hand tool or with the aid of a ditch digging machine. Before replacing the soil one side of the trench is lined with tin or some other type of sheet metal, polyethylene, or several thicknesses of a good grade of roofing paper. This type of control may last as little as two years or as much as ten years or longer.

2. Ditching and backfilling. In this method, a narrow trench is dug and then backfilled with fresh cinders of coarse crushed rock. In the case of cinders, the sulfuric acid contained in fresh cinders will keep out new roots for almost the same period of time as the less permanent types of edging under similar conditions. Where coarse crushed rock is used, a condition of severe layering is set up and new roots are reluctant to penetrate the large, dry air spaces between the rock particles.

3. Slicing of roots by dragging a special blade through the soil. This method was developed by Mr. James Haines, Superintendent of Grounds at the Denver Country Club. Root pruning in this manner must be done frequently for good control but the method is relatively inexpensive and fast. All turf areas on an average size 18-hole golf course can be root pruned in one day without interfering with surface playing conditions.

There are doubtless many mechanical and chemical methods of controlling tree roots other than the three mentioned here but each requires an expenditure of time, effort and money and, short of removing the tree, is only a temporary measure. Ultimately, the time to arrange for control of tree roots is in the planning stage.

Much of the problem could be eliminated by selection and placement of trees in strategic locations. It is hard to conceive of any tree not sending out some feeder roots into the surrounding soil but it would be wise to avoid the use in critical areas of trees such as cottonwoods, willows, maples, elms, poplars, and eucalyptus, which are notorious for their massive system of feeder roots. By selected deeper rooted trees and placing them well away from critical areas we automatically and permanently eliminate the tree root problem.

Establishing Winter Bermuda Putting Turf

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The successful development of a winter turfgrass on dormant bermudagrass depends on the grass or grasses used, date of seeding, watering, and cultural method. In this paper we discuss the results from an experiment on date and method of overseeding cool season grasses on bermudagrass greens. The experiment was conducted at the James River Golf Course of the Country Club of Virginia, Richmond, Va.

Methods of Seeding

Areas were prepared for overseeding on September 14 and October 4, 1962 on a 4,000 sq. ft. Tifgreen putting green. The seedbed preparation treatments were: (1) undisturbed bermudagrass turf, (2) moderate to heavy vertical mowing, (3) aerifying, and (4) topdressing with ¼ cu. yd. per 1000 sq. ft. of a "topdressing" soil after seeding. These methods were used alone and in combination as shown in Fig. 1. All plots were overseeded separately with 20 lbs. of Penn lawn creeping red fescue* and 50 lbs. of common ryegrass per 1000 sq. ft. The seed-

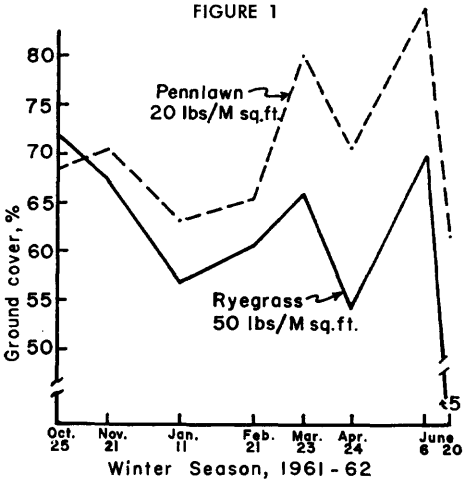
* Better winter turf was obtained when Pennlawn was seeded at 30lb/1000 sq. ft. See U. S. G. A. Journal and Turf Management, Vol. XIV, No. 5. Sept. 1961.

bed treatments were arranged in a split plot design and repeated three times at each of two seeding dates.

After overseedings were finished, all plots were kept moist until the cool season grasses were well established. A mowing height was maintained at 5/16 of an inch. The plots were mowed often enough so that not more than 1/3 of the total top growth was mowed off at any one time.

The turf cover was estimated during October 1960 to June 1961. Common ryegrass provided quicker cover than red fescue, but the Pennlawn creeping fescue produced a denser sod during the rest of the season. (Fig. 1). This was especially evident during spring when the sod cover of common ryegrass dropped from 70% on June 6 to 5% two weeks later, while on the other hand, the creeping red fescue still had a 64% sod cover on June 20. This gradual reduction of turf cover with Pennlawn creeping red fescue gave an almost unnoticeable spring transition to Bermuda.

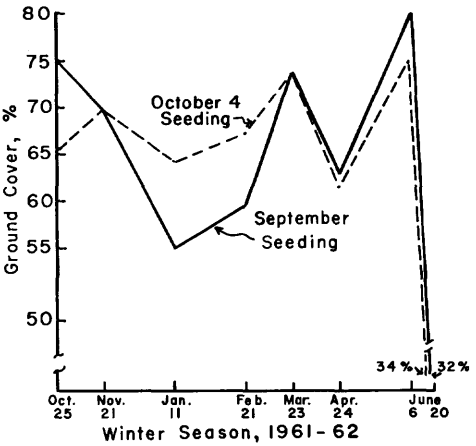
FIGURE 1



Turf cover of Creeping Red Fescue and common ryegrass overseeded on Bermuda Putting Turf as influenced by time of overseeding.

The overseedings made in early October gave better turf cover than the overseedings made in mid-September (Fig. 2). Comparison of the density estimation of grasses sown at different dates (Fig. 2) shows that this later seeding date gave greater cover especially in the late fall and winter months. The average January turf cover of plots overseeded in mid-

FIGURE 2



Average turf cover of two cool season grasses overseeded on Bermuda putting turf.

September was 55%; the early October overseedings averaged 64%. Therefore, it may be concluded that the younger seedlings appeared more capable of tolerating cold weather than the older seedlings.

The proper time to overseed will differ with location, depending on latitude and altitude. However, the data compiled from this experiment indicate that overseeding on Bermuda should begin when soil temperatures start to decline.

The preparation of Bermuda putting greens for overseeding drastically influenced the quality of winter turf. Both creeping red fescue and common ryegrass turf quality was similarly affected by the various seedbed preparations (Fig. 3).

Turf density was increased proportionally to the degree of soil-seed contact. Overseeded plots that received no seedbed preparation averaged only 45% winter turf cover for creeping red fescue and 25% for ryegrass. Both

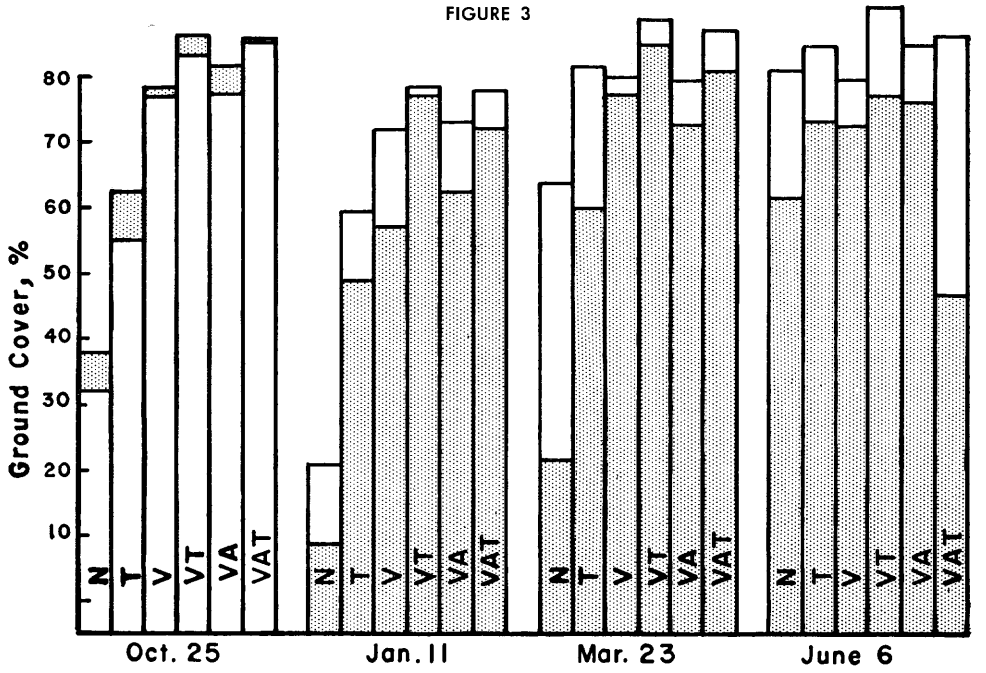
topdressing and vertical mowing increased winter turf cover. However, the best turf for the entire season occurred on plots that received the combination treatment of vertical mowing and topdressing. These plots averaged 73% cover for ryegrass and 82% for Pennlawn.

Hollow tonged aerification at time of overseeding did not increase winter turf quality (Fig. 3). This may be attributed to the fact that the seeds tended to collect in the aerifier holes and cause spotted stands upon germination.

It may be concluded that method of preparation and time of overseeding greatly influenced winter turf quality on Bermuda putting greens. There is also an indication that Pennlawn creeping red fescue under the condition of this experiment was superior to common ryegrass for winter turf, especially during the spring transition to Bermuda.

For best results overseeding of cool season grasses on bermudagrass should be scheduled when soil temperatures start to decline. Immediately prior to the overseeding operation the Bermuda sod should be vertically mowed moderately heavy. After seeding, the seed should be covered with soil topdressing and water applied frequently to insure adequate moisture for seed germination and seeding development.

FIGURE 3



N No preparation - seed sown on undisturbed Bermuda
T ¼ cu. yd. soil top dressing after seeding
V Vertical mowing (2 x) prior to seeding
A Aerification
□ Pennlawn @ 20 lbs./1000 sq. ft.
▨ Common ryegrass @ 50 lbs./1000 sq. ft.