THE
GOLF COURSE

A MONTHLY BULLETIN DEVOTED TO THE DISCUSSION OF MODERN METHODS AS APPLIED TO GOLF COURSE CONSTRUCTION AND UPKEEP

Soils

By Leonard Macomber

TEXT books classify "clayey soil," "loam," "light sandy soil," and the like and the average person looks at his lawn, which to him is only plain "ground" and is quite at a loss to know its real description.

The principal ingredients of soil are sand, clay, gravel, and humus; and it is the proportion in which these are mixed that determines the kind of soil.

A loam, as far as plants are concerned, is a workable and a most digestible mixture of clay, sand, silt and humus, but when one or another of the ingredients predominates, it gives its name to the loam—viz.: sandy loam or clay loam.

A sandy soil, by adding humus, can be converted into a sandy loam, and a heavy clay soil by adding sand, peat, leafmould, and often lime is necessary, can be converted into a clayey loam.

An Easy Soil Analysis

Aside from the feel of soil and its appearance, there are mechanical tests which are not so difficult to apply. First get a fair sample of the soil from several different places (say a quart). Weigh this and put down the weight. Next put the soil in a pan at the back of the stove and let it stand until thoroughly dry, but it must not be allowed to burn. Weigh again and the difference between this and the first weight is the amount of water the soil holds.

Now put it in a hot oven for three or four hours; then weigh again. The humus will have burnt and the difference between the second and third weights gives the amount of humus.

Now in your pan is clay, sand and silt. Put this soil in a wide-mouthed glass bottle or jar—a two-quart jar will do; the larger the better. Fill it with water and then shake it violently. Then set it down on a table and observe.

The sand or gravel being heaviest will settle first; next the silt; while the clay will remain in the water for hours. After a day or so, it will be seen that there are no sharp divisions, but yet the different elements are separated definitely enough to give a fairly good idea of the proportions. You can then work and treat your soil accordingly to make it well balanced.

It is hardly ever necessary to make a complete chemical and mechanical analysis of soil, unless one knows for certain that its failure to carry the desired crop is entirely due to the structure or chemical constituents, and not to position or environment or the climate conditions ruling in the district.

(Continued on Page 106)

Soils

(*Continued from Page 101*)

If soil is known to be barren, it is necessary to make a close analysis of it to find out why it is barren. If however, soil is not barren, but does not carry a crop well or is under suspicion, it is well to test for nitrogen, phosphoric acid, potash and lime, but unnecessary to test for iron, magnesia, sulphuric acid, silica, soda, or chlorine, because the latter are so generally present that they can be almost ignored.

It is almost always better to work from a description and an examination of samples of soil in prescribing than from the closest and cleverest analysis, unless the soil is known to be barren.

The analysis of soil can only be approximately true for these reasons:

If the sample is taken from one place and represents several acres, it may be absolutely misleading. The presence of a leguminous plant growing on the spot, the stalling of a beast, or the presence of a piece of refuse, might throw the analysis right out of gear.

If the area to be analyzed is plotted and samples carefully taken from each plot, the whole mixed and a small portion analyzed—the result would be substantially correct, but in all probability if portions of the one sample were sent to different chemists for analysis, each one would give a slightly different result.

To sum up, science in regard to agriculture is a good servant, but a cruel master—or in other words, a crop cannot be grown by thumb and rule, and unless rainfall, temperature, the humidity of the air, the quality of the soil, its conditions, drainage, power to conserve water, and all such factors are taken into account, and are more or less favorable—soil may be barren, although it may be proved by analysis to be rich and fertile.

The analysis of poor soil placed against a good soil is pretty confusing to the ordinary man, and so hopelessly unintelligible to the majority, that they rarely exist except in text books.

Example:	Poor Light Soils	Poor Heavy Soils	Good Heavy Soils
Nitrogen	0.10	0.12	0.19
Potash	0.02	1.11	0.60
Lime	0.10	0.00	2.61
Phosphoric Acid	0.05	0.05	0.27

The usual chemical analysis of a soil consists in finding out the amounts of the above elements present and also the percentage of magnesia and humus contained. These materials, except the humus, are extracted from the soil by strong acids, and the action of these acids is many times stronger than is ever brought to bear by plants on the soil in its normal condition in the field. It is therefore impossible at present to draw any certain conclusions from the results of such an analysis that are applicable to field conditions, since the acids used in the laboratory dissolve out much more of the plant-food in the soil than is ever in solution in normal soil water. If, however, an analysis shows only a very small amount of nitrogen, then one can certainly conclude that the soil is deficient in this element and would probably be benefited by its application. In inspecting new property and judging the qualities of the soil it is always advisable to observe the natural plant growth.

A soil deficient in nitrogen is constantly showing its condition in the growth of the plants on it. Short growth of straw and vine, failure to develop a full dark green color in the foliage and the growth of sorrell and ox-eye daisy, all tell as accurately as the chemist, with all his skill, that the soil lacks nitrogen. It is the same with the other constituents.

It is only when a soil is extremely deficient in certain plant foods that a chemical analysis of it shows the cause of the trouble. Usually an examination by an expert will suffice.