



GRASS ROOTS 3 to 6 feet Deep

By O. J. NOER

Dr. Robert Hagen at Davis, Calif., is intensely interested in grasses for special purpose turf. Some of his turf plots are designed to study water relationships because water is becoming scarce in California and other western states, due to demands of increased population.

Some very interesting observations have been made by Bob on several of the plots of U-3 strain of Bermudagrass and of Merion bluegrass. The soil is a loam of good structure and has a good water-holding capacity. The turf has remained green all summer. Rain stopped in April. Plots were watered only once, and by mistake, when Dr. Hagen was away.

The 6 ft. sampling tube used by Dr. Hagen to measure root depth consists of a metal pipe of one in. inside diameter with a barrel shaped cap on the bottom which has a sharp cutting edge. The driving mechanism is square in shape and is made of cast steel with rods extending from opposite sides. The rods fit inside the sampler tube and serve as guides for driving the sampler into the soil. The soil cores are taken at 6 to 12 in. intervals and can be examined for structure, for moisture, and the presence of grass roots.

The ability of U-3 Bermuda to continue growth and stay green is due to the deep root system. There were roots at the 6 ft. depth. The soil at that depth still had some moisture. Merion bluegrass had roots at a 3 ft. depth, and the soil there showed evidence of moisture.

These plots were most impressive when visited by the writer on October 9, 1952. The grass on both the U-3 and the Merion bluegrass plots was dense and the color was pleasing. It makes one think about watering practices and wonder about the interval between water applications es-



Top: Bob Hagen shows U-3 Bermuda plot at Davis, Calif., to Wm. Daniels of Purdue and C. G. Wilson of USGA Green Section.

Middle: This U-3 Bermuda at Davis, Calif., was watered only once during the season, after rains stopped in April.

Bottom: Across the sign is root of U-3 Bermuda taken from 5 ft. depth at Davis, Calif., plot

pecially on loam soils of good structure and water-holding capacity.

These tests bear out the contention that water should be used to keep the grass alive, and used to make turf lush and green. Grasses of the permanent perennial type like Bermuda, bluegrass, fescue and bent can and do withstand some wilting without loss of turf, provided the root system is deep enough to tap moisture in the deeper soil. When loss occurs the roots are near the top. Then grass dies from too much or too little water, and is very sensitive to — and sometimes severely and permanently damaged by — herbicides such as 2,4-D, 2,4,5-T, etc., and may be badly injured by sodium arsenite which is otherwise safe when used at moderate rates.

Poa annua is hard to hold because of its shallow root system. Roots are always near the top so it is necessary to keep the surface soil moist at all times. In bad weather several hours of neglect may be the difference between keeping and losing it. That is why light syringing with water is imperative in the heat of the day during bad spells of weather.

In places where *poa annua* is the sole grass in the ground cover, bare soil is left when it dies. But where the ground cover is a mixture of *poa annua* and a permanent grass, there is some cover when the *poa annua* is lost.

Instead of abruptly stopping the use of all water on fairways to curb *poa annua* the more logical procedure would be to do it gradually and take steps to introduce a more desirable cover of permanent grasses. Both schemes work but the first puts the course in bad shape for play for several seasons.

The investigations being conducted by Dr. Hagen at Davis and by other workers at State College, Pa.; at Rutgers, N. J.; at Beltsville and elsewhere are sure to provide valuable information. They emphasize the well known fact that water usage is one of the most important factors in golf turf maintenance. No set rule for watering applies everywhere. The secret of success is to adapt the basic principles to local conditions of climate, soil and kind of grass.

Top: This soil sampling tube will take samples to 6 ft. depth.

Middle: The soil sampler reaches 6 ft. in giving Hagen data on his research.

Bottom: Dr. Bob Hagen and student assistant in charge of the plots at Davis examine a plot of Merion bluegrass that has roots 3 ft. deep. This plot has been watered but once.

