

Integration of Control Methods Necessary to Prevent Thatch Buildup

R. N. Carrow, Assistant Professor, Horticulture Department, Kansas State University, Manhattan, Kan.

Excessive thatch accumulation results in degradation of turf and increases maintenance. Turfgrass cultural problems associated with thatch are: (a) greater susceptibility to heat, cold, and drought stress, (b) localized dry spots, (c) increased insect and disease incidence, (d) scalping, (e) reduced effectiveness and penetration of fertilizers and pesticides, (f) more wilt, (g) greater iron chlorosis, and (h) increased time, labor and money to maintain an acceptable turf.

Thatch control is not a once a year project. Instead it requires an integrated approach involving prevention, biological control, and mechanical removal. Each of these aspects requires a basic understanding of how thatch forms and how it is decomposed.

Prevention

Thatch develops in turfs because shoot growth results in organic matter accumulation at a faster rate than decomposition occurs. One approach to thatch control is to reduce accumulation by restricting excessive shoot growth. Factors which contribute to unnecessary shoot growth are discussed below.

Vigorous turfgrass cultivars: Turfgrass species and cultivars utilized for recreational turf are often vigorous. While this characteristic is important for persistence and recuperation from use, it also promotes rapid tissue production. Where feasible, the turf manager should use cultivars less prone to thatch development.

Excessive nitrogen fertilization: Thatch consists of an intertwined layer of living and dead stems, rhizomes, stolons, leaves and roots of grasses. Adequate nitrogen is required for acceptable turf quality and recuperative potential; however, excessive nitrogen increases shoot production which contributes to thatch accumulation.

Excessive irrigation: Applying excessive irrigation enhances shoot production and therefore results in thatch buildup.

Mowing and collection of clippings: Thatch accumulation can be reduced in bermuda and zoysia turfs by mowing closely. This retards total shoot

production. For cool season turf, clipping removal has little influence on thatch accumulation since the leaf tissues easily degrade. Clippings contribute more to thatch buildup in bermuda and zoysia. Removal will aid in preventing thatch in these turfs; however, clippings only contribute 15-25% to the thatch.

Biological Control

The decomposition process for thatch normally involves digestion and mixing with soil by earthworm and insect activity. At the same time fungi, bacteria, actinomycetes and other microorganisms are active in decomposing various constituents within the thatch. Any factor which interferes with this natural decomposition pathway will enhance accumulation.

Promoting microorganism activity: Degradation will occur at a rapid rate if microenvironmental conditions within the thatch are suitable for a large, balanced microorganism population. The primary environmental variables influencing microorganisms are moisture, aeration, temperature, pH, organic matter, and inorganic nutrient supply. When a turf manager topdresses with a well-composted topdressing mix, he is adding microorganisms to the soil. However, more importantly he is changing the microenvironment to favor sustained microorganism activity. With topdressing soil well intermixed with thatch, moisture retention is improved. Also, due to a denser and moister environment temperature variations are decreased. Thus, improved moisture and temperature conditions aid in maintaining an active microorganism population within the thatch.

Thatch and its decomposition products consist of a wide variety of organic compounds. To adequately degrade such a diverse assortment of compounds requires a very diverse microbial population including fungi and bacteria. Thatch tends to become acidic even if the underlying soil is alkaline. Exception to this would be if irrigation water is alkaline. When the thatch pH reaches 6.0 or less many bacteria involved in decomposing resistant components of thatch are no longer active. Thus, a light application of lime to keep the thatch

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Mechanical dethatching brings thatch to the surface for removal.

pH at 6.0-7.0 will aid in maximum thatch breakdown. Generally, 5-10 lbs. CaCo₃/1000 sq. ft. once a year on heavily irrigated turf is sufficient. Also, maintaining a soil pH of 6.0-7.0 will help insure a good natural microorganism population.

Cultivation practices, such as coring and grooving, improve moisture and temperature relations by mixing soil into the thatch. Improved soil aeration from cultivation — coring, grooving, slicing, spiking — will aid in the maintenance of an active microorganism population. Adequate irrigation also favors microbial activity.

Promoting earthworm activity: On golf greens earthworm casts are objectionable, they do not interfere to a great extent on higher cut turf. A good earthworm population is often the cheapest and most efficient control for thatch. Earthworms digest thatch, integrate soil into the thatch, and carry some of the organic matter down into the soil. Promoting earthworm activity is best achieved by avoiding pesticides detrimental to earthworms and maintaining a favorable pH range of 6.0-7.0. Cultivation on compacted soils will aid in creating a loose, friable physical condition for earthworms. Biological dethatching materials: Several biological dethatching agents are commercially available which consist of a dry or liquid media inoculated with specific microorganisms. These are applied to the turf and when exposed to a favorable environment the microorganisms are activated and reportedly decompose thatch. Research studies conducted at several universities (Georgia, Hawaii, California, at Riverside, Nebraska, Michigan State) have not shown any beneficial affects from these materials. Inoculation with a specific microorganism population will have little affect if the microenvironment is unfavorable for sustaining the population. Natural, as well as added, microorganisms require correct moisture, aeration, pH, etc. conditions, if they are to persist at a high enough level to influence thatch decomposition.

Mechanical Removal

Vertical mowing is the most common method used to remove thatch. On golf greens or close cut turf, vertical mower attachments are available for



Damage to turf and shrubs caused by burning thatch as a method of removal.

riding greens mowers. This allows frequent, light vertical mowing without disruption of the playing surface. However, on higher cut turf vertical mowing is normally done once or twice a year, if thatch accumulation requires it. These can be severe and result in at least some disturbance of the turf surface.

When a severe vertical mowing is necessary, at least 3-4 weeks of good growing weather should follow in order for turf to recover. For example, with a cool season grass early fall would be a good time to verticut, while mid-spring would be acceptable for a warm season turf. Care should be taken not to severely verticut just prior to annual grass germination. If it is necessary to vertical mow at that time, a good preemergence herbicide for annual grasses should be applied to prevent severe weed encroachment. Do not verticut after applying a preemergence herbicide for annual grasses or the herbicide zone will be destroyed. Maintain good nutritional, moisture, and other growing condition after vertical mowing to insure rapid turf recovery.

Sometimes when a turf with rhizomes or stolons has developed a thick thatch, the turf can be stripped and allowed to recover from rhizomes or stolons that remain. Turning the sod under is generally not desirable since mixing it into the soil is difficult. This method is unsightly and requires several weeks for recovery.

Burning is sometimes used to remove thatch, particularly on bermuda. This method can reduce thatch but it is not without problems. If a thick thatch exists, the plant crowns may be elevated into the thatch. Burning can then result in high temperature kill of the crown, even on dormant turf. If burning is used it must be rapid and preferable with a moist soil. Burning should not be attempted around houses or where evergreen trees and shrubs are present.

Thatch is not a desirable turfgrass growing media. The turf manager should not consider mechanical removal as a routine maintenance practice. Instead he should give careful attention to preventing excessive shoot growth and promoting maximum decomposition. Mechanical removal is expensive and time consuming and should be used only as a last resort.