
The Delicate Art of Turfgrass Cultivation

By JAMES B. BEARD

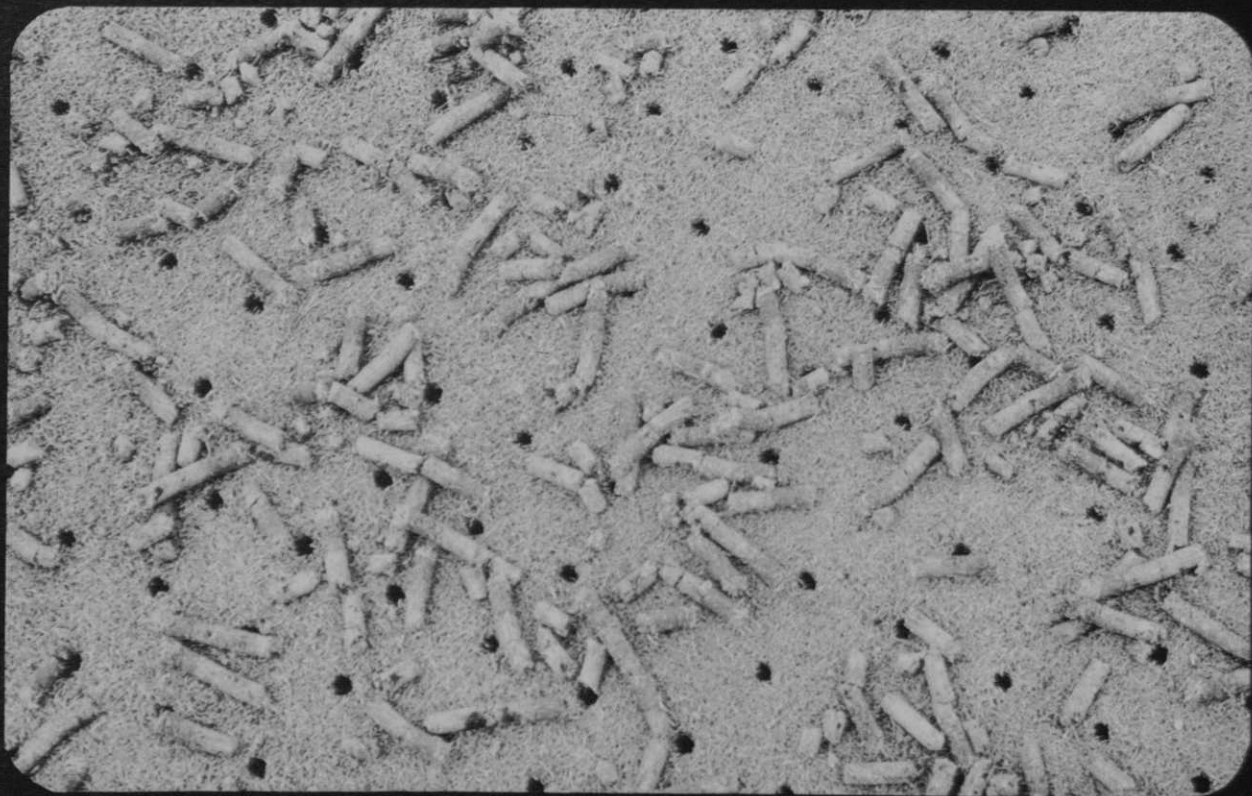
These methods of cultivation can bring new vitality to a course, but only if certain procedures are followed

The cultivation of turfs is not possible as normally practiced in ornamental and horticultural crops. The term cultivation refers to mechanical methods of selectively tilling an established turf without destroying the sod characteristics. Because one of the key criteria in turfgrass cultivation is minimum damage to the turf, it is very difficult to achieve through cultivation of established turfgrass soils. The term aerification has been used as a synonym for turfgrass cultivation; it is misleading because it emphasizes improved soil air movement, whereas in fact, improved water movement may be as important or even more important under many turfgrass soil conditions.

Types of cultivation

There are five primary types of turfgrass cultivation: (a) coring, (b) grooving, (c) slicing, (d) forking and (e) spiking. Each provides a specific type and degree of cultivation.

Coring uses a hollow tine or spoon to remove cores, which results in a hole or cavity remaining in the turf. The normal depth of penetration from coring is three to four inches with the cores located on two, four, five or six inch centers. The actual diameter of the tine or spoon and resulting care varies. The cores may be broken up and



worked back into the surface. Core removal is done either by sweeping or collecting in a box mounted at the rear of the coring unit. Following removal of the cores, the area is normally top-dressed and the soil worked into the holes by matting. If the cores are returned, a vertical mowing unit is utilized to chop up the cores, particularly on greens. Then a steel mat is dragged over the surface to work the soil into the holes.

Grooving uses vertical rotating knives or saw teeth which cut vertical slits through the turf into the soil. The knives rotate in either the opposite or same direction as the direction the machine is traveling. Grooves up to four inches deep are possible. Grooving is frequently practiced for dethatching and over-seeding, since a considerable quantity of soil is lifted to the surface which acts as a topdressing over the turf. In general, a fairly dry soil is preferred for the grooving operation.

Slicing uses a deep, vertical cutting action which provides soil openings and loosening for improved air and water movement. It is accomplished with discs or ridged, V-shaped knives which are mounted on circular, weighted wheels. The slicing unit is pulled across the surface of the turf and the discs or knives penetrate the soil. Penetration is to a depth of three or four inches,

but soil is not removed. Slicing is best accomplished on moist soils.

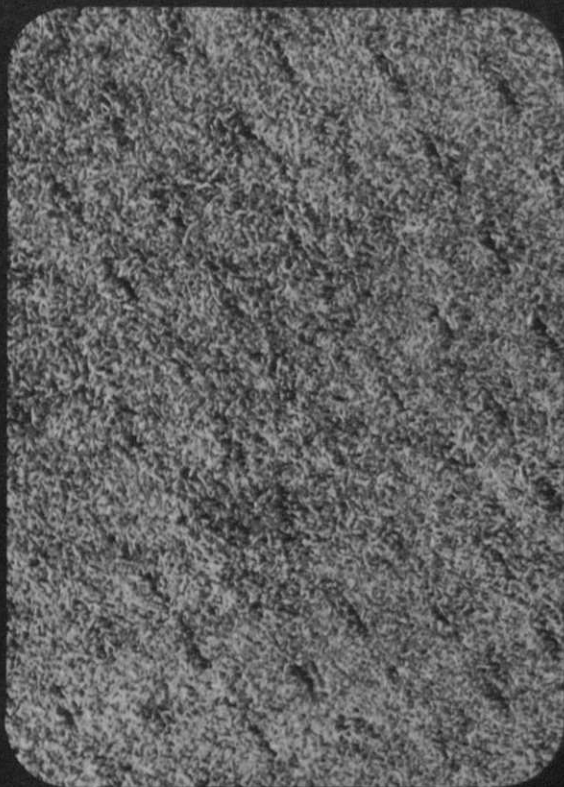
Forking involves the use of a fork or solid tined device for the cultivation of compacted soils. It may involve either powered or manual operation. Forking usually permits cultivation to a depth of six to eight inches with a minimum disruption of the surface. The use of forks for manual cultivation of localized dry spots is a common practice on greens.

Spiking involves the perforation of the turfgrass surface by solid tines or blades. The design and weight of the spiker results in a shallower, less effective cultivation than is achieved by grooving, slicing or coring. Spiking should be used for temporary alleviation of a surface compaction problem. It can be done with a minimum disruption of the playing surface which can be an advantage under certain conditions.

Benefits

Basically, turfgrass cultivation is a mechanical method of improving the exchange of air and water between the atmosphere and the soil. Water and oxygen move downward into the soil while carbon dioxide and certain potentially toxic gases

Continued



Examples of the types of cultivation: coring (opposite page); slicing (left) and spiking (above) are shown here on bentgrass greens.

move upward out of the soil into the atmosphere. The enhancement in air and water exchange resulting from cultivation is greatest on compacted, fine textured soils which have been subjected to intense traffic. Deep cultivation also permits the penetration of fertilizers and lime to greater soil depths.

Other beneficial affects of cultivation include a decrease in the

"Generally, cultivation practices on greens tend to increase the velocity of ball roll."

amount of water lost by surface runoff and an associated increase in infiltration of water into the soil. Under certain conditions, an increase in the water holding capacity of the soil has been observed which reduced the frequency and amount of irrigation required. Deep cultivation of compacted soils can improve the resiliency in the soil and will also stimulate thatch decomposition. The increased rate of thatch decomposition is greatest when soil is brought to the surface to function as a pseudo-topdressing.

The net affect of the improved soil environment resulting from turfgrass cultivation is to encourage a deeper, more extensive root system. An increase in shoot density may also be observed. A further beneficial affect of cultivation is the severing of numerous stolons and rhizomes which results in a stimulation of young, juvenile growth. This is desirable since it improves the overall vigor and quality of the turf.

Cultivation can also be used for overseeding or turfgrass renovation practices. One of the most important principles in achieving adequate seedling establishment in es-

tablished turfs is providing good contact between the seed and soil. This can best be done through turfgrass cultivation and, at the same time, provide a minimum degree of disruption to the existing desirable species.

Potentially detrimental aspects

In the case of golf course greens, cultivation does disrupt to a certain degree the smoothness and quality of the putting surface. The disruption is greatest if a core or quantity of soil is removed. For this reason, it is usually necessary to topdress greens immediately after cultivation followed by a second topdressing two to three weeks later. Generally, cultivation practices on greens tend to increase the velocity of ball roll. If cultivation, particularly where a core is removed, is practiced in late fall the results can be serious damage to the greens due to winter desiccation. A third potentially serious problem associated with cultivation is that it can provide openings of bare soil,

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which are ideal avenues for the invasion of turfgrass weeds, particularly annual bluegrass. Because of this problem, cultivation practices should be done with germination and encroachment of potentially serious weeds are minimal.

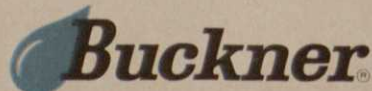
When to cultivate

Turfgrass cultivation is one of many cultural practices which can be incorporated in a turfgrass maintenance program. It should not be used as a routine cultural

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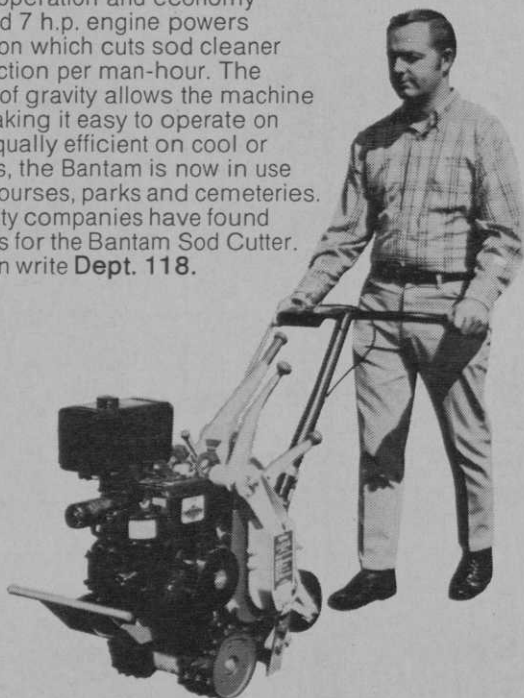
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CULTIVATION

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practice, but only as needed to correct poor soil aeration, inadequate internal soil drainage, a compaction problem and other associated problems, such as localized dry spots. The first step, therefore, in the use of turfgrass cultivation practices is to assess the need. This is best determined by practical experience combined with a basic understanding of the principles of turfgrass cultivation.

The frequency of cultivation will vary greatly and is influenced by the (a) intensity and type of traffic, (b) soil-water content during periods of traffic, and (c) soil texture. Relatively sandy soils maintained at a low soil moisture content and subjected to controlled traffic may never require cultivation. On the other hand, fine textured soils tend to be quite wet and are subjected to intense traffic and may require frequent cultivations. This may range from a monthly basis, in the case of coring, to a weekly basis, for spiking operations.

Turfgrass cultivation is best practiced during periods of active turfgrass growth. The reason for this is that the turf has a more favorable recuperative capability. Thus, it will provide the least potential for weed invasion and the most rapid rate of recovery to the original level of quality, which is particularly important on putting greens. A moist soil is desirable at the time of cultivation to insure deep penetration. Soils with a high water content should be avoided to minimize the degree of soil compaction which can occur during certain types of cultivation. The preferred periods for the cultivation of cool season turfgrass species is in the spring, late summer or early fall, whereas warm season species can be cultivated any time during the early summer to mid-summer period. In addition, the timing of cultivation operations should be adjusted, whenever possible, to disrupt golf play only minimally. □

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