How Much Must Be Spent For Turfgrass Irrigation?

By DR. WILLIAM W. WOOD
Economist, Agricultural Extension
And Associate, Giannini Foundation
University of California, Riverside

Editor's Note: As an economist, Dr. Wood views the commercial turfgrass industry in different terms than to what we are generally accustomed. Economics is a study of the factors affecting production, distribution and the return on investment for a given endeavor. Thus, in terms of irrigation, he attaches relative cost figures to determine the relationship between the golfer and better quality turf. By substituting your own figures it is possible to develop a better insight to irrigation on your course before the system goes in. *JAS.*

AS has been frequently noted, commercial turf managers do not have an easily identifiable product nor a market susceptible to traditional demand analysis. The superintendent produces a product that is measured in terms of satisfaction, a difficult standard to measure. The result, in terms of specifying appropriate costs levels, is either to do the "best" job with whatever funds are budgeted or to do the "best" job and see how much it costs.

The problem focuses on determining this range; to establish a reasonable budget level, determine how to allocate among cultural operations, and then produce the "best" job.

Basic to this problem is some viable definition of what the accumulated cultural operations are to produce. What turf condition is either optimal or at least minimum for the purpose of those with power to reject?

In this context, perhaps the first decision to be made is a specific identification of who must be satisfied. It may be a greens committee, a city council, a single individual who has the power to reject the turf condition, or it may be defined in terms of avoiding a certain number of complaints per time period.

Having decided who it is that must be satisfied, the very difficult task of specifying what will satisfy the individual or group must be accomplished. Unfortunately, many people react only in a negative manner. They can frequently state when quality or condition is not acceptable but cannot specify in a positive manner what the goal should be.

As a result, turf management seems to have been historically faced with trying to provide that quality turf which can be achieved with a minimum cost and yet provoke a minimum of complaint.

Three Approaches

In terms of irrigation, sufficient water must be applied to replace evapo-transpiration plus provide for inefficiencies in distribution with respect to both time and space. *This minimum relates to simply keeping the turf alive. Beyond this point, both quality preferences and intensity and/or frequency of use may necessitate additional cost.* To accomplish identification of additional costs, the turf industry must begin to quantify these variables and relate them to irrigation and other cultural operations.

For a starting point, one approach to this problem is to determine a turf management system that will have the capacity to provide the very best turf quality attainable.

Let us assume, for irrigation, this is a solid-set stationary sprinkler system that is fully automatic and of sufficient capacity to provide peak water demand in 28 hours a week or 4 hours per day. Note that by the above assumption, we also have identified certain characteristics of soil, terrain, and turf with respect to absorption capacity.

To specify numbers, assume an installation cost of $5,000 per acre for 120 acres (18 hole golf course) or total capital investment of $600,000. With an average life expectancy of 20 years, the annual fixed cost (depreciation and interest) would be

(continued on page 42)

HOW MUCH TO SPEND ON IRRIGATION?

(from page 14)

$54,000 total or $450 per acre.

There is no irrigation labor cost but there is an additional cost for repair, maintenance, and inspection of $6,000 per year or $50 per acre. Thus, we have a bench mark figure of $500 per acre, plus water cost annually, to do the ideal irrigation job.

At the other extreme, assume an irrigation system capable of supplying the minimum amount of water to keep the turf alive without regard to timing. The system will make no distinction between greens, fairways, or rough, and will seldom contribute to anything vaguely resembling playing the quality of the turf. The system may, in fact, preclude use of the turf during certain hot spells or specific playing times. However, the system is a minimum cost distribution system and may contribute to lower mowing and fertilization costs.

This system may have costs of $50 mixed, $20 labor and $30 repairs and maintenance for a total annual cost of $100 per acre plus water. We now have a cost range against which turf quality differentials can be compared.

A second approach to this problem is to rate turf quality acceptability against an artificial turf to determine comparative costs. Assuming artificial turf will range in cost, installed, between $110,000 and $440,000 per acre, with a life expectancy of 10 years, the annual cost per acre will range from $15,400 to $61,600.

Obviously the entire acreage for a golf course does not need to be in artificial turf so some portion (perhaps other than green and/or fairways) of this cost will be deleted. However, for other types of turf area this begins to give another bench mark since irrigation and other cultural operations are eliminated. Rather than in terms of what must be spent, this second approach tends to establish an upper limit of costs.

The third approach to determining the relationship between optimum turf quality and minimum cost is to examine what the preference system of potential users may be. This approach attempts to relate expected revenue to costs.

Although the usual product demand analysis may not be appropriate, some approximation seems necessary to provide any answer to the basic question of how much must be spent for turf maintenance. By no means do I have the answer. However, perhaps by suggesting a methodology, sufficient discussion can be prompted to direct attention toward a solution. Let us again use the golf course as an illustration.

There is theoretically a demand function for the service called a round of golf. For the individual this demand is a function of many variables including: price, playing quality, distance from residence (or office), aesthetics, difficulty, time, and turf quality. The aggregate demand is a summation of the individual demand functions plus other aggregate variables including population and income.

Golf courses tend not to be homogenous because of differences in physical layout, landscaping, location and, of course, turf quality.

The problem is to determine the relationship among the many variables as they relate to the number of rounds of golf the individual wants to play. This may be expressed in terms of a mathematical equation. Anything that is not a fixed factor could be inserted as a variable to

Rounds of golf and price are easily quantified. Turf quality is not, as yet. However, an index system ranking qualities from 0 to 10 (0 = unmake the determination more meaningful.

acceptable and 10 = ideal) can be arbitrarily developed. For each number rank there would be a corre-

(continued on page 49)

Table 1. Turf Quality Index (0 = unacceptable, 10 = ideal)

Rank	Description
0	Natural grass, no mowing, irrigation to keep grass alive.
1	Greens mowed every two weeks, irrigation to maintain essentially green color.
2	Fairways mowed occasionally.
3	Differential treatment of greens and fairways.
4	Roughs trimmed and greened.
5	Present turf quality.
6	Night irrigation every other day.
7	Greens maintained in uniform springy condition.
8	Fairways mowed and irrigated twice weekly.
9	Irrigated and mowed every other day.
10	Irrigated and mowed nightly, turf always green and uniform. Constant maintenance crew.

HOW MUCH TO SPEND ON IRRIGATION

(from page 42)

sponding total operational cost. Since data are not readily available, a joint effort between the greens committee and the superintendent might do this on a questionnaire basis. Figures I and II are two examples of how to develop a turf quality index Table I. is an example of an index.

In the final analysis, the answer to the question, "What must be spent for irrigation or other operations?" is simply "Whatever is necessary to satisfy turf use customers."

This in turn, centers on a determination of what they, the customers, are willing to pay for various types of turf quality. Although the turf industry deals in a service, that service has utility for all present and potential customers — even in the case of local government where the customers may simply be the taxpayer.

Therefore, the quality of turf necessary to provide that service function must relate to revenue — either in terms of dues and greens fees or in governmental budgets from tax dollars.

Until this is specified we remain in the archaic position of guessing how to manage turf. Least cost may not provide an optimum solution. In fact, least cost may be a losing proposition.

As a final comment, many people play golf or use other turf areas. However, we really don't know what factors are involved in either deciding to use a turf area or not, or in selecting among alternatives similar areas.

The turf industry is becoming sufficiently sophisticated that it should devote more effort toward this unknown facet of turf — the user, his motivation, and willingness to pay. □

Figure I. How many rounds of golf would you play at the following prices and qualities of turf?

Turf Quality	Price/round	No. of Rounds weekly	No. of Rounds annually
10	$10.00		
10	9.00		
10	8.00		
10	7.00		
9	10.00		
9	9.00		
9	8.00		
.			
.			
5	8.00		
5	7.00		
5	6.00		
5	5.00		
5	4.00		
.			
.			
1	2.00		
1	1.00		
0	1.00		

Figure II. In order to provide different qualities of turf, costs are incurred which must be covered by greens fees or other money sources. Please indicate your preferences as to quality and fees by indicating number of rounds you would play at each level.

Turf Quality	Green Fee	No. of Rounds weekly	No. of Rounds annually
10	$12.00		
9	10.00		
8	9.00		
7	8.00		
6	6.00		
5	4.00		
4	4.00		
3	3.00		
2	1.00		
1	1.00		