



—A PART OF TURF

by LEE RECORD, Mid-Continent Director, USGA Green Section

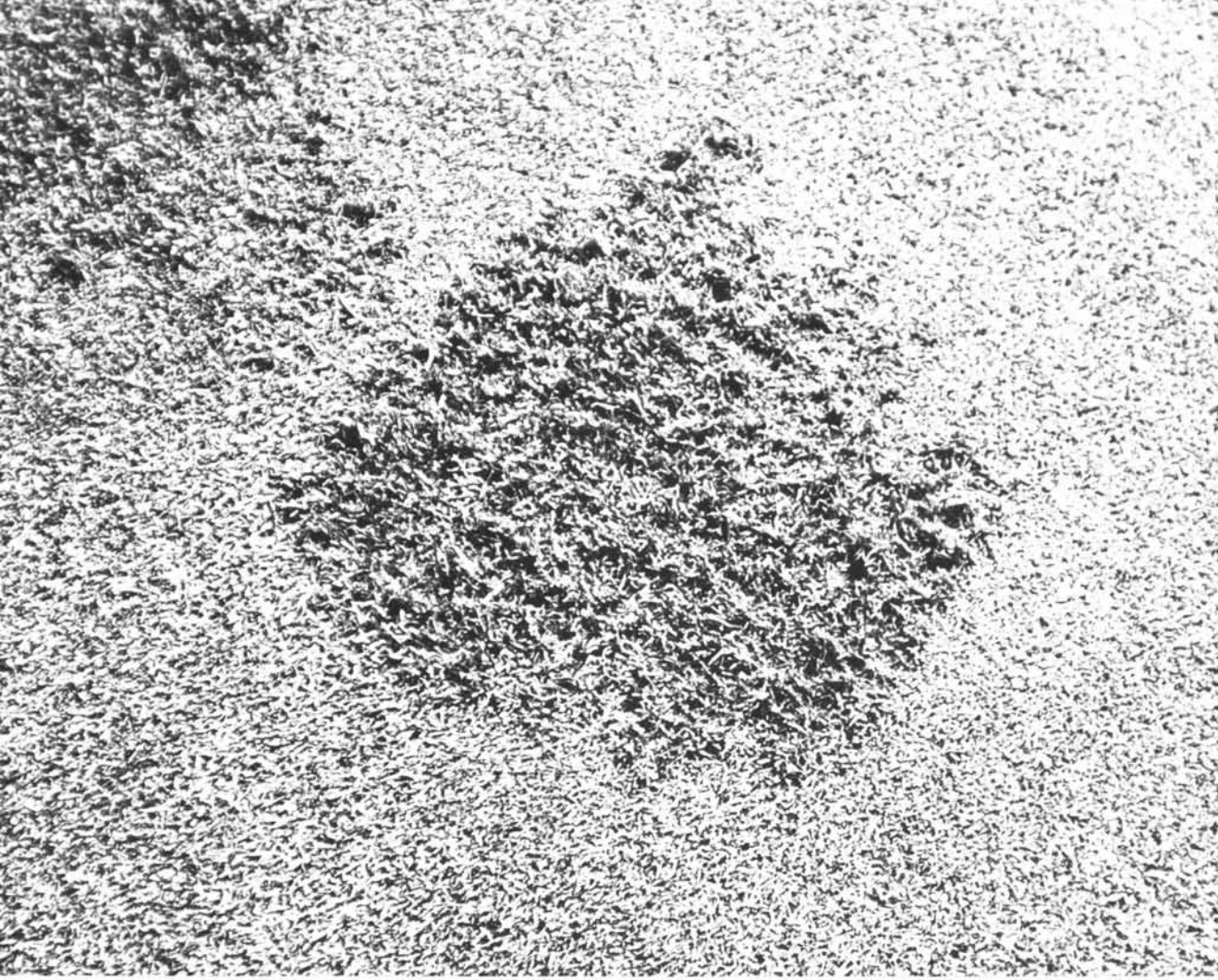
Thatch and mat are terms used interchangeably to describe a condition in which excessive vegetation has accumulated. Although these two terms actually relate to different conditions, it is possible for mat and thatch to occur together, but either may occur singly as well.

Thatch is an accumulation of dead or undecomposed stems and leaves of the soil surface. Mat is the thickly overgrown and tangled mass of living roots and stems hidden beneath the green vegetation. This is associated with sponginess or fluffiness of the turf.

Some of the first signs to look for when identifying mat are uneven mowing, scuffing and

scalping the turf. Because sponginess is associated with this condition, the putting surface is not always a true playing surface. Mat, therefore, is a common condition frequently brought about by rapid growth due to excessive fertilization. Mat can lead to severe mowing problems.

I am sure you have experienced, or at least seen a matted condition on greens during the summer, especially during periods of high humidity. Greens have become spongy or, if you wish, fluffy, and the playing surface has been scalped. (See Page 10) It is during this stress period that disease activity is high. By having an excessively matted condition, fungus



Excess thatch can act as a sponge.

organisms are protected from contact fungicides and systemic fungicides may not be as effective, depending on the pathogen. The mat itself serves as a breeding ground, favoring fungus development. Certain diseases may be quickly brought about after foot traffic presses the healthy turf against the fungus infected mat. We can conclude, therefore, that a matted condition contributes greatly to an environment which encourages disease activity. Fortunately, mat can usually be eliminated without injuring the excess vegetation and will cut or remove prostate stems and leaves. If you prefer, brushing the greens and close mowing are also sound cultural practices to follow when removing a building up of mat.

One other phase of a cultural program in holding mat in check is through the use of top-dressing. Top-dressing is frequently associated with vertical mowing or raking of the putting surface. Top-dressing may be used by itself if the material is worked into the matted

condition. If top-dressing is not worked into the mat, a layered condition can easily begin. This in turn will impede the movement of water and may also contribute to a very shallow root system.

Thatch as it Relates to the Game

But what about thatch? What about the layer of dead but undecomposed vegetation frequently found on greens? How does it affect our turf management program, and what effect does it have on the game?

Thatch is a much more serious problem than mat because of difficulty associated with its removal. Thatch is beneath the living turf and consequently, when you remove thatch you are also removing some of the living turf which is lying above it. There is no question that thatch accumulation hinders plant growth and, although most turfgrass species are perennials, parts of each species in question are continually

dying and are being replaced by new life.

Any condition that favors increased vegetative production of grass necessarily aids in thatch development as well. Today's bluegrass plant breeder for example, is trying to develop greater plant density with dwarf bluegrass species. This in turn yields more vegetation and this eventually means more thatch. There is no question that rapid thatch development is a direct product of today's intensive turfgrass management programs.

Factors Favoring Thatch

Many other factors favor thatch accumulation. Soil types certainly have a bearing. Thatch is more likely to form on a heavier clay soil than on a light-textured soil. When grass is killed through winter injury, disease or if an insect problem has been present in the thatch or mat area, thatch accumulation is aided. Compaction, too, plays a part. Weeds in fairways or roughs or even in greens contribute to thatch buildup. The height of cut clearly has a bearing as to the amount of thatch which will accumulate within a given period of time. Excessive nitrogen speeds thatch formation. Rapid growth provides the entanglement of

prostate stems and leaves producing mat which in turn leads to thatch formation.

It has been pointed out recently that insecticides, too, may favor the development of thatch, particularly when using chlorinated hydrocarbons for earthworm and grub control. Thatch may also occur because of an abundance of heavy clippings. This is brought about by excessive fertilization, watering practices, and to some extent, non-removal of clippings. Thatch also occurs when there is a slow decay of dead plant parts. In fact, any factor that slows down organic decomposition favors thatch buildup.

We do know that a frequently top-dressed turf seldom produces a thatch. It is obvious that an application of fresh soil contributes to a more rapid breakdown of dead vegetation. Are there certain elements lacking at the original surface to bring about decay? Could fungicides be affecting the beneficial micro-organisms? Could it be the pH level creating an unfavorable balance for micro-organism activity? It may be a deficiency of free calcium, nitrogen or any of the minor elements associated with soil organisms. It's difficult to say, but we do know that top-dressing works!

This is a sample of soil that shows the mat, thatch and soil layers distinctly.



Thatch is important, however, in developing the resiliency and cushion that is needed in greens or on fairways. Thatch helps to buffer soil temperature from air temperature and thatch helps to prevent the encroachment of weeds. Most agronomists feel the optimum level of thatch on greens and fairways should fall in the neighborhood of 1/4 to 1/2 inch. The desired amount of thatch can be maintained through the use of aeration, spiking, vertical mowing, top-dressing, brushing, lime applications and other phases of cultural management. When there is not enough thatch on greens, excessive ball marks and pitting, along with a poor playing surface are frequent complaints.

Although thatch is important in any golf course management program, it can also create problems for the Golf Course Superintendent. Excessive thatch is undesirable and the disadvantages are legend:

- 1) Dry spots develop and require increased attention in water management programs.
- 2) Thatch can create an uneven playing surface.
- 3) Conditions within the thatch provide a favorable environment for disease.
- 4) Insect activity may be stimulated.
- 5) Excessive thatch brings about desiccation in early spring.
- 6) Fungicide and insecticide treatments are not as effective when thatch levels are excessive.
- 7) Water infiltration rates are affected, decreasing the efficiency of water.
- 8) Management practices required to reduce thatch are expensive.
- 9) It is difficult to obtain satisfactory overseeding.

Thatch Research

Fifteen years ago there was very little research being conducted investigating the development and control of thatch. Since that time, a great deal of money has been spent in research to discover what could be learned about thatch decomposition. R.E. Engel and R.B. Alderfer, of Rutgers University, presented one of the first papers after a 10-year study on Seaside bentgrass, dealing with the effect of cultivation, top-dressing, lime, nitrogen and wetting agents on thatch development. A turf cultivation study conducted by F.B. Ledboer at the University of Rhode Island reported that cultivation appears to increase surface decomposition. Ledboer worked with glucose, sucrose, fertilizer, dolomitic limestone, gypsum and top-dressing combinations on thatch decomposition, and reported them unsatisfactory for increasing the rate of known thatch decomposition. C.Y. Ward, of Mississippi State University, reported that top-dressing and culti-

vation were deterrents to thatch in bermudagrass. J.D. Butler, at the University of Illinois, worked on "Thatch: A Problem in Turf Management," where he showed that thatch may be desirable, depending upon where and under what conditions the thatch exists. Butler pointed out the following benefits by having thatch:

- Shading and lowering of the soil temperature. With a mulch, soil temperature tends to be lower during the day and higher at night.
- Some protection from frost and low temperatures can be achieved from the insulation provided by thatch.
- Reduction of water loss, as thatch may protect the soil from drying winds.
- Reduction of the weed problem.
- Recycling of nutrients: With thatch some turf areas have looked good for many years without supplemental fertilizer.

Most of the thatch research in the past had attempted to find the best management programs and mechanical renovation procedures to reduce thatch accumulation. Today a new focus in thatch research is directed more to the biological degradation of the thatch layer. J.B. Martin, at Michigan State University, investigated the total cell wall, the hemicellulose, cellulose and lignin analysis that make up the thatch layer on the leaves, stems and roots of Toronto bentgrass, Merion bluegrass and Penn-lawn red fescue. He showed that lignin, the most resistant plant constituent to microbial activity, was found in greatest quantities in the thatch layer nearest the soil. Fescue contained higher percentages of lignin than either that of bluegrass or bentgrass. In comparing the living plant parts, roots have significantly higher percentages of total cell wall constituents and lignin than the stems or leaves. He also concluded from his study that clippings of turfgrasses contribute very little to thatch accumulation.

J.S. Koths, of the University of Connecticut, showed that although changes in the thatch microenvironment bring about quantitative changes in microbial balances, such ecological changes do not necessarily contribute to a more desirable thatch balance. A great proportion of the viable microflora is inactive. Increasing activity is important and can be obtained through top-dressing. Changing the physical characteristics of the thatch layer to provide microecological sites that promote continued activity by the resistant microflora may be the most important attribute of top-dressing.

Thatch, a part of turf, plays an important role in providing optimum playing conditions for the game of golf. How the Golf Course Superintendent manages thatch plays an important role in his success or failure in his profession.

NEWS NOTES

CHARLES K. HALLOWELL

The turfgrass world lost another pioneer with the passing of Charles K. Hallowell on October 3, 1974. Charles Hallowell was a graduate of Pennsylvania State College in 1917 and served as County Agricultural Agent in Philadelphia, Pa. from 1923 through 1954. He was closely associated with golf course superintendents' activities nationwide.

He conducted the first comprehensive turfgrass survey in the United States for Los Angeles County in 1950 while on sabbatical leave. This was a cooperative project sponsored by the University of California, Los Angeles, and the Southern California Golf Association. Mr. Hallowell served as Mid-Atlantic Director for the USGA Green Section from 1955 to

1961. His entire professional career was dedicated to his teaching and work with turfgrass.

START THE YEAR RIGHT!

It won't be long before you'll be working over 1974 income tax returns and wish there were more deductions to list. Don't let that happen to you again in 1975. Contributions to the USGA Green Section Research & Education Fund, Inc., are tax deductible. And every dollar you give goes directly to turfgrass research; there are no administrative costs. Your support is needed for better turf and playing conditions in the future. If you enjoy good golfing turf, please send your contribution in any amount to the USGA Green Section Research & Education Fund, Inc., Golf House, Far Hills, New Jersey 07931. Become a part of the research effort. Do it today and start the year right.

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