



Better Turf for Better Golf

# TURF MANAGEMENT

from the USGA Green Section

## HOW TO MEET RISING COSTS OF GOLF COURSE MAINTENANCE

*The USGA Green Section conducted an Educational Program at the Drake Hotel in Chicago on January 24, 1958. In the chair was Mr. William C. Chapin, Chairman of the Green Section Committee. Vice-Chairman was Dr. Marvin H. Ferguson, Mid-Continent Director and National Research Coordinator.*

*The following summarizes the panel discussions.*

### Architectural Matters Affect Maintenance Costs

**Robert Bruce Harris**

*Golf Course Architect, Chicago, Ill.*

**T**HERE are many ways in which design of the golf course may affect the cost of maintenance. Because of present-day labor costs, the golf course architect must use all the methods available to him to eliminate tedious time consuming maintenance tasks.

To take the golf course features in order, we may start with tees. Tees should be large. The elevated area should be made to blend into surrounding terrain by means of long gentle slopes. Corners and sharp breaks in contour are to be avoided. These considerations affect the ease of maintaining tees with the larger units of power equipment and permit the use of such equipment without a danger of scalping. Tees should be long (generally more than 100 feet) to permit flexibility in the length of the hole and to permit frequent rotation of tee markers.

Fairway bunkers are the next item in

our progress around the course. Those bunkers which do not affect the strategy of play and those which penalize the high handicap golfer should be eliminated. Fairway bunkers should be built so that the sand is visible, so that they will be well-drained and so that slopes will be gentle. It is easier to maintain the areas surrounding bunkers if the edges are smooth rather than scalloped.

With reference to putting greens, one of the most important factors is to have the green large enough to provide plenty of space for setting the cup. Cup locations need to be changed frequently. Traffic around the green is a serious matter and design can be used to minimize this problem. Carts and golf buggies are coming into greater use and it is difficult to avoid concentration of traffic from this source.

Bunkers around putting greens should be far enough from the putting surface to allow for passage of fairway mowing

equipment between the bunker and the green. Greens can be shaped so that bunkers will be relatively near the hole even though there is room for mowing units to pass between the bunker and the green.

Plant materials should be used judiciously on the golf course to prevent their

interference with maintenance. Trees should be spaced so that there is not a necessity for the use of small mowing units. Shrubs probably should not be used on the golf course. Their place is around the clubhouse. Golf balls cannot be played from beneath shrubs and they invariably constitute a difficult maintenance problem.

## Technical Advances Which May Counteract Unnecessary Maintenance Costs

O. J. Noer

*Milwaukee Sewerage Commission*

**T**ECHNICAL advances have had profound effects upon the quality of turf and upon the cost of maintenance. Better grasses have been uncovered, management procedures have been simplified, and costs have been reduced, in some instances.

At one time grubs of the Japanese beetle threatened complete destruction of turf in the Philadelphia area. Control with carbon disulfide was tried first. It killed the grubs, but turf damage from its use was worse than from the grubs. The USGA Green Section induced the United States Department of Agriculture to attack the problem. Leach got the assignment and promptly developed the lead arsenate method of grub-proofing turf. He pointed out other virtues of lead arsenate usage—such as worm cast control and the marked reduction in weeds, notably crabgrass and chickweed. Then chlordane displaced lead arsenate. It killed grubs quicker and more effectively and solved the ant problem. An over-all spray gave better control and was cheaper than the old method of poisoning each ant hill by hand.

This is but one instance of a case where applied research saved the day and in doing so provided other important benefits including a better and cheaper way to control ants.

Even more startling advances are in prospect because of intensified research by the various experiment stations. Research workers there are the true missionaries in the turf field. Besides finding the answers to immediate practical problems, it is their task to delve into the realm of the unknown. As a result of such research the

impossible of today becomes the commonplace of tomorrow.

The problem of translating research into practice must be faced by the superintendent. You must separate the wheat from the chaff. In most instances it is a simple matter. To put any proposal of a revolutionary nature into large scale use immediately is unwise. Field testing first, followed by pilot scale use is the wise procedure. It is the way to acquire the know-how to do the job, and to uncover any weaknesses in the method. Some can be corrected, but others may nullify what seemed like a desirable change.

The same kind of approach should be used by outside advisory agencies. The money spent is not their own. They must be sure of their ground when offering a positive recommendation, and must be prepared to defend the program.

Budgets for course maintenance have not been out of line. They have been within reason, mostly too low rather than too high. Any attempt to make a moderate or drastic cut will be bad for the turf. Economy-minded officials have made slashes before. Turf deterioration occurs gradually, especially where there has been a high standard of maintenance. The economists have their day for several years. After the day of reckoning, the cost of rehabilitation is more than would have been spent to keep the course in good playing condition.

The golf course is no place to waste or to save money. It is important to provide those things which make the golf course

pleasant to play and to get full value for each dollar spent. Metropolitan clubs can afford to schedule fungicide treatments to prevent disease, and can provide the niceties their members want. A small town club may be compelled to take more chances with disease and provide the bare necessities only. By good management they can keep their members happy.

## **Agricultural Chemicals in Efficient Turf Management**

**Dr. William H. Daniel**

*Purdue University, Lafayette, Ind.*

**Y**OUR first question is: What can agricultural chemicals do for me? In reply you must answer the questions: What are my problems and my needs? What equipment, labor, experience and technology are available for the utilization of agricultural chemicals?

Agricultural chemicals is a term which encompasses a broad field. It includes fertilizers, insecticides, fungicides, and many other special items. Let us consider fertilizers first.

Fertilizers include organic materials, such as cottonseed meal, sewerage sludge (either activated or processed) and waste by-products. There are also four types of manufactured or synthetic nitrogen; ammonium salts, nitrate salts, urea and urea-formaldehyde. Besides these there are two major forms each of phosphates and potash. One is concerned then with the desired combination of three major nutrients which are available in twelve major forms.

Recent studies of plant tissue content and compilations of soil test results confirm earlier observations which indicated that when phosphorus is present in the soil at an adequate (medium) level, growth response to further additions of phosphorus should not be expected. Therefore phosphorus incorporation should be a part of seedbed preparation. Phosphorus should be incorporated as completely into the root zone as possible. Dr. Alderfer, in New Jersey, reports that roots will grow only where phosphorus is above minimum levels.

Phosphorus use has been emphasized in the growing of field crops, and its use in seedbed preparation has been stressed.

Although the session is designed for the superintendent, it would seem fitting to stress the wisdom of keeping abreast with new developments. By the same token it is important for the club to have a competent man at the helm. Besides being well versed in the technical problems of turf management, he should have labor management know-how.

These facts may cause one mistakenly to apply unnecessary amounts of phosphorus. The fact that phosphorus has been used in more than adequate amounts is evidenced by the findings of recent studies which disclosed that 98 per cent of the established golf greens in the Midwest have excess phosphorus accumulated in the upper 2" of the soil. The fertilizer industry is rendering a valuable service in the current trend to produce fertilizers of a 4-1-2, 3-1-2, or 2-1-1 ratio. These permit you the convenience of using a complete fertilizer without the necessity of over-using phosphorus.

Potash is a different matter. Its repeated application on irrigated turf should be mandatory. For many golf greens I would like to see some potash applied monthly. This applies to those fertilizers which give a peak availability, then a dearth of supply. These must be used more frequently and at lighter rates per application to achieve satisfactory results.

You are well acquainted with the organic nitrogen materials whose excellent performance is particularly noticeable in the late summer and fall periods. Under comparative testing the new class of urea-forms has been brought to the attention of many of you. These materials, which are chemical compounds produced industrially by the combining of urea and formaldehyde, can give a rather uniform release of nitrogen so that two applications per year may perform very satisfactorily. Continued use of these materials will contribute to successful understanding of their performance.

As with organics, you may use the urea-

forms as the background fertilization. Then, for special occasions, for cool weather or other conditions when you wish added vigor, light applications of soluble nitrogens may be applied to augment the background supply.

As a final point on fertilizers, it should be pointed out that if you are feeding turf heavily in experimental plots or under actual growing conditions, the first noticeable decline is in the yield of clippings. This will be followed shortly by a lightening in color, but it may be a considerable time before the density of the leaves of turf below the cutting height are actually reduced so that playability is modified. For this reason, all turf fertilizers may give satisfactory performing turf as long as we look at the performance of the grass remaining after clipping, while if we watch only clippings or greenness we see predictions and warning signs which may not yet be important in the golf playability of the turf itself.

#### **Fungicides are Good**

When we observe or learn of the tremendous variation in the fungi and algae that may affect turf plants, by producing disease symptoms, we marvel at their complexity and their variation. I never think of disease without thinking of Cohansey (C-7) creeping bentgrass. It does very well but only when protected from disease. We do have available from reliable producers a comparatively satisfactory array of fungicides. There is, as always, the problem of proper timing to have the chemical protection on the leaf blade as the fungus mycelium attempts to grow and cause damage.

The USGA has, in its past years, done a marvelous job of supporting and encouraging the research and the exchange of knowledge which has brought about the understanding of management principles and the capable performance of turf today. Currently in the Midwest we appear to lose more turf due to wilting than to all disease combinations. With good fungicide preventive maintenance, spraying schedules is your key to continued quality turf ready for play. As we progress, the use of broad spectrum fungicides, for example, Acti-

dione RZ and Kromad, will continue to offer more potential to both turf superintendents and the novice homeowner.

#### **Herbicides Improve Rapidly**

Perhaps the group of agricultural chemicals most important to you is herbicides. Weed problems in turf may be caused by chickweed, crabgrass, goosegrass, knotweed, henbit, dandelion, buckhorn, etc. With herbicides many of these can be controlled. Nevertheless, the potential of the chemical to control seeds is only one part of a three fold problem. The other two parts are proper use of the material and subsequent improvement of the turf in the area involved. Dr. J. A. DeFrance, reporting to the Northeast Weed Control group, mentioned that seven grasses needed additional study—annual bluegrass, goosegrass, chickweed, knotweed, nimblewill, pearlwort and spotted spurge. Certainly in the Midwest nimblewill presents a major problem.

On golf greens *Poa annua* continues to be a major pest. Although many chemicals have been tried—all so far, even partially selective—have to be used very painstakingly and only in favorable selective seasons or stages of growth. Endothal offers some promise. Neburon, although it will kill *Poa annua* and chickweed, lacks sufficient safety to desired grasses.

We at Purdue have done extensive work on applications of arsenic in toxic quantities for the control of *Poa annua*. Calcium arsenate at the rate of 12 pounds per 1000 square feet or lead arsenate at the rate of 24 pounds per 1000 square feet, are suggested with follow-up half rates twice a year until vigor and survival of the *Poa annua* is inhibited. Soils high in pH, organic matter, clay or phosphorus require more arsenic for adequate inhibition. Although several companies are considering pelleted arsenics (for convenience in application) none will be on the market before fall of 1958 or later. Since arsenics also inhibit crabgrass establishment the homeowner market is very attractive for this item.

#### **Crabgrass Control is Practical Now**

In 1955 disodium methyl arsonate was first sold. Today it predominates the post-

emergence crabgrass control market, succeeding potassium cyanate and supplementing phenyl mercuric acetate. Research in 1957 has led to the production of a faster acting material, amine methyl arsonate, which will be available in 1958 through several formulators.

#### **Soil Sterilization Needs More Attention**

Dr. Gene Nutter of Florida reports on tests of 12 chemicals—four of which (Vapam, methyl bromide, Mylone, and calcium cyanamid) have been used to

some extent by turf superintendents. It does require extensive planning and some added work before satisfactory performance can be expected from these materials. Nevertheless, the potential service of sterilization of special soil is generally not being utilized.

Insecticides require some finesse in use but many types are available and the user may usually expect satisfactory performance. Generally, recognizing the problems is the key to satisfactory results.

## **Adequate Equipment Contributes to Efficiency**

**David M. Lilly and J. R. Watson, Jr.,**

*President and Chief Agronomist, Toro Manufacturing Corp., Minneapolis, Minn.*

**E**FFICIENCY in golf course operation implies the development and maintenance of the highest possible degree of turfgrass quality and player acceptance commensurate with a given expenditure of time, energy and money. Efficiency in golf course operations is attainable through organization, planning and supervision. Adequate equipment contributes to efficient golf course operations. In fact, adequate equipment is essential for efficient golf course operations. The selection, procurement and use of adequate equipment should be approached on the same basis as the overall golf course operation; i.e., a planned and organized approach with proper supervision.

#### **Need**

Labor costs have been and still are rising. Further, there seems little reason not to expect this trend to continue. Likewise, player demands for higher quality playing conditions are increasing. Budgets are not, and probably will not, increase proportionately.

Labor is most likely the biggest expense item in a yearly budget. This means, primarily, that hand operations are too expensive and must be eliminated. If the demands for ever improving maintenance standards are to be met economically, operations must be keyed to the use of not only more mechanized equipment, but also to equipment which will produce a great number of work units per man hour of operation. Great strides have been made in this respect during the past two decades,

but still greater strides must be made if player demands are to be met.

#### **Planning**

The direction for increased efficiency through adequate equipment does not necessarily lie in the development of new equipment, non-existent today. Rather, increased efficiency may (and probably does) lie in the development and execution of programs built around equipment presently available, or in the later stages of development. Certainly the greatest immediate potential for increasing efficiency calls for such an approach in our thinking. This means planning.

**RESPONSIBILITY**—The club membership is responsible for overall programming of operational standards. It must decide the type of course and level of maintenance required for its particular needs. These expressions are made through their appointed representatives — the Green Committee. Based on the authorized expenditures (budget for golf course operation) the committee, in cooperation with the golf course superintendent, prepares and submits a long range and immediate plan of operation. If approved, the superintendent executes the program under the general supervision of the Green Chairman.

Planning for adequate equipment then, is indirectly the responsibility of the membership but, in actuality, the direct responsibility of the superintendent—acting within the confines of an operational program, planned and developed in coopera-

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tion with the Green Committee and approved by the membership through their representatives (Board of Directors). Participation of the golf course superintendent in local, regional and national educational conferences, particularly the National Show and Conference, is invaluable from the standpoint of keeping abreast of developments in golf course operations.

**DEVELOPMENT**—Planning for adequate equipment begins with a detailed study of the course layout. Ideally, a scaled layout of the course, with possibly relief models of the greens inserted, should be made. Such a layout would show the various landscape and terrain features; roadways and bridges; the size and shape of greens, tees, fairways and roughs; and the location, number and shape of traps. From such a layout, coupled with a knowledge of the necessary maintenance practices, plans for increasing efficiency through adequate equipment may be developed. These should be developed along two lines—an “immediate” or current program and a “long range” program.

**IMMEDIATE PROGRAM**—The objective of this program should be to determine if the course, in its present condition, is being maintained as efficiently as is possible with equipment on hand or available for purchase. This involves, among other things, an examination of the capacity, maneuverability, sturdiness, durability—and in the case of certain mowing units, trimability—as well as a study of the maintenance records on each piece of equipment to determine annual service and repair costs. Replacement of inadequate and costly (from standpoint of operation) equipment with units which will produce more work per man hour of operation will contribute materially to efficiency; however, since equipment purchases are essentially capital expenditures, and certain types may last from five to fifteen years, no equipment should be purchased except within the framework of a long range program. (Others on the program are scheduled for detailed discussion of long range planning. We will cover only the highlights as related to adequate equipment.)

**LONG RANGE PROGRAM**—This approach is basically a modernization program. Many of our courses were designed and constructed during an era when labor costs were negligible and mechanization of little importance, thereby creating many time consuming operations requiring the use of low capacity, and often costly equipment. Landscaping may not have been planned, but grew haphazardly over the years with little thought to the maintenance demands being created (often in accordance with the whims and fancies of some particular member). Shrubs and trees requiring specialized care in the way of spraying, trimming, etc., and often located in such a manner as to interfere with large capacity mowing equipment—thus requiring additional time consuming operations to maintain surrounding turfgrass—do not contribute to efficient operation.

A long range program of redesign in keeping with modern trends, landscaping calling for elimination of problem trees and shrubs, substitution of more hardy species requiring minimum maintenance and located to accommodate equipment

with greater capacity and, perhaps most important, the construction of greens and tees employing the latest materials and techniques developed through research will unquestionably contribute to efficiency. Such a program may require several years for completion, but with competent direction, supervision and adequate equipment, may be accomplished with only a reasonable increase in operating budgets.

#### **Selection of Adequate Equipment**

Adequate equipment for one course may be inadequate for another and excessive for a third; therefore, equipment must be selected on the basis of the individual requirements for a particular course. Features of the course, as developed earlier and incorporated in the plan of operation, will dictate the various kinds, sizes and types of

equipment required for efficient operation.

Other factors to consider when selecting equipment are: (1) Equipment purchases for the most part are capital expenditures and should be treated as such—amortized and depreciated; (2) The manufacturer or his representative should be consulted on the type of equipment needed. Information on new equipment and improved features, as well as the suitability of their equipment for the job at hand, is readily available from the reliable manufacturer. (3) The availability of parts and service facilities. This is of prime importance when selecting equipment. If repair parts are not available when needed and a machine is inoperable for extended periods, it is of questionable value and certainly will contribute little to efficient operation.

### **Question and Answer Session**

MODERATOR: *A. M. Radko—USGA Green Section Eastern Director*

PANEL MEMBERS: *Mr. Harris, Dr. Watson, Dr. Daniel, Mr. Noer,  
Mr. Andrew Bertoni, Superintendent, Meadowbrook Country Club,  
Northville, Michigan  
Mr. Carl Bretzlaff, Superintendent, Meridian Hills Country Club,  
Indianapolis, Indiana  
Mr. Charles K. Hallowell, USGA Green Section Mid-Atlantic  
Director*

MR. RADKO: With reference to equipment, do you have suggestions as to how a club could set up a machinery replacement reserve?

MR. BERTONI: The best thing to do is to set aside so much out of your budget each year for machinery replacement. Set up a depreciation schedule and find out what you have and what the turnover will be. This will help somewhat to prevent some board member from decreasing the maintenance budget in order to promote some other project.

MR. RADKO: Mr. Bertoni, will you tell us how you go about determining the rate of depreciation of equipment? Doesn't it vary a great deal depending upon the kind of equipment?

MR. BERTONI: I try to check with the manufacturer or the salesman. You can operate a piece of equipment for a long time but it may be more expensive than if it were disposed of sooner, because of the expense of repairs. Length of life depends

on use to a great extent. We try to figure the expected life of each individual piece of equipment.

QUESTION: Mr. Bretzlaff, what do you think your total inventory is worth?

MR. BRETZLAFF: If we were to sell our equipment, it would bring around \$22,000. If we were to go out on the market and buy it, we would have to pay around \$35,000.

MR. HALLOWELL: I think Mr. Bertoni and Mr. Bretzlaff have touched on something rather obvious, that the life of the same piece of equipment will vary considerably from one part of the country to the other. One approach to determining the life of equipment is to keep your own records of cost and maintenance and to develop these data for your own particular course.

MR. HARRIS: I'm glad you mentioned that about different parts of the country. On my own course in Florida we have a replacement budget of \$5000 a year. Here

in the Midwest we get by on about half that amount.

QUESTION: Do the members of the panel find that cheap labor plays havoc with equipment? Is cheap labor harder on equipment than good labor?

MR. BRETZLAFF: Labor has a lot to do with the maintenance of equipment. I have two tractors, one of which is twenty three-years old and has been repaired once. The other one, operated by a different man, is repaired quite often.

QUESTION: I'd like to have Mr. Harris discuss surface drainage of greens in relation to reduction of maintenance costs.

MR. HARRIS: I really should have discussed that in my talk because it is a very important thing. One common fault in the Midwest is that greens may have a low area where the cup is often set near a high area or mound that needs a great deal of water. The low area gets soaked because the water all drains to the center. Greens of this kind are susceptible to diseases and to *Poa annua*. So the central area of the green should not be the lowest area. It is good to have the drainage going to the side in several places.

QUESTION: Mr. Harris, what is the cost of a green in this area today?

MR. HARRIS: I hardly ever figure the cost that way. In the trade, we figure by the hole and it is seldom we make an 18-hole course for less than \$200,000. That would be a very modest golf course. Most of the courses we have been building, if they have a fairway watering system, will average around \$300,000 to \$325,000. I believe that is around \$15,000 to \$16,000 a hole.

MR. BRETZLAFF: I think he is trying to get the cost of rebuilding a green that is in poor condition. How much will that cost?

MR. HARRIS: It depends on how much is to be done. If you do the green right from the start it would probably run better than half the cost of the hole.

QUESTION: Mr. Harris, what has the golf architect or the USGA done in the past ten years that represents a valuable contribution to the effort of economical operation?

MR. HARRIS: I can't speak for the USGA but I can speak for myself and what I believe in. I believe that everything on a modern golf course should be streamlined. There shouldn't be any sharp slopes or angles because you cannot operate on such areas with big machinery. I believe in large greens that are well drained, bunkers being the width of the fairway mowers away from the putting surface. Sandtraps should be built above ground so you can see them, so they will drain naturally and slopes should be such that they can be maintained with fairway units. Tees should be large and should be suitable for mowing with fairway mowers. Bunkers should not be placed to penalize the beginner or poor player. Make the course a real test for the low-handicap player but a pleasant place for the beginner. That's my own code but I don't know if it is that of the USGA.

MR. RADKO: Speaking for the staff of the USGA Green Section, it is our thinking that modernization practices to eliminate things which increase maintenance costs should be encouraged.

QUESTION: This question is about sand. I'd like your opinion on the kind of sand for bunkers.

MEMBER: I am from Westchester, in New York. We have used silica which comes from the glass processing business. It is extremely white and is of very regular texture. It presents a problem because of glare and it tends to slide under the feet of the golfer.

MR. BRETZLAFF: Silica is a very pure grade of sand. Some clubs in this area use it but it is very expensive. Whether sand is suitable depends upon the physical condition of the sand particles. Mr. Harris, what kind of sand do you use?

MR. HARRIS: We always try to choose a sand that will not blow and will not pack. I cannot state just what size it is.

DR. WATSON: I'd like to comment on the question of what has contributed most to efficiency of operation in the last 10 years. It can be said in one word—knowledge. Knowledge gained through the exchange of ideas at meetings such as this will help us to be more efficient than we are today.