

Moisture Retaining Properties of Different Soils and Its Relation to the Growth of Grasses

John R. Van Kleek, Kenilworth Inn, Sebring

I deem it quite an honor to be asked to deliver a paper before the State Horticultural Society of Florida on this subject of the growth of grasses. However, I feel as I felt some six or seven years ago when I was employed at the State University of Illinois. I was an instructor with the Landscape Extension Department out there and was sent into various towns in the State to lecture on the beautification of schools, lawns, etc., where it was the custom in the rural districts to call any man who came from the University, "Professor." I was sent into a small town in the southern part of Illinois and got off the train loaded down with about 300 lantern slides, a traveling lantern and a suitcase. I found several people waiting at the station, including a reporter, and a fellow came up and said, "Have you seen Professor Van Kleek?" I said, "No, but my name is Van Kleek and if I can fill the bill I will be glad to do so." I feel tonight, with my short experience in Florida, the same way. I know that most of you, in fact all of you, have had more experience with Florida conditions than I have and no doubt you will want to hear the experiences of a professor and I can only give you the experiences of an instructor.

A little more than a year ago I began the construction of an eighteen-hole golf course at Sebring, Florida. You can imagine my consternation after leaving northern conditions of rock, clay and loam to be cast down upon the sands of Florida. I will tell you frankly that it had me scared and some of it still has me scared, but it has been one of the most interesting problems of my life to try to cultivate grasses on these sandy soils. Perhaps some of you do not know the section around Sebring. Sebring is in the central part of the State and is quite rolling. The majority of the soil is of a yellow texture which has been or which is now used for the most successful growing of citrus fruits. On the particular piece of land which I had to work (about 400 acres), we had five separate and distinct types of soil. The problem then was the growth of grass on these five soils.

Contrary to the common belief the construction of a golf course is purely a horticultural problem. There are some engineering features, such as the design and construction of locations for greens and the proper outlining of the fairways and traps, etc. Those are purely technical features and can be constructed from plans, and have really little to do with the

construction of a golf course. The real problem is the growing and the cultivation of young grasses for the playing surfaces of the golf course. There are two playing surfaces on the golf course, fairways and greens, that constitute two different and distinct problems; but nevertheless, the main problem is the growth and the cultivation of the grasses.

In the cultivation of the grasses the one thing that has come under my observation and the one thing that I think spells success or failure is the moisture retaining properties of the soil in the course. As I have said, we had five distinct types of soil at Sebring. One was the yellow sand common in the high pine land. Another was what a lot of us know as Rosemary scrub, and those of you who don't know Rosemary scrub I don't want to introduce you to it; it has no food value that I have been able to discover. The third soil that I had to deal with is from the bottom lands and it was a muck. The fourth type was a sand soaked type that, again, I don't want to introduce to anybody; and the fifth type was the salt and pepper sand which resembles the yellow sand in composition.

Well, for the first few weeks and months, I asked questions of everybody that I could talk to in Florida, and discovered that Bermuda grass was the type of grass best suited to cultivate for the fairways and greens. Hence, I started to plant everything in Bermuda grass. In the yellow sandy soil not previously under cultivation, and which had not been disturbed in the clearing, the Bermuda grass roots planted four to six inches apart with an ordinary amount of rolling,

fertilizer and natural rains, developed a very good and substantial stand of grass. On the other hand, in the same type of soil but formerly under cultivation in orange groves, the grass planted in the same way, with the same amount of fertilizer and water gave very little growth. That was due, I believe, to the stirring of the soil to a depth of six or eight inches giving a very loose condition which held no moisture. Also the water applied by hose would quickly disappear and hence the grass would not grow. The soil here was made to grow grass only under intense applications of water and with much rolling. It is my belief that the application of water and rolling brought the soil back to a firm condition and when that was attained we got the same results as in the soil that was undisturbed.

The second type was Rosemary scrub or white sand. For a long time I could not grow a sprig of grass although I used every kind of fertilizer anybody could sell me; used all kinds of manures. I made only a slight application of water. Finally I commenced pouring the water on during the latter part of the afternoon and evening and then I began to get a growth of grass. Now, here again was a case where without an intensive and extremely steady application of water we could get but little grass. The natural condition of this type is very loose and that in a way accounts for lack of plant food in the soil. At a later date I covered the entire fairway with a stiff muck. Even though the expense of the operation prevented a complete job, still this muck added to the loose sand helped to retain the moisture in the soil and produce a

good stand of grass. That soil today still needs lots of water and will never produce a good fairway until the Bermuda grass has so permeated the soil that the water will be held there in sufficient quantities to supply the natural needs of the grass.

Now, when we came to the bottom lands we had a good type of soil. It was a black sandy muck high in plant food. I planted the grass before the rainy season and to my utter consternation after the rain was over I had no grass. The water had completely killed out the Bermuda grass roots. I constructed ditches and lowered the water table and replanted, and still the capillary action was so great in this soil that it drew the water to the surface and killed the roots again. Afterwards I began making another tour of the State and found that the old residents whom I met had discovered the facts long ago and they depended on the native grasses. Hence, I am now depending on the native grasses under these conditions. Here too much moisture in the soil spelled failure for the type of grass needed.

In the fourth type of soil or sand soak, as many call it, there was no food left in it. At least I could discover none. On stirring this sand base the grass would grow up for a time but soon the soil would pack and the grass would die out. The only solution I found for that problem was over-laying with a loose sand. Here again too much water retained in the soil had spelled defeat for Bermuda grass. In the fifth type—a black and white or salt and pepper type—the same treatment as with yellow sand produced a very good growth of grass.

The foregoing discussion dealt with the fairways alone. When it comes to the greens the conditions are changed. Most of the greens are elevated and the grass desired must be of the finest possible texture. The soil is practically all brought to the greens and we can control absolutely the type of soils for them. We cannot, however, control the water table and have to water constantly. In my first construction of greens I followed the northern procedure putting on clay and muck and then top dressed with Moore Haven muck or a light woody muck that some of you know. I used some of the Moore Haven muck with some of the yellow sand and fertilized with about 150 pounds blood and bone to each green. The grass grew in great quantities and in magnificent quality but before long I discovered that my soil was too light. It took immense quantities of water to keep the grass in good condition.

I then changed my method of procedure, cutting out the clay because I discovered that it was too sandy for the needed use, and picked out a type of stiff muck that contained a sufficient quantity of vegetable matter in a sweet condition. I used about four to six inches of this muck on my greens with no clay and after that I had no trouble. It takes a very small amount of water during the golf season and during the season when we don't have so much playing it takes water two or three times a week to keep the course in perfect condition. In some cases commercial fertilizer alone was used in dressing the top. I had a peculiar case in front of the hotel. Between the hotel and the road, a space probably 60 by 200

feet, I gave a slight application of stiff muck, probably two inches in depth. Across the road in an area about 50x400 I did not put on the muck but I gave it the same application of commercial fertilizer as I did at the hotel. Now the Bermuda grass where I had applied the muck stayed green all winter, whereas the place across the road turned brown very quickly. (Some of you who know the situation no doubt discovered Italian Rye growing directly in front of the hotel in the area where muck had been applied. In my observation the presence of the rye grass was disregarded and the Bermuda grass alone was watched. The muck no doubt held the moisture in the soil, prevented leaching and produced a wonderful stand of grass.)

*Now all this has to do with golf courses but the same principles apply to every lawn in the State. One of the big problems that I see in the State of Florida is that of lawns and the main problem with lawns is that of maintenance. If I should be asked to give my opinion of the landscape features of the State of Florida, not from the standpoint of the value of plants, but from the view point of a landscape architect, I would say that the maintenance item is the thing that has been absolutely forgotten. The man in his little home who has a lawn of 20x30 feet perhaps set out in St. Augustine, St.

Lucie or Bermuda grass, as the case might be, sprinkles on a little fertilizer once a year and then proceeds to forget it. Now I think the State Horticultural Society, from the viewpoint of a landscape gardener or architect, can do more for the State in its beautification by advocating good lawns than in any other way. The soil is the main problem. If one can get good stiff muck that retains moisture, 90 per cent of your problem is solved; then with a little common sense and personal supervision of the water supply and fertilizer we can have as fine lawns as exist anywhere in the United States. The putting greens at Mountain Lake, under the supervision of Mr. Linderman, who follows me, are the best I have ever seen in the South and I believe but few of the Northern courses have the equal. You would not believe this to be a fact, but Bermuda grass with plain muck, with proper top dressing, produces finer lawn grass than any grass produced in the North. This cultivation of grasses, of course, is a great thing. We all know that England has the best lawns in the world. There is only one thing that gives them this success—moisture in the air. We have a fair amount of moisture in the air and I believe the lawns of Florida can be made as fine as anything in this country by the proper preparation of the soil and application of water and fertilizer.