

Thoroughness Is Vital in Building Perfect Greens

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WHAT ARE the essentials for a permanently good putting green? In order of importance in the writer's estimation they are: (1) Drainage, (2) Soil Structure, (3) Purity of grass strains, (4) Fertilization, (5) Care.

The best of grass will not keep a green perfect if the other four requirements are absent. Care, proper fertilization and good grass together can produce a fair surface for two or three years. Add a reasonably good soil structure and good playing conditions may be extended a few years longer. But without adequate drainage eventually the green will begin to go bad, maintenance costs will rise and sooner or later all or part of its grass will have to be replaced. If the fundamental trouble is not diagnosed and remedied it is only a matter of time before the same conditions are met again.

Let it be understood that drainage alone will not make a perfect green. Without the right kind of surface soil the best planned drainage system cannot fully function. Without good grass strain the ideal green can never exist on the best of soil. Without scientific fertilization and proper care even the best of grass will not attain and keep its greatest perfection though soil and drainage be excellent. All five stones are required for the perfect arch. Drainage is the keystone. Without it the edifice may stand for a period but will crumble eventually under the weight of constant play.

Proper drainage is a structural condition which effectively conducts from topsoil all unneeded moisture. Every amateur gardener knows that the hole in the bottom of a flower-pot is for just this purpose. Surface drainage usually presents little difficulty. A gentle slope, in two or three directions if possible, without depressions, will conduct a considerable portion of excess of water directly off the green. On established greens, low areas and general contour can gradually be built up by frequent topdressing applications. Deep

channels and abrupt changes in pitch should be avoided, thereby minimizing change of scald from concentration of fertilizers and fungicides therein by washing.

If green contour has a valley try to pitch crown of depression slightly away from the lower area whenever possible. Excessively high ridges, bumps or knobs are hard to keep adequately moist in dry season without excess water in lower levels. If such must appear it is usually better to slope these with surface soil only.

Sub-Drainage Most Vital

Sub-drainage is the real problem and the more important one. In new construction it is simple work and provided for in plans of all reputable course architects. For those who "build their own" it is not impossible of accomplishment if the underlying principles are known. For the benefit of these let us sketch the requirements. Take first the simplest type for drainage, the green higher at all points of its periphery than the surrounding fairway and banked against the approach (higher in the back than in the front). If such a green has a permeable topsoil, usually no tile work is required provided back to front pitch is fairly sharp and even. It is necessary then only to arrange the subsoil base so that it has a constant and uninterrupted pitch from back high-point to front low-point. To help quick evacuation there should be also a slight subsurface pitch transversely from this center line to each side. This will then allow subsurface flow in three directions.

Nowhere should there be a hollow which will hold water. If there is to be a depression in finished green, shape subsoil accordingly. If raised portions are called for, construct them solely of topsoil material unless all sides of raised base will turn water without great in-

ruption. The lowest parts of sub-base must terminate above fairway, otherwise compact fairway soil may act as a dam. Topsoil cover can be extended and graded to fairway level if a flat approach is desired. The finished shape can be altered or contoured almost at will by the disposition of the covering topsoil, due care being observed for surface drainage. However, the subsoil base which supports the topsoil should drain clear in every possible direction.

Tiling Requisites

If base pitch is not sharp enough in a practically constant angle or if a deep valley shows on green plan a single tile line may be sufficient. On practically flat greens or on those whose edges are all or largely on level with or below surrounding fairways, tile drainage to a greater or less degree is almost invariably called for. The one exception may be found on courses built on a very sandy soil where green topsoil is more compact than surrounding fairway and where excess water will be readily absorbed by underlying soil.

Tile drainage of established greens is a different and generally harder proposition. There the exact slope and contour of subsoil base is largely unknown, and impossible of change without removal of sod and topsoil. The condition of the grass gives the only clue to those portions most needing attention. The tiling must be planned primarily to reach these particular locations. Between alternate routes the expert can usually determine the best. But even the experienced cannot see and know all of the hidden bumps and hollows covered with topsoil and grass. Three or four lines must sometimes be laid where one would have done with a properly planned base.

Each green will produce its own drainage problem and consequently no general plan can be presented in an article such as this. Nevertheless an outline of the reason for and the theory and practice of tile draining may be of interest. All portions of the green must be reached in such a manner that any undue retardation of subsurface water flow will be eliminated and the excess passed quickly from the surface soil. Excess moisture remaining in the soil will prevent the penetration of needed air to root structure, retard and greatly diminish the bacterial ac-

tion required to change mineral constituents into forms which can be assimilated by the roots, and will gradually change the structure of the soil and its chemical properties. Fine grass growth thins out, sometimes being replaced by coarser grass or weeds, at other times remaining half bare in spots. A plug of soil from these areas will feel and seem lifeless, often slightly darker than surrounding soil and sometimes of a rather unpleasant odor. Resodding affected areas gives only temporary relief as long as the fundamental trouble remains.

Laying Tile Properly

The so-called herringbone type of tiling is probably the most efficient and cheapest method of laying. Usually 1-in. inside round or hexagonal unglazed tile is sufficient except for main stems. The pitch from high to low points should be of a constant angle, pipes being laid on cinder or fine crushed stone well under sub-surface grade. These trenches must have no hollows or pockets on lower side. Joints should never be cemented, but it is advisable to cover top of joints with a strip of heavy tarpaper to prevent soil seepage during settling of topsoil. A small piece of slate at each end will prevent soil entry there. Trenches should then be filled with cinders or fine stone completely to subsoil base grade, wet down and tamped, care being taken not to break any of the tiling. The low point terminal can be led to a lower portion of fairway, to a side trap or to a rock-filled sump. Wire a coarse copper screen over discharge end of each line to prevent moles and rats from entering. This is important as otherwise discharge may be interrupted. Very careful study and planning is required for a successful layout and the amateur is advised against attempting it. It is economy to call in an expert to analyze the problem and to furnish working plans.

Soil Structure is Necessary Adjunct

Unless the topsoil structure is correct the best planned drainage system will not function properly and grass growth will suffer. If the topsoil is too heavy, surface water cannot soak into and through. This will throw an added burden on surface drainage and tend to wash and roughen putting surface. A considerable loss in fungicides and fertilizers will result, as in solution they will be washed

off the surface rather than into it. Lower areas are bound to accumulate an excess from high points with risk of scald and certainly of undue concentration. Excess water must be given in dry periods to assure any permeation and, even then, little moisture will sink keep enough to form a future supply for root use by capillary attraction. Root growth will invariably be shallow as hard soil makes penetration difficult and free access of air almost impossible. Friendly bacterial functions will likewise suffer. Roots will naturally stay close to surface where air and water are more readily available. Sturdy natural growth is thereby hindered and excess water and chemicals are required to keep appearance. Added susceptibility to disease naturally follows.

If topsoil is too friable difficulties will again be met. Here water will pass too quickly and too completely through surface and off green via the tiles. Not enough will remain in suspension. Fertilizers will wash right through before complete transformation and absorption takes place. A greater degree of watering again will be required at the cost of water and labor. The danger of over-watering is not as great as on the heavy-soil green, but the expense is there. Too much water is often worse than too little, particularly in hot weather.

What Soil Best?

It is therefore obvious that a proper soil medium must be provided not only for adequate drainage but for proper grass growth. The perfect soil is sand-loam with ample humus content. A sand-loam is a soil which will be solid and at the same time permeable; open enough to permit ready water and air absorption, compact enough to hold a portion of the water underneath and yet not show or hold foot-marks and other evidences of hard play.

A rough test can easily be made by picking up a handful of damp (not wet) soil and compressing firmly in the palm. Open and tap the hand gently. If the earth cracks and crumbles the consistency is approximately correct. If it remains in shape there is too much clay. If it falls too readily out of shape there is an excess of sand. There is still the question of humus content. Humus is required to promote bacterial growth and to function and aid in water holding and in keeping an open soil structure for root breathing.

If the topsoil comes from cultivated farm land which has been kept well fertilized with organic matter or from a properly made soil nursery, there is probably sufficient humus in it for initial use on a new green. For topdressing an addition is usually required to replenish supply on old green surface. Samples of soil from each green should be analyzed at regular intervals and tested for structure as well as for chemical composition. Each green will vary and topdressing proportions can be altered to best suit individual requirements.

To change soil structure on existing greens is at best a tedious job but one possible of accomplishment over a considerable period of time. It is always much quicker and often much cheaper to rebuild an entire green rather than attempt to change its structure through the only other method, continued topdressing. If the sod is fairly good it can be lifted, topsoil removed and mixed to proper consistency, sub-base corrected and tilted if necessary, in a surprisingly short time and at relatively small cost. I know of cases where such work has been done and play resumed in less than two weeks.

If correction is to be made from surface application only, a comprehensive plan must be worked out and followed over a period of several years. Frequent deep spikings and more frequent and more friable topdressings will hasten correction. Great care is required lest layers of different soil types be produced. Expert advice is required to assume final success.

ONE OF THE serious problems with which some of the metropolitan district clubs had to contend during 1932 was that of the so-called "tramp" golfer. This is the fellow who refuses to become interested in a club membership under any circumstances, but who will play around at private clubs, introducing himself as a guest of a member. Frequently the member is embarrassed by requests from the tramp golfer to be allowed guest privileges for even though the tramp golfer is willing to pay his own green-fees, he often plays the same course more days than many of the club's members.

Many clubs were compelled to post notices reminding their members of rigid enforcement of the usual rule that no guest could be extended privileges more than four times a year.