

Irrigation Affects Budget

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“WATER IS THE cause of 90% of the problems on the golf course.” This is a statement I heard one of the Green Section agronomists make shortly after I joined the staff last year. Since traveling and visiting golf courses this year and observing many of the problems myself, I believe my fellow agronomist made a conservative comment.

If we consider that the grass plant is 80- to 90-percent water, then maybe it makes more sense that water can be the cause of so many of our problems. Even though water can be a problem, it is also essential for proper turfgrass management. The cost of water is a major portion of golf course maintenance budgets.

With ever increasing budgets, many clubs are now looking at methods of either reducing maintenance costs, or else assuring that they don't increase further. Labor is the largest single item in most golf course maintenance budgets. The cost of irrigation is usually right behind labor. If present economic trends continue, we can anticipate that they will remain the most expensive items on the maintenance budget. If we want to reduce or limit the amount of money devoted to irrigation, perhaps we should examine the areas where irrigation affects the budget.

We might classify the effects as direct or indirect. The direct costs are obvious: they include the actual purchase price of the irrigation water, the energy costs for pumping and delivery of the water, and the direct costs for maintenance and repairs of the irrigation system. The indirect costs are not as obvious, and sometimes they are quite intangible. They include part of the maintenance costs of all equipment, chemical costs and labor costs.

The figures we normally associate with irrigation costs and those that are reflected as the irrigation costs in the budgets are the direct costs of irrigation. These costs will be based directly on the amount of water the golf course uses. The more water used, the greater the cost. The more water used, the greater the energy costs for pumping and delivery. The obvious way to lower these direct costs, or to keep increases within reason, is to achieve maximum efficiency from the irrigation system and watering practices. The irrigation program or schedule should be designed to meet turfgrass and playability requirements, to maintain optimum turfgrass quality, and to avoid excessive use and waste.

It is important that we understand the water requirements of the turfgrass plant as well as soil and water relationships in developing our irrigation program. This will help insure that we are not needlessly applying water and that we are achiev-

ing maximum efficiency from our irrigation operation.

What should our watering program be to achieve maximum efficiency? We know that the plant seems to absorb moisture best at or near the field capacity of the soil. This is the level which we should strive to maintain. In most soils, throughout even a four-inch root zone, we are unable to maintain this level by simply watering frequently to replace lost moisture. We should allow the soil moisture content to drop almost to the wilting point before more water is added. Then, the entire root zone should be recharged with fresh water. By watering in this manner, plants will always have adequate moisture and oxygen for proper growth. Frequent watering would tend to exclude oxygen near the surface.

Water should never be applied faster than the soil can absorb it. The application rate should be adjusted in relation to the infiltration velocity of the soil for a minimum amount of runoff. More frequent, light watering during the irrigation cycle may be required to wet the root zone fully on heavier clay-type soils. Careful consideration should be given to insuring that proper spacing of heads, proper type of sprinkler head and total operating time of the sprinkler are used to achieve the proper water application rate for the particular soil type.

In some areas, the energy costs for pumping the water are actually greater than the cost of the water itself. If your golf course fits into this category, the need for application of proper watering techniques becomes even more important, since energy costs can be expected to accelerate at even faster rates than water costs. The use of a properly designed irrigation system also becomes more important in considering energy costs. Use of modern pumping systems may provide possible energy savings. Use of combinations of motors rather than operation of excessively large motors for smaller irrigation requirements may be a consideration, along with proper spacing of sprinkler heads to provide uniform coverage and insuring that all sprinklers connected to a valve are located in areas with similar irrigation requirements. For instance, the top and bottom of a hill have different irrigation requirements; valves and controllers should allow different irrigation programs for each area.

These all become budget considerations if we want to conserve energy, maximize the efficiency of our irrigation system and still maintain the quality of our turfgrass operation.

Other factors, such as climate and temperature, play a major role in the water use rate of the plant. We can see, therefore, that the water use



(Above) When grass growth is heavy due to excessive natural or irrigation water, clippings present a messy problem and turf and soil present a soft surface to play from.

rates of the plant are constantly changing throughout the seasons, and our irrigation program should be adjusted accordingly. The cost-conscious superintendent will constantly monitor and adjust the irrigation program almost daily to meet the specific plant needs. When we have achieved this, we know we are doing as much as possible to realize maximum benefit from our irrigation dollar.

The indirect effects of irrigation on the budget encompass the total golf course operation. Items such as mowing frequency, fertilization, pesticide application, repair and maintenance of equipment, etc., are all indirectly affected by our irrigation practices. These items all play a role in the computation of our budgets. The proper application of water will help insure the best response of the turfgrass to other maintenance practices. The misapplication of water will result in turfgrass and maintenance problems that will ultimately be reflected in our budgets.

Irrigation practices can have a great effect in a simple operation such as mowing. Overirrigation can stimulate too much top growth at the expense of root development during active growth periods. To compensate, either more frequent mowing or more frequent sweeping must be done to remove the clippings. Either of these procedures will require a greater expenditure of labor, and they will be reflected in the budget. Even if the growth rate of the grass increases without an increase in mowing frequency, the effects of the overirrigation will be reflected in the budget by the cost of increased maintenance work on mowing equipment. For example, reels and bedknives will have to be sharpened more frequently because they are used so often in unfavorable conditions. These costs are real and are generated to some degree by your irri-

(Below) Irrigated turf requires more mowing, therefore more back-lapping, new bedknives more often and more of the mechanic's time.



gation practices; however, they are probably not recorded in your budget as irrigation costs.

Fertilizer and chemical costs also are influenced by irrigation practices. Fertilization is done to supply the grass plant with the needed nutrients to provide a uniform and steady growth rate throughout the growing season. We may use different methods to achieve this goal. They include applications of soluble fertilizers on a light, frequent basis, or applications of insoluble or organic fertilizers at higher rates on a less frequent basis, or a combination of materials both soluble and insoluble through the growing season. Our goal is to produce a dense, uniform turfgrass that provides the desired playing qualities.

The three major nutrients normally applied in our fertilizer program are, of course, nitrogen, phosphorus, and potassium. When we say soluble, we are normally talking about highly water-soluble nitrogen, such as urea or ammonium sulfate, while ureaform and IBDU are examples of water-insoluble sources of nitrogen. Regardless of the water solubility of the nitrogen fertilizers, they all depend upon water to make the nitrogen available to the turfgrass plant. Nitrogen is not strongly bound to the soil particles and can be readily leached. Excessive irrigation levels on a too frequent basis will speed the movement of nitrogen through the soil profile and cause an increase in the nitrogen fertilization schedule. Thus, it is important to practice watering techniques that maximize the efficiency of nitrogen fertilization.

Normally we do not have problems with leaching losses of phosphorus and potassium, because

these materials are more highly bound to the soil particles. Once we have supplied these materials at a sufficient level to meet the demands of the grass plant, we can normally expect them to be available throughout the growing season. However, leaching losses of potassium can be a problem on greens of sand construction that have a low cation exchange capacity. In a few cases, there have even been reports of phosphorus losses on high sand content greens. Therefore, irrigation practices can have an effect on the efficient use of all fertilizers. Research has proven that plants which are properly supplied with nutrients actually require less water for growth and development.

The benefit of other chemicals can also be affected very dramatically by the proper use of water. The development of a healthy plant with a good root system that resists or outgrows insect and disease damage can often eliminate the need for many pesticides. The importance of proper irrigation in developing the desired healthy turfgrass plant has received a great deal of attention. It would be difficult to put a price tag on the part irrigation plays in the effectiveness of our chemical pesticide program, but we can be assured that proper irrigation is important to its overall performance and efficiency.

The proper use and management of water on the golf course is the key to successful turfgrass management operations. Water, either directly or indirectly, affects almost every operation on the golf course. If we can use water efficiently and in a judicious manner, it will ultimately reflect favorably in the golf course budget.

