The Role of Water in Plant Growth

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Water is the most abundant material in a growing plant, usually comprising 80% or more of the plant weight, but in the plant's environment water is never found in a pure state. The essentiality of water for many plant functions and properties is beyond question.

It is a solvent for mineral nutrients and the complex substances manufactured within the plant.

It is a means of transportation for food materials and the medium in which these products move from one plant part to another.

Water is the source of the hydrogen which is combined with carbon and oxygen from the air to form carbohydrates by the process of photosynthesis. Photosynthesis is believed to be the underlying process which supports all life.

Evaporation of water from leaf surfaces provides refrigeration or temperature control for the plant.

Water may even be considered a structural agent. Plant cells containing an abundance of water are turgid and the plant stands erect. When there is a water deficit the cells are flaccid and the plant droops or wilts. This principle can be demonstrated with a toy balloon. Inflated fully, it will support a considerable weight. When only partially inflated it will support practically nothing. Many observers have noted that wilting turf suffers much greater damage from traffic than does well watered turf.

There are a great many anatomical and morphological plant modifications that determine a plant's ability to survive in a given environment with respect to water. These same modifications dictate to a considerable extent the management practices that must be followed.

The depth and form of a root system have a great deal to do with the behavior of plants in conditions of too much or too little moisture. The biochemical and biophysical characteristics of plants differs to such an extent that rice can grow in standing water while most other plants cannot, and the members of the cactus family can maintain water in their tissues even in severed parts under extremely hot and dry conditions.

Leaves of grass display many interesting anatomical differences that are correlated with the environmental conditions in which the grasses are found.

The grower of plants should learn as much as possible about the species with which he deals with respect to its water needs.

NOTE: This topic is discussed more fully in the November 1959 issue of the USGA Journal.

Water Requirements of the Golf Course

The Golfer's Point of View

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There are many varying opinions among golfers as to their likes and dislikes in the preparation of a golf course for tournament play. It is my opinion that with the exception of lightning-fast greens, the member who supports the Golf Club should enjoy the same well-groomed golf course that the professionals and top amateurs enjoy when teeing off in an important championship. Let us, therefore, begin with an imaginary round of golf at an imaginary golf course with you as my guest.

As we arrive at the first tee, I will impress you with the tee alignment. It is facing straight down the middle of the fairway, not toward the dreadful out-of-bounds on the left nor the timber laden rough on the right. The teeing area is clean, level and well-trimmed. It is watered but moderately dry. You will have no problem in selecting a choice spot for your initial drive. The markers are squarely set. The area is level, and the tee itself will not give you the impression of a down-hill or up-hill lie. The

grass is trimmed as close as possible in order for you to execute your drive or iron with the least possible resistance to the club head.

You will notice our fairways are watered. They are cut on the short side, and the grass is firm and strong. The ball rests well enough for a brassie lie—no clover, no hard pan nor crabgrass about which to worry. The bunker on the left of the green is well trimmed and freshly raked. The sand is uniform from top to bottom providing no possible way of escape without a sand wedge.

The greens, you will see, are uniform in speed throughout. They have color and freshness mostly as a result of watering. The putting surfaces are smooth and fast but not unreasonably so. A good shot will hold on them without too much trouble, but they are not saturated to the point where a half-hit two iron will come to rest on the target. The fringes are neatly cut, and in many cases a putter can be employed from these areas. The cups are cut clean and in reasonably flat areas. You need not worry about three putting from four or five feet.

I am sure you will agree that the watering system has done a great deal in maintaining the playing yardages of the majority of our golf courses which have been built prior to World War II. With the great advancement in the improvement of the golf club and ball, the watering system has saved many of our golf courses from the drive and pitch category. Therefore, in addition to the necessity of water for the cultivation of good grass, the irrigation system is also necessary for the golf course to retain its pride and self-respect. As a means of illustration, we at our club were reaching our No. 1 hole which measures 390 yards with a mere drive and nine iron. However, since we have installed a watering system, it is now necessary to use at least a drive and a five iron.

It is my opinion that most golfers like to play on fairways that are trimmed on the short side. That is to say, the grass should be cut to such a height that the ball can be clearly seen and reasonably set up in order to give the clubhead a chance to get it into the air without having to dig up an unreasonable amount of turf. It has been my own experience that many watered fairways have as a general rule been left to grow unreasonably long. This condition, I believe, is annoying to the golfer particularly since he is unable to control the speed or the flight of the ball due to the resistance applied to the clubhead as it travels first through the grass before making contact with the ball. This shot is commonly known as a "flyer."

I am of the opinion that if the fairway is watered, the rough should be allowed to grow to a height whereby a shot that does not find the fairway will not result in one more advantageously played out of the rough. This can be best illustrated on any given golf course particularly during the dry season when it is difficult to grow a reasonable amount of rough. Consequently, a tee shot landing in such rough will pick up an additional 30 to 40 yards of roll in contrast to one landing on a watered fairway with a net result of approximately 10 or 15 yards of roll. It is necessary therefore to justify a straight tee shot played in the fairway, and this can be done by growing the rough to a point where the lie is not one to be wanted.

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The Golfer's Point of View

By WILLIAM HYNDMAN, III
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This discussion will be a description of the condition of a course as I think it should be for championship play. In order of discussion I shall consider greens, fairways and roughs, and tees.

For tournament play I like a very firm putting surface. I would prefer that the green not be watered for two to four days before the tournament. Certainly some light sprinkling may be necessary to keep the green alive but heavy watering immediately before a tournament should be avoided. This may be a surprising statement, but a firm green is desirable from several standpoints. The putting surface will remain true and free