



THE GRASS BOOKLET

A GUIDE TO AMENITY SPECIES, DISEASES & PESTS

INTRODUCTION

DLF offers a wide range of professional sports, amenity & lawn mixtures with the best varieties and species for all the challenges of today's market

The development of a new amenity grass seed variety is a long-term commitment that demands patience, expertise, and clear foresight. From the earliest stages of selection through to commercial availability, no less than 15 years are required to breed, trial, and refine a single new lawn variety. The varieties featured in our current portfolio are therefore the direct result of the vision our breeders had more than a decade ago.

At that time, they anticipated the changing demands that modern amenity turf would face. Reduced inputs have become the norm, with turf managers expected to achieve high-quality surfaces using less fertiliser, fewer mowing operations, and reduced water availability. Alongside these pressures, expectations for performance have increased: improved disease tolerance, stronger resistance to wear and tear, finer leaf texture, greater sward density, and year-round visual quality are now essential requirements rather than optional benefits.

To ensure each variety meets these expectations, species and cultivars undergo extensive testing at trial sites across the world. These trials expose grasses to a wide range of climatic conditions, soil types, maintenance regimes, and stress factors. The data collected provides invaluable technical and qualitative insight into establishment speed, persistence, tolerance to drought and low nutrition, recovery from wear, and resistance to key diseases and pests.

This guide has been developed to bring that knowledge together in a clear, practical format. It is designed to support customers, consultants, and turf professionals in selecting the most appropriate varieties for their specific applications. Alongside varietal characteristics, it also includes guidance on the most common amenity turf diseases and pests, helping users make informed decisions that deliver sustainable, high-performing turf surfaces now and into the future.



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UNDESIRABLE GRASSES

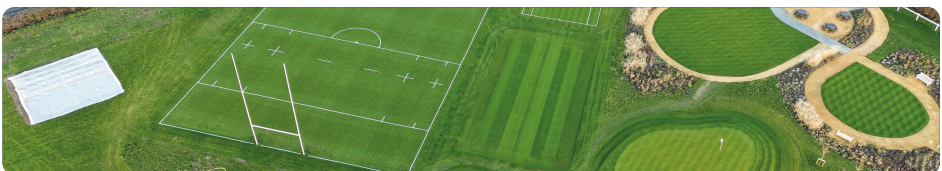
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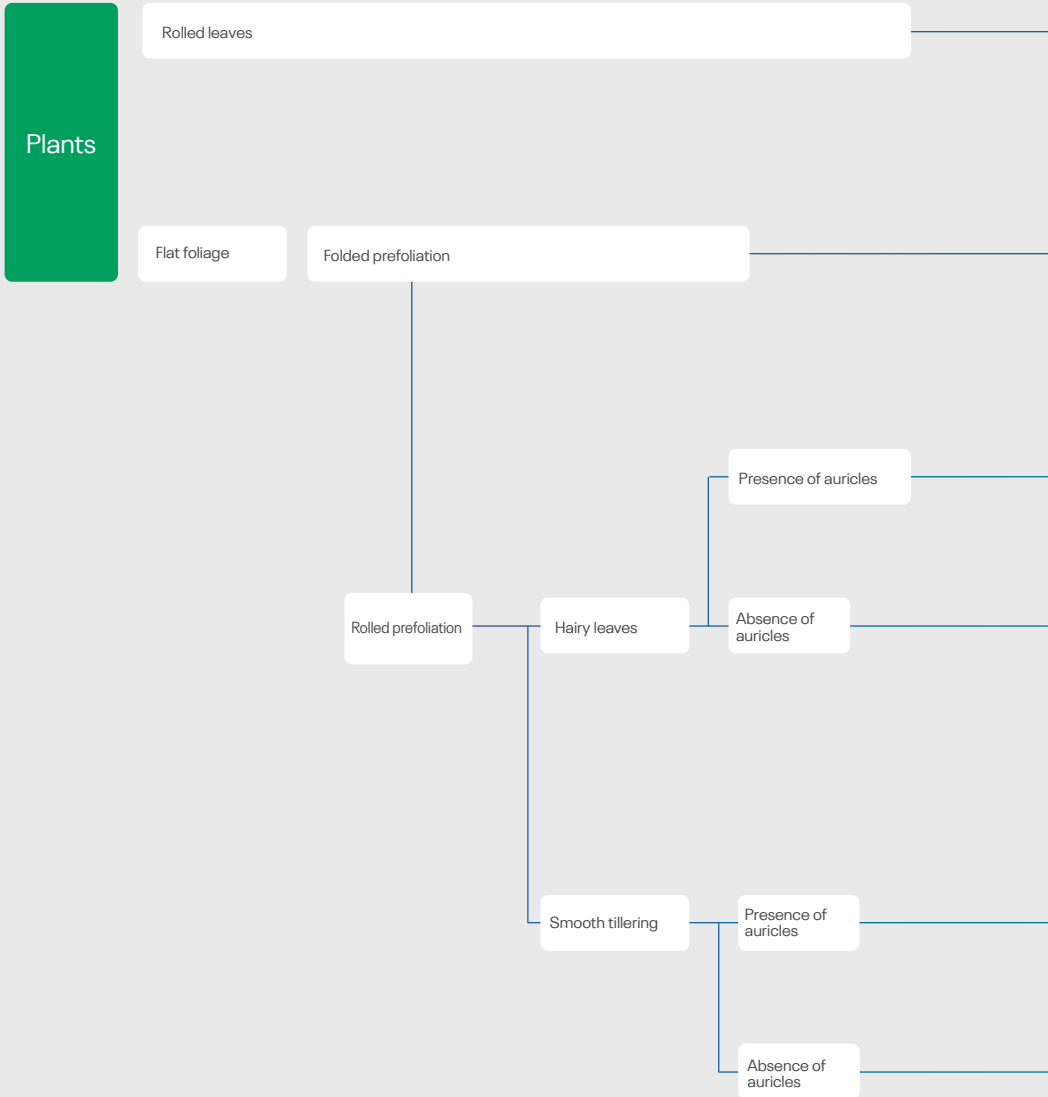
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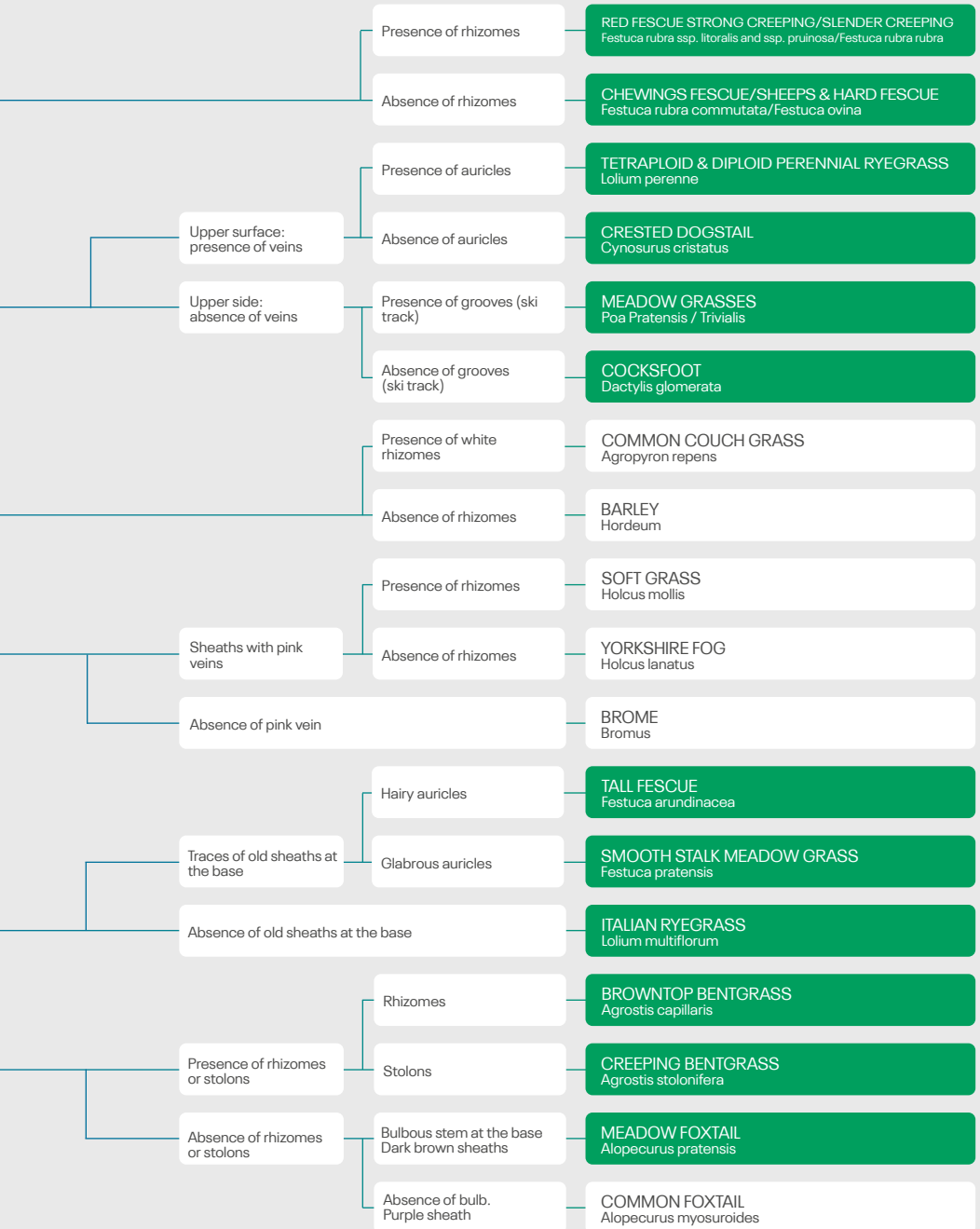
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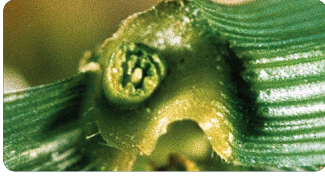


Practical guide for the identification of grasses

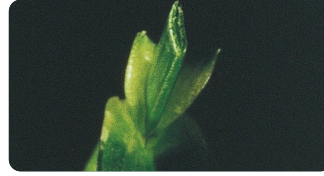


CROSS-SECTION VIEW

Rolled



Folded

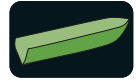
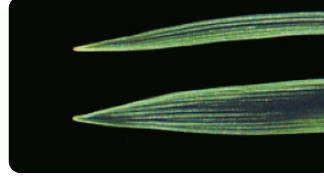


LEAF TIP

Boat-shaped tip

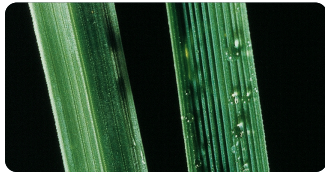


At the tip

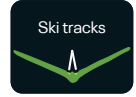
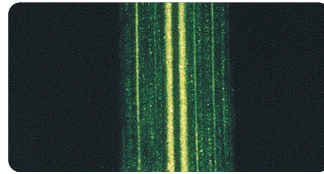


THE BLADE

Blade smooth or with veins
/ Keel or not



Wide blade with two well
marked grooves (ski tracks)



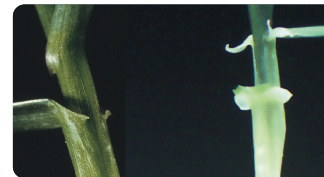
THE LIGULE

Long or short



THE SHEATH/AURICLES

Large or small



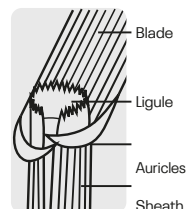
THE STEM

May have nodes



The sheath is the part of the leaf that holds the stem

The auricles are like small collars that surround the stem.





CREeping BENTGRASS

Latin name: *Agrostis stolonifera*

Other names: Slender bentgrass

Number of seeds/g: 10,000 seeds/g
Germination: About 2 weeks
Tillering density: 400-600 tillers/100 cm²
Mowing height: Normal: 3-12 mm. Not above 15 mm.
Growth: Trailing stolons.

Characteristics: Mat green foliage, wider at the base and gradually finer towards the tip. Leaves with veins on the upper surface. Rolled prefoliation. Ligule rounded and slightly toothed, up to 5 mm in length. Capable of producing roots at the nodes. Numerous stolons.



Properties: It is the species among *Agrostis* that tolerates mowing the shortest. Unlike common bentgrass, stoloniferous bentgrass requires intensive maintenance – fertilization, irrigation. Tends to become dormant in winter.

VELVET BENTGRASS

Latin name: *Agrostis canina*

Other names: -

Number of seeds/g: 11,000 seeds/g
Germination: 2-3 weeks
Tillering density: 2000 tillers/100 cm²
Mowing height: Normal: 3-12 mm
Growth: Weakly rhizomatous with sometimes long stolons.

Characteristics: Mat green foliage. Rolled prefoliation. Long ligule 2-3 mm & toothed/pointed.



Properties: Forms an extremely dense and fine turf. Produces a lot of thatch, requiring frequent mechanical operations/sanding. Probably the densest species on golf greens. Tolerates acidic soils and shade better than *A. tenuis* and *A. stolonifera*.

BROWNTOP BENTGRASS

Latin name: *Agrostis capillaris syn. tenuis*

Other names: -

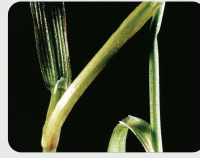
Number of seeds/g: 10,000 seeds/g
Germination: 2-3 weeks
Tillering density: 400-600 tillers/100 cm²
Mowing height: Normal: 3-12 mm; long-lasting persistence at 5 mm.
Growth: Creeping with mainly short rhizomes.

Characteristics: Dull green foliage, wider at the base and gradually narrower towards the tip. Flat leaves with parallel veins. Identical appearance on the upper and lower sides of the blade. Rolled prefoliation. Ligule short, truncated, length 0.5 - 2.0 mm. Rhizomes short and, to a lesser extent, stolons.



Properties: Ideal for golf greens in mixture with creeping red fescue and Chewings types. Best performance with moderate maintenance (fertilization and irrigation without excess). Avoid soil compaction and shade, which promote the development of *Poa Annua*.

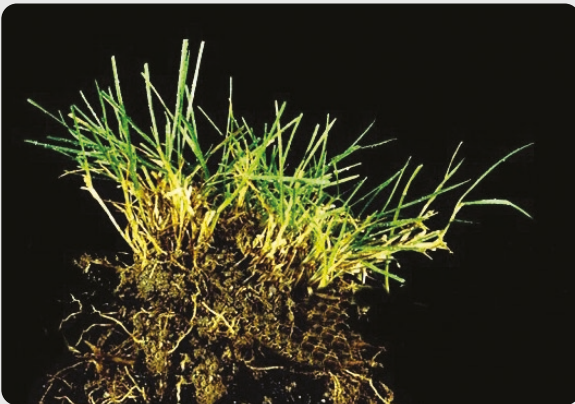
Stoloniferous bentgrass with stolons visible on the surface. ↘



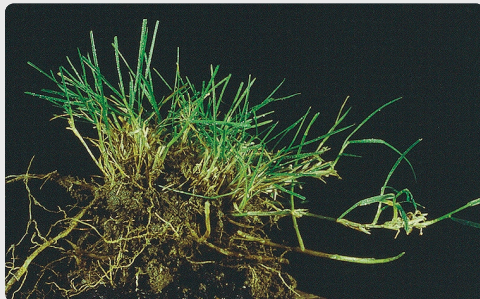
On the left: A. stolonifera with long ligule & toothed. On the right: Bentgrass common with short ligule. ↑



Stem with pointed leaves. ↑



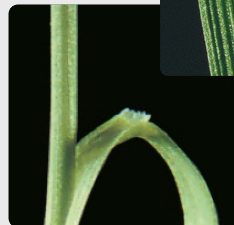
Dog bentgrass: few or no stolons, weakly rhizomatous plants. ←



↑ Common bentgrass with visible rhizomes.



← Leaf with very pronounced veins.



← Short and straight ligule (without tip).

TUFTED HAIRGRASS

Latin name:	<i>Deschampsia cespitosa</i>
Other names:	-
Number of seeds/g:	500 seeds/g
Germination:	2 weeks
Tillering density:	200-300 tillers/100 cm ²
Mowing height:	Normal: >15 mm
Growth:	Tufted
Characteristics:	Rough leaves, long and pointed ligules.



Properties: Good performance in the shade. Tolerance to trampling. Moderate requirements. Low resistance to drought and heat. Not very aggressive, sensitive to competition.

BERMUDA GRASS "CYNODON"

Latin name:	<i>Cynodon dactylon</i> (sterile hybrids = <i>C. dactylon</i> x <i>C. transvaalensis</i>)
Other names:	-
Number of seeds/g:	1,400 seeds/g
Germination:	1-2 weeks (requires high temperature).
Tillering density:	3-6000 tillers/m ²
Mowing height:	10-20 mm depending on use.
Growth:	Stoloniferous. There are varieties that propagate vegetatively (sterile) and varieties that produce seeds.
Characteristics:	Folded prefoliation, sheath and underside of the leaves hairy. Hairs instead of a ligule.



Properties: *Cynodon* is a grass of "warm regions" whereas all the other species in this guide are classified as "cool-season grasses." *Cynodon* stands out for its resistance to drought and high temperatures, which is much greater than that of cool-season grasses. The drawback is a dormancy that begins in autumn and lasts until April/May, with a yellow/white appearance. One way to address dormancy is to overseed, for example, with perennial ryegrass or other non-dormant species to green the lawn during the winter period.

Characteristic tuft, presence of culm at the base.



Tufted hair grass: absence of stolons and rhizomes.



Cynodon:
Presence of stolons.
Ensures the perennial nature of the species.



Cynodon:
Ligule replaced by hairs.



Cynodon:
Sometimes presence of stolons not rooted.

CRESTED DOGTAIL

Latin name: *Cynosurus cristatus*

Other names: Combgrass

Number of seeds/g: 2,000 seeds/g
Germination: 2 weeks
Tillering density: 200-250 tillers/100 cm²
Mowing height: Normal: > 15 mm
Growth: Tufted



Characteristics: Foliage rather coarse, stiff and rough. Glabrous plant. Short ligule approx. 1 mm and membranous.

Properties: Good winter appearance and resistant to cold and trampling. Excellent component in golf course roughs.

TALL FESCUE

Latin name: *Festuca arundinacea*

Other names: -

Number of seeds/g: 550 seeds/g
Germination: 2-3 weeks
Tillering density: 200 tillers/100 cm²
Mowing height: Normal: 30-40 mm. Not less than 15 mm.
Growth: By tillering



Characteristics: Upper side of the leaf with very pronounced venation and with a sharp edge. Rolled prefoliation. Leaf broad and flat. Short ligules. Auricles small and hairy. Sheath base purplish.

Properties: Resistance to water stress (drought/flooding). Adapts to all soil types. Moderately slow establishment. Some varieties develop rhizomes. Hardy plant.

HARD & SHEEPS FESCUE

Latin name: *Festuca ovina* / *Festuca longifolia* / *Festuca brevipila*

Other names: -

Number of seeds/g: 1,300 seeds/g
Germination: 2-3 weeks
Tillering density: 800-1000 tillers/100 cm²
Mowing height: Normal: 15-35 mm. Not less than 5 mm.
Growth: By tillering.



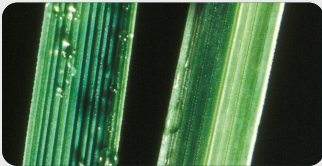
Characteristics: Plant with very fine and very dense foliage. Leaves glabrous with a wavy upper surface. Leaves of glaucous color. Absence of auricles. Very short ligule. Absence of rhizomes. Open sheath and protruding margin.

Properties: Very hardy plant with good resistance to drought. Adapts to poor soil. Low nutritional requirements. Slow establishment. Commonly sensitive to trampling - however specific cultivars can have good wear tolerance.

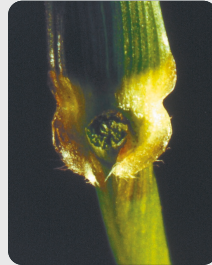
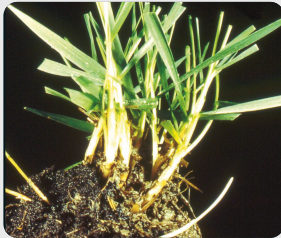


Crested dogtail: Plant tufted, not very dense, sheath lower part brown.

↓ Crested dogtail: Glabrous plants



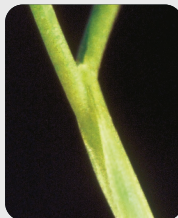
← Left: vein clearly visible on the upper side Right: keel visible on the lower side.



← Small auricles slightly broad hairy on the sides.



Very fine foliage with high tillering density significant.



↑ Very short ligule and barely visible.

← Open sheath and margins protruding.

CHEWINGS FESCUE

Latin name: *Festuca rubra commutata*

Other names: Red Fescue

Number of seeds/g: 1,100 seeds/g
Germination: About 2 weeks
Tillering density: 450-800 tillers/100 cm²
Mowing height: Normal: 20-35 mm. Not less than 5 mm.
Growth: In tufts - bunch type
Characteristics: Fine, stiff, needle-shaped leaves.

Folded prefoliation and often remains folded once developed.
 Short ligule, without a tip and difficult to see. Clustered roots. No rhizome or stolons. Entire sheath without overlapping.

Properties: The very high density and tolerance to close mowing make the species particularly suitable for golf greens, fairways & ornamental lawns. Low water & fertilisation requirements. Tolerates acidic soils. Good Spring colour.



SLENDER CREEPING RED FESCUE

Latin name: *Festuca rubra litoralis*

Other names: 1/2 Creeping Red Fescue

Number of seeds/g: 1,000 seeds/g
Germination: About 2 weeks
Tillering density: 450-800 tillers/100 cm²
Mowing height: Normal: 20-35 mm. Not below 5 mm.
Growth: Creeping with short rhizomes.

Characteristics: Fine, needle-shaped leaves. Folded prefoliation and often remains folded once developed. Short ligule and difficult to see. Short rhizomes. Entire sheath without overlapping.

Properties: The very high density and tolerance to close mowing make the species particularly suitable for greens of golf, fairways, and ornamental lawns. Excellent salt tolerance. The rhizomes allow regeneration of damaged areas. Well suited for mixtures with Chewings Fescue.



STRONG CREEPING RED FESCUE

Latin name: *Festuca rubra rubra*

Other names: Creeping Red Fescue

Number of seeds/g: 800 seeds/g
Germination: About two weeks
Tillering density: 250-450 tillers/100 cm²
Mowing height: Normal: 20-35 mm. Not below 12 mm.
Growth: Creeping with long rhizomes.

Characteristics: Stiff, needle-shaped leaves. Folded prefoliation and often remains folded once developed. Short ligule and difficult to see. Long rhizomes. Entire sheath without overlapping.

Properties: The rhizomes stabilize the root zone & allow recovery of bare areas. Also used in sod production for consolidate the turf. The ability to restore areas damaged thanks to the rhizomes also makes it possible to use it on fairways.

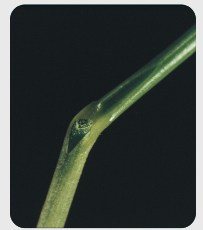




↑ Tuft of Chewing Fescue.
Very fine foliage.



↑ Red fescue without rhizome. Connected root system.



→
Foliage extremely fine.



← Slender creeping red fescue with of the rhizomes short – leaves filamentous.

↓ In comparison:
Strong creeping red fescue with long rhizomes.

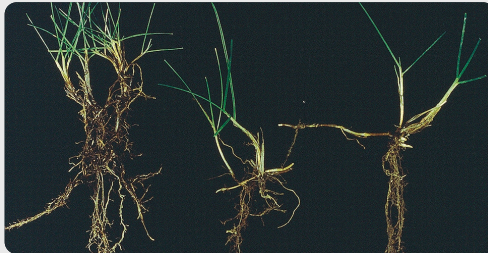


→
Comparison of the three types of red fescue.

On the left: without rhizomes (Chewings)

In the middle: With short rhizomes (Slender)

On the right: With long rhizomes (Strong)



↑ Leaves in the shape of needles in red fescue.



↙ Strong fescues with long rhizomes.

SMALL-LEAVED TIMOTHY

Latin name: *Phleum bertolonii*
Other names: Bulbous meadow-grass / Turf timothy



Number of seeds/g: 3,000 seeds/g
Germination: 2 weeks
Tillering density: 300-400 tillers/100 cm²
Mowing height: >15mm
Growth: Tufted
Characteristics: Foliage with a rather coarse appearance and a matte grey-green color. Rolled prefoliation and ligule < 4 mm finely toothed. Base of stems bulb-shaped.
Properties: Withstands very cold conditions and excess moisture – a high-performing grass in case of winter submersion. Good resistance to trampling/pulling out.

MICRO WHITE CLOVER (LEGUME)

Latin name: *Trifolium repens*
Other names: -



Number of seeds/g: 1,400 seeds/g
Germination: 1-2 weeks.
Tillering density: Very dense if mown short. Microclover with more than 2300 stolons/m² & wild types with 900-1500 stolons/m².
Mowing height: Up to 8 mm for microclovers. Typically 1.5-5 cm.
Growth: Clover spreads thanks to stolons. In a uniform manner for microclover.
Characteristics: It is a perennial legume. Symbiosis with bacteria of the genus Rhizobium fixes nitrogen from the air in nodules on the roots of the clover. The nitrogen becomes available to the clover & surrounding grasses when the roots senesce. Recommended only in mixtures with grasses.
Properties: The integration of microclover into lawns optimizes the nutrition of grasses thanks to biological nitrogen fixation. This association improves soil structure, resistance to wear & the lawn's ability to regenerate!

ROUGH STALKED MEADOW GRASS

Latin name: *Poa trivialis*
Other names: Common meadow grass / Rough bluegrass



Number of seeds/g: 5,500 seeds/g
Germination: 1 to 2 weeks
Tillering density: 300-400 tillers/100 cm²
Mowing height: Normal: 10-35 mm. Can tolerate shorter in favorable conditions.
Growth: By tillering – without rhizomes.
Characteristics: Folded prefoliation. No auricles. Ligule entire, tongue-shaped, oval, length: 3-4 mm. Leaves light green to fairly light green, with the upper surface smooth or rough, lower surface with a keel & shiny. The central vein is bordered by two pale grooves more easily visible in the light. Sheath rough, sometimes slightly reddish.
Properties: Forms a dense turf. Moderate resistance to wear and poor resistance to heat/drought. Performs well in winter, used for its rapid establishment and good performance in shaded situations, the species is often associated with ryegrass for autumn and winter overseeding.



← Small-leaved timothy:
Grey-green. Stolon
greenish.



→
Small-leaved timothy:
'Bulbs' at the base of the stems.

White clover lawn
"Micro clover"



↓ Tripartite leaves:
the new varieties
have smaller leaves
(Microclover).




↑ Lawn and micro clover




↑ Rough stalked meadow grass:
Glabrous plant, absence
of auricles, long ligule and
folded vernation.

←
Rough stalked meadow grass:
Unlike meadow grass
of the meadows - no rhizome.

SMOOTH STALKED MEADOW GRASS

Latin name:	<i>Poa pratensis</i>	
Other names:	Meadow grass / Kentucky bluegrass	
Number of seeds/g:	5,500 seeds/g	
Germination:	3-4 weeks	
Tillering density:	200-350 tillers/100 cm ²	
Mowing height:	Normal: 20-35 mm. Minimum of 8 mm.	
Growth:	Creeping with rhizomes.	
Characteristics:	Absence of auricles. Blue-green leaves. Uniform width ending in a boat-shaped tip. The central vein is bordered by two pale grooves, more easily visible in the light. Lower surface with keel. Folded vernation. Short, rounded ligule, length: 1-3 mm.	
Properties:	Forms a carpet with a pleasant aesthetic appearance. Very good resistance to wear and uprooting. Good regenerative capacity. Good performance in heat with reasonable water supply. Slow establishment. Widely used in sod production, golf tees, and sports fields.	

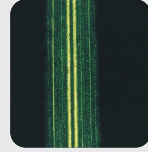
PERENNIAL RYEGRASS

Latin name:	<i>Lolium perenne</i>	
Other names:	Diploid Perennial Ryegrass / English Ryegrass	
Number of seeds/g:	800 seeds/g	
Germination:	1 week	
Tillering density:	200-350 tillers/100 cm ²	
Mowing height:	Normal: 25-35 mm. Minimum of 8 mm.	
Growth:	Tillering	
Characteristics:	The sides of the leaf are parallel, upper surface of the leaf matte with very pronounced veins. Lower surface smooth and shiny with a clearly visible keel. Folded vernation. Short ligule (2 mm). Small and non-clasping auricles.	
Properties:	Perennial ryegrass has excellent resistance to wear. Easy establishment. The species is very well suited to sports fields and heavily used lawns. Adapts to all types of soils. Recommended for overseeding due to its rapid establishment and adaptation to different soils. Greater nutrient requirement.	

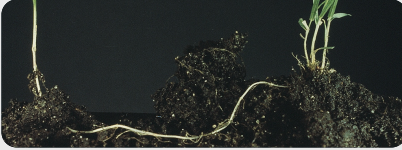
↓ smooth stalked meadow grass has stiff blue-green leaves with a boat-shaped leaf tip.



↓ The small ligule is visible on the leaf on the left.



↑ The vein central is bordered by two pale grooves.



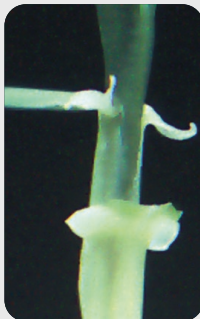
↙ Smooth stalked meadow grass develops underground rhizomes.



Perennial ryegrass has a dark green foliage. The underside of the leaves is shiny.



The auricles are easily visible on the perennial ryegrass.



The leaves and stems are red at the base.



TETRAPLOID PERENNIAL RYEGRASS

Latin name: *Lolium perenne (tetraploid)*
Other names: 4Turf

Number of seeds/g: 550 seeds/g
Germination: 1-2 weeks
Tillering density: 150-250 tillers/100 cm²
Mowing height: Normal: 28-40 mm. Minimum of 8 mm.
Growth: Turf-forming
Characteristics:

Leaves are slightly broader and darker green than diploid types. Upper surface matte with strong ribs; underside glossy. Folded vernation. Clear ligule (~2 mm) and small auricles. Strong, deep-growing roots.



Properties: Tetraploid ryegrass establishes quickly, even in cool soils. Large, energy-rich seeds give strong early growth. Highly tolerant of drought, cold, and disease. Performs well under wear and recovers fast. Suitable for sports fields, golf tees, sod production and overseeding. Efficient under low-input regimes due to improved nutrient use.

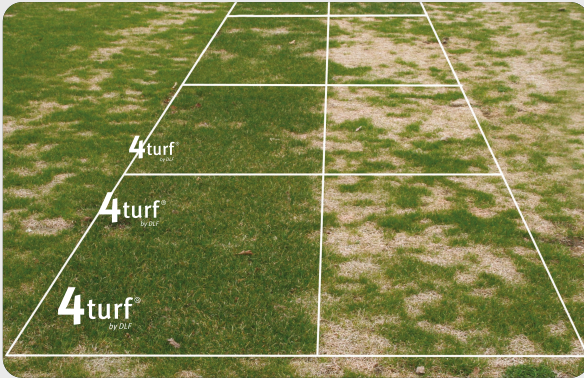


4turf® varieties perform better because they have four sets of chromosomes, whereas perennial ryegrass, in its natural state, has just two sets. The doubling of chromosomes creates bigger cells with more chloroplasts. That means each cell contains more chlorophyll and produces more sugars.

The boost in chlorophyll gives you healthy, high-energy plants. They are more stress-tolerant and recover faster after periods of extreme temperature and disease attack. They're more sustainable too because you need only a minimal input of fertiliser, pesticides and water to maintain your turf.

4turf® tetraploid seeds are bigger than diploid seeds. A larger seed size gives you better seed-to-soil contact for stronger establishment and more playing hours.

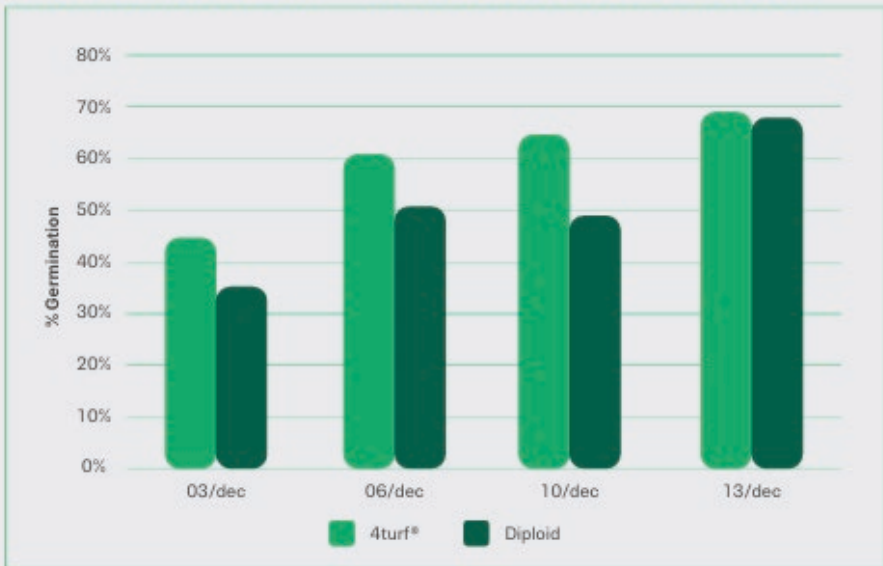
Quick establishment prevents weeds from developing, while proven disease-resistance is a result of stronger and more resilient genetics. The result is a low-maintenance turf that needs less overseeding and pesticides to stay green and healthy throughout a long season of use.



Tetraploid perennial ryegrass comparison to diploid ryegrass in harsh conditions.



GERMINATION AT 4°C - SOWING DATE NOVEMBER 21ST



↑ Tetraploid perennial ryegrass comparison to diploid ryegrass for germination percentage at 4°C

ANNUAL MEADOW GRASS

Latin name: *Poa annua*

Other names: Annual bluegrass

Growth: Forms tufts (rarely with short stolons).

Characteristics: Pale color of uniform width ending abruptly in a boat shape. Leaves often with transverse lines. Seen against the light, two parallel lines are visible along the central vein. Keel-shaped underside of the leaf. Rolled vernation. Rounded ligule, finely membranous up to 5 mm in length. Can flower even on golf greens mown to just a few millimeters.

Properties: Very widespread weed. Undesirable in any type of turf. Very shallow rooted & susceptible to disease

YORKSHIRE FOG

Latin name: *Holcus lanatus*

Other names: Woolly soft grass / Velvet grass

Growth: Rosette with significant tillering

Characteristics: Rolled vernation. Very unique with its soft hairiness on the leaves and sheaths with anthocyanin coloration and darker veins. The keeled sheaths are fused only on the first half. Oval ligule, very toothed and hairy. Absence of auricles.

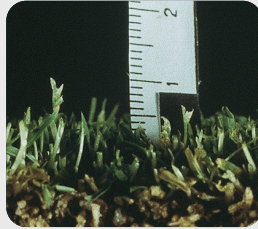
Properties: Common in wet meadows and may hinder the year of lawn establishment or even persistently. Not very aesthetic with its broad leaves and large rosettes. It reseeds itself easily.



On the left: Annual meadow grass with pale green foliage and inflorescences silvery.
On the right: annual meadow grass with strong leaves of blue-green color.



↑ The annual meadow grass has foliage that is pale and often with lines transverse.



↑ Annual meadow grass with inflorescences in a lawn mown to less than 5 mm.



← Stem with long ligule.



Yorkshire fog 'Soft' appearance, but undesirable in green spaces.



ANTHRACNOSE

Latin name:	<i>Colletotrichum cereale</i>
Other names:	Basal rot
Symptoms:	Early attacks are easy to spot by the yellow color of individual plants throughout the lawn. The development of the disease depends on temperature and humidity. In wet weather and temperatures below 20°C, irregular yellowish spots of 1-3 cm appear. The youngest affected leaves are often brick-red in color. Root rot may also appear. Affected plants are then easier to pull out and will show black rot at the base of the leaves. Large yellow to reddish-brown spots are visible in wet weather (>25°C). When diseased plants degenerate, the lawn becomes less dense with bare patches (bare soil). Anthracnose is often seen when the soil is compacted, lacks fertilizers, or is wet.
Hosts:	Can attack all lawn species. Annual meadow grass is particularly sensitive.
Periods:	From summer to winter, but possible throughout the year.

BLACK LAYER

Latin name:	Several species of bacteria, including the genus <i>Desulfovibrio</i>, <i>cyanobacteria</i>.
Symptoms:	Black layer in the root profile of the turf. In an anaerobic environment, this is a biological process, bacteria are involved in reducing sulfates and sulfur into sulfite ions (SO ₃ ²⁻) which mainly exist in their gaseous form (H ₂ S). Metallic cations combine with hydrogen sulfide (H ₂ S) to form a black precipitate composed of acid and sulfite. This black layer is not directly lethal to the turf, but it increases problems with water flow and gas exchange, and above all, indicates the presence of hydrogen sulfide, which prevents the respiration of the root system cells and is toxic.
Hosts:	Waterlogged soils and sanding operations without sufficient aeration can promote the formation of black layers by superimposing layers of thatch and sand, making the soil impermeable. Soil asphyxiation favors the organisms responsible for the creation of the black layer. Excess sulfur and certain metals, including iron. Limit sulfate inputs.
Periods:	All year round and especially during periods when the soil is excessively wet.



Early attack of anthracnose. The diseased plants are yellow. (WG).



Attack of anthracnose. The turf is sparse with yellow and reddish-brown plants. (STRI).



Black layer:
The roots cannot develop properly.



Black layer: presence of a compact, impermeable, and suffocating black layer.

RED THREAD

Latin name:	<i>Laetisaria fuciformis/Corticium fuciforme</i>
Other names:	Corticium disease
Symptoms:	The attacks become evident with the appearance of small irregular spots of 2-5 cm in pale brown color evolving to straw color. There are often healthy plants among the affected ones. The spots can cover large areas. The fungus then develops the very typical reddish filaments at the tips of the affected leaves. The affected area appears with a typical red hue.
Hosts:	All turfgrass species but especially common on perennial ryegrass and red fescue.
Periods:	Often present from March to October but can develop throughout the year if conditions are favorable. Favored by humid weather and temperatures of 16-22°C. Often an indicator of low nitrogen in the plant

MICRODOCHIUM NIVALE / FUSARIUM

Latin name:	<i>Microdochium nivale/Fusarium nivale/Gerlachia nivalis</i>
Other names:	Winter Fusarium (Cold)
Symptoms:	The damage caused by the fungus may appear not only after snow cover, but also in humid conditions with temperatures just above 0°C: spots of 4-6 cm, gray waterlogged plants visible at the beginning of the attack. The spots grow to merge into larger patches. A dark brown edge is often present on the outer edges where the infection is active. Above the affected area, a pink cottony mycelium forms if the humidity is sufficiently high. Late applications of heavy topdressings can promote the disease. The turf regenerates from the center of the spots.
Hosts:	Can attack any species of turfgrass, but bentgrasses, annual meadow grass, and perennial ryegrass are particularly sensitive. Cold fusarium is the most important disease on turf.
Periods:	Damage is often present during autumn, winter, and after the snow melts in March. Heavy rains can dislodge the spores: the disease follows the flow of water.

LEAF SPOT

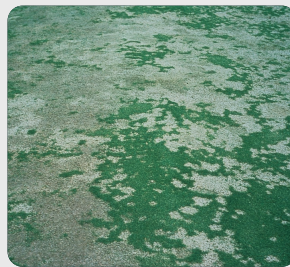
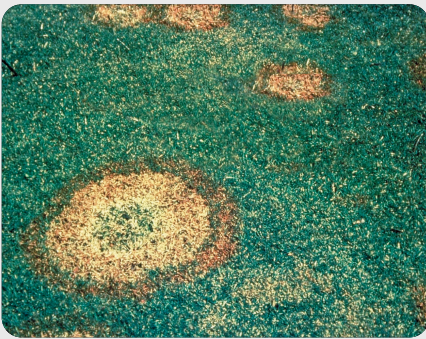
Latin name:	<i>Drechslera spp. and Bipolaris spp.</i>
Other names:	Helminthosporiosis
Symptoms:	Dark oval or elliptical leaf spots. Depending on the species, the spots are reticulated or more compact and often eye-shaped, allowing identification of this disease. Humidity promotes the development of the disease especially when the sugar content of the leaves is low – during vigorous growth the disease has less impact. In the shade, plants are more sensitive.
Hosts:	Perennial ryegrass, red fescues, and annual meadow grass as well as tall fescue are frequently affected by helminthosporiosis.
Periods:	Helminthosporiosis is very common on temperate grass species but also on <i>Cynodon dactylon</i> and zoysia. If conditions are favorable, the disease can develop throughout the year and its presence can often further degrade an already mediocre winter appearance.



The very typical red filaments formed at the tips of the affected plants. (STRI).



The affected area with red thread has reddish-colored spots. (STRI).



Winter fusarium after attack by *Microdochium nivale* – the spots grow and eventually merge. (STRI).



Fusarium attack. The plants are waterlogged. (STRI).



Ring structures formed following attacks by *Gaeumannomyces graminis*. (STRI).



An old ring of take-all patch with the color red-brown to bronze. (WG).



DOLLAR SPOT

Latin name:	<i>Sclerotinia homeocarpa</i>
Other names:	-
Symptoms:	On closely mown turf, the disease appears as small spots 1-2 cm in diameter. Generally, the spots are circular and very distinct, unless the attack is so severe that the spots merge to form larger affected areas. Inside the spots, the grass is discolored, white or straw-colored. Often, a darker border separates the discolored and sunken center from the healthy turf around it.
Hosts:	Bentgrasses, Poa sp., fescues, and Zoysia.
Periods:	A lack of nitrogen can make plants sensitive. Dormant mycelia become active when both night and daytime temperatures are above 16°C. If the nights are mild and humid, the disease can progress very quickly from spreading in surface wetness.

TAKE-ALL PATCH

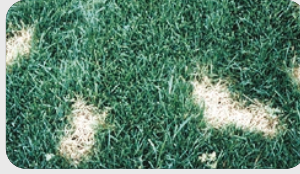
Latin name:	<i>Gaeumannomyces graminis</i>
Other names:	Ophiobolus patch / Foot rot
Symptoms:	Attacks appear as dark green spots irregular in shape, 5-10 cm, which become pale green to reddish-brown or bronze in color. A ring structure is formed when the attack becomes serious. The ring may return, year after year, to the same place, expanding. The fungus attacks the stems and roots, which wilt and are easily pulled out. The roots have a typical black-brown color. There are significant changes in the botanical composition in the center of the ring. Instead of the original species, there is often red fescue and Poa Annua as well as weeds such as Sagine sp. and chickweed. The change is permanent. The disease is mainly a problem on young lawns (the first 3-4 years).
Hosts:	Take-all patch mainly attacks bentgrasses, but perennial ryegrass and Poa Annua can also be affected.
Periods:	Visible damage from May to October. Mainly a problem in cold and wet years. Occurs with Acid/Alkaline junctions

YELLOW TUFT

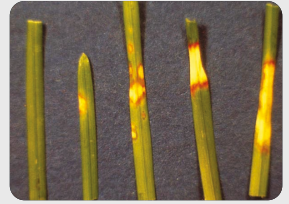
Latin name:	<i>Sclerophthora macrospora</i>
Other names:	-
Symptoms:	This disease appears as small, bright-yellow patches, usually 1-3 cm in diameter, consisting of densely tillered plants. Affected plants have shortened, weakened roots and can be easily pulled from the turf surface. The pathogen disrupts crown and root development, producing a tufted, uneven sward. Under prolonged wet conditions, symptoms may expand or coalesce, giving an irregular mottled appearance on closely mown turf.
Hosts:	Most common on intensively maintained fine turf, particularly golf and bowling greens. In the UK it is seen mainly on Poa annua and Agrostis spp., though other fine grasses can be affected where soil saturation or restricted aeration occurs.
Periods:	Favoured by cool, wet weather in spring and autumn. Outbreaks may also occur in wet summers, especially after sand topdressing, brushing or dragging when moisture persists at the surface.



↑ Circular spots of the size of a 'dollar'.



↑ Brown patches.



↑ Damage to the leaves in egg-cup shape.



Ring structures formed following attacks by *Gaeumannomyces graminis*. (STRI).



↑ An old take-all-patch ring with a reddish-brown to bronze color. (WG)..



← Characteristic "frog's eye" of early summer attacks

GREY SNOW MOLD

Latin name:	<i>Typhula incarnata</i>
Other names:	Typhula Blight
Symptoms:	The infection spreads rapidly under the snow, where humidity is high and the temperature is around 0°C. Small grey spots become visible when the snow melts. Individual plants dry out and degenerate to form a dry, paper-like structure. If humidity is high, a grey-white mycelium develops. The affected areas are often about 50 cm in diameter. A typical feature of grey mold is the presence of golden-brown sclerotized structures the size of a pinhead. Symptoms are often observed on dried leaves or at the base of the roots. The affected areas rarely die, but regenerate relatively quickly in spring.
Hosts:	All turfgrass species, but bentgrasses, annual bluegrass, and perennial ryegrass are particularly sensitive.
Periods:	From October until March after the snow.

DAMPING-OFF - PYTHIUM

Latin name:	<i>Pythium spp.</i>
Other names:	Pythium foliar blight / cottony blight / grease spot / Pythium "melting out" and "damping off" on sprouts/seedlings
Symptoms:	Pythium can cause damage both to young seedlings (sprouts) and mature plants. Round patches several tens of centimeters in diameter appear during warm and humid periods. The appearance is reminiscent of turf submerged in water and feels greasy to the touch. With high humidity, the mycelium may appear cottony.
On seedlings:	Pythium spp. are among the fungi capable of causing damping-off (attacks on roots and/or aerial parts). Additionally it can occur in heavy seed application rates.
Hosts:	All species are susceptible.
Periods:	All year round but especially in warm and umid weather.

FAIRY RINGS

Latin name:	<i>Marasmius oreades, Sclerotoderma spp., Hygrophorus spp. etc.</i>
Other names:	-
Symptoms:	Fairy rings can vary greatly in size: a few centimeters, but they rarely exceed a diameter of 5-10 meters. They are classified according to their appearance:
Type 1:	Forming rings where the turf withers and dies. The ring is bordered on each side by darker, vigorously growing grass. Fungi may be present. A white mycelium is present under the affected plants. In the soil, there is a typical mushroom odor. This type is the most damaging.
Type 2:	Forms rings with vigorously growing grass.
Type 3:	Does not visibly affect the turf but creates mushrooms on the surface.
Hosts:	All turfgrass species.
Periods:	Once present, the rings generally remain for years.



Grey snow mold.
The plants die and stick together in a kind of structure like paper. Brown-golden structures are visible in the middle of the photo. (GCN).



Brown-golden structures on affected plants. (GCN).



Pythium: Cottony appearance.



Pythium:
Severe attack.



Pythium: turf completely destroyed in some areas.



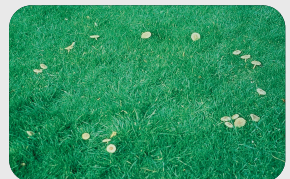
↑ Type 1 fairy ring forming rings where the turf withers and dies. This ring is surrounded by vigorously growing grass. (STRI).



Round of fairy type 2 forms rings or the vigorously growing turf. (STRI).



Fairy ring of type 3 apparently does not affect the turf, presence of mushrooms on the surface.



RUSTS

Latin name:	<i>Puccinia and Uromyces spp.</i>
Other names:	-
Symptoms:	The onset of the attack is characterised by small light yellow spots on the leaves. The spots enlarge as the fungus develops in the leaves. Then a large number of yellow, brown, or black spores are produced. Their appearance depends on the type of rust. A fine powder or "dust" is often visible on the surface of the leaves when the spores are released. A severe attack gives the turf a yellowish or brownish appearance. The spores are spread by wind, people, and machines. They can quickly travel to other locations. The attack weakens the plants and the turf may thin out.
Hosts:	All turfgrass species.
Periods:	Mainly from June to September. Rusts develop mainly above 20°C on stressed plants.

BROWN PATCH

Latin name:	<i>Rhizoctonia solani</i>
Other names:	Rhizoctonia blight
Symptoms:	Only the leaves are affected, and the turf usually recovers with proper nutrition & adequate moisture. The affected areas appear discolored, with round spots following a purplish-green appearance. On tall fescue, the disease may be uniform, without visible spots. The English term "brown patch" refers to a brown border sometimes present, giving the turf a dried-out appearance, similar to a lack of water.
Hosts:	Mainly a problem on tall fescue, ryegrass & creeping bentgrass, but the number of potential hosts is large. Easy propagation using mycelium or sclerotia.
Periods:	Especially in summer/autumn in the presence of continuous humidity – hence the importance of starting any irrigation late at night or early in the morning (avoid watering on hot soils).
To be avoided:	Excess nitrogen fertilisation at the end of spring beginning of summer – however maintain a balanced fertilisation of P & K. Higher sensitivity in the year of sowing.

DRY PATCH

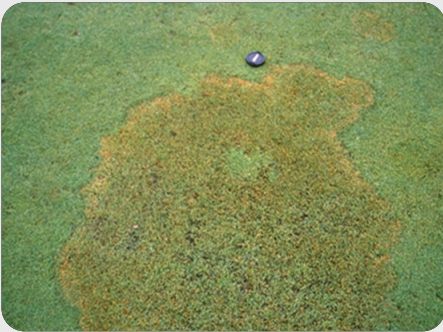
Latin name:	<i>This is not a fungal or bacterial disease but a physical phenomenon associated with poor degradation of organic matter.</i>
Other names:	Localised Dry Spot (LDS)
Symptoms:	Certain areas of the turf, more or less extensive, are of an appearance similar to a real lack of water. However, the cause is asphyxiation caused by a substrate that has become insufficiently permeable & hydrophobic & by shallow, & weak, rooting. Certain diseases may be present without being responsible for the problem.
Hosts:	All species are affected, but more frequently on golf greens due to excessive thatch accumulation caused by insufficient mechanical maintenance, inadequate fertilisation & poor decomposition of organic matter. The turf weakens and degrades easily, leaving bare soil areas.
Periods:	From early summer until autumn – but poor aeration will have consequences throughout the year.



↑ Rust attack on meadow grass. (GCH).



↑ Rust attack on ryegrass English. (GCN).



↑ Brown patch "smoke ring" on the periphery.



↑ Brown patch: Symptoms at the onset of infection.



Dry spots. Unfortunately, a frequent phenomenon. Surface water runoff indicates the hydrophobicity of the area. Characteristic symptom of Dry Patch.

GREY LEAF SPOT

Latin name: *Pyricularia oryzae*

Other names: -

Symptoms: The spots on the leaves are initially round or oval, light brown with a dark brown border. In humid weather, they become grey & produce spores. As they spread, they encircle the leaf, leading to the death of the plant. If the disease progresses, it can seriously damage the lawn.

Hosts: All species are affected, but more frequently on tall fescue (*Festuca arundinacea*) & ryegrass (*Lolium perenne*).

Periods: When temperatures are between 28 & 32°C, & there is continuous humidity in the turf for 9 hours, or when temperatures are between 20 & 23°C, & there is continuous humidity for 21-36 hours. The fungus also requires at least 14 hours of uninterrupted leaf moisture to initiate infection. Any factor that increases leaf moisture promotes the development of pyriculariosis.

SUMMER ROTS

Latin name: *Sclerotium rolfsii*

Other names: Southern blight / Rolf's disease

Symptoms: The disease is favored by warm and humid weather, which causes the sclerotia to germinate. The light beige then brown sclerotia, visible during attacks at the base of the plants, are quite large - 1 to 3 mm in diameter. Pale ring-shaped patches of turf quickly appear, often leading to almost total dieback. The sparse regrowth in the center of the patches gives a characteristic appearance of the disease. Presence of whitish mycelium if humidity is high.

Hosts: The disease mainly affects bentgrasses, bluegrasses & sometimes *Cynodon* spp. However the host range is very broad. Rare in regions with temperatures below 0°C.

Periods: Warm and humid periods. A lawn in poor condition, too thatchy, poorly balanced on soil where excesses & shortages of water alternate, is more vulnerable.

PESTS

FEVER FLY

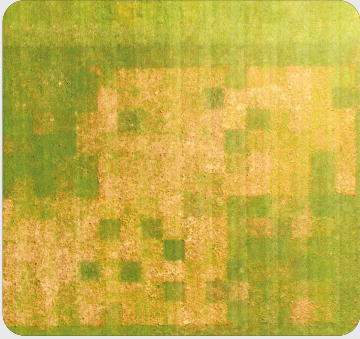
Latin name: *Dilophus febrilis/Bibio marci*

Other names: Bibions

Symptoms: The larvae often consume the dead parts at the base of the plants, but if the population becomes large and they lack food, they may attack the living parts. The plants are eaten just below the soil level - they die and become easy to pull out. The larvae then appear in large numbers like maggots in a piece of meat. Significant damage occurs if birds peck in search of the larvae.

Hosts: Any species of turf grasses.

Periods: Bibions have two generations per year. The first generation causes the most damage in June and July. The second generation causes damage in autumn until spring/end of April when larval pupation occurs.



Rear view of a test site affected by Pyricularia



Sports field damaged by Pyricularia disease
↓



↑ Characteristic "frog's eye" of early summer attacks



↑ Sclerotium: Total dieback in some areas.



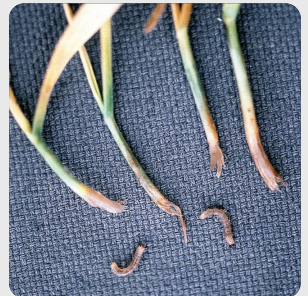
↑ Fever fly larvae with a black head and spiny outgrowths on the body. (GCN).



↑ The adult fever fly resembles a typical fly, reaches 5-6 mm and is very hairy. (GCN).



Fever fly attack. Plants cut just below the soil level. (GCN).



FRIT FLY

Latin name:	<i>Oscinella frit</i>
Other names:	-
Symptoms:	The adult does not cause damage: it is the larvae, which feed on the most developed tillers and on the roots, that attack the turf. The cells die, the tillers turn yellow and disappear. The main tillers can easily be pulled out and the damage caused by the larvae becomes visible at the base of the tiller. The plant stops growing in height and produces tillers on the sides.
Hosts:	All species of turf grasses. Ryegrass, red fescues & bentgrasses are the most sensitive.
Periods:	Oscinella larvae hatch three times a year, in May/June, July/August and August/September. It is the third generation that causes the damage the most significant in September.

COCKCHAFERS OR CHAFER GRUBS

Latin name:	<i>Phyllopertha horticola</i> / <i>Hoplia philanthus</i> / <i>Melolontha melolontha</i> / <i>Amphimallon solstitiale</i>
Other names:	Garden Chafer/Welsh Chafer/Summer Chafer
Main species of cockchafers residing in UK:	<ul style="list-style-type: none"> • The garden chafer (<i>Phyllopertha horticola</i>): Annual cycle. Presence of young larvae in July and older larvae in August-September. • The flower chafer (<i>Hoplia philanthus</i>): 2-year cycle. • The common cockchafer (<i>Melolontha melolontha</i>): 3-year cycle. • The Saint John's chafer (<i>Amphimallon solstitiale</i>): 2 to 3-year cycle.
Symptoms:	The larvae feed on the roots of the turf. This causes the plant to wither, a phenomenon accentuated by water stress; in cases of infestation, the turf can literally be rolled up like a carpet! Wildlife and birds are very fond of these larvae, which they seek out, causing even more significant damage than that caused by the insect itself.

CUTWORMS OR GRAY WORMS

Latin name:	<i>Agrotis sp</i>
Other names:	-
Identification sheet:	Pests on the rise. Nocturnal activity.
Symptoms:	The larvae consume the leaves and cut off the plants near the collar. On greens, the larvae can be identified by the grazing of grasses around their gallery. The damage is all the more significant as the larvae are older.



↑ Frit fly larvae reach 4-5 mm without heads or protrusions. (GCN). →



Frit fly on perennial ryegrass. The main tillers are yellow. (GCN). ←



← The larvae of horticultural cockchafer are between 1-2 cm long, whitish with 3 pairs of legs and a shiny brown head. The larvae are often in a "C" position. (GCN).



← The adult reaches 1 cm, green at the front, with shiny brown forewings. (GCN).



↑ Attack on green by horticultural cockchafer (BB).



Cutworms. Pest on the rise. Nocturnal activity. ←

MOLE CRICKETS OR MOLE-GRYLLIDS

Latin name:	<i>Grylotalpa grylotalpa</i>
Other names:	-
Identification sheet:	Belongs to the same order as grasshoppers (Orthoptera). Increasing in numbers. Predominance in loose, cool soils rich in humus.
Damage:	The insect is very mobile beneath the surface of the soil at night and cuts the roots of grasses as it passes through.

WEEVILS

Latin name:	<i>Phyllobius pyri</i> , <i>P. maculicornis</i> and <i>P. vespertinus</i>
Other names:	Leaf Weevil
Identification sheet:	No damage is caused by the adults, but by the larvae which consume the roots. The bites are just below the level of the soil, then allowing the turf to be rolled up like a carpet. If the plants are pulled up, the larvae are visible on the soil surface or just below. Early attacks appear as individual dead tillers or when several plants wither. Large or small patches are visible on the turf, especially in areas of light soil.
Hosts:	Attacks all species of grasses, but fine-leaved species such as red fescues are particularly sensitive.
Period:	Frequent damage in August and September. Severe attacks possible in June and August, especially in dry years. Pupation from the end of September.

LEATHERJACKETS

Latin name:	<i>Tipula Paludosa</i> / <i>Tipula Oleracea</i>
Other names:	Crane fly
Identification sheet:	Undoubtedly the number one enemy of your lawns; a predominant species in Northern Europe: <i>Tipula paludosa</i> – Its presence is favored in moist soils poor in humus.
Tipula oleracea:	2 cycles per year
Symptoms:	In permanent meadows and maintained lawns, plants die in patches as a result of the cutting of stems and underground organs; The clumps become sparse and turn yellow. Birds, which are very fond of the larvae, can cause significant damage.



Mole crickets or Mole crickets very mobile beneath the surface of the soil at night.



Weevil larvae are about 8 mm, white, legless with a brown head. (GCN).



The bites of weevil larvae cut the roots just below the soil, then allowing the turf to be rolled up like a carpet. (GCN).



The weevil adult measures between 6-8 mm, green-brown with a metallic sheen. (GCN).



↑ Crane fly larvae are grey-brown and about 4 cm at full development. (GCN).



The nostrils clear and outgrowths pointed outgrowths of larvae of crane flies. (GCN).



→ The crane fly is a large, slender mosquito-like insect with a body length of about 2 cm (GCN).



ABOUT DLF

DLF Seeds is a world-leading grass and wildflower seed company, operating in more than 80 countries. DLF have a variety of brands/ product ranges for local landscapes all the way up to high profile and elite sporting facilities or grounds.

GUARANTEED SEED PURITY YOU CAN RELY ON

To give you the purest seed on the market had to set new standards of quality control – to define levels of purity that exist nowhere else.

For our most demanding level of purity – our superior quality, S-grade – we applied a tenfold increase to the standard sample size. DLF Select S-grade seed is for customers who demand the extraordinary.

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DISEASE WATCH BY DLF

We're committed to developing pioneering management solutions for turf managers utilizing the knowledge and expertise of our global research network. As part of this, we have implemented an industry-leading 'Disease Watch' programmes. By gathering input across Europe, we can monitor and understand the shifting disease landscape. Utilising this information, we develop screening programs to assess the disease resistance in our grass portfolio.

Along with this, DLF have conducted comprehensive GLS & Brown Patch screenings to ensure performance of key varieties against these diseases.

REFERENCES

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