

WHEN TO WATER?

Mass. Recreation
Conference Paper

By JACK WHITE

Pro-Greenkeeper, Stockbridge (Mass.) C. C.

ARTIFICIAL watering on putting greens is an important phase of golf course maintenance and requires considerable planning. Irrespective of the type of golf course, several factors are involved, and each of these items should be carefully considered before a definite program can be arranged.

The water supply to the plant must be continuous. Any shortage, even for a brief period, will cause wilting and if it is sufficiently intense it may permanently affect growth. Shortage in the early days may cause retardation of growth that may continue throughout the life of the plant, while shortage at a later stage will cause the plant to be abnormal in character. Artificial watering should be used purely as a supplement to rainfall and should never be resorted to unless an actual shortage exists.

Water Serves Dual Purpose

The plant absorbs water through the root hairs and gets its supply from the soil. Water has two distinct operations in connection with plant life—the first, external and the second, internal. The external job is to serve as a solvent for the elements in the soil necessary for growth.

This point merits some emphasis as only in this manner is the plant capable of obtaining the nutrients that are so vital to its life. A soil well stocked in nutrients, but depleted of water, places the plant in a position similar to that of the destitute man who gazes longingly at the display of food in the window of a palatial restaurant. Both have the desire to eat. To each, food is but a short distance away, but neither has the means to get it, the man lacking money and the plant water.

The solution enters the root hairs by osmosis and is conducted up the stem to the leaves which are the manufacturing parts of the plant. When this area is reached, water serves as one of the essential raw materials in the process of carbohydrate manufacture, called photosynthesis. Again water comes into the picture and translocates the manufactured foods to the roots where it is stored and where some of it is used. Much water is required for the process of transpiration

(loss of water from the plant in the form of vapor). According to figures compiled by Dr. Sprague of the New Jersey experiment station, the average green of 5,000 sq. ft. will throw off from 100 to 211 gals. of water every 24 hours. The enormity of these figures, coupled with the fact that plant tissues are made up of from 70 to 85% water, clearly indicates why it is necessary that we make certain the plant has a continuous supply of water. The grass plant might well be compared to a two-story factory. The root hairs serve as the landing platforms where the raw materials are delivered.

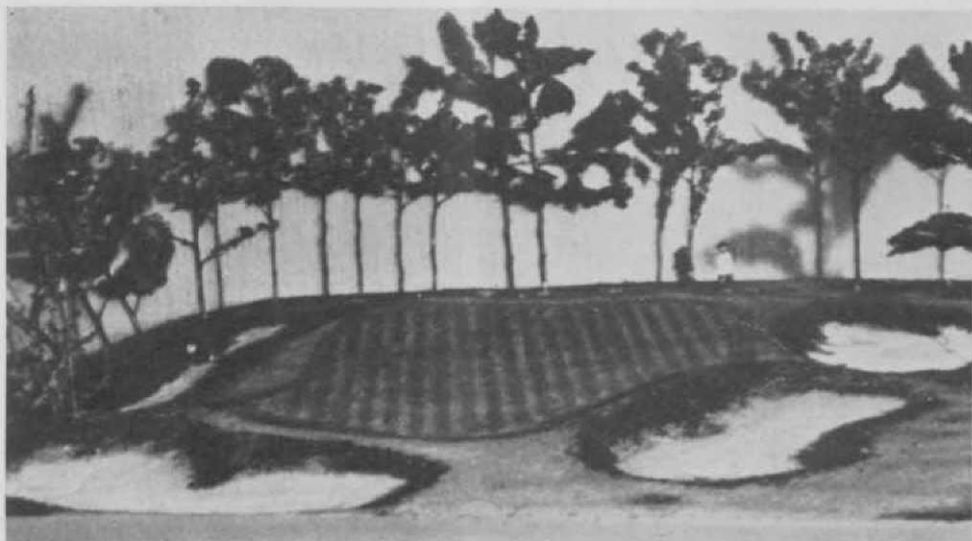
The roots and the stem are the first floor that provide storage space and also contain the elevators through which this raw material is moved to the upper floor. The leaves represent this second floor where the manufacturing takes place and water is the motivating force which delivers both the raw materials and the finished product to their respective places.

Four Possible Water Periods

The hours for watering will be divided into four general periods, namely, all night watering, the application of water during midday when play is heavy, early evening watering and water that is applied during the early morning.

In order that we may arrive at a reasonable conclusion, it is necessary that some definite assumptions be made as to the type of soil we have on the course and also the condition of the grass on the greens. We shall use the average good soil of normal fertility and one that is reasonably friable. The grass is to be one of the healthy bents, the time of year will be during the hot summer months when the moisture in the soil is low and the plants in danger of wilting.

The factors involved in the order of their importance are: 1. the natural use



Midwest Greenkeepers' Assn., representing superintendents of leading clubs in the Chicago District, has been awarded the Ontario trophy by the Greenkeeping Supts Ass'n. for its exhibit in the Association's model greenkeeping annual national contest.

Midwest's model green was a replica of the No. 13 green on Olympia Fields' No. 4 course. It was constructed of plastic wood, with colored farina representing grass. Torpedo sand was used in the traps. Artificial landscaping surrounded the green. The model was constructed on a scale of 4 feet to the inch.

Fred Kruger, Supt. of Olympia Fields, was chairman of the Midwest winning committee. Other members were C. A. Tregillus, Harold Clemens, Peter Stewart, Norman Johnson and Graham Gardner.

of water by the plants; 2. the type of soil on the course. 3. the possibility of causing injury or encouraging disease; 4. the item of expense and the consideration of the golfer so his pleasure in playing the course will not be reduced.

Research has proven that the plant performs certain functions at definite times of the day. Starch-making is the most important of these. Photosynthesis, the process of making starch, requires strong light and takes place from sunrise until about 4 P.M. For this reason the plant will absorb more water during this period than at any other time during the day.

Brown-patch Likes Hot, Wet Conditions

Some plant diseases, particularly brown patch, thrive during hot, wet conditions. During the summer months temperatures often drop suddenly, and the resultant rise in relative humidity materially affects evaporation. If such a condition happens at a time when the rate of transpiration is high and the sprinklers are pouring water on the greens, the brown patch is presented with a made-to-order home in which to operate.

Different soils have different water holding capacity. Water exists in the soil in three forms: capillary water that forms

a film around the soil particles, hygroscopic water that is locked up within the soil particles, and free water that should run off through good drainage. Capillary water is the only one available to the plant, and this fact should be considered when we are determining the amount of water to be applied to the greens. Free water is especially harmful in that it prevents aeration and causes the plant to suffer.

The turning-on of a sprinkler system and allowing it to run all night has been a common procedure at many clubs. This has been resorted to in many cases as a solution to the labor problem, inasmuch as no workmen have been present during the time the water was running. While this may have seemed beneficial to the budget, it is a questionable practice and many eminent greenkeepers consider this operation important enough to demand their personal supervision.

Excessive costs can be built up in two ways from this practice. More water may be applied than was necessary, with the resultant high water bills, and much fertilizer will be leached out of the soil in the drainage water. This, of course, has to be replaced with additional applications of fertilizer at considerable extra

cost. In addition to this, overwatering results in a water-logged condition in the soil. Poor aeration in the soil cuts down the rate of respiration in the root, which all means less root-growth. A dwarfed root system results in less water absorption by osmosis, which in turn means the process of photosynthesis is hindered. The amount of water lost by transpiration is also lessened. Concerning this latter point, recent investigation shows that the greater the rate of transpiration, the greater the intake of organic salts by the grass plant. Concerning the advantages of all-night watering, it is only natural to assume there will be an ample supply to the grass the following day. While this is desirable, the water put on at night may offer conditions suitable to the growth of fungus diseases. This is dependent, of course, on the temperature and humidity readings,

Evening and Night Watering Results Similar

The application of water from 6:30 to 8:30 in the evening has much in common with all-night watering. Many of the advantages and disadvantages are similar. If this is made a common practice, however, there is danger that a good portion of the water supplied to the plant during the evening hours will not be available the following morning. There will be loss of water by evaporation and by downward flow of water in the soil. If this condition is followed by a day ideal for high transpiration and evaporation, wilting is apt to follow because of water shortage. Also, in cities and towns, a great deal of water is being used during the evening hours, which causes a variation in water pressures.

Applying water to greens from noon until three o'clock, when play is usually heavy, is sure to bring much unfavorable comment from the golfers. Putting is uncertain due to the varied speed of the greens, while pitch shots leave large ball marks which are undesirable, both from the playing and the cultural standpoint. When caddies are sent ahead to shut off the water these youngsters frequently find the line of least resistance the most convenient, and double up the hose instead of walking a few more steps to a faucet. This frequently calls for an item of considerable size in the next year's budget for hose replacement. The tramping of a large number of players and caddies will cause a packed or puddled condition.

The results of this packing causes injury to the plants similar to those mentioned when over-watering was brought to your attention. Transpiration and respiration are interfered with and the condition usually persists until spiking or some similar operation is resorted to. This, of course, means additional expense. Again the possibility of wilting is apparent as the supply may be evaporated before the following morning. Pressures are not constant and the rate of evaporation is exceptionally high, which means that no more water will have to be used to have the soil get the desired amount.

Early morning watering should take place from 4:30 to 7:30 A.M. One of the main advantages of this time is that we are working with nature in providing the plant with a supply at a time when it is most natural for the plant to use it. This is advantageous as it assures the processes of photosynthesis and transpiration normal conditions in which to work. The water is applied when the grass is already wet and poling is reduced to a minimum. A better general idea of the weather for the day can be made at this time and water not needed will not be applied. This will prove profitable both from the cultural and financial standpoint. This time may call for a slight adjustment in the working hours of the greensmen, but the golfer will not be annoyed, nor will the greens be susceptible to injury from the players. Pressure will be more uniform and there should be no extra loss by evaporation. Water supplied at this time will prove less apt to encourage disease than at any other time during the day.

It is my belief that the 18 greens on the course should be treated as individuals. While they may have the same general appearance, they will have individual characteristics and will respond differently to our cultural practices. This is very important to consider when watering. Many courses, particularly those of a hilly nature, have a variety of soils; and greens that are on knolls will have different water requirements than those situated at the lower part of the course.

From the facts previously mentioned, you can readily see that each period of the day has its advantages and disadvantages in respect to the time of watering. However, upon careful thought and consideration, I feel confident that the advantages of early morning watering more outweigh the points in favor of watering at any other period.