Effectiveness of Three Thatch Reducing Products on Creeping Bentgrass

by Steven Kuretsky

Introduction

In golf course management, there are many variables involved in maintaining a healthy turfgrass plant. Some of major variables include water, light, soil conditions, and nutrition. Although a minor variable, thatch has given golf course superintendents problems over the years. Thatch is a tightly intermingled layer of living and dead grass stems, leaves, and roots that develops between the verdure (green live tissue) above and the soil below (1). Thatch is a variable that can create problems in the soil profile.

The turf profile consists of three distinct sections: the verdure, the thatch, and the root layer. The verdure layer encompasses the green living plant tissue remaining after mowing (2). Below the verdure layer lies the thatch. The root layer makes up the area of soil that the roots occupy. The condition of each of the layers in the turf profile has separate impacts on the overall turf health. The thatch layer is no exception.

Thatch has both good and bad qualities, depending on its thickness. A desirable thickness is between one-half and 1 inch,depending on the purpose of the surface (green, tee, or fairway) (3). A certain amount of thatch suppresses weed growth. Thatch insulates the ground from extreme temperature, and provides a cushion to help reduce compaction of the soil from traffic (3). If the thatch layer is too thin, grass roots may be damaged from freezing or excessive heat and the soil may become compacted from the weight of traffic. Normally these problems only occur when first establishing turf.

More serious problems may result when the thatch layer is too thick: wilted grass, interception of chemicals, favorable insect and disease conditions, and scalped grass. First, a large buildup of thatch can create a hydrophobic layer during dry periods, which prevents water from reaching the soil and roots. Water runs off the surface, bypassing the roots, and results in wilt. Another problem is the interception of chemicals. Fertilizers and plant protectants are less effective because they get trapped in the thatch matrix (4). This prevents them from reaching the roots and soil, areas where the grass takes them up. A third problem arises from waterlogged thatch. The wet conditions create a favorable environment for disease and insect infestation. The last problem results from scalping when mowing. With too much of a cushion, mower blades scalp the verdure because the heavy machine sinks, giving a shorter cut than intended. Because of these problems, turf manager have to attempt to maintain the proper thickness of thatch to promote a healthy turf.

There are two principal methods of thatch control-mechanical and biological. One mechanical method is aerification. Aerifying removes cores from the ground and allows more oxygen to reach the zone where the decay of organic matter occurs. With more oxygen available, the microbes responsible for thatch reduction decompose it at a faster rate. A second mechanical method is verticutting. Verticutting uses vertical blades to dig into the ground and remove thatch, leaving parallel cuts over the ground surface. This method physically removes thatch rather than improving conditions for biological decomposition. Both of these mechanical methods can be labor intensive on golf courses because the mess created must be removed to allow golf play.

There are two approaches to biological reduction of thatch. The first is topdressing. Topdressing adds a light coat of sand, sandy topsoil, or compost to the grass surface. The topdressing is then worked into the thatch by dragging a mat over the area. When added to thatch, topdressing maintains better moisture and temperature relationships (3). Other benefits may include improved nutrition for microbes and the introduction of a new supply of microorganisms that increase thatch decomposition. The

second type of biological control and the focus of this research project is the addition of biological agents. By adding biological agents, the micro- organism population or activity is increased, improving thatch reduction. This method increases microorganism numbers significantly more than topdressing alone, especially if pure sand is used for topdressing. Applying biological products takes little effort because it only involves spreading or spraying the material over the grass surface. No clean-up is needed that would interrupt golf play or keep employees from other duties.

All these methods of control are important to practice in a turf management program. Each one attacks the thatch problem from a different angle, allowing for a more uniform control. If only one method is used, thatch reduction may not equal thatch buildup, allowing continued increases in thatch thickness. With different methods in the thatch control arsenal, managers can choose the method that is the most economic and prudent to use at a articular time. Including biological agents in thatch control programs increases the options for managers.

This research project was designed to see how well three biological control products performed along with other control practices on a golf course tee. The research was performed at the University Ridge Golf Course in Verona, Wisconsin, on the sixth gold tee.

Methods

The three products tested were Carbo-Aid, Envirogenesis Thatch BioDigest, and Bio- Groundskeeper Thatch Reducer. These products were selected because they have different modes of action. Carbo-Aid is a high-energy food for microbes that stimulates growth and activity of the native microorganism population. BioDigest adds microorganisms to the turf. Thatch Reducer reportedly acts by creating a more favorable environment for microorganisms.

The area of the study the sixth hole gold tee sits on an elevated mound surrounded by open space, which allows for good air circulation and full sunlight. The original construction of the tee in 1991 was 6 to 8 inches of pure sand overlying and bounded by native silt loam soil. Normal cultural practices on the tee were not interrupted during the experiment. The bentgrass is mowed at 1/2 inch twice a week. The tee is rarely used so traffic is light. Core cultivation and sand topdressing have been carried out on a regular basis. The tee is irrigated to prevent moisture stress and fertilized with 4 to 5 lb N per year.

The four treatments (the three reducing products + an untreated control) were randomly assigned to 6 x 10 foot plots in four blocks, giving a total of 16 plots. After the plots were staked out, five soil cores were randomly removed from each plot for measurement of initial thatch thickness and the percent organic matter in the thatch layer. Thatch thickness was found by compressing the core and measuring thatch depth with a ruler. The organic matter content of the thatch was found by removing the layer from the soil core, brushing off sand grains adhering to the outside of the thatch core, and obtaining the oven-dry weight. The core was then crushed and heated to 600 C for 2 hours to burn off the organic matter. Subtracting the final weight from the initial weight gave the percent organic matter.

After sampling the plots, the thatch control products were applied as solutions with a CO2-powered backpack sprayer. Carbo-Aid was applied at 16 oz/M each of the first 2 weeks. The Envirogenesis product was applied at a 1 gal/A rate once a week for 3 weeks. The last product, Bio-Groundskeeper Thatch Reducer, was applied only once at a rate of 32 oz/7,500 ft2. These rates are those recommended by the manufacturers.

The first application date was September 15. On November 13, or about 2 months after treatment began, cores were once again removed from the plots for thatch measurement and determination of organic matter content.

Results and Discussion

Initial thatch thickness on the tee averaged 33 mm, or 1.3 inches. Because of repetitive core cultivation and sand topdressing, the original thatch organic matter content was only 9.61%. The changes observed in thatch thickness and organic matter content were as follows:

	Thickness reduction (mm)	Organic matter reduction (%)
Control plot (no treatment)	0.3	0.85
Carbo-Aid	0	1.68
Envirogensis Thatch BioDigest	0	1.08
Bio-Groundskeeper Thatch Reducer	0.3	1.78

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Statistical analysis revealed that none of the reductions in thatch thickness or organic matter content could be attributed to the treatments applied. Rather, the changes observed were merely due to uncontrolled random variation in the plots and/or the samples collected.

Failure to see a change in thatch thickness is understandable. Core cultivations and sand topdressing have intermixed so much sand into the thatch layer that thickness of the layer is controlled by the sand present. A more proper term for this type of layer is mat rather than thatch.

The plots were cultivated and sand topdressed during the study. The addition of more sand to the thatch may well account for the reduction in percent organic matter observed in the control treatment. If it is assumed that all other treatments were similarly affected, the reduction of 0.85% organic matter in the control treatment needs to be subtracted from the reductions in the other treatments to see how the products affected thatch organic matter content. Doing this reveals organic matter reductions from 0.23% in the Envirogenesis treatment to 0.93% in the Bio-Groundskeeper treatment.

Although the reductions in thatch organic matter content were not significant, it has to be borne in mind that study was conducted for only 2 months in the fall of the year. Given this short time period and the fact that declining temperatures in fall slow microbial activity, it seems reasonable to conclude that the Carbo-Aid and Bio-Groundskeeper products merit further testing as thatch biocontrol agents.

Literature Cited

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