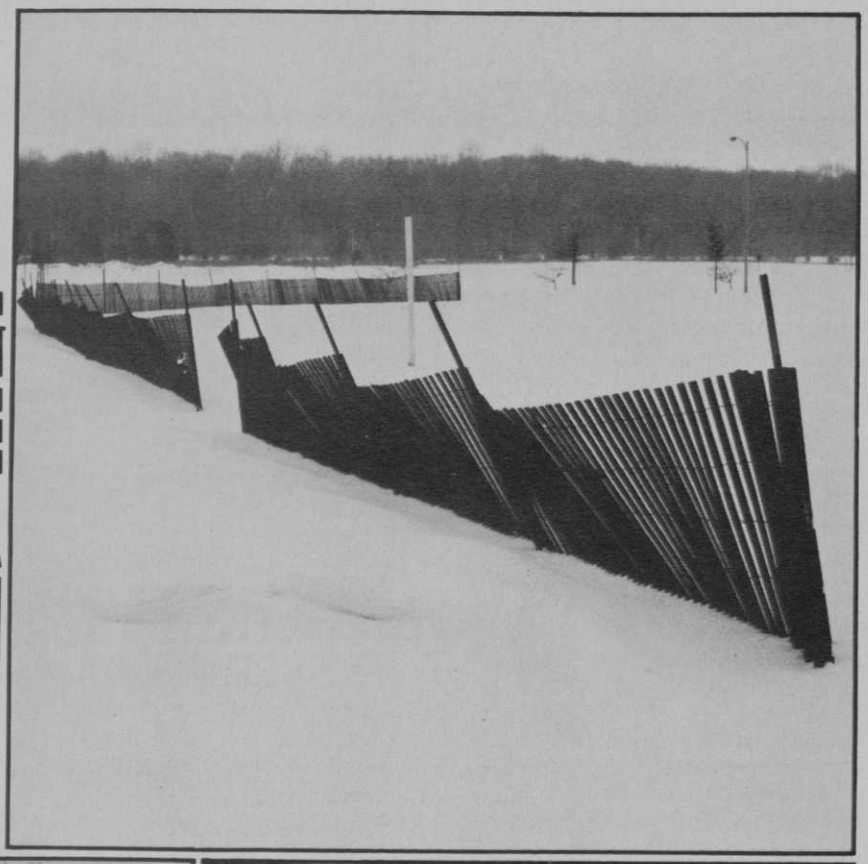
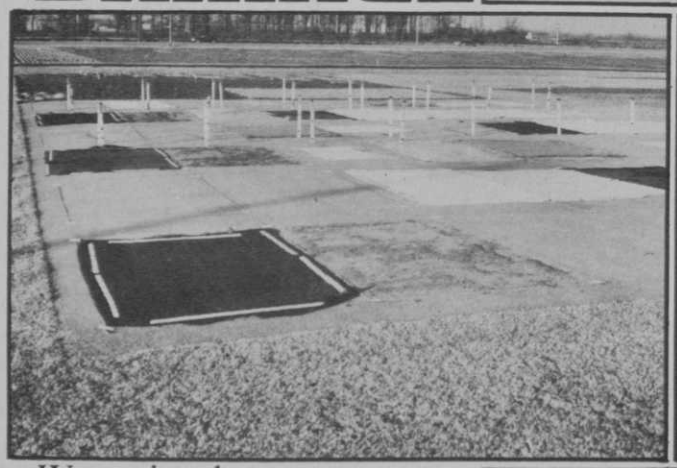
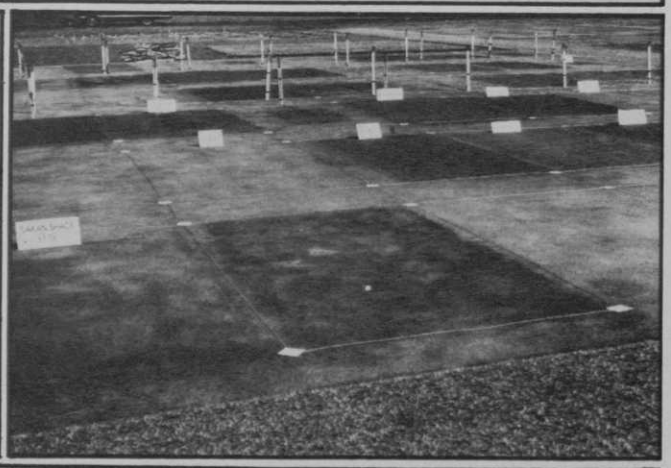
PUTTING THE DAMPER ON WINTER DAMAGE

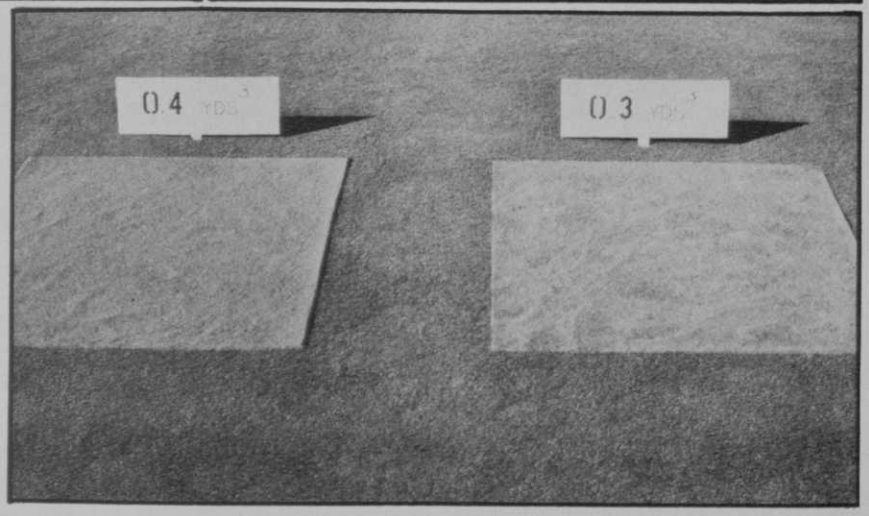






Water is a key to preventing winter desiccation, but how to retain it over the cold, dry period is the problem. Here are programs tailored to individual course conditions

by DR. JAMES B. BEARD



Winter desiccation, along with direct low temperature kill and the low temperature diseases, is one of three major causes of turfgrass winter injury. Winter desiccation of turfs becomes a concern if severe injury occurs to the meristematic areas of the crown responsible for initiation of new roots and shoots or to the nodes on rhizomes and stolons that initiate new turfgrass plants. Some atmospheric desiccation occurs to turfs every winter. If the injury is only to the leaf tissue, then it is superficial and causes no permanent damage to the turf, which requires reestablishment. This type of winter desiccation is frequently referred to as "windburn."

Winter desiccation is most commonly observed on cool season turfgrasses, but can also be a problem on warm season species, such as bermudagrass. Turfgrass species or cultivars that continue to maintain shoot growth later into the fall period are more prone to winter desiccation injury. Differences have been observed among the bentgrass cultivars in terms of their proneness to winter desiccation injury. Seaside creeping bentgrass is particularly tolerant of winter desiccation under Michigan conditions.

CAUSES OF WINTER DESICCATION

The basic cause of winter desiccation may be attributed to either soil or atmospheric drought. Winter desiccation caused by soil drought most commonly occurs in the plains regions of the United States and Canada where fall and winter precipitation, both rain and snow, is very low. Turfs that are subjected to extended soil drought during the winter period may develop deep cracks caused by soil shrinkage. This condition is frequently observed on greens.

Snow fence (top), as a windbreak, enhances snow accumulation on leeward side. Winter protection plots with covers (center, left) and turfgrass appearance just after removal (right). Appearance of winter topdressing (bottom) at 0.4 and 0.3 cubic yards per 1,000 square feet.

Atmospheric winter desiccation is a problem to varying degrees throughout North America. It may occur even though adequate soil moisture is available, because the evapotranspiration rate from the turf exceeds the water absorption rate from the soil. Conditions most commonly associated or contributing to atmospheric winter desiccation injury include (a) a restricted root system, (b) droughty atmospheric conditions, including a low relative humidity and high wind velocity, (c) soil water in a frozen, unavailable state in so far as root absorption is concerned, and (d) increased viscosity of water at low soil temperatures plus decreased root membrane permeability to inward water movement.

Atmospheric winter desiccation most commonly occurs on elevated sites that are subjected to the severe desiccating effects of winds plus increased loss of precipitation by surface runoff.

PREVENTING WINTER DESICCATION

Numerous cultural techniques have been utilized over the years to prevent or minimize the degree of winter desiccation injury, particularly on intensively maintained turfs, such as putting greens. The basic methods involved are controlling the loss of water from the turf by using some sort of barrier or by applying additional quantities of water to the turf during the winter period. The particular method that is most effective in a given location of the country will be determined by (a) the extent of golfing activity during the winter period, (b) facilities and availability of water to irrigate the area, (c) severity of desiccating conditions anticipated, and (d) budget available for use in preventing winter desiccation injury.

Synthetic Protective Covers. A winter protection cover should be considered for use on turfs subject to (a) low amounts of winter precipitation, (b) severe drying winds, (c) minimal snow accumulation, (d) negligible winter use, and (e) a history of serious desiccation injury. A number of synthetic protective covers have been developed recently for use on critical turfgrass areas, such as greens and tees. Characteristics desired in a synthetic winter protection cover include:

1. Protection against winter desiccation by functioning as a barrier to soil moisture loss;
2. Insulation against low temperature extremes that can cause turfgrass injury;
3. Partial light penetration that permits early spring green-up of the turf;
4. Sufficient temperature insulation in the spring so that excessive shoot growth does not occur;
5. A minimal "greenhouse effect" that may result in producing lethal heat buildups.

A comparison of five winter protection covers is presented in Table 1. The appropriate winter protection cover should be selected for a particular site depending on the particular problems encountered and the characteristics that best suit these needs.

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TABLE 1. Comparisons among five winter protection materials for use on putting greens and similar intensively cultured turfs.

CHARACTERISTICS COMPARED	TYPE OF DESICCATION PROTECTION COVER				
	Conwed Winter Protection Blanket®	Polyethylene 4-6 mil	Saran Shade® 94%	Soil Retention Mat®	Soil topdressing (0.4-cu yd/ 1,000 sq ft)
Desiccation protection*	Good	Very Good	Good	Medium	Medium
Low temperature protection*	Good	Poor	Fair	Good	Poor
Rate of spring green-up*	Good	Very Good	Good	Good	Medium
Degree of shoot growth control*	Good	Poor	Good	Good	Good
Difficulty in timing removal**	Medium	High	Medium	Medium	Low
Wind displacement proneness**	Low	High	Low	Low	Very low
Lethal heat build-up potential**	Low	High	Low	Low	None
Winter disease proneness**	Medium	High	Medium	Medium	Low
Stability for reuse*	Medium	Good	Good	Poor	None

*Order of comparative rankings (Very good, good, medium, fair, poor)
**Order of comparative rankings (High, medium, low, very low, none)

DESICCATION *from page 45*

Installation of the winter protection cover should be done after turfgrass growth has ceased and a high state of winter hardiness achieved, but before the soil freezes and the first permanent snowfall occurs. The following steps should be followed when installing a cover:

1. Remove all clippings and debris from the turf;
2. Apply the appropriate fungicide to prevent low temperature disease development;
3. Install the cover by securing with five-inch wire staples or with wooden laths placed at 20-foot spacings over the cover and along the (two-inch) overlapping edges. Spikes can be driven through predrilled holes in the lath and into the underlying soil. The cover should be drawn tight prior to nailing down the lath to minimize wind effects;
4. It may be necessary to place barriers around turfs covered with a winter protection cover in order to minimize damage by snowmobiles, skiers or other individuals involved in winter activities.

One additional concern in the use of winter protection covers is to recognize the importance of ensuring that the turf area has adequate surface and subsurface drainage. This is particularly important in areas that are also subject to low temperature kill. Winter injury cannot be prevented by the use of covers if the area will be subjected to periodic winter flooding followed by rapid drops in temperature to below 20° F. In this case, the potential for direct low temperature kill is quite high unless adequate surface drainage and internal soil drainage are provided.

One of the most difficult decisions in effective utilization of synthetic winter protection covers is the proper timing of removal in the spring. Success will no doubt be increased as experience is gained. General guidelines concerning removal include the following:

1. Climatic conditions should be such that there is a relatively low probability of severe desiccation or low temperatures occurring;
2. The turf be dark green without an excessive quantity of shoot growth;
3. The timing of removal is dictated by the quantity of leaf growth that has occurred. The cover should be removed early enough so that the initial mowing does not scalp the turf. The first mowing after removal of the cover should be delayed for at least three days to permit hardening of the turf and to improve the initial mowing quality.

Topdressing. A topdressing applied in late autumn, but not matted into the turfgrass surface can be utilized for winter desiccation protection. The most effective topdressing rate under Michigan conditions has been between 0.3 and 0.4 cubic yard/1,000 square feet (page 45). The soil mix used in winter topdressing should be the same as that on the green to prevent a soil layering problem. Topdressing offers the advantage of being one of the cultural practices frequently used in smoothing greens as well as in preventing excessive thatch accumulation. A late fall application that is not matted in will serve the additional benefit of protecting against winter desiccation. Thus, the cost for this type of practice is relatively low. There is also no problem in timing the spring removal and few difficulties in removal as are encountered with the mulch-type materials. However, topdressing has not proven as effective a winter protection as some of the synthetic protective covers listed in Table 1. It has almost no benefit from the standpoint of low temperature insulating effects. As is the case with windbreaks that enhance snow accumulation, the winter topdressing practice should not be utilized until a preventive fungicide has been applied to protect against the low temperature diseases.

Mulches. In areas where an adequate snow cover can not be guaranteed, with or without the use of windbreaks, the use of alternative and locally available materials, such as straw, pine needles or a similar organic mulch is a possibility. This has been one of the older practices that can be used in preventing winter desiccation.

Windbreaks. Windbreaks can be utilized to minimize the desiccating effects of strong prevailing winds. An additional benefit in areas where snowfalls occur is the enhancement of snow accumulation on the leeward side of windbreaks; thus providing even greater protection against desiccation. The windbreaks may involve (a) planting a permanent vegetative screen of trees and shrubs, (b) strategic placement of snow fence during the late fall or early winter period or (c) piling brush or tree limbs on the site during the late fall period. Increased severity of low temperature fungi may occur when utilizing windbreaks to enhance snow accumulations on greens. Thus, steps should be taken to ensure that an adequate preventive fungicide program has been instituted prior to the first snowfall. Using a snow fence to surround greens has the additional benefit of preventing potential damage from winter sports activities.

Irrigation. Winter irrigation of dormant or semidormant turfs is most commonly practiced in those portions of the country where the winters are less severe. Under these conditions it may not be possible to utilize windbreaks, mulches or synthetic protective covers because of periodic winter golfing activity. The alternatives under this condition are to correct the desiccating conditions by applications of water or to establish a temporary green and place the appropriate cover or windbreak on the permanent green in order to ensure an adequate turf for the prime golfing season.

Dormant turfs that have been without a snow or organic protective cover for an extended period of time may have to be irrigated to prevent winter desiccation. If the soil and environmental conditions do not permit opening up of the irrigation system, the alternative is to haul water to the site by tank trucks or similar equipment.

Additional irrigation practices that will assist in minimizing winter desiccation by soil drought include ensuring that the turf is adequately irrigated in late fall before the soil freezes. The soil moisture level should be near field capacity at the time the soil freezes or the first permanent snowfall occurs. Saturated soil conditions should be avoided, because this will increase the proneness to low temperature kill or winter diseases. □