

## Thatch Removal For Fairways

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Thatch as defined by Beard (2) is the tightly intermingled layer of living and dead stems, leaves and roots that develops between the zone of green vegetation and soil surface.

When this layer does not exceed .25 inches in depth, it has a beneficial effect. The thatch provides resiliency, increases wear tolerance to the turf, and insulates the soil from temperature extremes.

If the thatch layer accumulation exceeds .25 inches, problems begin to arise. Some problems associated with excessive accumulation are; a) increased susceptibility to disease and insect problems, b) localized dry spots, c) chlorosis, d) proneness to scalping, e) footprinting, f) decreased cold and drought hardiness, Beard (2), g) decrease of root penetration into the soil and h) a decrease in the efficacy of preemergent herbicides, Hurto and Turgeon (5,6).

Excessive accumulations of thatch cause the turf plant to elevate the crowns, rhizomes, stolons and roots above the soil surface. When this occurs, the soils buffering capacity is lost to the plant. The plant is then subject to greater temperature extremes, drought and low temperature stress, Beard (2).

Many insects that attack turf lay their eggs at or just below the thatch-soil interface. When the eggs hatch the larvae feed on the turfgrass roots which are present at this interface level. At times of stress the turf plant will die due to a root system which is incapable of supporting the above-ground portions of the plant.

Thatch develops when the accumulation of dead organic matter from actively growing turf exceeds the rate of decomposition, Beard (2). There are some cultural factors which seem to favor thatch accumulation; a) vigorous growing turfgrass cultivars, b) poor aeration, c) acidic conditions, d) excessively high plant nitrogen nutritional levels, and e) infrequent cutting or excessively high cutting heights, Beard (2).

Earthworm (*Lumbricus terrestris* Linn.) activity has a direct beneficial effect on reducing thatch buildup in turf, Beard (1) and Turgeon et al. (7). It has been observed when certain fungicides and/or insecticides were applied to the turf and soil, earthworm activity was decreased significantly. Dead organic matter degradation rates were decreased, and excessive accumulations were observed.

Cole and Turgeon (3) state, "The degradation of plant residues require a wide variety of simultaneous enzymatic activities to effect decomposition of the heterogenous molecules found in plant materials. Hence, a reduction in a single enzymatic activity may result in a substantial decline in overall decomposition."

It has been shown that the most effective cultural practices in controlling excessive thatch buildup are topdressing and core cultivation. Danneberger (4), while at Illinois, found core cultivation, vertical mowing and returning the soil from the cores changed the physical and chemical properties of the thatch layer. By incorporating soil into the thatch medium, the cation exchange capacity (C.E.C.) of the medium was increased significantly. The "thatch layer" then becomes something other than thatch by definition. Since the hybrid thatch has a greater C.E.C., it therefore has a greater ability to support plant life. The structural and textural differences which existed with pure thatch at the thatch-soil interface are not as great with the hybrid thatch. This would then increase the hydraulic conductivity at the interface.

Methods and Materials. At Saginaw Country Club, fairway turf consists of 75-80% Poa annua and 20-25% bentgrass. Prior to 1973, fairway turf received approximately 3-4 pound actual nitrogen per 1000 square feet per year. Turf was irrigated manually with a quick coupler system. Fungicides applied were Cycloheximide (Actidione KZ) and Cadmium chloride.

In 1973 fairway turf received two pounds N/1000 square feet per year. Turf was irrigated automatically. Fungicides applied were Benlate (1991), Daconil 2787, and Cadmium Chloride.

In 1974 an excessive amount of thatch buildup was noted, and a decrease in earthworm activity was observed. Isolated dry spots were occurring frequently, and turf was less resistant to stress.

Mechanical spiking and wetting agents were employed in an attempt to increase water penetration and alleviate isolated dry spots. This definitely helped, but did not reduce the buildup of thatch. Several fairways were selected for various trials in an attempt to reduce the problem of excessive thatch buildup.

Treatments were as follows:

- a) Aerification 1X
- b) Intensive aerification 2X
- c) Intensive aerification 2X + verticut 1X
- d) Verticut 1X

All treatments received one pound N/1000 square feet per year.

A fairway aerifier with 0.5 inch diameter closed tines was used for coring 2X\*. A fairway aerifier with 0.5 inch diameter open tines was used for coring 1X.

A Rogers 720 Sweeper with a vertical mowing attachment was used to slice into the thatch layer approximately one inch on four inch centers. The hopper attached to the rear of the 720 sweeper was removed.

After the vertical mowing unit was used to slice and break up the soil cores, a John Bean Rotomist was used to move the excess organic matter into the rough areas. The organic matter was then picked up using the Rogers 720 Sweeper with the hopper in place.

Results and Discussion. Through coring some thatch is removed; however, it is such a small amount that it cannot be considered significant in reducing the thatch layer. The main objectives are to increase aeration of the soil and incorporate soil into the thatch layer. In doing so, the physical properties of the thatch are changed significantly, and the ecosystem is then improved to a point which will encourage the biological degradation of the excess dead organic matter.

It is found by incorporating soil into the thatch through aerification in combination with vertical mowing, there was a significant decrease in the thatch layer (from 1" to 1/2") when treatments were initiated in September. The biological degradation did not become apparent until 30-40 days following the treatment. Once degradation began, it was very rapid and continued until the soil was frozen.

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\*Twice the number of coring tines were installed on the fairway aerifier than the manufacturer normally provides.

Other treatments of aerification, one time, and verticutting alone had no significant effect. Intensive aerification without vertical mowing was effective in reducing thatch, but left so much dead organic matter on the surface, it was found undesirable.

It appears as though excessive thatch accumulations can be kept under control by using this method. Soil incorporation into the thatch layer is the key factor in controlling thatch. The soil and turf may be managed more economically and with predictable results.

#### References

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