

same compost and care, and are all cut with the same mowing machine at the same height. In making the tests the machine is set up at the edge of the plot and a ball is repeatedly putted from the same position. The average distance of several (usually five) putts is taken as the distance for that setting on that particular grass. The machine is then moved to a corresponding position on a nearby plot and with the same spring and back-swing setting the test is repeated. After several repetitions of the above, both upgrade and downgrade on the different grasses, there is something more than mere personal opinions on which to base a judgment as to the relative putting qualities, particularly that of speed, of the various grasses. Before any scientific judgment is warranted from such tests it will be necessary to repeat them many times at different seasons of the year and in different localities. It is perhaps sufficient for the present to state that, from the preliminary trials made so far, it is safe to predict that many of the dogmatic assertions of the past are doomed to be decidedly modified within the near future.

As an illustration of the apparent failure of the golfer's eye to detect slight differences in speed of turf a single example may be cited from the experiences of last summer at the Arlington Turf Garden. Three good players who were visiting the garden together were asked to look over six different grasses growing in adjoining plots and to choose the fastest and slowest. Three of these grasses had been planted by the stolon method and three with seed, and all had just been mown. Each visitor chose the same plot, which for convenience we shall designate A, as the fastest, and agreed on the adjacent plot, B, as the slowest. The putting machine was then brought into the discussion. The machine reversed the decision for it showed that on both the upgrade and downgrade putts plot B was faster than A. In justice to these golfers, however, it should be added that the difference between the two grasses was small.

### Soil Studies at the Rhode Island State Station

Many of our readers, especially those in New England, will be interested in the results of the golf turf studies which have been conducted for a period of years by the Rhode Island State College. These results were published by the college in June, 1928. For the benefit of our readers we are giving a brief review of the publication here, and suggest that those who are further interested write to the Agricultural Experiment Station, Rhode Island State College, Providence, R. I., for Bulletin 212, "An analytical study of the putting greens of Rhode Island golf courses," by Dr. B. E. Gilbert.

Especial attention has been given to the study of soil acidity and active soil aluminum (a chemical in a form which is toxic to plant growth if present in excessive amounts), in influencing the growth of turf grasses and certain weeds. It is pointed out in the bulletin that it is an open question as to whether weeds are discouraged by the acidity of the soil or by the presence of large amounts of active aluminum. Before investigating the matter further it was decided to make a chemical study of soils on which cultivated grasses were growing. In 1926 and 1927 samples of soil were obtained from putting greens of 22 Rhode Island golf courses and chemical analyses were made of the samples. Observations made in the collection of these samples are included in the publication.

A table is given showing the chemical analyses of the soil samples. In the table the soils are arranged in the increasing order of their active acidity. The table includes figures representing the lime requirement of each soil, the active aluminum present, the total nitrogen, the percentage of humus, and the green rating. A system of rating greens was adopted for the purpose. Another table gives the results of a mechanical analysis of the soil samples, showing the percentages of coarse gravel, fine gravel, coarse sand, medium sand, fine sand, very fine sand, silt, and clay. "No relation was found to exist between the fineness of the soil," the bulletin states, "and the rating of the greens. It would seem that with judicious fertilization, golf grasses will grow satisfactorily despite small differences in the physical state of the soil."

The chief interest in the study was that of the chemical analyses. The courses where sulphate of ammonia had been consistently used were all in the high-acidity group. The course "which had the least acidity had poor greens and had been subjected to applications of lime in previous years." It was found that "there was no evident relationship," to quote from the bulletin, "between the acidity of the soil and the active aluminum content with the golf soil samples. This is in agreement with the results already obtained with soils from different parts of the country." It was further observed that the practice of top-dressing with sand caused dilution of the soils, with the result that active aluminum content was affected. An inverse correlation between the finer portions of the soil and the active aluminum was found. It was found that the nitrogen had as much to do with the good growth of grass as any other factor. The total nitrogen data are of interest in this connection. It was noted that all courses of "A" rating were high in total nitrogen. It was also observed that the nitrogen content was closely linked with organic matter. "Since the best turf was found on courses which had a high humus content," the bulletin says, "it is doubtless of value to keep the organic matter of soil high."

A series of tests was made to determine the relative amounts of phosphorus in the soil available for plant growth. It was found that many of the putting green soils would benefit from the addition of superphosphate (acid phosphate). The fertilizer formula recommended as a basal application consists of 6 pounds each of sulphate of ammonia, superphosphate, and muriate of potash. This quantity is for 1,000 square feet and is to be applied in the spring before the grass starts growth.

A digest of the seeding practices showed a variety of grasses used for putting greens, chief of these being Rhode Island bent, redtop, and German mixed bent.

Only 4 of the 22 courses were found to have nurseries in which turf for use in plugging or returfing greens was grown. It was noted that all four of these had greens which ranked high in quality of turf. Thirteen of the 22 courses had water piped to their greens. Eleven courses reported brown-patch, and worm casts were troublesome on 12 courses.

A digest of the fertilizer practices is given, which shows a wide variation but a more or less general use of compost, local loam, and sulphate of ammonia. The use of some of the common fertilizers is discussed briefly. With three courses definite indications were obtained to show that weeds had been discouraged by the use of sulphate of ammonia.