogen in every application. The criteria for selecting slow–release nitrogen sources must be stringent. It is recommended that these sources release, at most, fifty to fifty–five per cent of their nitrogen within the first four weeks. This rate of release can be found in organic nitrogen, polymer–coated ureas, and urea–formaldehyde products. Moreover, when choosing a fertilizer

mixture for fairways, its composition must be of at least seventy–five per cent slow–release nitrogen. For putting greens, one–hundred per cent is preferred.

Liquid nitrogen sources — During the summer months, using a liquid fertilizer program may be problematic. Sprayable fertilizers inherently contain large amounts of quickly–available sources of nitrogen. Even so–called slow–release sources of liquid nitrogen may contain extremely high levels of urea.

Potassium fertilization — The benefits of potassium to turfgrass growth include improved hardiness against extremes, such as heat and drought, and improved resistance to diseases, including Curvularia. Applying potassium is NOT effective once summer stress or disease occurs. Potassium must be used PREVENTIVELY. The spring use of potassium is a means of preparing turf to better resist HEAT and DROUGHT stress, the two factors that will predispose annual bluegrass to infections of Curvularia.

Nitrogen–to–potassium ratio — To ensure the highest degree of heat and drought resistance, some turf managers select fertilizers with a nitrogen–to–potassium (N–$K_2$0) ratio of 1–to–1. Others prefer a ratio based upon soil test results, or employ more CONVENTIONAL ratios, such as 2–to–1, or 3–to–1. Some experts more precisely recommend the use of 1–to–1 ratios for high–sand soils and high–leaching conditions. Such conditions are usually found on putting greens. Moreover, when the annual application of nitrogen exceeds 6 pounds per 1000 square feet, it is advised to use ratios of 1–to–0.75 or 1–to–0.50. For 3 to 6 pounds of nitrogen per 1000 square feet per year, a ratio of 1–to–1 is advocated.

3. Herbicide Applications

Research has shown that the use of herbicides, such as 2,4–D, mecoprop, and dicamba may stimulate *Bipolaris* and *Drechslera* development. Although no such research has been done with Curvularia, it is a safe assumption that this organism is also activated by these herbicides.

Therefore, the use of broad–leaved weed control products should be AVOIDED during the summer months.

If the use of such weed controls is deemed necessary, small areas should be sprayed as « *tests* » before implementing an overall herbicide program. Moreover, areas that have historically been infected with Curvularia should be avoided altogether until fall.

4. Leaf Wetness and Irrigation Practices

Poor air circulation — Prolonged exposure of grass leaves to moisture, in combination with high temperatures, creates an ideal environment for Curvularia infection. High humidity weather and poor air circulation will result in moisture remaining on turf leaves for extended periods. Air circulation may be impeded by the presence of NUMEROUS LARGE TREES very close to the turf area. Therefore, large trees should NOT be planted within one-hundred feet of the perimeter of golf course putting greens. Such existing trees may need to be removed.

Mimicking symptoms of drought — It is often difficult to distinguish Curvularia from drought. In both cases, the turf appears thin and weak, and seems to be suffering from lack of water. However, diseased turf will NOT recover with adequate or increased irrigation. In fact, the opposite is likely to occur. Increased and untimely irrigation will aggravate the disease.

Irrigation practices — Irrigating late in the day tends to increase the incidence of Curvularia. So too will light and frequent drenching. Therefore, irrigation should be done early in the day, rather than late at night, to decrease the risk of Curvularia. During hot weather, irrigation quantities should be MISERLY, BUT SUFFICIENT. Moisture deficiency can be determined by the feel and appearance of the soil, or by the appearance of the turf. For instance, a bluish leaf colour and drooping foliage indicate that moisture stress has been reached. Obviously, turf should be irrigated just prior to this point; otherwise, wilting injury may occur.

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5. Mis-diagnosis of Diseases and Insects

Problems of discernment from other diseases — Misidentification of a disease can lead to IMPROPER corrective action. The following summer turf diseases produce symptoms that are similar to Curvularia — (1) Anthracnose Leaf Blight. (2) Black Layer. (3) Summer Patch. In fact, Curvularia will often infect annual bluegrass IN UNISON with Anthracnose Blight and Summer Patch. This is why diagnosis of Curvularia and Summer Patch should always be performed with a MICROSCOPE.

Problems of discernment from insect pests — Annual bluegrass will be more susceptible to Curvularia with exposure not only to drought stress, but also to insect attack. In fact, it may be difficult to distinguish Curvularia infection from drought injury or insect damage. In the months of June, July, and August, two white grub larvae insects cause symptoms that are SIMILAR to Curvularia by chewing away at the roots of turf plants — (1) Annual Bluegrass Weevil. (2) Black Turfgrass Ataenius.

6. Mowing Height

Obviously, the effect of any disease that begins by attacking leaves will be more devastating as mowing length is SHORTER. When Curvularia is active, the mowing height must be raised to the MAXIMUM POSSIBLE LEVEL. Short and frequent cutting must be stopped. Additionally, turf that is subject to obvious heat and drought stress should NOT be mowed, especially not in the afternoon.

7. Soil Compaction and Mechanical Activities

Traffic — Annual bluegrass will be more prone to infections of Curvularia when its leaves are subjected to OPEN WOUNDS. The frequent use of vehicles on turf, particularly during hot and dry weather, creates such avenues for disease

attack. Maintenance equipment, and even golf cars, may have to be RESTRICTED from operating on turf areas. Full prohibition may become an absolute necessity during hot and dry summer afternoons, when day–time temperatures peak.

Mechanical interventions — During the summer months, the UNTIMELY implementation of mechanical cultural practices may add unnecessarily to heat and drought stress, thus increasing the risks of Curvularia infection on annual bluegrass. Mechanical interventions that constitute a HIGH–RISK injury include — (1) core aeration, (2) heavy vehicle use, (3) soil topdressing, (4) triplex greens mowing, and (5) verti–cutting. Mechanical interventions that represent a LOW–RISK injury include — (1) arrow–head aeration on fairways (i.e. Aer–Way), (2) conditioning of golf course putting greens with groomers, (3) light–weight fairway mowing, (4) manual greens mowing, (5) slicing aeration, (6) solid–tine aeration of greens, and (7) spiking aeration.

Aeration practices — An INADEQUATE core aeration program in the preceding spring and fall, will WEAKEN turf resistance to heat and drought stress. Likewise, previously INADEQUATE spring and fall core aeration will also render turf LESS ABLE to tolerate summer heat and drought stress. Such stress can predispose turf to Curvularia infections on annual bluegrass. Obviously, a WELL–ROOTED turfgrass plant will BETTER RESIST disease pressure. For most turfgrass conditions, core aeration is required in either spring or fall, or both. More specifically, on golf course putting greens, core aeration should be performed once for every 10,000 rounds of play. Beyond 25,000 rounds, non–core aeration methods, such as solid–tine, must be frequently used throughout the summer.

8. Syringing Practices

Turf managers who do not implement syringing practices during the summer months are FAR MORE LIKELY to attract problems with Curvularia. As we all know, syringing is a method of REDUCING HIGH TEMPERATURES on putting greens and fairways during hot summer days. Syringing is NOT a supplemental form of irrigation. It is a practice used purely for TEMPERATURE CONTROL.

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Annual bluegrass will be prone to infections of Curvularia whenever it suffers from PROLONGED HEAT STRESS. As mentioned earlier, severe outbreaks can occur when day–time temperatures exceed 30 degrees Celsius (86 degrees Fahrenheit). When turf surface temperatures are nearing this level, syringing is recommended.

On golf course putting greens, syringing is normally performed at a frequency of three to five times per day, if turf temperatures exceed 30 degrees Celsius before noon. The practice of syringing must strictly accomplished a very light watering of the leaves, not irrigation of the root system. This is to say that only the leaf blades are to be moistened in order to allow water evaporation to remove excess heat from the surface. The wetting action must NOT reach the root–zone.

During syringing operations, if water moisture reaches the root–zone, it will carry the ambient air heat into the soil, and thus will fatally raise the root–zone temperatures. Should this occur accidentally, it is recommended to immediately soil drench the root–zone, until cool temperatures are restored therein.

9. Thatch Accumulation

Thatch is the layer of organic matter located between the soil and the grass blades of turf. It is composed of stems and roots that are living or dead. The accumulation of thatch becomes a problem when turf tends to root in this layer of organic matter rather than in the soil.

Thatch can AGGRAVATE the effects of heat and drought stress, as well as Curvularia. Indeed, during unfavourable weather conditions, Curvularia survives mostly as a saprophyte in the thatch layer. It uses non–living organic matter as a food source.

Therefore, as a general rule of thumb, thatch should not be allowed to accumulate beyond a thickness of 0.5–inch (1.3 centimetres).

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Chemical Control

Canadian pest control product manufacturers have yet to update their product labels to include Curvularia.

As we all know, federal regulations prohibit the use of a pest control product in a manner that is inconsistent with the label directions. In other words, since Curvularia is not itemized on any fungicide label, one cannot claim to have tried using any fungicide to control this disease in Canada.

Under these current circumstances, it is impossible for turf managers to properly document a Curvularia control program. It is also difficult for consultants and educators to provide recommendations regarding the treatment of Curvularia in Canada.

It could be argued that any label direction allowing the use of a fungicide for controlling « *Leaf Spot and Melting–Out* » diseases must ipso facto include Curvularia.

In fact, Curvularia has historically been referred to as « *Leaf Spot and Melting–Out* ». This has been the case since 1965.

Consequently, conventional wisdom has often dictated that fungicides capable of controlling « *Leaf Spot and Melting–Out* » will also control Curvularia.

In Canada, the following fungicides are registered for the control of diseases classified as « *Leaf Spot* » — Banner ® MAXX, Compass ™ 50WG, Daconil ® Ultrex, Daconil ® Weather Stik, Heritage ™ MAXX, Rovral ® Green GT.

In the United States, *Curvularia* spp. is indicated on the label of Daconil Weather Stik Flowable Fungicide. In fact, Curvularia is listed under the heading « *Leaf Spot, Melting–Out* ».

Moreover, Curvularia is indicated on the U.S. label of Rovral 26 GT, which contains iprodione, for preventive applications on bermudagrass turf.

Force Of Nature presents THE WHOLE TRUTH FROM AN INDEPENDENT PERSPECTIVE from National Organization Responding Against Huje that seek to harm or misinform the Green Space Industry (NORAHG). It is a series of Reports destined for the Green Space Industry, the Environmental Terror Movement, Governments, and the Media, nationwide across Canada, the United States, and overseas. This Report has been developed for the education and entertainment of the reader by providing TECHNICAL INFORMATION WITH COMMENTARY. The neutrality of the Report might be disputed.

The information presented in this Report is for preliminary planning only. Before making a final decision, the turf manager is expected to obtain trusted expert advice from extension specialists, local distributors and/or agronomists. All decisions must take into account the prevailing growing conditions, the time of year, and the established management practices

All products mentioned in this Report should be used in accordance with the manufacturer's directions, and according to provincial, state, or federal law. For the official advantages, benefits, features, precautions, and restrictions concerning any product, the turf manager must rely only on the information furnished by the manufacturer. The mention of trade names does not constitute a guarantee or a warranty.

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Force Of Nature is the brainchild of William H Gathercole and his entourage. Mr Gathercole is a principal founder of the Modern Professional Lawn Care Industry in both Ontario and Quebec. He holds a degree in Horticulture from the University of Guelph, and another pure and applied science degree from McGill University. He has worked in virtually all aspects of the Green Space Industry, including golf, professional lawn care, and distribution. Mr Gathercole has supervised, consulted, programmed, and/or overseen the successful execution of hundreds of thousands of management operations in the urban landscape. He has trained, instructed, and advised thousands of turf managers and technicians. Mr Gathercole has also been an agricultural agronomist. Mr Gathercole is personally credited for crafting the Exception Status that has allowed the Golf Industry to avoid being subjected to the prohibition of pest control products. He is also the creator of the signs that are now used for posting after application. Mr Gathercole is now retired from Force Of Nature, although his name continues to appear as the founder.

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