Sound Watering Practice to Develop and Hold Greens

By O. J. NOER

MORE WOES and bad greens are traceable to faulty water management than any other single thing. Excessive soil wetness is worse than overdryness because damage is more severe and recovery more uncertain.

The average golfer encourages and may demand overwatering so greens will hold any kind of shot. To satisfy them the soil is kept so wet that turf becomes thinner and thinner. Then direct evaporation loss from the exposed soil produces a dry skin-like layer on the surface. This occurs soon after watering stops, especially when there is little or no humidity. Generally the soil underneath is sopping wet. Yet golfers clamor for more and more water. The cycle becomes a vicious one and the superintendent is blamed for bad greens rather than the players censured for a water-logged soil.

Overwatering is not the way to produce greens which will hold a correctly played shot. The proper answer is to have a dense, tight sole of turf with the right kind of soil underneath — which is a medium sandy loam containing 20 to 25 per cent by volume of organic matter. With this combination a green will hold the ball without the necessity for overwatering. An added aid is to have the grass growing at a moderate and uniform rate.

Despite the fact that grass foliage never sun-scalds, there is a notion that daytime watering is bad for grass. Ponded water is the only kind that injures turf on greens, and then only in hot weather. A ban on daytime watering may pave the way to disaster. The prompt use of a little water to stop daytime wilt is the only way to prevent browning followed by loss of grass in trying weather, irrespective of whether wilting is due to an overly dry or an overly wet soil.

Applying water when the hole cups are full and the soil saturated with water would seem like the height of stupidity. But sometimes it is the only way to save the grass on water-logged greens following a prolonged spell of drenching rains. It may be necessary to apply water the day after the rain stops. There may not be a live root in the water-logged soil. Consequently the grass wilts promptly when the top half-inch of soil becomes dry. Light watering revives the grass. Moisture is absorbed through the few surface roots and directly by the leaves. The light watering carries the turf until the cooler night time temperature reduces the rate of transpiration — which is the term applied to direct evaporation of water from the surface of the leaves.

How Grass Uses Water

Water is used by grass and other plants in three ways. A small quantity combines with carbon dioxide in the leaf to produce a simple sugar which is the basic product used to make every other plant substance. The process is called "photosynthesis". Water is the vehicle of transport within the plant. It carries the mineral soil nutrients from the roots to the above-ground portions of the plant. Likewise it moves part of the sugar manufactured in the leaf from there down to the roots where it is used to make new roots and sustain old ones. The bulk of the water used is evaporated from the leaf surfaces. It is called "transpiration water". The amount is from 500 to 1,000 lbs. of water for each pound of dry matter produced. For golf greens the figure is more nearly 1,000 than 500 lbs.

Plants obtain water from the soil. It is absorbed from the capillary films surrounding the soil particles. Absorption is most rapid when the films are thick or when the soil is at field capacity. The rate decreases as the films become thinner and stops when the attractive force of the soil particle is greater than the pulling power of the root hair. At that point the plant wilts.

Field capacity is a function of soil texture, whether the soil is a sand, a loam, a clay loam, etc. It is highest in the loam and clay soils and lowest in the sands.

When wilting starts, there is less residual water in a sand than a heavier soil, but this seeming advantage is offset by the vastly lower field capacity of the sand. In

practice there is no point in applying more water than is required to attain field capacity. More than that is a waste of water and may result in loss of soluble plant food by leaching. It takes less water on sandy soils to attain field capacity, but sands and light sandy loams must be watered more often due to their low water holding capacity.

Soil Isn't Just Dirt

Instead of being just dirt, soil is a mixture of a solid, a liquid, and a gas. A productive dry soil is half solids and half voids by volume, but in the field the voids are occupied by water and air. The volume relationship in an ideal soil is 50 per cent solids, 25 per cent water, and 25 per cent air. Soil air receives scant notice, yet it is highly important in the scheme of plant growth. Roots die when deprived of soil air. They need the free oxygen it contains. Deep extensive root systems are associated with a well ventilated soil. Shallow roots are commonly found in water-logged and in tight compact soils. They do not contain enough free oxygen.

The notion that capillary movement will provide moisture during times of heavy demand is not based on fact or practical experience. Upward movement is too slow. The sensible approach is to create a deep and extensive root system. Instead of being dependent on the top inch or two of soil, deep roots secure moisture and food at depths of 10 to 12 inches or more. Their forage area is increased five to tenfold. Deep roots reduce or eliminate the possibility of windburn damage in winter, and wilting in summer, because the deeper soil contains usable water long after the surface soil becomes dry. The best way to create a deep root system is to provide a well aerated soil and after doing that, not to clog all the pore spaces by overwatering.

Damages of Overly Wet Soil

The evil effects of overly wet soil are many. Excessive wetness may result from overwatering or continuous rains during hot, humid weather. High humidity tends to keep the grass and soil wet because it checks evaporation. Effects include a thinning of the turf with subsequent weed and clover invasion, shallow roots, more severe and more frequent attacks of disease, especially pythium and brown patch. Leaf spot and algae are fostered by over wetness — along with iron chlorosis, which is a nutritional disturbance. The sudden collapse of turf on large irregular areas is associated with overwatering or drenching rains in hot weather. The cause is ob-

Tom Mascaro photo

MASTERS OF SOUTHERN TURF AT MASTERS' COURSE

Superintendents from many southern courses attended the Georgia Turf Assn. meeting at the Augusta (Ga.) National Golf Club May 11. Hugh Luke, National supt., had the course in magnificent condition, and was host for the day. Principal speaker was Tom Mascaro of West Point on "Soil Structure and Texture." B. P. Robinson of USGA Green Section handled a "Question and Answer" session. Joe Burnam of East Lake CC, Atlanta, Ga., is pres., Georgia Turf Assn.

scure and not clearly understood.

The classic recommendation for deep roots is to water generously at infrequent intervals. The advice is sound when the soil is good and the water infiltration rate is rapid. The axiom fails for waterlogged or overly wet soil. Roots die under these conditions for want of soil air. They drown, so to speak. After the root system is gone, light frequent daytime watering seven days a week is the only way to keep the grass alive until new roots form. Wilting determines how often to water. Once at midday may suffice, but at other times more often may be the only way to revive the grass.

Thinning of the turf on overly wet greens is inevitable because the condition is an unhealthy one and is aggravated by leaf spot, brown patch, pythium, and other diseases. Clover, crabgrass, and other weeds appear and flourish because an open turf offers no opposition.

A green scum of algae often appears on overwatered greens after the turf becomes so thin that the soil is exposed. Algae require sunlight and plentiful moisture. Algae can be stopped by using a little hydrated lime, but the best way is to prevent its growth by keeping a dense turf which shades the soil below.

Turf diseases are caused by mold-like fungi. A moist medium is necessary for their development. Dry stale bread never molds. The difference between it and moldy bread is moisture. Damp or wet grass aggravates disease, whether it be from overwatering, from dew or gutated water. The latter is droplet water expelled by the leaves. Troubles from overwet grass during the night are in the humid rather than the dry regions.

Leaf spot is aggravated by overwatering. This is true of the fine textured Bermuda as well as the bent grasses. Fine Bermudas must be watered differently than common Bermudas.

Turf Collapse Mystifies

Iron chlorosis is becoming more common on putting greens. It is associated with wetness and a high content of soil organic matter. A high soil reaction, the use of too much lime and phosphate make it worse. Overwatering is one reason for its prevalence on velvet bent greens. The unusually tight turf retards soil water loss by direct evaporation. That is why velvet should be watered less frequently than creeping bent.

The sudden collapse of turf on greens during or following downpouring rains in hot weather is hard to explain. It may be disease, or it may be due to toxicity from decomposition products produced under waterlogged conditions. The fact that troubles of this kind are most common on thatched greens, and the further fact that there is a marked response to light doses of hydrated lime lends support to the toxicity theory.

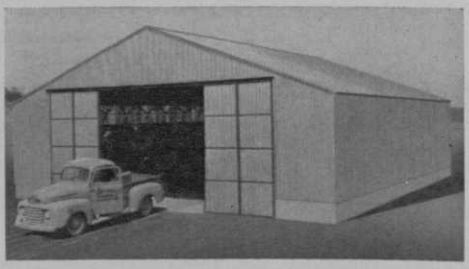
To stop watering abruptly where overwatering has been practiced is not sensible. The toll of grass may be terrific. The better plan is to change gradually and let the grass adjust itself to the new and better practice.

Underwatering presents fewer problems. The chief difficulty is to rewet bone dry soil. It cannot be accomplished with sprinklers only. Water does not penetrate deeper than an inch. This makes the soil too wet because it is too dry. The top inch is waterlogged because the amount of water was sufficient to wet the soil to a depth of 8 to 10 inches. There are several ways to restore soil moisture. One is to fork the dry areas, or aerify if possible, and drench with water several times. Water retained in the holes gradually seeps into the dry soil. Once soil becomes moist water will be absorbed in a normal manner. The use of a tree sub-irrigator to rewet dry soil is common practice.

Thatch Prevents Water Absorption

In other countries grass is used instead of shingles on many buildings. A surface

SOLVES KLONTZ PROBLEM



Herb Klontz, supt., Ellis Park course at Cedar Rapids, Ia., and Pres., Iowa Golf Course Supts.' Assn., says in his years in charge of golf courses one of the biggest problems has been lack of room for machinery, machine repair equipment and topdressing and fertilizer storage. Last fall that problem was solved with the above 44 by 60 ft. building with 16 ft. doors on both ends permitting passage of fairway mowers and other large equipment. There is room enough to store 80 yds. of peat and 45 tons of fertilizer and have a constant stock of topdressing. During rainy days the men can work inside without losing time. Klontz plans to stock dirt and peat in August when it contains least moisture.

mat of grass acts the same way on greens. It impedes or prevents absorption of water. Localized dry spots and sometimes the entire green becomes dry. Forking or aerifying then becomes necessary before the soil can be re-wetted. Removal of the surplus grass is the permanent solution. This can be done by cross-raking followed by close cutting or with one of the machines made for that purpose. Turf should be kept tight after that by close cutting along with brushing if necessary.

Tree roots in greens are responsible for much bad turf. They deplete the soil of all its moisture to a depth of several feet. Greens become hard and the soil refuses to accept water. The surface becomes sopping wet after each watering. Grass thins and algae puts in an appearance. Trenching between the trees and the green to sever the tree roots, or root pruning with the Haines tree root pruner, is the best answer. In order to obtain and keep good grass, tree roots must be controlled.

How to water is always a debatable question. Some favor sprinklers, others hand-water, and still others use a combination of both methods. It is not easy to water severely contoured greens with sprinklers without overwatering the low areas. That is why some superintendents water one time with the sprinkler and the next time by hand during hot weather. The man who does the hand-watering is taught to direct the water to the high spots.

The necessity to keep the soil on the banks and slopes of the green moist seems obvious, yet is not appreciated by everybody. Dry banks will rob the green of moisture. Then wilting occurs around the edge of the green and the bruising effect of the driving drum on the power mower takes its toll.

The amount of water to apply at one time is important. That can be judged by pressing the soil between the thumb and forefinger. Whenever water can be squeezed from the soil several hours after sprinkling stops, the indication points to overwatering.

When to water is another popular question. When overwatering is practiced, time of watering does not matter. There is some evidence in favor of early morning as the best time when the proper amount of water is used. This applies to humid areas where grass is apt to be laden with dew in the early morning. Sprinkling destroys the drops of dew and dries the grass so disease is less severe. In areas of low humidity, there is no difference between night and daytime watering because turf gathers no dew during the night.

Infrequent watering is the goal to strive for and is best practice when there is an extensive and deep root system. Yet the necessity for frequent watering in times of stress when root systems are shallow must be recognized and followed. The use of a little water during the daytime is inevitable when grass is in severe wilt and the day is hot and/or windy. This practice saves and does not kill the grass as some believe. Watering soon after heavy rains may seem ridiculous to some, but it may be the difference between saving and losing grass which is in an advanced stage of wilt. Metallic blue color and footprinting are unmistakable signs of wilt if you do not know it.

Duration of Insecticides in Soil Not Known

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BEGINNING in 1943 experiments have been carried out at the Japanese Beetle Laboratory at Moorestown, N. J. to determine how long a single application of the newer chlorinated insecticides, including DDT, chlordane, toxaphene, aldrin, dieldrin, and heptachlor, would persist in different soils under various conditions, and how long each of them would be effective in controlling larvae of the beetle in established turf.

The treatments were applied at rates required to control the fully grown larvae. The residual insecticide in the experimental plots was determined periodically by chemical analysis and bioassay.

The investigation is still in progress but, so far as information is available, it appears that when the percentages of the insecticides remaining in the soil are plotted against the periods of weathering, the resulting curves were of the sigmoid (curved in two directions, like the letter S) type.

DDT has been under investigation for 9 years, chlordane and toxaphene for 6 years, aldrin and dieldrin for 4 years, heptachlor for 2 years, and treatments with isodrin were applied this year. During these periods the treatments have been effective in eliminating the annual broods of larvae that hatched in the treated soil. The duration of the effectiveness in controlling the larvae and the persistence of these compounds in soil have not been determined.