WATCH DRAINAGE

As Turf Problem Source

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★ IT IS obvious when water stands on the surface of a fairway or a green sufficiently long to interfere with play or until it kills the grass, it is necessary to remove it through some kind of an engineering project to produce good playing conditions.

Tile drains and open ditches will take care of most such problems on fairways and in the roughs. Wide grassed ditches or waterways through which fairway mowers and other equipment can work are ideal for areas where the removal of water is only necessary on special occasions.

Tile drains sometimes fail to function because the backfill is too impervious to let water get to the tile. In such cases lines should be dug up and backfilled with coarse material like gravel or coarse cinders, at least in the lowest part of the poorly drained area.

The need of drainage is not so noticeable when the water does not stand on the surface in pools but merely fills the voids in the soil excluding air and interfering with the free exchange of air. The resulting effect is just as deadly as surface flooding for although water is essential for the growth of grass it is equally necessary that grass roots be continuously supplied with fresh air. If the soil air is not constantly being renewed from the atmosphere, carbon dioxide replaces the oxygen causing the plants to turn yellow and eventually die. Wherever poor drainage conditions exist the turf becomes thin and yellow.

Factors Affecting Greens Drainage

The downward movement of water through a green or through any soil is dependent upon the number of large pores available for the free movement of water. It is through these same large pores that air moves since the supply of these in the voids of the soil complement each other, i.e., that portion of the voids that is not filled with water is filled with air. The small pores absorb and hold water against the pull of gravity so the air supply in a green is in the large pores.

A very important fact that is often forgotten is that the least pervious layer in a green is the one that determines the rate of downward flow of water. Whenever a pipeline is blocked the free movement of water is impeded and the total movement of water in the line is determined by the rate at which it can pass the smallest part.

Coarse-textured soils have the greatest number of large pores and therefore allow the freest downward movement of water, whereas clay, clay loam, and silt loam soils contain very large numbers of extremely small pores. Water movement is usually slow in them. However, if these soils are in a granular condition, as sometimes occurs under general agricultural conditions, they contain many large pores and are well drained. Under conditions of excessive packing when soils are wet, the air capacity of clay and clay loam soils may be reduced to almost zero. This condition is frequently found in golf greens constructed of too heavy soil. The soil is almost always wet and the constant packing when players walk on it puddles the soil and reduces the air capacity. The air capacity of one golf green was reduced from 25 percent to 4 percent by this constant tramping.

It is on account of the above problems that we have recommended for many years that golf greens be constructed of coarse sandy loam soil and that coarse sandy loam soil always be used for topdressing. The problems of maintenance would be greatly reduced by these simple factors.

Let me cite a few case histories that I have had the opportunity to study:

A local golf course has a green in a beautiful location in a wooded bend of a river. The green is built on a sandy bank near the river. The builder placed a layer of approximately 3 inches of fertile river-bottom soil on top of the sand and then placed the top soil (a good sandy loam) over this soil. Whenever the weather is even moderately rainy this green shows all of the symptoms of poor drainage. The grass becomes thin and turns yellow. In-

(*Continued on Page* 56)

Watch Drainage

(*Continued from Page* 53)

vestigation shows the sandy soil underneath to be perfectly dry. The 3 inch layer of fine soil is practically impervious to water. Attempts have been made to improve drainage and aeration conditions without removing the sod, but eventually this green must be reworked to mix the layer of fine soil into the sand or else to remove it.

On another course the owner constructed a green in a wooded corner. The soil was a heavy clay in that vicinity. This soil was used to build the green and no provisions made for drainage. Every season this green was thin and yellow. Dollar spot attacks were frequent and severe. Finally it was reworked. Tile drains were installed, backfilled with sand. Sand was added to make a coarse sandy loam topsoil. This is a good green at the present time and maintenance is much easier.

A golf course that had well-constructed greens had a series of greenkeepers who tried to economize for the club by topdressing the greens with a mixture of muck and clay loam because the club had a large area of each on the course. In time, all of the greens on this course have shown the effects of poor drainage. The last two greenkeepers have managed to recondition a couple of the worst ones which immediately reduced the care and attention needed to maintain them in good playing condition, but there are several more that need reconditioning to complete the job.

Sandy Soil Cemented

Sometimes poor drainage is found in greens constructed of apparently quite sandy soil. On a course in northern Michigan the green is composed of sandy soil in which the sand is quite fine. When this was mixed with a little organic matter and a very small percentage of clay it produced a more or less cemented condition which did not permit the free percolation of water. Tile drains at strategic spots and backfilling with coarse sandy gravelly soil cleared up this situation, where the grass was very yellow previously.

On the same course we found a green located in a position where it was being continuously saturated with seepage water from hills on two sides. Interceptor tile drains were installed and the green became healthy and easy to maintain. Previously the grass was thin and quite yellow.

I have in mind 2 other greens that present more difficult drainage problems.

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These are on 2 different golf courses but the conditions are almost identical. The greens were built near water hazards. These are small ponds fed by small intermittent streams. During seasons of heavy rainfall the water table is so high that the greens become waterlogged, the grass turns yellow and begins to get very thin. I have recommended changing the position of the greens to higher locations. In one case it has not been feasible. However, this green was raised about 3 feet and is considerably improved although it is on a mucky base and will eventually settle somewhat.

Although the drainage of fairway areas is important I am not too concerned about them because I know that whenever they interfere with play the management will see to it that they are drained.

However, let no greenkeeping superintendent be guilty of placing any layer of material in a putting green either in its construction or as topdressing that will in any way interfere with the free percolation of excess water and the free movement of fresh air to the grass roots, that the greens may always be green and healthy.

Air Drainage

Air drainage as a factor in the production and maintenance of turf is not as frequently a problem as is water drainage. By air drainage is meant the free movement of atmospheric air. The places where it is most frequently encountered is in wooded corners where the prevailing winds cannot hit, and in low pockets or valleys.

The main damage to turf has been the fact that in the hot summer months conditions in an area of poor air drainage favors the growth of disease-producing fungi and are less favorable to grass. The humidity is usually high and the grass does not dry as quickly as where there is free air movement.

The problem has received some attention, but since it is not as common as some other problems no great amount of work has been done about it. The treatments consist mainly in cutting an opening through trees and shrubs towards the prevailing winds to allow the free movement of air in cases where a dense stand of trees is the contribution factor.

Large fans have been used to give air movement in pockets and low areas where there has been no way to allow nature to do it. There are many airplane propeller types of equipment which have been used for this purpose. Undoubtedly many more will be on the market in the near future.

Paper prepared for GSA meeting.

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