

Microorganisms develop in response to a particular set of conditions, and if conditions are favorable for their growth they will develop from the great diversity of microorganisms that inhabit the soil. There are chemical substances that will decompose organic matter, but these would destroy the plants and also produce unfavorable soil conditions.

Relatively little can be done to control the temperature, and there is no need to consider the factor of aeration. It is possible, however, to provide additional nutrient substances as fertilizer salts and to modify the reaction with lime. Fertilizer materials may exert their effects not only on the decomposition of organic matter but also on growth of the grass itself. Addition of fertilizer salts would increase growth of the grass and might result in an aggravated thatch condition. High rates of application of nitrogen, such as 6 to 8 pounds of nitrogen per 1000 square feet per season, are often associated with thatch accumulation. The effects of fertilizer both on thatch decomposition and on increased growth of the grass should be evaluated before this procedure is adopted for thatch control.

The problem could be solved by substituting for bent grass another grass that does not produce thatch, but it is unlikely that such a change would be made until some new grass became available. If the type of plant is fixed, it is not possible to affect the composition of the organic material appreciably.

Physical treatment of thatch provided a considerable degree of control. The turf is spiked, scratched, cut, and torn. All of these treatments solve the primary problem, that of getting water into the soil. In all cases the thatch is broken and openings are provided through which water can move to the soil beneath. Other things are also accomplished. By scratching and tearing, a considerable amount of the plant residues is lifted, cut, and then taken away, thus physically removing part of the thatch. Spiking not only breaks holes in the turf, but also brings a considerable amount of soil to the surface of the thatch. Top dressing with soil brought in from another area or added by spiking has effects similar in some respects to those produced by mixing plant residues with soil; as mentioned previously, the organic matter is kept moist through contact with the moist soil, nutrient materials are provided by the soil,

and conditions are favorable for more nearly continuous microbial development than where the plant residues rest on the soil surface. Top dressing without disturbance of the thatch would be less effective than top dressing after scratching and removal of part of the plant material, because there would be more intimate mingling of the soil and plant residues in the latter case. Furthermore, the addition of soil on top of the thatch would leave an undesirable layer of organic matter.

The persistence of residues of bent grass and thatch formation may be due principally to the repelling action on water; the surfaces shed water instead of absorbing it. Some of the treatments are based on this assumption. A direct approach that appears to have been given little or no consideration is the use of wetting agents. There are many different wetting agents, and some will doubtless be toxic. This was true of some trial tests carried out by Dr. Ralph Engel at the New Jersey Agricultural Experiment Station. Undesirable rather than desirable effects resulted from these tests. Problems will also arise regarding dosage and method of application, but the possibilities of wetting agents for control of thatch have not been thoroughly investigated.

Turf Maintenance of N. Y. Courses, \$5,000,000

New York State Turf Assn. Bulletin No. 44 says:

There are about 150 eighteen-hole and 280 nine-hole golf courses in New York State. Conservative estimates indicate that a golf course has 4 acres of turf per hole, 1/9 acre of putting green turf per hole, and maintenance costs about \$1,000 per hole. On this basis:

Annual turf maintenance costs	
of New York Golf Courses=	\$5,220,000
Total turf acreage on New York Golf Courses	2,088

No accurate data are yet available as to the amount of play received by golf courses, but some indication can be drawn from the records of the New York City Park System. In 1947 the 10 city-owned courses registered 469,467 rounds of golf. Golf is not necessarily a rich man's game. This play is admittedly very heavy. Even if play were only half as heavy on the average this indicates nearly 10 million rounds in the State per year.