Q & A With the Canadian Turfgrass Research Foundation

Turfgrass and environmental research in Canada took a giant leap forward in 1993 when the Canadian Turfgrass Research Foundation (CTRF) restructured to become a partnership between the Royal Canadian Golf Association, Canadian golf superintendents and seven regional turfgrass associations and foundations. In the following six years through 1998, the RCGA contributed $435,000 and the regions and industry donated $210,000. This total of $645,000 has attracted $453,250 in matching government and industry grants.

An independent Research Steering Committee of qualified turfgrass researchers and professionals assess all research proposals and monitor the projects to ensure relevance and scientific integrity. The program has resulted in the funding of 10 research projects at five different Canadian universities and research facilities designed to answer the following questions.

Will winter covers protect Poa annua putting greens?

J. Dionne, and Y. Desjardins, Dept. of Plant Science, Laval University, Quebec (3 yr study completed 1996)

The principal causes of winter damage on putting greens are snow mould fungi, low temperature kill and hydration damage which is the repeated freezing and thawing of plant tissue. Poa annua (annual bluegrass) putting greens are the most susceptible to hydration damage and superintendents have been experimenting with ways to protect their greens with varying results. Laval University's Dr. Yves Desjardins and graduate student Julie Dionne set out to test a variety of cover materials and measure the temperature changes under the different covers.

Test plots were set up in Quebec City where snow accumulation was great and Montreal where snow cover was variable. Eight different cover materials were tested. Some provided insulation while others helped to keep the green dry. Snow proved to be a very good insulator keeping the temperature under the covers fairly stable at just under 0° C, regardless of the cover material used. Straw and mats made of shaved wood provided the most insulation for greens with little snow cover.

Some practical information was revealed by the Laval study. Protection against hydration damage requires keeping the greens dry. This can be achieved with solid plastic covers either alone or over insulating materials. If local snowfall is deep and consistent, insulating material is not necessary. Timing of installation and removal of the covers is crucial. The greens must be exposed to lower temperatures in the fall to properly harden the plants. Also, leaving the covers on too long in the spring will promote disease and premature, weak growth. All covers appear to promote snow mould disease activity requiring all greens to be treated with a preventative fungicide. Finally, covers are not a substitute for correct construction and management of greens. Work is being continued to better understand what is happening under the covers.

At what temperature does winter damage occur in grass plants?

Tompkins, Bubar, Toews and Ross, Prairie Turfgrass Research Centre, Olds College, Alberta (3 yr study completed 1997)

Previous studies by researchers and observations by golf course superintendents indicate that creeping bentgrass has a greater tolerance of cold temperatures than Poa annua (annual bluegrass). Dr. Darryl Tompkins and his team at Olds College set out to determine if there is a physiological difference between the two species that would explain this and if other factors may be involved in a plant's susceptibility to low temperature damage.

Bentgrass and Poa annua plants were exposed to different freezing temperatures in the lab and the field and then regrown. When fewer than 50% of the plants recovered, this temperature was considered the lethal temperature for that plant group. Without any pre-cooling to condition (harden) the plants, little difference was seen between creeping bentgrass and Poa annua. Both species could withstand temperatures of about -5°C before half of the plants would die.

Exposure to a constant temperature of -3°C for an extended period "hardens" the plants enabling them to withstand lower temperatures. This is when differences between bentgrass and Poa annua started to show. The hardened Poa annua plants were able to withstand temperatures to -25°C in the lab and only while the bentgrass could survive in temperatures of -39°C. Field tests showed that both species were not able to attain their maximum cold tolerance due to incomplete hardening and Poa annua will probably only tolerate -15°C on a golf course.

In the spring, plants start to lose their cold hardiness as the temperature rises, making the plants more susceptible to low-temperature damage. Maintaining dormancy as long as possible is preferred while severe low temperatures are still a threat. Snow can protect the plants from rapid, premature dehardening if temperatures fluctuate wildly in the spring, but may be safely removed if temperatures remain above freezing.

What type and levels of gases accumulate under green covers in the winter?

Dionne, Desjardins, Castonguay, Rochette, Nadeau, and Huff Dept. of Plant Science, Laval University; Agriculture Canada; and Agronomy Dept. Pennsylvania State University (2nd yr of 3 year study)

This is a continuation of the winter green cover study completed in 1996. In addition to temperature, oxygen and carbon dioxide measurements were taken under the different winter covers. Carbon dioxide levels increased as the oxygen was consumed, but not in equal amounts. Dr. Yves Desjardins believes some of the carbon dioxide may be trapped in soil water, possible allowing the Poa annua greens to survive longer in an oxygen depleted environment.

The Olds College study looked at temperature as the primary factor involved in the "hardening" or cold acclimation of turf grass plants for winter survival. This study indicates that low oxygen situations may also affect cold hardiness. The collaboration with Agriculture Canada allows the Laval researchers to analyze biochemical changes associated with cold-tolerance to further understand what makes a plant better adapted to survive low temperatures.

This cold acclimation work is being used to screen Poa annua strains for

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