



Pre-Proposal Title: **W**



- 1 Determine effective reestablishment techniques for putting greens following simulated winterkill injury.
- 2 Determine optimal fertilization strategies for turfgrass in the autumn.
- 3 Determine the effectiveness of different core aerification timings.
- 4 Determine the effect of ice encasement on turfgrass species/cultivar survival.



Winterkill is a general term that is used to define turf loss during the winter. Winterkill can be caused by a combination of factors including crown hydration, desiccation, low temperature kill, ice sheets, and snow mold. Due to the unpredictability of environmental factors, and differences in other factors such as surface drainage, the occurrence of winterkill on golf courses is variable and can vary greatly between golf courses and even across the same golf course.



Research will be conducted at the Hancock Turfgrass Research Center on the campus of Michigan State University. A creeping bentgrass putting green was sprayed with RoundUp in 2006 to simulate winterkill, this will be repeated in late 2006 for the 2007 research trial.

The experimental design will be a 3 cultivar/species x 2 nutritional program x 2 cover factorial with three replications. As soon as weather conditions permit in the spring the damaged green will be seeded with two creeping bentgrass cultivars and annual bluegrass. The creeping bentgrass cultivars A4 and Providence will be seeded into the damaged putting green. Prior to seeding a job saver attachment on an aerator will be used to create a small depression in the green where the seed can germinate. Annual bluegrass seedheads will be collected from an adjacent putting green by collecting clippings following mowing. The clippings will then be spread onto the plots to facilitate germination. Immediately following seeding and application of the annual bluegrass clippings/seedhead mix, a light sand topdressing will be applied to all plots.

A starter fertilizer (19-26-5) will be applied at 0.5 lb. N/1000 ft.² at seeding. Starting at two weeks after seeding there will be two fertilizer treatments:

1. Granular fertilizer applied at 0.3 lb. N/1000 ft.²/every three weeks.
2. Liquid fertilizer applied weekly at 0.1 lb. N/1000 ft.²

The third factor that will be investigated is the use of a protective plastic cover. The presence or absence of a simple transparent plastic cover will be assessed. The cover will be placed on the plots immediately after seeding. The protective covers will be put on the plots every night when temperatures are expected to be below 50 °F.



A late autumn fertilization was once the basis for a sound fertilization program but concerns over snow mold incidence, crown hydration injury, and low temperature kill have now resulted in many superintendents avoiding a late autumn fertilization. This trial will investigate different nitrogen sources and timings to determine turfgrass response both this autumn and next spring. Treatments are being applied to creeping bentgrass maintained at putting green and fairway height. The nitrogen source treatments are: Milorganite, polymer sulfur coated urea, methylene urea, urea, and an untreated control. The application dates for the nitrogen treatments are Sept., Oct., and Nov. All treatments will be applied at 1 lb. N/1000 ft.². I am currently pursuing industry fertilizer companies to provide financial support for this trial. This trial was conducted in 2005-2006 and will be repeated in 2006-2007.



Core aerification timing in the autumn is a constant source of debate in Michigan as superintendents struggle to conduct this essential management practice at a time when autumn golf will be minimally disturbed. Some superintendents core aerify as early as the second week of August with the goal that the greens will recover quickly and prime putting green conditions will be restored by the Labor Day weekend. Other superintendents core cultivate late in September to maximize the length of time the putting greens are undisturbed during the peak autumn golf months. Recently due to the wide-spread incidence of crown hydration injury during the winter of 2005, some superintendents have inquired about the legitimacy of core cultivating late in the autumn to facilitate drainage during winter/spring snow melts that often result in standing water on putting greens refreezing and causing crown hydration injury.

This trial is investigating core aerification timing and nitrogen source. Core aerification will be conducted on 3 different dates in the autumn and two different nitrogen sources, urea and methylene urea, will be applied at 1 lb. N/1000 ft.². Turfgrass recovery will be assessed this autumn and next spring. This trial was conducted in 2005-2006 and will be repeated in 2006-2007.



The original research to investigate turfgrass species tolerance to ice encasement/cover was conducted by Beard (1964). Beard investigated the effect of ice, snow, and water covers on Kentucky bluegrass, annual bluegrass, and creeping bentgrass. Specifically Beard tested these effects on common Kentucky bluegrass, and Toronto creeping

bentgrass. More recently Tompkins et al. (2004) investigated the effects of ice cover on annual bluegrass and Penncross creeping bentgrass. There has been speculation that the new creeping bentgrass cultivars such as the A and G series bentgrasses have superior ice encasement tolerance to older bentgrasses and of course annual bluegrass.

This research would build upon the research of Beard, and others, to provide updated information on specific turfgrass cultivars tolerance to periods of ice encasement/cover. The research would be conducted in controlled laboratory conditions to simulate duration of ice coverage experienced in the field. Further experimental methods will be provided if the pre-proposal is selected for full proposal submission.