soil profile. Soil disruption was detected at the 8 inch depth with hollow tine treatment and the 7 inch depth with solid tines.

These results indicate the necessity for turf managers to evaluate their particular soil compaction problems and equipment capabilities. Soil surface compaction (3 inches deep or less) can be managed with equipment which penetrate through the compacted soil zone. Cultivators with widely spaced tines may require several passes to sufficiently breakup the compacted surface zone. Ideally, coring holes should be spaced no greater than 3 inch apart on highly compacted sites. Deep soil or subsurface compaction can be managed adequately with deep tine cultivators which will penetrate and disrupt those compacted zones, such as the Verti-DRain unit.

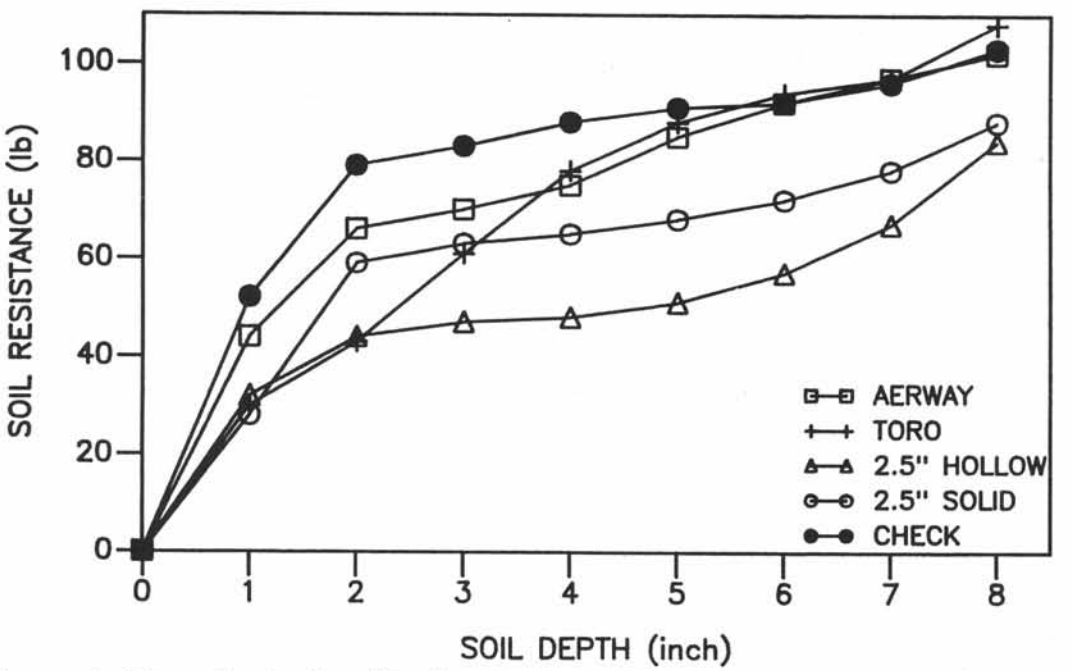

Figure 1. The effect of cultivation on the soil strength of an athletic field.

Table 1 presents turf visual quality data from a cultivation study on a "Ram I" Kentucky bluegrass turf. The cultivators used were the Toro aerator, Coremaster unit, and Verti-Drain unit. The Toro unit was equipped with 5/8 inch diameter hollow tines and penetrated to the 2.75 inch depth. Three treatments frequencies were performed with the Toro aerator; a September only, September-May, and September-May-

June treatment. Two treatments were performed with the Coremaster unit to achieve full depth tine penetration (2.75 inches) and 1 inch tine penetration. The Coremaster was equipped with 1/2 inch diameter tines and treatments were applied in September. Two treatments were applied with the Verti-Drain unit utilizing hollow and solid tines in September. The study was initiated on September 2, 1987. Soil cores brought to the surface with each treatment were broken up with a Ryan's Mataway. The Mataway was used only to break up soil cores and did not penetrate into or remove thatch material. The organic debris left after the soil cores were broken up was taken off with a light raking. The plot area received minimal traffic from routine maintenance operations.

The data in Table 1 demonstrated that visual quality was not consistently influenced by cultivation influence until August of 1988. Frequently treated (3 or more treatments applied) plots showed a positive response to cultivation. Soil incorporated back into the turf/thatch with cultivation on a frequent basis enhanced visual quality by maintaining a slightly darker and more uniform color. Turf density was superior on all plots in this study. Modifying thatch with soil has several desirable aspects. Soil incorporation will serve to cover crowns, rhizomes, and roots growing in the thatch layer. The soil also provides protection (buffering) against extremes in moisture and temperature. Adequate soil additions to thatchy turf will reduce mower scalp. Improved environmental conditions in soil surface/thatch should increase root activity (functioning). A better functioning surface root system will improve nutrient utilization within the turf surface zone.

Table 1. The influence of several cultivators on visual quality of a "Ram I" Kentucky bluegrass turf.

	Evaluation Date (9=Ideal)	
TREATMENTS	6/22/88	8/25/88
Toro Sept	7.3 ab	8.3 bc
Toro Sept-May	8.0 ab	8.7 ab
Toro Sept-May-June	8.3 a	9.0 a
Coremaster full depth	8.3 a	7.8 c
Coremaster 1" depth	7.0 b	7.8 c
Verti-Drain Hollow	8.0 ab	7.8 c
Verti-Drain Solid	8.3 a	8.0 c
Check	8.3 a	7.8 c
L.S.D. (.05)	1.0	0.7