

UNITED STATES GOLF ASSOCIATION  
GREEN SECTION  
WESTERN OFFICE

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• **Western Turfletter** •

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P U T T I N G G R E E N S - W A T E R M A N A G E M E N T  
A N D  
T E N S I O M E T E R S

Around for quite some time, tensiometers (an instrument used to measure soil moisture) have been chiefly a research tool for the soil scientist. They have found some limited practical use in florist crop and citrus grove management but, by and large, they are not widely used nor widely understood.

During the recent past, some information sources have advocated tensiometers for use on all turfgrass areas as a means of determining "when to irrigate". Included in this category are golf courses and particularly putting greens. In the opinion of the USGA Green Section, such a recommendation does not seem justified at this time and, indeed, warrants a closer look.

What Are They? How Do They Work?

As a means of measuring soil moisture, the tensiometer is not a new nor a particularly complicated instrument. At one end of a sealed tube (that is filled with water) is a porous clay tip. Water may be drawn through this tip when under tension. At the other end of the sealed tube is a vacuum or tension gauge. The porous tip is placed in the ground to any desired depth. As the surrounding soil dries out, water diffuses from the clay tip into the soil. When this occurs, a pull or tension is exerted within the tube and is registered on the gauge. The drier the soil, the higher the reading.

When irrigation is accomplished, the action is reversed. Now the water movement is into the clay tip from the soil. The vacuum or tension is relieved and the gauge moves to a lower reading.

Their Role In Turfgrass Use:

Most turf is overwatered! School grounds, athletic fields, home lawns, cemeteries, park areas and other recreational facilities utilizing turf are usually under the care of a gardener or general foreman. He has problems other than turf quality and turf management. To him the philosophy "water the grass and it will take care of itself" is adequate.

But what of the professional turfgrass manager; the golf course superintendent? He must be constantly concerned with turf quality, playability and appearance over 120 acres or more. Can he depend on a tensiometer (or a series of tensiometers) to tell him when to irrigate? We think not! His crop is an unusual one and so are the uses to which it is put. Even if, as tensiometer advocates suggest, every fairway is equipped with one instrument and every green has two; - tensiometers seem to have little value on the golf course.

The claim is then made that the tensiometer, although it may not be able to tell us exactly when to irrigate, will at least serve as a good indicator or guide to soil moisture conditions in greens. This may be true. But it is also true that the tensiometer has certain drawbacks or limitations. These limitations may well reduce any practical value the instrument might have on greens. For example, consider these facts:

- A. The tensiometer must be carefully located and carefully installed in every green. Any error here means an erroneous reading.
- B. The gauge must be protected from the golfer, equipment, etc. It is usually contained in a covered underground box, making daily readings difficult.
- C. Each reading must be interpreted for each location and each green. This is no job for the ordinary golf course worker or night irrigator.
- D. The instrument is capable of measuring moisture in the immediate area only; effective at best for a few feet around the porous tip.
- E. The physical construction of the instrument limits its use to the perimeter area of a green.
- F. The initial cost per instrument is approximately \$12.00 to \$20.00.

#### "Twenty-four Hours From Disaster"

A putting green is a peculiar piece of agricultural land. These peculiarities present additional problems that a tensiometer would find difficult to solve.

- 1. The contouring or undulations of greens means that high areas and low areas will exist. Obviously the high places are going to dry out faster than the lows. How will one place and then interpret tensiometer readings under such conditions?
- 2. Depth of effective rooting in most greens is 2-inches or less during the critical summer months. To have any meaning, the porous tip must be placed in the root zone. There is some question as to reliability of tensiometers when placed at a shallow depth (2-inches or less). -- Furthermore, rapid surface drying may render meaningless any tensiometer reading, even within the root zone.
- 3. Localized dry spots may occur in any green at almost anytime. Thatch accumulation, faulty water distribution, soil difference, etc., may be their cause. Tensiometers would be hard pressed to account for localized dry spots.

4. Differences in soil types, not only from one green to another, but within greens themselves are the rule rather than the exception. And different soil types mean different tensiometer readings and interpretations.
5. Soil layers, present in a majority of greens, create another problem. The false water tables produced by them would only compound tensiometer interpretation.
6. Any instrument placed in a putting green soil, especially at a shallow depth, creates a problem during aeration, spiking and even cup placement.
7. Finally, golfer demands often require the superintendent to follow irrigation practices other than those he would wish to follow. His crop is being grown for use - not for harvest. Some time back, Bill Dunn of the Pasadena Park Department put it this way, "I just try to keep my greens 24 hours ahead of disaster".

#### Is Push-Button Greenkeeping Here?

This profession is still one of art as well as science -- and it will probably always so remain. Al Radko of the USGA Green Section says of water management, "here is one phase of turf management where 'the feel of things' ----- common sense ----- observation and judgement really play an important role."

Dr's. Lunt and Youngner of UCLA and Dr's. Nielsen and Henderson of U.C. at Davis generally agree that tensiometers may yield useful research information on water management in soils, but do not advocate their general use on golf course greens.

The development of a practical device to aid irrigation technique on greens would be welcomed by all, but such a device has not yet appeared. Well, perhaps with one exception -- Bill Beresford (L.A.C.C.) says "The best tensiometer on any golf course is still the Golf Course Superintendent".

And we can only agree!

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#### "DO YOUR EXPERIMENTS MISLEAD THE FARMER?"

"Uncontrolled limiting factors ruin a lot of experiments. This would not be too serious except for our tendency to use any data as the whole truth as long as it comes from a formal experiment, good or bad as it may be.

"Let us abandon or make historic museums out of inadequate experiments and not use them as fences across the roads to progress. To use data in new literature from such experiments is not only misleading, but clutters our libraries and makes dead what can be inspiring and stimulating.

"To conduct an experiment to determine the value of a specific factor, when one or more other factors may be the chief function defining the performance, is wasteful, erroneous, and boring."

George D. Scarseth, American Farm Research Association

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