TURFGRASS RESEARCH a management tool

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After a first-round 69 over a rain-drenched course in the recent Byron Nelson Golf Classic at Preston Trails Country Club in Dallas, Lee Trevino was quoted as saying, "If we don't get any more rain, then those greens are going to get lightning fast. The greens were easy to putt. They were still wet and the mower didn't pick up all the grass on the greens. You have to have mowed greens to know that and I had mowed greens."

Trevino's statement underscores the importance of turf condition in the play of the game. When one stroke often makes the difference of several thousand dollars in prize money, it is absolutely necessary for the best players to be aware of the subtle differences in playing quality that may result from a rain shower, from a difference in grass texture, or from mowing techniques.

When a player spends time looking over the line of a putt or a chip, he is either consciously or subconsciously examining the quality of the turf and making an estimate of the effect it will have on his stroke.

Agronomy and golf may appear to be diverse fields of study, but the fact is that golf courses suitable for high standards of play are remarkably dependent upon the science of agronomy. Improvements in grasses, drainage and control of pests have been the result of basic research in genetics, soil science, plant physiology, plant pathology and entomology, all of which comprise the spectrum of plant and soil sciences known as agronomy.

Agronomy and golf meet on the golf course because the game is played over a grass-covered expanse, but the refinements of plant growth technique resulting from scientific research, come into play only when some middleman or "brokers" enter the picture. Among these brokers are the extension agronomists whose job it is to relate usable scientific information to practical problems in the field.

Another middleman is the golf course architect. For too long the architect has been viewed as a man who knows the game of golf and who can fit together 18 holes of golf on a given piece of property. His artistic talents and his ability to provide a testing series of holes have been appreciated. He has not, however, been appreciated nor has he always shown great aptitude, for embodying sound principles of plant and soil science in his design procedures. Yet this is one of the major requirements for design of a successful golf course.

All the subtle sculpturing of land forms, all the beautifully contoured sand traps, and all the artistic blending of foliage masses will lose their appeal if play has to be cancelled because the greens are too wet, or if the club members must play on a temporary green because of disease attacks on one of the permanent greens. Press agentry and artistic flair notwithstanding, the architect of the future will not survive if he does not have at least a rudimentary knowledge and appreciation of sound agronomic principles.

The other middleman, and the one most intimately involved in bringing sound agronomy to bear upon the quality of the golf course is the golf course superintendent. Enormous credit is due these men who keep such large expanses of turf in such near-perfect condition.

The knowledge of plant and soil sciences is only one of the many requirements of a superintendent. He must be a labor supervisor, a diplomat, and a purchasing agent, among other things. If he fails to grow good turf, however, it matters little how he fulfills his other roles. It may seem harsh judgment, but a superintendent who cannot provide near-perfect turf is a failure.

Historically, golfers have been the leaders in sponsorship and monetary support of research efforts. In the United States such research had its formal beginnings in 1920 when the Green Section of the United States Golf Association was "created for the purpose of collecting and distributing information of value respecting the proper maintenance and upkeep of golf courses."

In the half-century since the sponsorship of this first research by golfers, almost every state and metropolitan district has seen the formation of turf associations and golf course superintendents' associations. Invariably, one of the objectives set forth when these associations are formed is to encourage and sponsor turfgrass research at the state experiment station.

And invariably golf interests have been dominant among all the groups who have supported such research. Thus, golfers have generously borne more than their share of the support for research which is to their benefit as well as to that of all other users of turfgrass.

In still another manner, "benefits have flowed upstream." Very often researchers have not appreciated the problems existing on golf courses and the results of their research have missed the mark, but golfers have expressed their needs to superintendents and architects, and the information has been relayed to the extension agronomist and eventually to the researcher. An example of this inter-relationship is in the history of fertilizer usage.

Since the end of World War Two, fertilizer production capacity has increased remarkably and until recently, fertilizer materials grew progressively cheaper. Researchers noted that production of most crops could be increased greatly by the use of more fertilizer, particularly nitrogen. Many of the research personnel equated better turf with in-

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creased rate of growth and deeper green color.

Consequently, recommendations were made for using high rates of fertilizer on golf courses. While it is necessary to use moderate amounts of fertilizer for good turf growth, the over-use of such elements as nitrogen produced a soft lush growth. On some fairways, accumulation of clippings became a nuisance, particularly in wet weather, thatch accumulated on putting greens, turf became susceptible to bruising and to disease attacks, and in some cases the grass produced wider leaf blades, longer internodes and a resultant coarse texture.

When the needs of the player were made known to the research men (through superintendents and extension personnel who discussed problems at turfgrass conferences), the criteria for evaluating effects of fertilizer use were changed. Turf quality as related to the other management practices such as irrigation and mowing frequency which interact with fertilizer usage became the yardstick for determining the effect of fertilizer. These criteria replaced those of green color and rapid growth.

A similar example involves the matter of soil texture and structure. Every plant scientist learns early in his career that a loam soil high in organic matter is highly desirable from the standpoint of productivity and workability. Because putting greens represent perhaps the most intensive degree of plant culture known, scientists naturally recommended the best quality of soil for this important area.

Golf course architects selected the best loam soils available and amended these by the addition of manures and other organic materials. When standards were not quite so high and traffic was not quite so heavy, when a little brown-patch, a little clover and Poa annua were accepted as normal, such soils were satisfactory. As golfer traffic increased, as players became less tolerant of the blemishes brought about by weeds, diseases and "scald," it became necessary to educate the scientist to the fact the traditional loam soil was no longer a satisfactory medium for putting greens.

Noting the deficiencies associated with loam soils because there was no satisfactory way to employ tillage on a golf course that has to be kept in play, I initiated a series of experiments at Texas A & M University, supported in part by the United States Golf Association Green Section, which were intended to discover the attributes of a soil which would resist compaction, permit water penetration and percolation, permit air diffusion and support a satisfactory turfgrass cover.

When the results of the experimentation were gathered, they indicated the need for a very high percentage of sand in the mixture. At that time, recommendations based on this research were considered heretical by many scientists, but the resultant putting greens pleased the superintendents who managed them and the golfers who played on them.

Now, more than two decades following the beginning of this investigation, almost every putting green being constructed makes use of a soil mixture having a high sand content. Again the needs of the game had to be communicated to the scientists before they could provide the knowledge that would meet the requirements.

Therefore, communications and benefits flow both ways between the research agronomist and the golfer. The extension agronomist, the golf course architect and the golf course superintendent provide the conduit through which such communications must pass.

The interrelationships between agronomy, golf and the middlemen exist in many areas. Plant growth fundamentals must be recognized by the golf course architect and by the superintendent. The manipulation of the environment to accomodate both the principles of plant growth and the needs of the player is the job of the architect in the formulation of a design, and it is the job of the superintendent after the course is built.

The architect can make the superintendent's job nearly impossible if he misses the mark in his design concepts. On the other hand, if the architect has done a reasonable job, the superintendent's ability can make the architect's creation into a beautiful golf course or it can be a disaster.

The areas of drainage, irrigation, management of traffic, control of pests, the use of trees and shrubs, treatment of ponds and streams, selection of turf species, treatment of sand bunkers, and others represent challenges to the designer and to the manager in providing the condition required for the playing the game of golf.

Players with the highest degree of skill can demonstrate that skill only when the underlying elements of golf course excellence are employed to the highest level. The peak of near-perfection can be reached only when each person involved in the various disciplines has a thorough understanding of the needs and the abilities of his counterparts in the other disciplines.

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the hole layout it provides; but if the slopes on the sides of these tees are enclosed with lumber as they are in some cases with steps leading to the tee, this will again mean increased labor costs and lack of efficient turf management because maintenance equipment will have to be carried by hand up to the tee to properly care for it.

Many times, the implementation of a swale here or there by the superintendent can save thousands of dollars in maintenance costs through the years if it causes the course to drain properly. How many courses have you seen where after a rain there has been puddling on greens, fairways or tees because of inadequate contouring?

The superintendent's presence during construction will enable him to gain valuable knowledge of the soils he must work with at various levels on his fairways, tees and greens. This can have a material effect on his maintenance program for future years.

All too often, superintendents are not aware of where drainage and irrigation pipes run on their courses because they don't have "as built"

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