

USE AND MISUSE OF WATER

The use of water in turf production should be examined in its many aspects. Consideration of its functions as a solvent carrier of nutrients and its effect on germination, plant tissue formation, food manufacture and number and activity of soil organisms is of great importance.

Water is important also with respect to its day-to-day use by grass. There are differences in the water requirements of various grasses, and the actual weather conditions influence the rate of water loss from both the plant and the soil.

The intelligent use of water is also dependent upon the relationship of both deficiencies and excesses to plant growth.

Efficient water usage must be based upon a thorough understanding of all the foregoing aspects, and the relationships of these aspects to one another. These factors tell us why we water, what are the consequences of improper watering and when water should be applied. However, such information is of little value unless we know: (1) the quantity needed when we apply water and (2) the slowness or rapidity of application. The weather must be taken as it comes. We have no control over the weather, although it is possible to modify its effects through good management.

The practical questions are, therefore: (1) what are the effects of over-watering? (2) how much water should be used? and (3) what is the proper rate of watering?

Effects of Over-Watering

Experimental plots were established at State College, Pa., in 1947 to study the combined effects of watering and compaction. Tests on mixed bluegrass, fescue and bentgrass turf were laid out to include plots under four soil-moisture levels and were subject to different degrees of compaction.

It will be noted from the chart on this page that heavy watering resulted in a decline of permanent grasses from 97 per cent in 1947 to 58 per cent in 1949. The decline of permanent grasses on the heavily watered, compacted plots was from 97 per cent to 72 per cent. The percentages included under crabgrass infestation explain the differences between the compacted and the uncompacted plots.

It is apparent that heavy watering resulted in a significant increase of crabgrass on both the compacted and the uncompacted plots and that the increase in crabgrass is more pronounced on the uncompacted series because compaction inhibits crabgrass germination. The experiment was established on a limestone soil noted for its good physical condition and excellent drainage. Thus it is small wonder that turf deteriorates rapidly under irrigation when soils are drained badly and are of poor physical condition.

How Much Water

These experimental results show the danger of over-watering as well as giving an indication as to how much water

COMPOSITE CHART

Soil Moisture Levels in 1949	% Soil Moisture under Various Water Rates in 1949	% Permanent Grass under Various Water Rates in 1949		% Crabgrass Infestation under Various Water Rates in 1949	
		No Compaction	Compaction	No Compaction	Compaction
		Natural Rainfall	12.5	95.0	96.0
Water as Needed	17.0	90.0	95.0	8.0	3.5
Field Capacity	24.0	61.0	72.0	39.0	26.0
Saturation	38.0	58.0	79.0	40.0	17.3

should be applied. There is little difference between the percentage populations of permanent grasses on plots that received natural rainfall and on plots which received water as needed. However, the water-as-needed plots were green and in good playing condition during a drought period in July, whereas the unwatered plots were brown and hard. The population of permanent grasses in the unwatered plots did not deteriorate because the drought was of short duration. "The results should not be interpreted as indicating that irrigation is undesirable or unnecessary, but only that it must be used properly."

The amount of water to be applied in one application will be governed by the capacity of a given soil to store it in available form, and until better practical methods are devised for testing the quantity of available water that a soil will hold, it must remain a matter of experience and good judgment.

"From a practical standpoint, differences in storage capacity between sandy soils and silts or clay types mean that, although the sandy soils must be watered more frequently, the quantity applied in a single sprinkler run can be much lower . . ."

If either type soil is well drained, excess watering is wasted water because the surplus drains away. If soils are compacted, excessive watering is dangerous.

Proper Rate of Watering

Experimental evidence has shown that water intake is not governed by increas-

ing the volume applied. Soils have specific absorptive capacities, and increasing the rate of application may result in a reduction of total intake. The importance of soil compaction should also be taken into consideration, because reduced pore space as a result of surface compaction further lowers the intake of water. This applies to soils under a turf cover as well as fallow soils. Also, as the rate of water intake is not constant, the sprinkler should run for 10 to 15 minutes before attempting to determine the intake rate of a given soil.

Subsoil compaction and impervious layers below the surface also affect watering practices. Much has been written already concerning correction of these problems. The danger of sudden rains following water application can be reduced materially if minimum quantities are applied. Modern aeration equipment will correct the condition of surface compaction which results in slow water intake.

The writer concludes with the statement that, if we accept the experimental evidence, "we cannot escape the task of re-examining our watering programs in the light of the capacity of our soil and the rate at which it can take the water we apply. At the least, we will recognize that good watering practice must be based on something more than the capacity of our system and the size of the sprinkler heads."

Abstracted from an article by H. B. Musser in the March-April, 1950, issue of The Greenkeepers' Reporter.

BRIEF BUT IMPORTANT

Joseph Valentine, Merion's golf course superintendent and discoverer of Merion bluegrass, covered himself with glory during the Golden Anniversary Open Championship. Merion's turf represented the tops for championship play. *Firmness* characterized all areas and is the mark of championship turf. *Close-cut* and *true* are other identifying marks of tournament turf. Incidentally,

Joe is one of the few superintendents who has a hand in picking each new green committee chairman. **M. E. Farnham's** interest in the newer grasses at the Philadelphia Country Club, Spring Mill, is focused on Z-52 zoysia, U-3 Bermuda and Merion bluegrass. A large nursery of U-3 was started from one square foot obtained from USGA Green Section. Z-52 is being increased by 2-