# All you ever wanted to know about Fusarium patch \ Microdochium patch \ Pink snow mold or whatever that disease is called.

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**What's the difference between Fusarium patch and Microdochium patch?**

The most common turfgrass disease of cool, wet maritime climates is caused by a fungus called *Microdochium nivale*. However, this fungus has been called by a variety of scientific Latin names including: *Fusarium nivale, Gerlachia nivalis, Monographella nivalis, Calonectria nivalis, Micronectriella nivalis* among others. One of the older names for this fungus is *Fusarium nivale*, and hence the common disease name, Fusarium patch. However, there have been attempts to change the common name of the disease to reflect the scientific name of the fungus, such as with the use of Gerlachia patch or Monographella patch. Most of these disease name changes did not catch on, except for Microdochium patch. So there is no real difference between Fusarium patch and Microdochium patch since they refer to the same disease.

**Why did the name of the fungus change?**

Blame it on the people who study the fungi (mycologists) and not the people who study the diseases (pathologists). The fungus was first described as in 1825 as *Lanosa nivalis*. Based on the similarity of spores of this fungus to those of *Fusarium* species, it was renamed *Fusarium nivale* in the late 1800's. Up until 1980, the fungus retained this name, and some researchers still refer to it as *Fusarium nivale*. In 1980, some mycologists proposed that it be renamed *Gerlachia nivalis* because the spores lacked a feature (conidial foot cell) that is present in spores of true *Fusarium* species. In 1983, other mycologists proposed a name change to *Microdochium nivale* based on shared features with another *Microdochium* species. This name has remained constant since then, and is generally accepted as the proper one for the stage that produces conidia. (There is another valid scientific name for the stage that produces sexual spores - but you don't really want to know more about that. Again blame it on the mycologists who deserve to be featured in their own Spider video. If you don't get this joke, search for spiders and drugs on youtube).

**What's the difference between Microdochium patch and pink snow mold?**

Microdochium patch, Fusarium patch and pink snow mold are all caused by the fungus *Microdochium nivale*. There was an attempt in the late 1990's to change the names of all these diseases to pink snow mold. This caused an awkward situation for regions that very seldom experience snowfall, yet were having outbreaks of what was being called a snow mold disease. More recently, there has been a trend, especially in the U.S., to use the name Microdochium patch to refer to the disease symptoms caused by *Microdochium nivale*, both with and without snow cover. Under snow cover, *Microdochium nivale* causes circular patches of disease that can be up to 20 cm across (**Figure 1**). In the absence of snow cover, and with cool wet weather, *Microdochium nivale* generally causes irregularly shaped patches that are less than 5 cm across (**Figure 2**) unless there is a prolonged outbreak. The issue then is whether these should be considered separate diseases or a single disease. I personally prefer to retain the two older names, pink snow mold and Fusarium patchÂ  as referring to separate diseases, rather than combining them into a single disease name, Microdochium patch. However, the name Microdochium patch may gradually replace the name Fusarium patch, as more turf managers become familiar with the newer name. So with these definitions in mind, Microdochium patch and pink snow mold are different since they refer to two different diseases.

**What's the difference between Fusarium patch and pink snow mold?**

Fusarium patch is a common spring and fall disease problem on turf in many parts of Canada and in cool temperate areas around the world, which have prolonged periods of cool, wet weather. The symptoms develop slowly, and the time from an initial infection until symptoms are visible can take weeks. In the fall, if actions are taken after extensive symptoms are observed, it may be hard to get rid of the symptoms because the grass is slowing down or going into dormancy, and regrowth may not occur until the following spring. In the spring, disease may develop around the edges of pink snow mould patches, or develop in small irregular patches or spots. In contrast, pink snow mold requires snow cover, and large circular patches are seen only after snowmelt. The fungus may be abundant on the patches with light pink fluffy growth called mycelium (**Figure 3**). Serious injury and large patches occur generally only after extended snow cover (more than a month) with a prolonged snow melt. Pink snow mold patches may develop a bright bronze fringe at their edges (**Figure 4**), and this is one way to distinguish between pink snow mold and gray snow mold. Heavy topdressing or a layer of leaves can also enhance disease caused by *Microdochium nivale*, which may be responsible for much of the turf kill on home lawns that have a heavy layer of leaves throughout a cool wet winter. So although Fusarium patch and pink snow mold are caused by the same fungus, they can be considered two different diseases.

**Which grasses are susceptible?**

All the cool season grasses can get disease caused by *Microdochium nivale*; however, creeping bentgrass, annual bluegrass and perennial ryegrass are considered more susceptible than the other turf species. Cereals such as wheat and oat also can be infected by *Microdochium nivale*, and the disease on wheat is called pink snow mold.

**What conditions favor disease?**

Fusarium Patch will occur when temperatures are between 0-15Â℃ with leaf wetness periods of greater than 10 hours a day for several days. Pink snow mold occurs under snow cover, with disease development enhanced by slowly melting snow, and more pronounced disease with longer snow cover. Both diseases are often more severe in shady areas with poor air circulation, poor drainage and a thick thatch layer. Heavy applications of fast-release nitrogen and heavy topdressing serve to increase disease levels.

**What are the symptoms?**

Fusarium patch in the fall starts as small orange to red-brown circular spots a couple of cm in diameter (**Figure 5**). Under conditions favorable to disease, the spots will increase in size, and the patches can enlarge and overlap to form large irregular shapes greater than 20 cm across (**Figure 6**), sometimes with green grass intermixed with yellow grass. When the fungus is very actively growing, the patches have a brown to bronze ring at the outer edge (**Figure 2**). The centers of the patches can turn pale and strawlike or sometimes retain a green color depending on conditions at the time of infection. Under prolonged wet conditions, white to pink mycelium may be observed on the outer edge of the patch matting the infected leaves together (**Figure 7**). Diseased grass may appear wet and slimy, and patch centers may have algal growth on the dead leaves. In the spring, fungal activity first starts at the edge of the pink snow mould scars. If favourable conditions (cool and wet) persist in the spring, new spots can occur. Because spores and fungal mycelia are spread by water, machinery and foot traffic, the blighting can appear in streaks or even straight lines when the fungus is carried by surface drainage and or wheels.

Pink snow mold becomes visible when snow melts, as entire patches of dead, bleached and mycelium-matted grassÂ (**Figure 1**). Patches are orange-yellow to red-brown ranging in size from 10-20 cm, but can overlap to form larger patches with scalloped edges. White to pink fungal growth frequently can be seen on outer margin of patch up to several days after snow melt (**Figure 3**). The intensity of the pink colour of the fungal growth and the infested leaves increases with exposure to sunlight (**Figure 8**). On Kentucky bluegrass and annual bluegrass, the patches are usually more white in the center and reddish brown on the outer edge (**Figure 9**), whereas on creeping bentgrass, the entire patch is reddish brown (**Figure 4**). Under severe disease conditions, crowns and roots may be killed resulting in little recovery in the spring. Disease tends to be present in same areas year after year if the same environmental conditions persist.

**What is the disease cycle of this fungus?**

*Microdochium nivale* survives through the summer as spores and mycelium in thatch or soil, and is generally dormant when temperatures are above 20C or when it is dry. In autumn, under cool, wet weather, spores may germinate or mycelium may grow from thatch or soil and infect leaves. Spores are carried by wind or surface water to adjacent healthy leaves. The fungus may attack foliage under snow cover especially if the plants have not hardened off and are damaged by the cold temperatures, or have become weakened by prolonged snow cover. After snowmelt the fungus remains active particularly if it remains cool and wet.

**What are the management recommendations?**

Minimize thatch, since this is where the fungus survives summer as mycelium and spores, and heavy thatch decreases the vigor of the turf. Prevent succulent growth into late fall, by mowing until leaf growth stops, and not applying quick-release nitrogen any later than 6 weeks before dormancy. Slow release nitrogen can be used during this time and also after dormancy has set in. Maintain adequate soil potassium levels throughout the fall. In autumn, remove surplus water, improve air circulation, rake leaves and avoid heavy topdressings. After heavy snowfall, the depth of the snow cover can be reduced so that that duration of snow cover is reduced, but avoid exposing turf to cold dessicating winds. After disease damage has occurred, rake matted areas to encourage drying and promote new growth by lightly fertilizing damaged turf. In the spring, avoid succulent growth by delaying heavy nitrogen fertilizer applications. Fungicides can be applied in the fall when disease symptoms first start to occur. This will reduce the amount of fungus present until the late fall preventative snow mould fungicides are applied. The number of fall fungicide applications depends on how long the weather stays cool and wet. Then if the area normally experiences snow cover of more than a month, a snow mold fungicide may be applied to protect the grass for the duration of snow cover. The snow mold fungicide applications often involve higher rates of fungicides and the use of more persistent chemicals. After snowmelt, if extensive pink snow is observed or if conditions continue to be favorable for Fusarium patch development, fungicides can be applied. Consult provincial publications for the registered products and the product labels for recommended rates.

**What's the difference between pink snow mold and pink snow mould (or grey snow mould and gray snow mold)?**

Mold and gray are American spellings, whereas mould and grey are British spellings. For regular usage among Canadians, either form is acceptable, but it is better to be consistent and not write "gray snow mould" or "grey snow mold".

## Figures

Figure 1. Under snow cover, *Microdochium nivale* causes circular patches of disease that can be up to 20 cm across

Figure 2. In the absence of snow cover, and with cool wet weather, *Microdochium nivale* generally causes irregularly shaped patches that are less than 5 cm across.

Figure 3. The fungus may be abundant on the patches with light pink fluffy growth called mycelium

Figure 4. Pink snow mold patches may develop a bright bronze fringe at their edges, and this is one way to distinguish between pink snow mold and gray snow mold.

Figure 5. Fusarium patch in the fall starts as small orange to red-brown circular spots a couple of cm in diameter.

Figure 6. Under conditions favorable to disease, the spots will increase in size, and the patches can enlarge and overlap to form large irregular patches greater than 20 cm across

Figure 7. Under prolonged wet conditions, white to pink mycelium may be observed on the outer edge of the patch matting the infected leaves together

Figure 8. The intensity of the pink colour of the fungal growth and the infested leaves increases with exposure to sunlight

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| Figure 9. On Kentucky bluegrass and annual bluegrass, the patches are usually more white in the centre and reddish brown on outer edge | |