

WINTER KILL - Its Cause and Cure

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Winter kill is a broad term which is used to describe injury to turfgrass during the winter period. Most often the condition is noted in late winter or early spring about the time that growth normally begins. There are five causes of winter injury. These may be listed and discussed as follows: 1. Desiccation, 2. Suffocation of roots from excess moisture, 3. Suffocation of the plant from carbon dioxide, 4. Scald from light reflection through ice crystals and 5. Snow Mold disease. Very often a combination of all five causes results in a single case of winter kill. Turf which has been weakened by disease or chemical or mechanical injury during the previous growth season is often more susceptible to winter kill.

DESICCATION: Turf which is not protected during the winter from strong dry winds may dry out and perish from lack of moisture. Even though turf is dormant and is not producing foliar growth it still has a minimum water requirement. Under normal conditions where snow covers the turf and protects it from drying out or where other vegetative wind breaks shelter the turf injury from desiccation is not common. It is most often noted on putting greens, on new or thin stands of turf and on elevated areas exposed to strong air currents such as greens and tees. This type of winter injury is caused by the loss of moisture from the frozen soil. Ice crystals change into water vapor through a process of sublimation and thus soil moisture is lost and carried off by strong winds. The depletion of moisture levels under a turf may be great enough to cause injury to the plants.

Protect against this type of winter damage by use of snow fences or other types of artificial or natural vegetative barriers to protect turf which is subject to winter desiccation. Encourage snow to collect on these areas. Where an open winter without snow is encountered it may be necessary to water the turf at infrequent intervals. This may be successfully done by using a large tank type sprayer on a day when temperatures are above freezing. The amount of water applied need not be large as long as the surface of the turf and soil is moistened.

SUFFICATION FROM EXCESS MOISTURE: During winter months ice may collect in low spots or hollows which do not drain. As temperatures rise in late winter and early spring water collects under the ice and above the frost layer in the soil. It may become trapped in this position long enough to suffocate the grass as it starts its first spring growth. Oxygen is required for the growth of all turfgrasses. It must be present in the soil or the roots fail to develop and may die. It has been noted that grass which has entered the winter in an over stimulated condition is more susceptible to this type of injury. Over stimulation is most often due to excessive amounts of available nitrogen in the soil.

To prevent this type of winter injury: (1) Topdress regularly to keep depressions which may collect excess moisture from forming. (2) Reconstruct areas of unstable turf to remove hollows and to improve surface drainage. (3) Aerify greens which are subject to winter injury late in the fall and leave aerifier holes open. (4) Remove a strip of sod from pockets in a green where water collects. Continue these strips out to the edge of the green. Deepen the channel by removal of soil so that water will drain from the low spot within the green to the edge of the green and off into the fairway. Place the sod strips roots down on the grass next to the green. Keep them from drying out during the winter. Replace them in the green after all danger of winter injury has passed in early spring. (5) Where the frost layer is thin puncture it several times with a crowbar or other pointed implement to allow water to drain out

of low spots in early spring. (6) Break up ice and remove large amounts of snow from turf which is subject to winter injury. This should be necessary only during late winter or early spring accumulations.

SUFFICATION FROM CARBON DIOXIDE ACCUMULATION: Injury to turf occurs at times before ice melts and frost starts to leave the ground. In this case a suffication of the plant from excess water in the rootzone cannot be responsible for the injury. It has been noted that a solid ice cover is always found over the injured turf. The ice may be covered with snow so that it is not visible but it is always present. It is known that as turf over winters even in a dormant state there is a certain amount of respiration taking place. A by-product of respiration is carbon dioxide. Since the plant is not growing it cannot use this in photosynthesis, thus it accumulates under the ice. At the same time oxygen is depleted. A toxic concentration of carbon dioxide is believed responsible for some turfgrass failures during late winter periods. A cracking of the ice to allow the carbon dioxide to escape is the only way to prevent this type of injury.

SCALD: Thin sheets of ice may be so formed that lenses develop within the ice that are responsible for turfgrass injury. The sun's rays may be so magnified by the ice that the turf heats up underneath. This may initiate growth at an unfavorable time from the standpoint of soil moisture conditions and soil aeration. Leaves may actually be scalded or become wilted from such conditions. This type of injury may be controlled by breaking up the ice to allow air circulation underneath it. This moderates growth conditions so that the turf may make a more natural start during early spring.

SNOW MOLD: The activity of fungi (Typhula and Fusarium species) on the dormant turf may cause disease injury during the winter and early spring. As a rule these pathogens are most active at temperatures from 40 degrees to 60 degrees F. They develop readily in areas along the receding edge of snow banks and under the snow where footprints, ski tracks and other forms of traffic have compacted the snow. Injury is not noted until the snow has melted and by this time it is too late for effective use of fungicides. Injury may be reduced by brushing the turf to break up the fungus organism and thus let air and light into the sod. Recovery will be speeded by applications of a little extra soluble or inorganic fertilizer applied early in the spring.

Where snow mold is noted regularly such as on putting greens and on bentgrass tees and lawns a preventative chemical treatment should be applied in early winter before the first snow and again in mid winter (during a January thaw). Mercury chlorides, phenyl mercury, thiram and cadmium compounds have been used effectively for this purpose.

SUMMARY: It is often assumed that there is little need for turfgrass managers to be concerned with the grass during the off season (periods of late fall and winter and early spring). All too often golf courses are understaffed at this time of year. If winter injury is to be prevented, particularly on putting greens, there is a time consuming job to be done in checking the condition of the dormant turf. Where winter injury occurs frequently major reconstruction or renovation may be necessary to improve over-all growth conditions for the grass.