The change in the source of power for turf equipment was one of the great accomplishments in this field. Prior to the time of power equipment, good turf management was restricted to a very small area. With the advent of power driven cultivation equipment, which came around 1946, the cultivation of turf became a standard management practice. Other developments which have advanced the field of turf have been planters for vegetative materials and machines for seeding steep slopes, improved mowers, seeders, sprayers and fertilizer distributors.

A 3-Phase Contract to Protect the Club

By GEORGE W. COBB
Golf Course Architect, Greenville, S. C.

I am afraid that many architects feel that the design of a course is the only thing that concerns them. Consequently, there are many cases in which the entire construction phase is tossed in the lap of an assistant, a construction supt., contractor or even an individual club member or a group of members.

We break our course building contracts into three phases. The first is the preliminary layout of holes; the second is setting up of specifications for building; the third is personal inspections while the course is being built.

I think that the second and third phases are so important that it is clearly stated in the contract that the client is not obliged to proceed with either until he is satisfied with what has been done before. He has immediate call upon my services to straighten out any detail which is not to his liking. I know of quite a number of courses where a designer's name has been attached to the layout although he has done nothing more than route the holes.

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zyme substances go unchecked, they not only slowly kill the cell but break down structural material between cells. This enables the fungus to spread through the entire plant.

Different species and strains of turf have varying nutritional requirements for strong growth and by-product resistance to disease. The same may be said of soil types. So, sweeping generalizations can’t be made covering nutritional relationship to disease control.

But this much is known:

Nitrogen in proper amounts promotes vigorous growth that enables turf to outgrow the slowly developing fungus infections. In excessive amounts, though, nitrogen stimulates production of thin walled cells that become easy prey to invasion by harmful organisms.

Phosphorous reacts with carbohydrates to produce building blocks for new cells and tissues. Because of this function, growth stimulation brought about by nitrogen when phosphorous is deficient, results in poorly balanced nutrition and the likelihood of increased disease susceptibility.

**Speeds Up Synthesis**

Potassium in adequate amounts speeds up synthesis of essential disease resisting and growth substances in grasses. Deficiencies of it weaken cell walls and lay them open to penetration by disease organisms.

Calcium strengthens intercellular areas and helps to contain the spread of fungus in a plant. Its balance with potassium is important. It also neutralizes acids and possibly other growth by-products. Calcium deficiency in turf is not common although it must be conceded that weak turf is often tied in with acid-heavy soil conditions.

The secondary elements, magnesium and sulfur, and the minor elements, iron, boron, manganese, copper, zinc and molybdenum, are known to have important regulatory functions within the plant. It is reasonable to assume that their presence in adequate amounts favors disease resistance.

What should be kept in mind so far as good growth, and resistance to disease are concerned is that it is not the presence of nitrogen, potassium and phosphorous in adequate amounts that is so important as the proper balance and absorption of these elements in relation to one another.

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**Drain Green Over Its Entire Width**

*By CHARLES DANNER Supt., Richland CC, Nashville*

One of our six new greens was built so that excess water was channelled off the green in a narrow area. It didn’t take long to find out that excess water must be drained off the green over the entire width of the front or sides and not channelled off. Another green was built with ample surface drainage with a one way fall toward the front which drained excess water down to a flat fairway. The result here was that the front approach would become sloppy during wet weather. This was a good breeding place for disease.

This green has been our problem every summer. We still have the green as it was built but it is only a question of time until we will have to rebuild it. We have found that any low spot around a green or even a leaky sprinkler valve is a good breeding place for disease.

In 1953 we converted six more greens to bent grass and finished the remaining greens in 1954. The last twelve greens were constructed by sloping the bottom of each green exactly as the finished top. We made one change on these greens by changing the way we installed the tile lines. Since we had a fall at the bottom and a fill of gravel why use the herring bone system of tiling? Instead, we put one tile line along the low front and side.