Royal Canadian Golf Association Green Section

The Royal Canadian Golf Association has followed the example set by the United States Golf Association, by establishing a Green Section to serve the Canadian golf clubs. Arrangements have been perfected by which the experimental work is carried on by the Canadian Department of Agriculture, and it is hoped that similar cooperation will be arranged with each provincial department of agriculture. For the present the publication of material will be through the Canadian Golfer.

It is also intended to prepare a hand-book for greenkeepers; to engage a specialist, who will be a whole-time employee of the Royal Canadian Golf Association and who will be available to all clubs belonging to the Royal Canadian Golf Association, to conduct experiments to ascertain the best grasses for use in Canada; to establish and maintain nurseries in eastern and western Canada for the development of the superior forms of grasses; and to cooperate with the agricultural colleges in providing short courses of instruction to practical greenkeepers. It was announced that arrangements have been made for the holding of five-day series of lectures early in March in Toronto and Montreal for all interested in the betterment of golf courses.

We wish our neighbors every measure of success in their new enterprise.

A Preliminary Study of the Root Growth of Fine Grasses under Turf Conditions*

By O. B. Fitts

The results of various studies on the roots of crop plants, trees, shrubs, and other plants have been published from time to time, but until 1921 or 1922 the subject had been given very little consideration with regard to the roots of grass cut to form a short turf. The importance of such knowledge became evident about that time, when the question arose as to whether or not it was wise to incorporate in the soil of putting greens in the course of construction, large quantities of manure and other expensive materials, a practice which was being advocated and followed very extensively in golf course construction. One of the main ideas in incorporating such materials in the greens was that of encouraging deep root growth, which, it was believed, would protect the grass against drouth and insure better turf. This question, of course, brought to surface many differences of opinion. Dr. Piper, Dr. Oakley and Prof. Carrier, who, it seems, were looked upon to settle many controversies involving grasses, golf courses, golf, and golfing conditions, prepared an outline of experiments to be conducted at the Arlington Experimental Turf Garden for the purpose of studying the roots of fine grasses and their relations to turf under various conditions, including different soils, various methods of care, the effects of the different seasons, and other features. The experiments were started and have since been kept under close observation, and the plots have been photographed for record. As a result of these experiments information has been gained which enables one to advise more intelligently regarding problems of root growth.

Before entering upon a detailed discussion of the experiments, it may be stated that the conclusions reached as a result of these and the hundred or more other experiments at the Arlington Turf Garden, are not in accord

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with certain theories and traditions on which some methods now practiced on golf courses are based.

The experiments consisted of eight different treatments in duplicate. Sixteen woven wire cages of 1 cubic foot volume were made for the purpose. These cages were numbered from 1 to 16, numbers 1 to 8 constituting one series of treatments, and numbers 9 to 16 the duplicate series. A trench was excavated 8 feet long, 2 feet wide, and 13 inches deep, and the two series of cages were placed side by side in the trench. The object in using the cages was that each might be handled separately and the soil washed out at the conclusion of the experiment with the least possible disturbance of the turf and the roots.

The cages were then filled with soil materials as follows:

Cages 1 and 9; 4 inches of loam at the bottom, 4 inches of sand next above, and 4 inches of compost on top.

Cages 2 and 10; 4 inches of compost at the bottom, 4 inches of loam next above, and 4 inches of sand on top.

Cages 3 and 11; 4 inches of sand at the bottom, 4 inches of compost next above, and 4 inches of loam on top.

Cages 4 and 12; 4 inches of sand at the bottom, 4 inches of compost next above, and 4 inches of soil on top.

Cages 5 and 13; 4 inches of sand at the bottom, 4 inches of loam soil next above, and 4 inches of compost on top.

Cages 6 and 14; filled entirely with ordinary clay loam soil in the natural order in which it was found in the turf garden.

Cages 7 and 15; filled entirely with compost.

Cages 8 and 16; filled entirely with sand.

When these cages were thus filled there still remained a depth of 1 inch to bring the surface to a level with the surrounding surface. One inch of clay loam was accordingly added to each cage, and in this the seed bed was prepared. The purpose of this was to give the young grass an equal chance to get established in each cage. Bent stolons were used in this experiment.

The experiment was begun on April 1, 1923, and throughout its duration all of the cages had the same treatment. They were watered liberally, top-dressed consistently, and kept cut down to putting green length at all times.

The results from all the series were measured in quality of turf. The turf produced on the natural soil was the best of the series. That produced on 4 inches of soil on top was the second best. The poorest turf was on the 12 inches of sand, while the series with 4 inches of sand on top produced very poor turf. The last two series suffered during extreme heat, and at times from lack of sufficient moisture, more than any of the others. The 12 inches of compost, and likewise the cages with 4 inches of compost on top, produced a vigorous growth of grass, but it was too coarse for good turf. The turf on compost showed indication of the need of more water during the summer months than did that on loam. All things considered, the natural soil gave best results. There was very little difference in root growth. The only difference of any consequence in this respect was that on the natural soil the roots and runners seemed to form a denser and more closely woven mat near the surface than they did on the other plots, and this is a very important factor in turf production.

In April, 1924, cages numbers 1 to 8 were lifted, soil, grass, roots, and all; and by playing a fine spray of water over them the soil was washed out, leaving the turf and roots practically undisturbed.

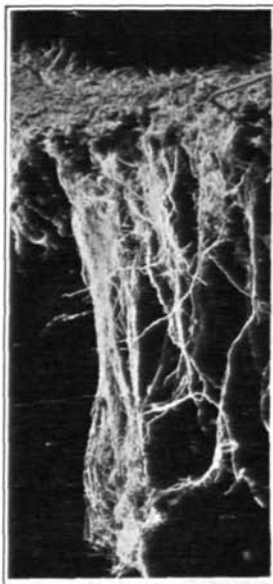

Fig. 1. Winter root growth in 12 inches of sand.

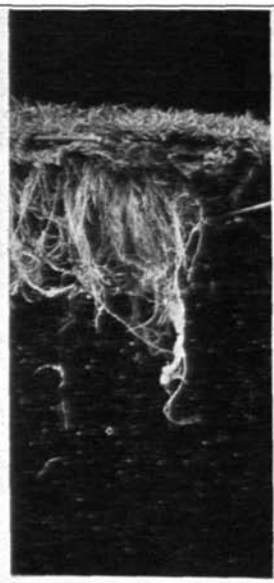

Fig. 2. Winter root growth in 12 inches of loam.

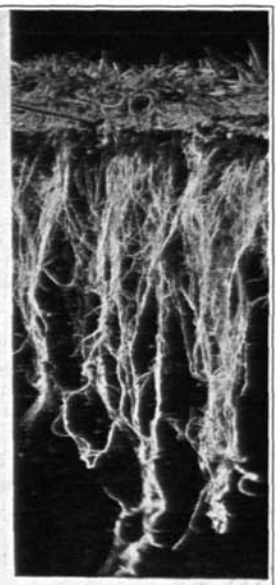

Fig. 3. Winter root growth in 12 inches of compost.

Fig. 4. Summer root growth in 12 inches of sand.

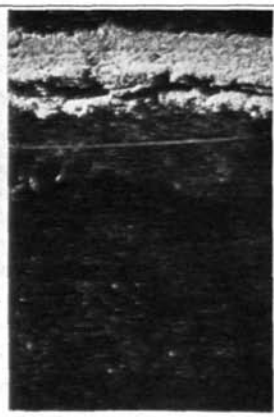

Fig. 5. Summer root growth in 12 inches of loam.

Fig. 6. Summer root growth in 12 inches of compost.

In the accompanying illustrations, figure 1 shows the winter root growth in 12 inches of sand. Figure 2 shows the winter root growth in 12 inches of loam. Figure 3 shows the winter root growth in 12 inches of compost.

In October, 1924, cages numbers 9 to 16, duplicates of the series 1 to 8, were lifted, and washed out in the same manner. The object in lifting these in the fall instead of in the spring was to study the effect of the summer season on root growth as compared with the effect of the winter season. Figure 4 shows the summer root growth in 12 inches of sand. Figure 5 shows the summer root growth in 12 inches of loam. Figure 6 shows the summer root growth in 12 inches of compost.

These results show that during the summer, while the grass is active or growing, there are practically no deep roots developed in any of these

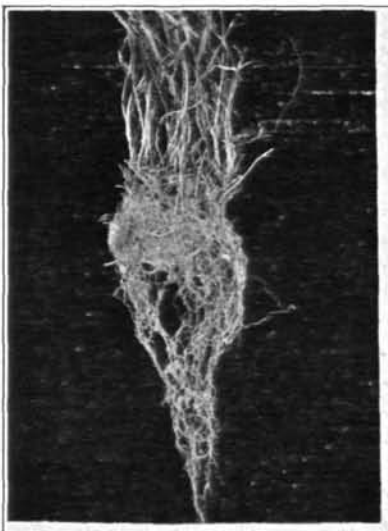

Fig. 7. Tall grass and its correspondingly long roots.

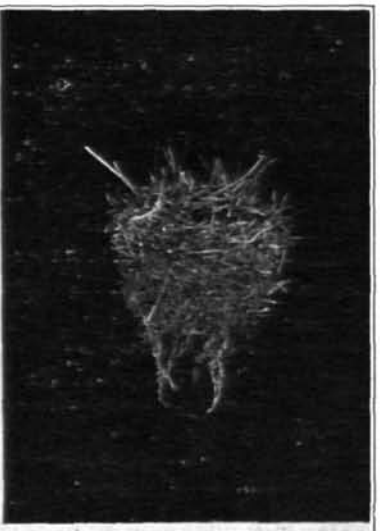

Fig. 8. Closely clipped grass and its short roots.

Fig. 9. Good turf. Properly fertilized.

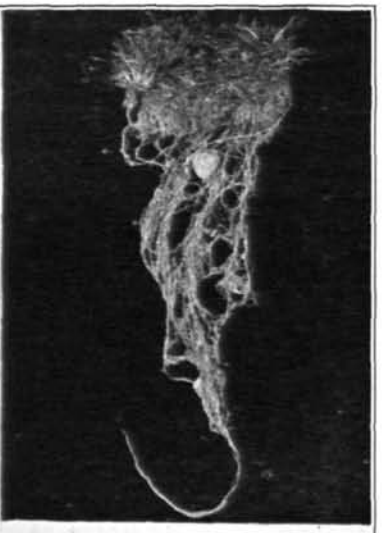

Fig. 10. Poor turf. Starved.

soils, whereas during the winter the portion of grass above the soil surface develops very little growth but the roots go down deep. The results were relatively the same in each of the combinations of soil used in this experiment, which indicates that the different soil combinations have very little effect on root growth.

The turf grasses known as perennials are perennial only as turf. The individual shoots are not perennial. These grasses form and support a perennial turf only by a succession of shoots. As new shoots become established the old ones give way to the new ones and die out. The duration of these individual shoots varies. The extent of the variation is unknown, but indications are that there are only a very few, if any, of the individual shoots of the common turf grasses that live more than one year under turf

conditions, and most of them probably live only a few months. During the growing season there is a constant succession of shoots. During this season the roots, instead of growing down deep in the soil, develop near the surface, aiding materially in making that dense resilient mat which is so desirable in putting green turf. These roots must receive their supply of moisture and food from a limited depth of soil, which is one of the many reasons why it is desirable to water and top-dress turf frequently and liberally during the summer months.

As winter comes on the growth of the shoots is checked by the low temperature. Mowing is discontinued and the succession of shoots stops; that is, the shoots which are present in the late fall exist throughout the winter, and during this period of relative dormancy a deeper root system is developed. In spring, when the new shoots begin growth, the old roots, as well as the old shoots, die, as new ones are produced to take their place.

There are methods of treatment which will influence root growth, but in most cases to effect such an influence is impracticable and the results are undesirable. For instance, if the grass is allowed to grow tall the roots will grow longer and deeper; that is, the length of the root will increase in relative proportion to the height of the grass. Figure 7 shows tall grass and its correspondingly long roots. Figure 8 illustrates closely clipped grass and its short roots. This relation has been studied in Rhode Island bent, creeping bent, Kentucky bluegrass, and red fescue, and the results of such treatment are relatively the same in all cases. In most instances during the summer and fall the roots of these grasses are on the average about equal in length to the individual upright shoots, varying in relative proportion very little except where some other influence is present. During the winter and early spring the roots are much longer than the shoots. Sometimes they measure as much as ten or twelve times the length of the shoots.

Another factor which influences the root growth of these grasses is that of surface fertilization. When grass is fertilized in such a way as to keep the turf in good condition on the surface the root system is composed mainly of short roots which remain near the surface, whereas if the grass is starved, the roots go down deeper but the turf becomes thin and poor. Figure 9 illustrates a piece of good turf, which has been properly fertilized. Figure 10 illustrates a piece of poor turf, which has been starved. Note the longer roots of the latter. These results show that deep roots can be developed—that is, if the quality of turf is disregarded. But to practice such methods on a modern golf course, where water and other facilities are available, is to ignore the principal object of greenkeeping, the production of and the maintenance of the quality of turf best suited to the game of golf.

The results of these experiments indicate clearly that the most practical thing to do in constructing putting greens or preparing seed beds for turf grass, is to build with natural soil, using only such other materials, sand, clay, or organic matter, as may be necessary to bring about the desirable texture (a medium loam type of soil being preferable in most instances). Plant the seeds or stolons, as the case may be, on such a seed bed. Save the bulk of expensive manure, fertilizer, and other material for top-dressing the greens after the grass is established, and by proper care control the growth of the grass by treatment on the surface—and forget all about root growth.