

CULTIVATION EFFECTS ON TURF AND SOIL

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Two major concerns in turf management are soil compaction and thatch. Soil compaction results in a number of harmful effects such as reduced aeration, drainage, turf quality and tolerance to environmental stress. Thatchy turfs can be more susceptible to scalping, environmental stresses and certain disease and insect problems. Cultivation is one important management tool which the turf manager can use to deal with compaction and thatch problems. This two part report summarizes briefly some results from our ongoing turf cultivation research.

Part I

This study dealt with soil compaction and hollow and solid tine cultivation effects on shoot tissue and thatch development on a creeping bentgrass green. Treatments were no cultivation (check), hollow tine (HTC) and solid tine cultivation (STC). These three treatments were applied under noncompacted and compacted soil conditions. Cultivation treatments were applied once in 1984 and three times in 1985 and 1986 for a total of seven applications using a Ryan's Greensaire using 1/2 inch tines. Compaction treatments were applied with a Ryan's water filled vibrating roller on weekly basis during all three years. Shoot/thatch plugs were taken in November 1986. Aerial shoot tissue and thatch were separated and ashed at 600 degrees C to determine organic matter content.

Table 1 displays the weights of shoot tissue and thatch found in November, 1986. Compaction treatments surprisingly produced no effect on shoot tissue while thatch organic matter content was increased. The latter could be a result of periodic oxygen stress and reduced surface area in the compressed thatch layer which would inhibit the decay of organic matter.

The two cultivation treatments differed dramatically in their effects on shoot tissue and thatch contents. HTC decreased shoot tissue (likely due to the physical removal of turf with the soil cores and resultant injury) and increased thatch organic matter contents when compared to STC. The latter response was attributed to soil incorporation into the thatch layer with HTC.

If thatch accumulates it can become the predominant growing medium for stolons, crowns and roots. This type of growth medium can be extremely susceptible to environmental stresses. Modifying thatch with soil incorporation has several positive effects on the turf. Soil incorporation can act as a buffer and reduce the duration and intensity of certain stresses. Increasing the soil content of the thatch will result in soil covered crowns, stolons and roots growing in the thatch layer. The soil will provide protection against extremes in temperature and moisture and reduce mower scalp. These improved environmental conditions in the thatch can increase surface root activity. A more active root system at the surface will improve nutrient utilization within the thatch layer.

Table 1. The influence of compaction and cultivation on the organic content of aerial shoot tissue and thatch in November, 1986.

	Shoot Tissue	Thatch
	----- gm cm ⁻² -----	
<u>Noncompacted Soil (NC)</u>		
Check	5.0	3.8
Hollow Tine (HT)	3.1	5.3
Solid Tine (ST)	4.8	3.9
<u>Compacted Soil (C)</u>		
Check	4.7	4.6
Hollow Tine (HT)	3.2	5.6
Solid Tine (ST)	4.6	4.3
<u>Comparisons</u>		
NC vs C	NS	*
HT vs ST	**	**

ns, * and ** refer to no significance and significant at the 0.05 and 0.01 level.