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SUMMARY OF PROCEEDINGS
ANNUAL CONFERENCE OF THE
MID-ATLANTIC ASSOCIATION OF GOLF COURSE SUPERINTENDENTS

Under the Auspices
of the
Extension Service
University of Maryland

Holiday Inn, Downtown
Howard and Lombard Streets
Baltimore, Maryland
January 11 and 12, 1965

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HOLIDAY INN, DOWNTOWN - BALTIMORE, MARYLAND
JANUARY 11 AND 12, 1965

Summary

With approximately 185 in attendance, the Annual Conference of the Mid-Atlantic Association of Golf Course Superintendents was called to order by Dr. George S. Langford, State Entomologist, University of Maryland, College Park. This was followed by Greetings and Welcome from Dr. Gordon M. Cairns, Dean of Agriculture, University of Maryland, and a message from Thomas A. Doerer, Jr., President of the Association.

The program committee consisted of Angelo Commarota, Sheldon R. Betterly, Frank J. Haske, Russell W. Kerns, George S. Langford, Alex D. Watson, and George C. Gumm, Chairman.

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THE PRESIDENT'S MESSAGE

Thomas A. Doerer, Jr.

Good Morning Gentlemen. May I on behalf of the Middle Atlantic Golf Course Superintendents, welcome you to this our 36th annual Turf Grass Conference. It is a privilege and also a pleasure to be President of this fine group of superintendents for the coming year. We feel we have made some progress in the past year and we will try to make even greater progress in the coming year. We feel certain that this fine conference will be the starting point toward this progress. Dr. George Langford of the University of Maryland and our Educational Director, Mr. George Gumm, along with his committee, have gone all out in their efforts to bring you one of the most comprehensive programs we have had in our history. May we present this two-day program to you for your education and enjoyment.

Assembled here for this conference are speakers whose combined knowledge, would be valued by industry at well over a Million Dollars. We have speakers representing all phases of the turf business such as - Pathology, Entomology, Agronomy, Fertilization, Irrigation, Chemicals, Landscaping, Horticulture, Publicity, Deans of several leading Universities, President of our National Association, also the Governor of this great state of Maryland.

If we as superintendents can absorb just 10% of what these men are going to tell us we will leave this conference with a bank account of knowledge that will produce great interest in the years to come. Time is another deposit we can add to this account, so let us use this time allotted these next two days to its greatest advantage. Please be here on time so that the speakers can use their time to our advantage.

This evening at 6 p. m. we will have a social hour sponsored by our good friends the Golf Course Suppliers of this area. At 7 p. m. we will start the annual Banquet; at this time we will present our distinguished guest speaker the Honorable J. Millard Tawes, Governor of the State of Maryland. After the message from Governor Tawes we will make three special awards to distinguished contributors to our progress in Turf in the Middle Atlantic area.

Once again welcome to the Conference and by all means have a good time.

TURF DEVELOPMENT IN VIRGINIA

H. L. Dunton - Department of Agronomy
Virginia Polytechnic Institute, Blacksburg, Va.

Today, I shall give a brief report on the development of the Turf Program in Virginia, not for what we have done and are doing but because of the very great importance that we attach to turf in the state.

We often do not realize the growing importance of turf. However, when we stop and consider the fact that in our state and most of the mid-Atlantic states, the population is increasing in the urban area and decreasing in the rural farm areas and is expected to continue this trend. This creates the need for more turf. We look at the increase in interstate highways and see that it takes at least twenty-five acres of turf on the average for each mile of interstate highway, or when we look at the fact that we are building in 1964 from ten to thirty-five new golf courses in each of the mid-Atlantic states, or when we stop and consider the vast increase in students at schools in the state, we realize again the great need of turf. In Virginia, we estimate that over 150,000 acres are now devoted to turf and that each family spends approximately \$50 per year for turf or a total of around \$50,000,000 or more per year. This is equal to the value of the total fertilizer sales in the state or exceeds the value of many crops now under production. Turf is not only important, turf is big business.

We have endeavored to organize the turf program as a complete program including research, resident teaching and extension.

Research

In research, we are dealing with most of the fields involved in turf such as that of fine turf as related to golf courses, with mixtures and management of these mixtures and a rather large program in disease and weed control.

We are also conducting lawn research involving mixtures, management, fertilization and similar. Research is being conducted for playgrounds and athletic fields. A large amount of cooperative research with the Highway Research Board and the Federal Highway Department is being carried out on road banks in which we are studying mulches, fertilization, mixtures, management and so forth. The above are a few of the phases in which the research is involved.

Extension

The extension program endeavors to take the information to the people who use it. The extension program includes information in the field of golf, lawns, playgrounds, athletic fields and the like. The extension program is carried out through the regular channels of communication in which the specialists and county agents are involved. Special emphasis is being given in urban counties to turf extension work. Many organizations such as the Four Turf Groups, the Turfgrass Council, the Garden Clubs and the like are most helpful in carrying information on turf to the users.

Teaching

The Agronomy Department has inaugurated what may be termed a work-study program. The undergraduate student enrolls in Agronomy and specializes in turf. He takes the regular courses plus special courses related to turf and during the summer works on golf courses or with the research program. This is a very effective program and is constantly enlarging.

Many more undergraduate students are needed in this program to supply the urgent demand for men trained in this field. High school students should be encouraged to give consideration to this.

In addition to the undergraduate program, a strong graduate program in turf has been inaugurated and a number of graduate students are at present majoring in this field.

The growing importance of turf must be recognized and adequate personnel, facilities and funds made available to carry forward this important program in our urban and rural economy.

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DEVELOPMENTS IN TURFGRASS CULTURE

Ralph E. Engel
Rutgers - The State University
New Brunswick, New Jersey

Staying abreast of the many new developments that may or may not apply to a turf production program is one of the grower's toughest assignments. Knowing the grass better and discovering new varieties has been an active field for two generations. The more recent advent of chemicals in turfgrass production has given numerous improvements. Currently, new grass varieties of prominence are rather scarce. This cannot be expected to last long, as new species are likely to become very abundant. The future will require even more effort to evaluate and place new turfgrass developments.

We have reached the day when the grower should keep records on new developments that may interest him. For example, with chemicals - large size file cards might be kept on the chemical and the weed of concern. Any pertinent observations on effectiveness, safety, grass species, and source of observation or comment should be recorded. This will help you know the chemical before attempting general use.

Pre-emergence crabgrass control has been one of the most dramatic areas. We had chlordane and the arsenates a few years back. For the past several years we have been in a dacthal and zytron era. Currently we have Azak, Betasan, El-110 (Binnell), Tupersan, and Vel 21944 which have shown varying degrees of promise. Of these Azak and Betasan have been studied longer. Tupersan which is newer offers an advantage in safety when treating over newly seeded lawn grasses. On repeated occasions dry applications of a given chemical are considerably more efficient than water spray application. In part this may be associated with uniformity of spraying. More study must be done to determine the most successful chemical and best techniques of usage. The most prominent chemical of the future will show immediate and long-term safety to the turfgrasses as well as ability to control crabgrass at low cost.

Goosegrass control - Azak, bandane, Betasan, chlordane, dacthal, zytron, Binnell (El-110), Tupersan, and V-21944 gave 50% goosegrass control or better on occasions in the 1964 tests. No chemical gave a high degree of control with any consistency in the various treatments which were applied on two different dates at each of two locations. None of the chemicals were consistently free of injury on the mixed fairway turf used for test sites. Azak, which gave more consistent control, was the most injurious. On one test site that was predominantly annual bluegrass, all chemical treatments gave higher clover readings. Some of the treatments showed more than 100% increase in clover content.

Zoysia Establishment - Chemicals were applied over zoysia rhizomes planted in June 1964. The rhizomes, typically had a few roots and shoots. The chemicals were applied the day following planting. Simazine and atrazine appeared most useful for weed control. An application rate of one pound per acre was effective and nearly as good as two pounds per acre. The two-pound rate of simazine was safe on five different zoysias tested.

NCPFP and dicamba herbicides on bentgrass turf - Late summer applications of 1-1/2 pounds per acre of NCPFP and 1/2 pound of dicamba were less harmful to the bentgrass during the fall season than 1 pound of silvex. Clover and chickweed control from the dicamba treatment was similar to the silvex treatment. The NCPFP treatment was slightly less effective on chickweed.

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USING ROSES FOR BEAUTIFICATION

Rodney Witman
Star Roses - The Conard-Pyle Co.
West Grove, Pennsylvania

There have been more songs, poems written, romances begun, and continued, hearts lightened and made joyful, feelings and thoughts conveyed, with roses than probably with any other group of plants known. And many times this has been accomplished equally as well with one single rose bud or with a huge bouquet of hundreds of roses.

The Black & Decker Company maintains they do not sell a $\frac{1}{4}$ " electric drill. They offer quite the opposite. They offer the easiest, quietest, and quickest $\frac{1}{4}$ " hole that is on the market today.

Eastern Airlines doesn't sell plane tickets to Miami, Madrid, or Puerto Rico. Instead they inform you that within 2 or 3 hours of your home romance, love, excitement, and beautiful girls are anxiously awaiting your arrival.

The Conard-Pyle Company does not sell a rose plant. Instead they offer something tangible that develops into something intangible, which allows us humans to convey our hope, our love, our sadness, and our joy to other humans.

I understand that every month, a Washington florist delivers one single rose bud to the grave of our dear departed President, John Fitzgerald Kennedy. Donor remains anonymous. Why? This donor could get his name in the newspapers, perhaps even his picture, but he chooses to remain anonymous, and to convey his feelings, with a rose bud. And I suspect that every time that rose bud is placed on that grave, a part of the whole world in which we live accompanies it. Can any better tribute be granted to such a man? Did he not install into each of us, enthusiasm, love, peace, or even make us feel a little younger? Or am I being too dramatic? I do not think so. The rose bud doesn't deserve the credit for who or what a man or woman is or was. But it does, give us poor, weak, and many times afraid, humans the chance to express our true feelings. Whether it be to an assassinated President, or to a drunken derelict who has caused nothing but misery to everyone he has come into contact with, or to a loved one who perhaps somehow we have harmed. A rose will say all that needs to be said, with all the emotion that is needed and all the love necessary. Accompanying each rose that you would ever give to anyone, will go a small part of you. But again I ask, why all this over a rose? Well perhaps it is the reliable nature that a rose contains. Roses are perhaps the oldest and hardiest of flowers known.

A man can place a lot of faith on the rose. He can have much confidence that after planting it will return him much beauty for any toil he may place into it. So perhaps when we give a rose it does instill a sense of confidence or faith. We have faith that it will do what it is expected to do. In happiness or in sadness, a rose will always transmit our feelings.

Perhaps it is the strong straight canes of a rose, that gives each bud strength, that causes us humans to gain a little strength by enjoying and working with roses. When a rose is judged, the stronger and longer the rose stems are, the better chance the rose has to be a winner. Isn't that somehow true of us humans.'

Perhaps it is the fine array of colors that the roses contain. The variety of colors enables them to appeal to nearly everyone. Perhaps many will not enjoy growing roses, however, nearly everyone enjoys looking at roses. The buds last for days when cut. When open, the fragrance fills the air wherever they may be. Even so, with all the fine colors that roses have, hybridizers are still trying to gain a deeper, truer red, and a deeper, truer yellow, than any known at present. If you ever get an intense liking for roses, you will be known as an addict in the plant world.

I suggest, all you gentlemen here tonight need roses. I feel you have a very definite responsibility to the people you serve. Why did the people join your clubs and continue to serve. Why did the people join your clubs and continue to be members for years and years. Oh, of course perhaps for a status reason. But I think above all it is to enjoy the atmosphere. It is, a quiet, peaceful, and relaxing atmosphere that prevails.

Many of your members have no desire or time to grow roses. So wouldn't it be a plus, to the already immaculate landscape of your club, to have a few roses in your landscape? You do not need many. You do not need roses for beautification. One rose will do much. I feel that we have many few true retreats to turn to today. Fine art, good music, and true natural landscaping. Can your Club help your members appreciate life a little more? Could a rose or roses help?

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TALKS NOT RECEIVED FOR SUMMARIZATION

What Every Superintendent Should Know About Plant Diseases

Dr. Stephen Bachelder
Agricultural Extension Service
Elizabeth, New Jersey

Turf Grass Weed Control

Dr. Joseph M. Duich, Associate Professor
Department of Agronomy
Pennsylvania State University
University Park, Pennsylvania

Note:--A mimeograph, with data covering Dr. Duich's talk was distributed at the meeting.

Progress of Golf

Herb Graffis, Editor
Golfdom Magazine
Chicago, Illinois

VALUE AND NEED OF COMPLETE GOLF COURSE CONSTRUCTION SPECIFICATIONS

H. B. Musser

The American Society of Golf Course Architects
State College, Pennsylvania

The heavy use and ever increasing demands for perfection in playing conditions on the modern golf course require such an intensive type of maintenance that anything less than the best possible construction is almost sure, eventually, to result in a poor, or at best, a mediocre course.

Faulty construction is directly responsible for many of the most serious problems encountered in maintenance of satisfactory turf. Failure to provide for adequate sub-surface drainage of greens, poor surface course mixtures which are subject to severe compaction, inadequate soil preparation on fairways, shoddy seeding methods - these and many more "built in" mistakes of the same nature, are the stuff of future maintenance troubles which will require major reconstruction or renovation to correct.

The preparation of a complete and concise set of specifications is the first step in protecting a very substantial initial investment against future outlays of additional funds, and of insuring against permanent mediocrity of playing conditions. Building a modern golf course is a specialized operation. Results can be far less than satisfactory, unless the right construction methods are clearly defined and properly fitted to each specific job.

Most of the difficulties arise from a failure to prepare a complete and firm directive which specifically outlines each phase of all of the construction operations. This should be so organized that the provisions are definite and capable of reasonably exact interpretation by everyone concerned. Essentially, it is the responsibility of the Architect. If specifications are so indefinite or so general that the directive for any operation is capable of different interpretations, they may be worth little more than the paper on which they are written. I strongly suspect that this is one of the chief causes of disagreements arising between construction and maintenance people, and for the very material differences we often find between contractors bid proposals.

It has been argued, and unfortunately sometimes assumed, that construction operations, such as greens drainage, seedbed preparation, methods of topsoil mixing, and many other items of a construction job, are so standardized that a good contractor will follow accepted procedures, and that there is no necessity for "spelling out" specific requirements. In an extreme case which I encountered several years ago there were no written construction specifications. Essentially, the agreement between the Owner and the Contractor was a verbal, shake hands understanding that the course would be built in accordance with the Architect's design and under his supervision. This by a group of men who, in their own businesses, would not even build a chicken coop without complete plans and specifications and a performance bond. Several hundred thousands of dollars were spent on the course and large sections of it had to be completely rebuilt within two years. While this is an extreme case, similar dangerous assumptions occur in varying degrees in entirely too many construction contracts. When trouble results there is no recourse, and it is difficult to be very sympathetic.

Sketchy or incomplete provisions for construction are not the only things that may affect the adequacy of specifications. Bid proposals must be based primarily on costs of materials and of the labor and equipment involved in doing the job in accordance with the provisions of the contract. Now, certainly, there are other factors which may influence a contract bid. But if the provisions for materials that are to be used, and for the method of doing each job are outlined in clear

concise form, which leaves no opportunity for misunderstanding, the owner will know exactly what he has a right to expect in the way of actual construction performance, and so has a basis for evaluating other considerations which may influence a bid proposal.

Among the many items, involving contractual relationship between owner and contractor, none is of more interest and concern to the Owner than the Construction Schedule. If it is a public course, he wants to get it into operation as soon as possible for financial reasons. On private courses there always is impatience on the part of prospective users to get them open for play. The section of the contract covering a construction schedule can be set up in simple tabular form and might look like this:

CONSTRUCTION SCHEDULE. The Contractor agrees to perform construction operations in accordance with the following schedule. Since it is recognized that certain operations may be affected by soil and weather conditions, the schedule may be modified with the consent of the owner or his representative.

<u>Operation</u>	<u>Starting Date</u>	<u>Completion Date</u>
1. Clearing		
2. Base construction (Greens & Tees)		
3. Rough grading and surface drainage		
4. Pond and stream development		
5. Installation of drainage and irrigation systems		
6. Completion of greens and tees construction		
7. Seedbed preparation of fairways and roughs		
8. Seeding of fairways and roughs		
9. Final surface preparation and seeding or vegetating of greens and tees		

Another important item in the category of relationships between owner and contractor, which should be covered as definitely as possible, relates to changes and unexpected work. It sometimes happens that owners change their minds after a green or tee is built, and want it changed. Also, since courses are built on many different types of terrain, it sometimes is very difficult to anticipate unexpected construction problems that may be encountered, and which are beyond the specific provisions of the contract. Both situations can become sources of controversy as to responsibility for the cost of doing the work. While I doubt whether it ever will be possible to cover every eventuality, I think that areas of disagreement could be reduced materially by including a section on such situations in the specifications.

Another source of potential misunderstanding and future maintenance problems, which should be covered in any set of specifications is responsibility for repairs and maintenance prior to acceptance of the complete job. Few courses ever have been built, especially on rolling terrain, that have not been subject to some washing and gulleying prior to establishment of a protective turf cover; and there always is danger of poor initial stands due to unfavorable weather, etc. If the owner wishes to make the contractor responsible for the repair of such areas, he should appre-

ciate that the bid proposal will be increased sufficiently to protect the contractor against the possible cost of the extra work. If the future superintendent is on the job, it sometimes pays off to gamble that not much repair work will be necessary, and absolve the contractor from responsibility for having to do it. But if the requirement for repairs is included in the specifications, the obligation as to what is to be done and the method of doing it should be outlined in detail. The provisions should include:

1. A specific item specifying who shall determine the extent of the areas requiring repair, and the basis for the determination.
2. The character of seedbed preparation and reseeding or vegetating.
3. A guarantee of an acceptable stand.

As everyone will appreciate who has had contact with golf course construction, it frequently happens that some areas have been completed ahead of others. Turf establishment on them may have progressed to the point where maintenance is required before the whole job has been accepted. So it would seem reasonable that the care of these areas be the subject of a definite provision in the contract. The definite provisions would include: 1. Frequency and height of mowing and the termination of responsibility for mowing operations. 2. Who shall provide water and irrigation equipment and operate it. 3. Provision that various types of maintenance equipment be available when needed. 4. Responsibility for providing and applying top dressing, fertilizer, pest control, and all other normal maintenance until final acceptance of the job.

I would like to return to what really is the heart of any set of construction specifications, namely; provisions for materials and methods of doing the job. As stated previously, most of the serious omissions in these provisions are due to failures to include vital items, or to misinterpretations or disregard of what is required, when bids are being prepared. Elimination of these sources of error and misunderstanding, and of resulting future problems of maintenance, is almost entirely a matter of systematic organization of the specification sections which cover these items.

If we hope to secure the greatest possible degree of simplicity and clarity, the logical approach is to group the specific requirements into their respective categories. The first task is to clearly define the kind and character of each material that is to be used, and to insure that their storage and handling on the job will be such that they will not deteriorate prior to use. This can be specifically outlined in descriptive paragraphs for each material. These should include a general statement covering how and where materials shall be stored, and a provision requiring the contractor to submit invoices, upon request, covering the kind, quality and quantity of each. It should be followed by descriptive paragraphs for each material, defining their general character and any special handling requirements. For example, the paragraph on fertilizers should specify that they be delivered to the project in original bags, correctly labeled with the analysis and formula, that they be in proper condition for spreading, and that they be stored in a manner that will prevent deterioration.

The second requirement of this section is that it contains specifications for the exact quality and rates of application of each material to be used on the various areas on the course. This can be done by setting up a relatively simple tabulation. Again using Fertilizers as an illustration, the tabulation would look like this:

<u>Area</u>	<u>Analysis</u>	<u>Formula</u>	<u>Quantity</u>		<u>Total</u>
			<u>per 1000 sq. ft.</u>	<u>per acre</u>	
Greens					
Tees					
Fairways					
Roughs					
Other					

Concentration of materials requirements in a section organized as outlined, permits development of specific directives as to how each phase of the construction job is to be done, without complicating each step by having to repeatedly refer to the kinds, rates, and quality of all materials that are to be used. A simple reference to the appropriate paragraph in the materials section takes care of this.

In preparing the methods section the first step would be to list all of the operations that will be required. This should be followed by detailed directives for each operation. They will include the preliminary operations of staking, clearing, topsoil removal, and treatment of borrow pits and roads, the preparation of sub-grades for all areas on the course, construction of greens and tees, installation of drainage and irrigation systems, seedbed preparation, methods of seeding or vegetative planting, mulching, sodding, and care of completed work.

One of the virtues of a detailed directive for how each job is to be done is that it eliminates differences in bid proposals by individual contractors, arising from differences in interpretation and judgment as to what is necessary.

Now let's call a spade, a spade. We all know that courses have been built in such a way as to create almost impossible maintenance problems. The frequency of the necessity for reconstruction is a sad commentary on our failure to use the knowledge and experience that is available. As noted in the beginning of this discussion, I feel strongly that the preparation of adequate specifications is the starting point in improving the whole picture of golf course building. But let's face it, the best specifications in the world are of no value unless they are fully accepted and conscientiously followed.

What about the adequacy of supervision of the actual construction work? Theoretically, this should be the responsibility of the architect. However, most agreements between owners and architects call for only periodic visits. At the rate at which modern construction operations progress, many things can, and too often do happen between these visits. A solution which has been used frequently with excellent results is appointment by the owner of a personal representative who is competent to give day to day supervision of every phase of the job. It almost "goes without saying" that this individual must have a complete and firm set of specifications as a basis for any decision he may have to make.

It has not been possible, within the time that has been available, to present anything approaching a complete outline for specification preparation. My concern has been, primarily, to emphasize the relationship of this to the ultimate product. For a complete outline of how construction specifications can be put together, I refer you to a special publication of the Extension Service of the Pennsylvania State University, "A Guide for Preparation of Specifications for Golf Course Construction." Requests for it should be made to the Publications Department, Agricultural Extension Service, the Pennsylvania State University, University Park, Penna. The policy of the Extension Service permits free distribution to residents of the State. A charge of 75¢ per copy is made to others.

(Paper read by Dr. Grau)

WILT

Robert A. Moore, President
Aquatrols Corporation of America
Camden, New Jersey

Wilt in turfgrass has over the years been associated with (1) a lack of moisture in the soil at the root zone (dry wilt); (2) a lack of oxygen in the soil or root zone solution (often called wet wilt); and (3) a poor, shallow root system.

The recent research work of Supt. Harry Meusel of the Yale Golf Course has thrown some new light on the phenomenon of wilt. Wilt is still the result of the plant losing water faster than the roots can replace it. However, his work is a breakthrough in understanding this mechanism. Let us quickly summarize his work. His earliest results showed that water losses from turfgrass occurred through the stomata in the leaf. Next, he showed that frequent watering, such as a rainy period, increased percentagewise the number of stomata and, thereby, the tendency to wilt. His most recent tests went a step further, and studied the effects of: watering frequency; extra fertilizer; the use of a non-ionic wetting agent; and the effect of sprays to close the stomatal opening. We will use these results to summarize this new knowledge on wilt.

SLIDES: In the first slide we see one replica of his work, showing obvious differences in color, density, and growth. Wilting was just as varied. In this work, wilting was studied (1) by naturally allowing the treatments to wilt; and (2) by placing them in a wilting chamber where light, temperature, air movement, and humidity were controlled. Results from both techniques agreed on the following order:

- | | |
|-----------|--|
| (Poorest) | 1. Frequent watering and fertilizer |
| | 2. Frequent watering |
| | 3. Frequent watering, fertilizer, and wetting agent. |
| | 4. Infrequent watering and fertilizer |
| | 5. Infrequent watering |
| | 6. Frequent watering and wetting agent |
| | 7. Infrequent watering, fertilizer and wetting agent |
| (Best) | 8. Infrequent watering and wetting agent |

It will be noted that frequent watering, or a rainy period, increased the susceptibility to wilt; that fertilizer tends to aggravate this situation; and the use of soil wetting agents lessens the susceptibility to wilting.

We must now look at the cell structure of the grass, in order to be able to see what is happening as a result of these management changes. Multiple random sample leaves were taken from each pot in each replica. Impressions were made to study the stomata. It was found that frequent watering gave percentagewise twice as many stomata, thus explaining partially the great susceptibility to wilting. Now these stomatal changes did not answer all the observations; i.e., fertilization had little or no effect on the number of stomata, but did increase susceptibility to wilting; soil wetting agents only slightly decreased the percentage of stomatal openings. Consequently, it was necessary to study the internal cell structure of the grass, and cross sections of each sample leaf were prepared, involving the preparation and study of thousands of sections.

The first slide of this group shows X the cross section of one sample, one that is fairly resistant to wilt. Note the well-defined cell structure, and the compactness of the cells. The second slide, on the other screen for comparison, shows what is happening inside the grass plant under frequent watering. Note increase in looseness of cell structure caused by an increase in intercellular air space, from 1% to 15-20%.

The third slide shows the effect of fertilizer and frequent watering. By comparison we see a further increase in intercellular air space - up to 70% now - and an explanation of the increased susceptibility to wilting earlier noted.

The last slide shows this same management condition with the exception that these pots were treated with the non-ionic wetting agent. Note the much better defined and tighter cell structure and reduced intercellular air space--down to 20%. This percentage reduction in intercellular air space was evident in all treatments treated with the soil wetting agent. Quality evaluation, area usage, etc. dictate the necessity of using fertilizers for the color and turf density required.

I would like to anchor down in everyday experience, the significance of some of this rather technical information. We all heard many times, that after a rainy period mower damage is more likely. This is the time to be extra sure that your mowers are set right and are good and sharp, or you'll get wilting, etc. The test results showed that morphological changes can be brought about in 10 to 14 days, and maybe in less time. In other words, a week of rain after a fertilization could cause your grass to go from a good cell structure to a very poor cell structure. This lack of turgid cell structure can also be a factor in traffic damage. Further, recent research on the incidence of disease under high and low moisture conditions, has shown greater susceptibility to disease under high moisture condition.

It would be well at this point to make one other very significant comparison. First Slide again. One replica, identified by letters only, was given an "eyeball" rating by the local golf course superintendents and several of the Experiment Station personnel. These two samples were consistently chosen to be the best, or the grass they would most like to have on their course, and next best treatment. When you look at their cell structure and wilting characteristics, one finds the one chosen best is really the best, but the one chosen second best is the absolute poorest. Weather, management and soil conditions can sometimes cause a deceiving impression by appearance of the true condition of the turf. Again, we say, the second best looking one was the poorest.

We have seen some of the factors causing wilt - let's go to the brighter side of the story. Remembering that the water loss, which when it is in excess causes wilting, occurs through the stomata of the leaf, work was done to develop materials that could control the stomatal opening. During the course of this study it was found that high light intensity was necessary for wilt; and a minimum temperature was required, above which temperature had only a slight effect.

The results obtained showed that the stomatal opening could be closed, and kept closed for a period up to 21 days by spraying the leaf with several different materials. One such mixture, we have had on the market for the past two years now. It has proved very successful, but cannot be used on Merion Bluegrass because of this grasses' susceptibility to phenyl mercury. We are introducing two new mixtures this year that are primarily used in floriculture and ornamental horticultural work, which will not have this toxic problem. These sprays affect the permeability of the guard cells of the stomata, causing them to collapse and thereby closing or keeping closed the stomatal opening.

In conclusion, I would like to summarize this information in a program that should assure the least incidence of wilt. We have seen that infrequent watering is highly desirable. Data from Texas A & M, and similar results with plants at Cornell and Penn State have shown that it is possible to increase the time between watering by 50 to 100% in soils that are treated with the non-ionic wetting agent. It takes twice as long to reach these wilting tensions in treated soils. As pointed out in the slides, this reduced watering will improve cell structure and will reduce percentage of stomata. Next, we have seen that the use of non-ionic wetting agents

will further improve cell structure by reducing intercellular air space for additional reduced tendency to wilt. These results would indicate the desirability of using a soil wetting agent to allow better water management, and to insure against adverse weather conditions.

Fertilizer applications should be regulated from a wilt standpoint, as well as from an appearance standpoint.

During periods of high light intensity and warmer temperatures, excessive transpiration can be prevented by the use of sprays to close the stomatal openings.

Summing up these desired conditions into an average program would be as follows:

1. In early spring - April - a treatment of non-ionic wetting agent at 8 oz./1000 sq. ft.
2. In later spring, when the weekly fungicide preventative sprays are started, the inclusion in these sprays of 1-1/2 oz./1000 sq. ft. of the non-ionic wetting agent. This application each week up through August or September, will maintain the desired low tension soil condition.
3. A reduction, by about two-thirds, in watering.
4. In early summer - June - a treatment each week of the stomatal control spray - preferably just before the weekend. These sprays should be applied as a routine preventative, and should be continued through September.
5. In early fall - September or October - a treatment of non-ionic wetting agent at 8 oz./1000 sq. ft. This fall treatment has proven very beneficial against winter damages - which is related, but is another whole subject in itself.

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PRESIDING AT THE CONFERENCE

The following superintendents aided President Doerer as presiding officials during the several conference sessions:

Alex D. Watson, Superintendent, Sparrows Point Country Club,
Sparrows Point, Maryland

Angelo Cammarota, Superintendent, Bonnie View Country Club,
Baltimore, Maryland

Sheldon R. Betterly, Superintendent, Chantilly Golf and Country Club,
Centreville, Virginia

TURF OBSERVATIONS IN MARYLAND

Elwyn E. Deal

Agronomy Department, University of Maryland

The turf industry has been big business in Maryland for several years, but recently it has been skyrocketing. In 1962-63, approximately 7,000 acres of sod were sold for \$2 million. The one million homeowners in Maryland spent an estimated \$33 each per year for lawn maintenance, hence a \$33 million business. The cost of establishment and maintenance of Maryland roadsides is about \$2.5 million per year. Golf course superintendents add almost a million dollars yearly to the state's economy from salaries alone.

In 1963, some 94 golf courses were in operation in Maryland and the District of Columbia. The population was about 3,870,000, resulting in a ratio of approximately 41,000 persons per golf course. Only the wildest imagination can picture what would happen to these courses if everyone played golf regularly. The Maryland-D.C. area ranks 49th among the fifty states in the high ratio of number of persons per golf course.

Some of the situations and problems of turf production in Maryland in 1964 are listed below:

Common Kentucky Bluegrass - was severely damaged by leafspot in the spring. Some slight injury was also noted in the fall.

Merion Kentucky Bluegrass - was damaged by several diseases including stripe smut, stem rust, dollar spot and Fusarium roseum. How wide-spread and how serious the latter problem, F. roseum, has become is not known. Stripe smut and leaf rust infections have not been wide-spread, but caused severe injury where they have occurred. Dollar spot problems have been rather general, but not too severe. Lack of management know-how is probably one of the prime reasons for poor Merion performance.

Tufcote Bermudagrass - has now been planted in almost all parts of the State. Information on its adaptation and possible uses is very limited, but it appears to be well suited for use on tees and fairways of golf courses. Newly planted sprigs of Tufcote will not tolerate simazin, the weed preemergence herbicide, at rates of one to two and one half pounds per acre. This was discovered when the fairways of one golf course were sprayed soon after planting. Almost all of the Bermuda sprigs were killed or severely injured and those that survived will probably not be able to survive the winter.

Meyer Zoysia - lawns in Maryland were invaded by billbugs, Sphenophorus venatus vestita. In some instances up to 85 or 90 per cent of the zoysia was killed. Only the Meyer variety has been severely attacked. Chlordane has not been very effective in controlling billbugs. Phosphorus-containing insecticides may provide a better cure for the problem than chlordane.

Poa Annua - contamination in seed lots of other bluegrasses, particularly those imported from other countries, has caused much concern recently. Some lots have been found to contain up to 37,000 annual bluegrass seeds per pound. If seed lots free of Poa annua are desired, it should be designated in writing on the order when purchasing seed.

New Turfgrass Species - "Evansville" creeping bentgrass and "Midwest" zoysia have been released by Purdue University. Neither has been evaluated in Maryland. "Windsor" bluegrass, released by O. M. Scotts, has not shown any great improvement over other varieties. Windsor appears to be intermediate between Common and Merion Kentucky bluegrass in most characteristics, including color, vigor, density, disease

resistance and others.

Soil Test Results - from Maryland golf courses in 1963 and 1964 show that at least 60 per cent of the greens and tees are very high in P_2O_5 ; most of the greens are medium and tees are high in K_2O ; greens and tees are usually high in magnesium; fairways are usually medium in P_2O_5 , K_2O and magnesium; and the average pH of greens is 6.4, tees is 6.0, and fairways is 5.7.

Numerous other problems in turf management were encountered during 1964, among them the extremely dry summer and fall. Lack of fairway irrigation on many golf courses multiplied the problems of summer survival and management. Misuse of chemicals and fertilizers has resulted in poor turf in some instances. Diseases, insects and weeds of somewhat less importance than those mentioned above were subjects of concern, but usually did not become widespread problems.

A serious shortage of outdoor recreational facilities exists in and around Maryland, particularly in the Baltimore and Washington areas. New facilities must be provided and existing ones improved to meet the demands of a rapidly expanding urban population. Several Federal, State and County Governmental Agencies are currently involved in programs to assist in developing these facilities. Considerably more activity in this field can be expected in the future.

In summary, 1964 was a rather favorable year for growth of warm-season grasses. Without supplemental irrigation it was difficult to maintain attractive and healthy cool-season turfgrasses. Several new and previously unnoticed turf disease and insect problems were encountered. The shortage of outdoor recreational facilities has been very striking. Programs are now getting underway to help solve some of these problems in all areas of the state.

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THE CONQUEST OF SPRING DEAD SPOT OF BERMUDAGRASS

Stan Frederiksen
Mallinckrodt Chemical Works
St. Louis, Missouri

The turfgrass problem now known as Spring Dead Spot was first observed more than 35 years ago, in Oklahoma, when it was noticed that when bermudagrass lawns greened-up upon emergence from winter dormancy, some areas remained "dead" in irregular circular patterns. During the ensuing summer they filled in with weeds and crabgrass, but not with bermuda. More significantly, a pattern of dead spots observed during a given spring would be repeated in exactly the same location, and in just about the same shape, when the grass sought to emerge from dormancy the following spring. Spring Dead Spot has been found to attack practically all varieties of bermudagrass throughout the upper tier of states in the bermuda growing region, being particularly destructive on U-3 bermudas.

Oklahoma State Plant Pathologists led the way in research on the Spring Dead Spot problems, beginning in the late fifties and early sixties, with other experiment stations joining in studies of the problem since then.

Many fungicides had been tried, in efforts at control, but with no success. The insecticide Dieldrin offered a degree of control in some tests, but not in others. Mat and thatch removal, use of wetting agents, changes in fertility programs, and other maintenance practices were tried in various control efforts - without success.

Researchers in St. Louis attacked the problem as early as 1960 - and achieved significant Spring Dead Spot control with a test chemical formulation in 1961-62, and in the years following, employing every exacting treatment dosages and techniques.

This work led to the development and offering of a commercial product, registered with the U.S.D.A. as a Spring Dead Spot fungicide in the summer of 1964.

Color slides show the dramatic story of

1. What Spring Dead Spot looks like.
2. What tests and comparisons were involved over a three-to-four year period.
3. The outstanding results achieved with successful treatment chemicals, applied at optimum rates and timing.

The work of the past five to six years shows:

1. Spring Dead Spot is likely the most serious of bermudagrass diseases.
2. It is wide-spread - found throughout the northern part of the "bermuda belt".
3. It has now been conquered by:
 - a. Good maintenance practices.
 - b. Treatment with a commercially available fungicide.
 - c. Employment of very exacting application techniques.
4. The damage is done during the summer and fall of the year before the spring when the dead spots become visible.
5. The few-hundred dollar cost to control Spring Dead Spot on bermuda, representing investments upwards of \$15,000 is most reasonable.
6. The conquest of Spring Dead Spot was made possible by close teamwork, over many years, of:
 - a. The alert people who recognized the problem.
 - b. Experiment station researchers who initiated studies of the problem.
 - c. Commercial researchers who cooperated - and who developed a commercial formulation.
 - d. YOU - the golf superintendents and turf managers, who provided tests areas, and who gave of yourselves, your time and your effort in helping meet the challenge of Spring Dead Spot head-on.

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LANDSCAPING THE COUNTRY CLUB

Raymond P. Korbobo
Department of Horticulture
Rutgers University, New Brunswick, N. J.

The clubhouse should be and is, and if it is not it had better be, the center of attraction in the entire golf course layout. However, we who are realists understand that the clubhouse and its landscaping has, in general, fallen in disrepute compared to the swimming pool, the golf course, the blacktop drive, pro-shop, the fancy bar and the wall to wall carpeted shower room.

Speaking of the club, in generalities, the view of the buildings becomes important from four distinct positions.

A. Entrance View: The main gate or the main driveway entrance. Too often these are real eyesores or they are totally inadequate as far as safe entry and exit are concerned in today's heavy traffic problems.

B. Driveway Approach: View of the clubhouse as you move up the driveway and come within sight of it. This might be a long shot on some golf courses, but most of them might be considered a medium range of about a hundred yards away. This is where the proper location of large shade trees is so important. It is hoped that such trees would do a framing job of the entire clubhouse.

C. Close-up Angle: This is when people get out of the car and actually enter the clubhouse itself. This is where the fine detail work in the foundation planting becomes very important. Also, maintenance of the same landscape job becomes very important.

D. From Course: Here I mentioned that it is ideal, although many times not possible, to have two beautiful views of the clubhouse from the golf course, from the ninth and the eighteenth holes. Some courses, such as Winged Foot that has 36 holes, actually have four beautiful views of the clubhouse.

Foundation plantings are not things of everlasting beauty. They should be considered a replacement item every 20 to 30 years. With the exception of shade trees, it is usually wise to remove all plants when a new job is done and start fresh from the ground up.

* * * * *

THE DINNER MEETING

The Dinner Meeting, at which Honorable J. Millard Tawes, Governor of Maryland, was the guest speaker, was preceded by a social hour - courtesy of F. W. Bolgiano & Co., Washington, D. C., G. L. Cornell Company, Bethesda, Maryland; Gustin's Baltimore Toro, Inc., Baltimore, Maryland and the National Capital Toro, Inc., Silver Spring, Maryland.

Following Governor Tawes' address, President Doerer, on behalf of the Association, cited and presented silver trays for distinguished contributions to the Association to the following:

Dr. Fred V. Grau, Agronomist and Turf Specialist
Dr. George S. Langford, State Entomologist, University of Maryland
Mr. Maury Fitzgerald, Newsman and Sportswriter, the Washington Post
Mr. George Taylor, Newsman and Sportswriter, Baltimore News American

The Dinner Meeting closed with an illustrated lecture on Roses, from Mr. Rodney Witman, Star Roses, West Grove, Pennsylvania.

INTRODUCTION OF GUEST SPEAKER - GOVERNOR TAWES

Thomas A. Doerer, Jr., President
Mid-Atlantic Association of Golf Course Superintendents
Fort Belvoir, Virginia

It is quite a privilege and honor for me at this time to introduce our guest speaker of the evening the Honorable J. Millard Tawes, Governor of this great State of Maryland. When Mr. George Gumm, our educational director, advised me that his Honor would take enough time away from his busy schedule to speak to us this evening, I was really at a loss for words. After thinking this over for a few days it dawned on me that the Governor did not play golf and maybe this meeting would give him an opportunity to pick up a few pointers on this game. The Governor is, and has been a dedicated man and statesman during his entire political career. He would certainly be a fine candidate for the Presidency of our country one of these days and of course, in order to achieve this goal he would definitely have to be a Golfer, as this today is as important as being a good Democrat. By 1970 they tell us there will be 12,000,000 golfers and this is quite an advantage to a golfing candidate, look what Ike Eisenhower did with the help of the golf fans. So Governor, at this turf conference you have a splendid opportunity to learn the game from the ground up. Without further adieu, here ladies and gentlemen is Governor J. Millard Tawes.

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ADDRESS

J. Millard Tawes
Governor of Maryland

It is, indeed, a pleasure for me to have this opportunity to extend to each of you here this evening a warm welcome to the State of Maryland. We are, of course, delighted that you selected Baltimore as the site of this year's conference, and it is my sincere hope that you will return often in the future.

Of course, since becoming Governor of Maryland six years ago, I haven't had many opportunities to squeeze in a round of golf but, nevertheless, I have retained my great affection for this wonderful game. I consider it not only a great physical conditioner and a tremendous aid in providing relaxation (despite what the cartoonists say), but also a valuable asset in the State's program of economic development.

The Baltimore-Washington area happens to be one of the three fastest growing science-based industry regions in the country. This type of industry attracts professional people who, more often than not, list golfing as their major source of recreation. Thus, I think it is essential from several points of view that golf be given major consideration in any present and future discussion of outdoor recreational activities. And one of the great challenges facing State and local governments today is solving the problem of providing sufficient facilities for outdoor recreation.

As great advances continue to be made in industry, more and more of our citizens have increased amounts of leisure time available to them. But, at the same time, new housing units, roads and other developments continue to occupy vast stretches of our open spaces, denying to present and future generations of our citizens a vital source of outdoor recreation. Last year, the Congress, recognizing the immediacy of this problem, enacted the Land and Water Conservation Fund Act of 1965. This Act is, indeed a milestone in public outdoor recreation for it provides for matching funds on a 50-50 basis with the states for the planning, acquisition and development of outdoor recreation facilities.

At my request, the Maryland Planning Department is preparing a statewide open space and outdoor recreation plan and the Department of Forests and Parks has been designated by me to administer the land and water conservation fund act for Maryland. In July, 1964, the Maryland Department of Forests and Parks assisted the Bureau of Outdoor Recreation in coordinating and conducting a statewide outdoor recreation facility inventory. This survey catalogs all State, County and Municipally owned outdoor recreation facilities in the State.

The Department of Forests and Parks has completed the draft of a master plan for State parks and recreation areas, and this master plan is now being reviewed by various State agencies. The plan outlines the demand for outdoor recreation facilities in Maryland through 1976 and predicts the requirements for additional facilities needed by the year 2000. Admittedly, this plan is ambitious and considerable effort will be required to carry out its provisions. Nevertheless, it is essential that a comprehensive plan be adopted and followed if the State is to meet the ever-increasing demand for additional outdoor recreational opportunities.

Maryland's land acquisition program has been accelerated and, during 1964, 1,125 acres, representing 46 tracts of land, were purchased for State Park purposes. Approximately 110 additional tracts of land are in various states of acquisition. Land acquisition has been proceeding at Assateague Island, Tuckahoe, Point Lookout, Patapsco, Gunpowder, Susquehanna, Seneca, South Mountain, Patuxent, Rocky Gap, Dan's Mountain and Deep Creek Lake and the State has been cooperating with the counties in the purchase of Patuxent River Watershed lands. Shad Landing State Park, near Snow Hill, in Worcester County, was opened in June, George Martinak State Park, near Denton, was opened July 1, 1964, and a dam creating a 42-acre lake is nearing completion at Greenbrier State Park in Washington County.

I mention these developments, ladies and gentlemen, simply because I want to impress upon you the fact that the State is aware of its obligations in providing outdoor recreational facilities. It is my hope that future activities at all levels of Government can be dovetailed with the plans and programs of private groups for the benefit of all our citizens.

In your work in supervising the operations of the many fine golf courses throughout the Mid-Atlantic region, you provide a substantial percentage of our people with a wonderful opportunity to enjoy outdoor recreation. But, you also do more than that. The wonderfully landscaped golf courses that dot the countryside are the most attractive features that many of our communities have to offer. They are, in a very real sense, a virtual guarantee that present and future generations will have the opportunity to enjoy the open green spaces despite the rush of time and progress.

The beauty of Bent Grass not only lures the golfer, but inspires the poet and even offers some satisfaction to the duffer. For, in my opinion, on the golf courses that you here today have helped to provide and maintain, no one really labors under a handicap. Thank..you.

FERTILIZATION

Fred V. Grau, Agronomist
College Park, Maryland

Fertilization is the enrichment of the soil for greater productivity. Fertilization also can mean the sexual union of male and female elements in plants and animals. In our work we strive to supply to plants all the needed nutrient elements in BALANCE to achieve greater quality in the turf we produce. In this paper no one should expect to secure a formula by which he can go home and successfully fertilize his golf course. We shall try to achieve a better understanding of the PRINCIPLES of plant nutrition so that we can more intelligently use the tools at hand.

Our tools are the variety of fertilizer materials available to us on the market, the soils in which roots can grow, the sun, air and water. Our goal is quality turf that is green, firm, dense, healthy, weedfree, and that heals injuries quickly and is playable.

The first mixed fertilizer (N-P-K) was made in Baltimore in 1849. Since then there has been vast technological development in all fertilizers. Regardless of what you use, know what is in it, how it acts under varying conditions of moisture and temperature, and how it can be used most effectively. Fertilizers supply nutrients first to the soil microflora which, in turn, convert raw materials into forms useable by plants. Oxygen and good drainage are essential to fertilization. Without abundant oxygen the microflora suffers and can even convert nitrates to nitrites which are plant poisons. Thus, soil aeration is a MUST.

Soil acidity must be corrected before soil organisms can most effectively make fertilizers available to plants. A pH range of 6.0 to 8.0 is a useful range. Major plant nutrients are: Nitrogen, Phosphorus and Potash. They may be used singly or in any needed combination.

Nitrogen comes from the atmosphere in a never-ending cycle. Legumes have bacteria in nodules on their roots. The bacteria are able to use atmospheric nitrogen and pass it on to the plant. Animals eat the plants and convert the N to proteins. Animal and plant waste products are used as N-fertilizers. Many N products are synthetic (manufactured) such as ammonium sulfate, ammonium nitrate, ureaform, urea. Turf needs more nitrogen than any other element. Nitrogen is the growth element, the one that makes plants green.

Phosphorus comes from phosphate rock in Florida and the Rockies. It must be treated with acids to make it useful. Plants that produce fruit and seeds require abundant P. Turf that produces no seed has a very low requirement for P. Many turf soils are over-supplied with P which does not leach from the soil.

Potash (K) comes from deep mines in New Mexico. Formerly it came from Germany. There are large deposits in Canada. Potash is a soluble material which leaches out of the soil and must be supplied about as frequently as N. K does not enter into chemical combinations in the plant. Where clippings are left on (fairways) the potash is recycled through the soil and the plant.

Secondary nutrient elements include:

Calcium (Ca), derived from limestone and gypsum, is needed for cell-wall "stiffening" or "framework."

Magnesium (Mg) is a vital part of the chlorophyll molecule. Dolomitic limestone is recommended when Mg is low.

Sulfur (S) can be supplied in sulfur, ammonium sulfate, iron sulfate, gypsum, and potassium sulfate. It is needed by soil organisms especially and often is lacking in sandy soils. I have recommended Potassium Sulfate to supply both K and S.

Iron (Fe) is tied up by excess P. Iron-hungry turf becomes yellowish. Iron sulfate corrects the condition temporarily. Iron chelates may be useful.

MICRONUTRIENTS or Trace Elements are those that are needed at rates of a few ounces or a few pounds per acre. They include:

Copper (Cu), Boron (B), Zinc (Zn) and Manganese (Mn). There are no satisfactory soil tests for micronutrients. They are supplied through impurities in raw limestones, crude low-grade superphosphates, and natural-organic fertilizers.

One deficient element renders all others ineffective. Grass can starve in the presence of abundance. BALANCE is essential. Too much of one element can cause others to be absorbed in "luxury", which may be poisonous to grass. The Ideal is a slight excess of each needed element, all in proper balance.

The best fertilizers will fail to give desired results unless other factors are favorable. These include:

1. A responsive grass
2. Favorable temperature
3. Adequate moisture
4. Abundant oxygen in the soil air
5. A porous living soil receptive to water and favorable to deep root penetration.

To be effective, any fertilizer must be applied uniformly. Streaks caused by skips or overlaps represent sloppy workmanship. Rates must be accurate. Every superintendent must know how to calculate pounds of nutrients applied with every material. Soil tests are an excellent guide to a good fertilization program. You can't ask the grass to stick out its tongue and say 'AH'." It is senseless to apply an excess of any nutrient if that element already is present in abundance. It is just as senseless to apply a complete fertilizer "for convenience" if, for example, the soil test shows that N only is needed.

Phosphorus need be applied only once a year. My choice is 20% superphosphate applied in fall with aerifying and topdressing to get it deeply into root zone. Apply it only if needed and at light rates (5#/M² Ft).

Potash should be applied several times a season at about 1/3 the rate of N. My choice is Potassium sulfate, soluble, applied as a solution along with nitrogen.

Nitrogen is more complex, but each kind will produce approximately equal results if used properly.

Solubles (urea, ammonium nitrate, ammonium sulfate) must be applied lightly and frequently. They leach easily. They burn if over-applied.

Natural organics also must be applied lightly and frequently for best results, but they do not burn and do not leach easily.

Ureaforms may be applied less frequently at heavier rates. They do not burn, do not leach, and are slower releasing than all other N sources.

Combinations of all three types of N seem to be gaining favor. Each form has certain advantages. But know the characteristics of each and use them accordingly.

The literature is full of information on Fertilizers. Here are some useful books:

Hunger Signs in Crops, Third Edition. A symposium. H. B. Sprague, Editor-in-Chief. David McKay Company, New York, New York, publishers. \$15.00.

Fertilizer Technology and Usage. Proceedings of a Short Course sponsored by Soil Science Society of America at Purdue University, LaFayette, Indiana. February 12-13, 1962. Soil Science Society of America, Madison 11, Wisconsin, publisher. Edited by McVickar, Bridges, Nelson.

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IRRIGATION INSTALLATION

Joseph C. Tropeano
President, Larchmont Engineering
Lexington, Massachusetts

His talk covered the field of turf irrigation. Mr. Tropeano is a firm believer in protecting the customer, as a Golf Course Irrigation System is a major investment. There is no requirement, or license required to design and install a \$50,000.00 to \$150,000.00 Irrigation System. On the other hand, if you want to have \$50.00 worth of plumbing or electrical work done, the contractor would have to be licensed and if his workmanship failed he would have his license to lose. But today any one can get into the Irrigation Business. He showed methods on how a Country Club could be protected.

He discussed sources of water and amount of water required, as well as various types of pumping stations. The talk was on various types of irrigation, up to the latest in automatic.

He showed how various Superintendents installed their own automatic systems and showed that this is not as complicated as the salesman puts it.

He showed the difference between a good installer and a poor one. His talk was summed up with an interesting experiment with water and fertilizer in the growing of grass.

Mr. Tropeano is credited with the following achievements and is consulted on water problems all over the world:

1. The first to install and develop large surface irrigation equipment.
2. Awarded the Gold "S" award from the University of Massachusetts, in 1963.
3. Received a citation from the Department of Commerce in 1960, for contribution to turf irrigation.
4. Has engineered and installed turf irrigation all over the world.
5. Co-inventor of 'Man Made Snow'.
6. Addresses the Turf School annually at the University of Massachusetts on proper installation of Sprinkler Systems.
7. Has been written up in Colliers, Reader's Digest; Time Magazine; Popular Science; Wall Street Journal; and hundreds of trade magazines.
8. Is President of three Corporations, each interested in Irrigation and hydraulics.

INCREASE OF PLAY AND ITS PROBLEMS

James E. Thomas, Superintendent
Army-Navy Country Club
Arlington, Virginia

Those of us who are employed at Golf and Country Clubs having a large membership, where the play is very heavy, are confronted with a baffling and perplexing problem to solve. At such locations it is becoming more difficult each season to maintain golfing areas in tip-top playing condition, this especially holds true around tees, putting greens, and their border aprons. Many of us have a sixty-four dollar question staring us in the face, and an answer to the query is needed.

At many clubs where there is a large amount of play, foot and cart traffic is bound to cause some deterioration of turf around restricted areas. This condition is not brought about by a lack of know-how on the part of the man in charge, nor through his carelessness or lack of neglect. It is due in most instances to the difficulty encountered by the Greensmaster in not being able to exercise his knowledge, or to provide when needed preventative maintenance at the proper time and place.

Golfers in their enthusiasm for the game are on the links from sunrise to sunset; when the head of the household is not present the rest of the family seems to take his place. As golf courses exist for recreational purposes, and they provide our bread and butter, activity is what we expect and like to see. Yet, as play tends to increase by leaps and bounds every year; the accomplishment of necessary routine chores such as, the mowing, verticutting, aerifying, top dressing, of tees, aprons, and putting greens becomes tougher and harder to do. At these bottle-neck spots where play is always the heaviest work cannot be done without many interruptions taking place, resulting in a great deal of idle and loss time; these delays become quite costly, and often cause us to forego many of the curative measures essential to a healthy state of growth for turfgrasses.

The stress placed on established sod by excessive and continuous traffic during inclement and adverse weather conditions must be quickly met and corrected. If this is not done the turfgrasses on golf courses can deteriorate rapidly. The old adage "A stitch in time often saves nine" cannot be over-emphasized when applied to the upkeep of a golf course. Quite often it is hard to follow this traditional maxim, since play is almost constant during the daylight hours. A two-way situation can frequently exist around greens and tees when work is attempted at those locations resulting in both workmen and players being stymied by each other.

This we try to prevent and avoid as much as possible, for by doing so the membership is kept happy and contented, still if courses fall apart and go downhill because of the lack of attention, golfers are soon displeased with what has taken place. And when this happens everyone points his finger at the golf course superintendent, placing the blame squarely on his shoulders. When actually the major contributing factor was wear and tear brought about by continued overuse of the golf facilities, and possibly could have been prevented if the groundsmen had had ample opportunity to carry out normal work procedures.

Let's liken and compare our work with other fields of endeavor. The pavements on highways do not stand up under heavy usage, the heavier the traffic the more need for repairs and resurfacing. If the original construction methods were faulty and poorly done, a proper base not prepared, nor both surface and internal drainage not provided for, the need for repairs and reconstruction will frequently occur.

Let's also take the human body as an illustration - when it is overworked, mis-

used, and does not receive the proper nourishment, it becomes susceptible to illness and poor health which often results in the occurrence of diseases, ailments, and nervous tensions. As a preventative of this, we as human beings strive to remain healthy and keep our bodies in good physical repair. This is done by calling on the medical profession for assistance; we resort to the use of doctors, surgeons, hospitals, etc. To this add the benefits of medicines and certain drugs.

There is nothing existing in the universe, whether it be natural or artificial, but what needs rest and good care periodically for its survival and longevity. So why not give more consideration to the poor little grass plant which is so often abused and forced to grow in an unnatural environment? Sooner or later golfers on over-crowded courses will be faced with the alternative of allowing and providing sufficient time for maintenance personnel to execute the tasks required to produce good grooming and upkeep; or else, they will have to tolerate and suffer inferior golf courses that are poorly conditioned. How to avoid such a possibility I am trying to solve, and so are you. All of us are seeking an answer to the problem. What is the solution?

None of us desire to have our members ask "Why interfere with our golf" Still we all desire to provide a well kept golf course second to none. For this goal to become a reality and perpetuated, some control and regulation of play is a must. The solution could be a simple one, but so full of complexities for the golf course superintendent and his club officials.

A definite time for opening of the golf course and starting of play on weekdays, say 8:30 or 9:00 a. m., could be one answer. Such an arrangement would permit the daily work routine around putting greens to be well out of the way or finished before play became too heavy, this certainly would hold true if workers started their duties around dawn. The employment of more labor, plus the purchase of time-saving equipment helps to speed up maintenance operations. A few clubs are resorting to night shifts as a solution, but this requires an additional staff of workers, also added supervision, and don't forget greater costs. The elimination of bottle-necks which require hand labor would help to a certain degree by permitting the use of power machinery which would result in getting the work done quicker.

As many links are over-played and crowded beyond their physical limitations; a problem is presented to golf course architects calling for thought and study of present day usage, as speed of play and ease of upkeep need to go hand in hand, each complements the other. Two putting greens for each fairway, like one sees on the short eleventh hole at the Washingtonian Golf and Country Club; also the Columbia Country Club has a few holes with such an arrangement. This along with the providing of extra large or double tees would afford an opportunity for over-used areas to be taken out of play, rested, and renovated if necessary without interruptions taking place. Perhaps in the future new layouts could be built with a tee and green at each of the fairways. Thus, the same purpose would be served and, also would provide additional variety from time to time.

Today's heavy usage of golf facilities calls for more of an equalized balance between the aesthetic picture and the ease and speed of maintenance operations. The time is fast approaching, if it is not already here, when those who are responsible for design and construction of golf course layouts must recognize and realize that these situations are already in existence in many localities.

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PUBLIC COURSE TURF MAINTENANCE

Bradley J. Strouth
Maryland National Capital Park & Planning Commission
Silver Spring, Maryland

(I). Introduction. While returning from a Superintendents meeting earlier this year, I overheard an older turf-grass man ask what he thought of the meeting. The elderly gentleman replied that these meetings were a waste of time. He had been in the grass growing business a long time and he knew the answers. I just cannot agree with this line of thinking. I feel that a man is like a growing plant with regard to obtaining knowledge. "So long as you know you are green, you grow. But when you think you're ripe, that is, you know all the answers, then you begin to rot!"

(II). Background of Sligo Golf Course and Northwest Branch Park Golf Course. Both courses with which I am presently connected are public golf courses operated under the authority of the M.N.C.P.P.C. Sligo Golf Course is a 9 hole, par 35 course. It was originally constructed in 1926 as a private golf course. The park opened the course as a public course on June 15, 1947 with reconstruction of the greens occurring in 1956 and 1957. The proposed operating budget for the next fiscal year is approximately \$39,000, of which 70% involves labor costs, which consists of 6 full-time men and 1 part-time man; approximately 20% is used for fertilizers and chemicals; and approximately 10% is used for new equipment, tools and repairs. Northwest Park Golf Course is an 18 hole, par 72 course designed by Ed Ault. It was constructed in 1963 and opened for play on June 15th, 1964. The proposed operating budget for the next year is approximately \$59,000, of which approximately 65% is labor costs consisting of 8 full-time and 4 part-time men, 20% for fertilizers and chemicals and 15% for new equipment, tools and repairs. Play on both courses is on a 12 month basis. During the summer, play is from sunrise to sunset. During the winter months, play is from 7:30 a. m. to sunset. Last season we had 73,000+ rounds played at Sligo and 32,000+ rounds at Northwest Park Golf Course (for a 6 mo. period).

(III). Maintenance Practices. George Gumm asked me to tell you two or three things we do at these courses which are slightly different from private courses. I've selected aerification practices, fertilization, watering and cup placement. I would suggest that before you begin aerifying a green that you check with the Club pro and starter.

A. Aerification. Our fairways and greens are aerified and rolled both spring and fall. Greens are aerified, verti-cut and top dressed with approximately $1\frac{1}{2}$ yards of top soil depending on the size of the green. To accomplish this work, while play is in progress, we make a temporary hole about 60 feet in front of the regulation green. Here we place a 4" cup about 3" below ground level, then at ground level the hole is cut 8" in diameter---"the golfers especially like the 8" hole."

We spike greens once a week during the summer months when it is possible and needed. We mow our greens Monday, Wednesday and Friday at $\frac{1}{4}$ " height. Even with the heavy play we experience at Sligo we somehow manage to get them mowed. Sometimes I have tried 2 greens mowers to a green, but of course when players approach both must stop for play. I have found from experience that it is just as fast, if not faster, to use one mower to a green and begin at two different greens. If it were possible the best solution to our mowing problem would be to mow after 10 p. m. Extremely heavy play at Sligo makes it hazardous to the workmen as when someone hollers fore you don't even know which way to look.

B. Fertilization. Due to our heavy play we must keep the grass growing at a vigorous rate as much of the time as possible. To accomplish this we use 13# N/1000 sq. ft./ per season on the greens, 4# N/1000 sq. ft./ per season on the tees

(cool season grass), 10# N/1000 sq. ft. (Bermuda tees), 135# N per acre per season on the Fairways. The sources of nitrogen are both organic and inorganic and are applied by a spinner type spreader. It takes approximately 53 minutes per fairway or 16 hours for the 18 fairways.

C. Watering. The watering practices used on any course are critical, if good grass is to be obtained. On any golf course, and especially on a public golf course, I have found that the greens must be kept on the dry side. If the greens are too moist and coupled with heavy play, the grass will soon be trampled right into the soil. A moist green holds the shot better, but the number of unrepaired ball marks increases at a high rate. This increases labor time by having to repair these marks and also gives a rough surface for putting until these marks are repaired. I combine both the use of sprinklers at night and hand watering in the morning. When watering at night, I use 4 settings at $\frac{1}{2}$ hour each and concentrate on the collars rather than the green itself. This is done 3 or 4 times a week, depending on the weather. I hand water the greens in the morning as the weather conditions dictate. We usually remove dew from the greens by light hand watering. During extremely hot days, we will syringe the greens to cool them.

D. Cup Placement. I use a two-cup per green cupping system at the courses. This is accomplished by placing two cups on each green. They are placed about 12 feet apart. This reduces the wear around the pins, thus, making both the players and myself happier. Also by this system the player puts the pin in the other hole rather than throwing it on the green.

E. Vandalism. A major problem on public courses. Each morning when I wander out on my course I wonder if the greens are still going to be there. Northwest Branch Course is famous for horses and cattle. Early one morning last spring when checking the course I spotted 7 cows on #7 green -- they really fertilized it well! It took 4 men about 3 hours to repair the damage. Other times we have had stray horses wander over our greens and some mornings it looks as though a cattle drive had taken place the night before. Football players, horses, automobiles, bicycles and motor scooters like the courses as well as the golfers.

Always missing are towels, hose, tee markers, flags and flag poles. Once we found a golf club in the top of a maple tree and another lodged on the chimney of the Club house. Duffers like these keep us extremely busy repairing the courses.

Greens seem to fascinate lovers at night. We have problems with burglars around our Club house and once had a large and bulky dollar bill changing machine removed and a brand new sofa. Also four safes over the years have been among the missing. Vandals and vandalism - you name it, we've got it.

SLIDES

(IV). Conclusion. Uniform, high quality turf is what we are all striving to produce. To approach this goal we use slightly different practices depending on location of the course, the kind of operation, and many other variables. As long as we are "green", our profession, our knowledge and jobs well done will continue to grow.

WHAT IS A GOLF COURSE SUPERINTENDENT?

L. R. Shields, Superintendent
Woodmont Country Club, Rockville, Md.

This question has been answered by each of you many times and in many different ways. Each of us has our own definition of what a superintendent is, and each of us is trying to live up to what we think a superintendent should be.

A golf course superintendent is the person who is directly responsible for the playing condition of a golf course. He is a specialist in the work of maintaining the area over which the game of golf is played and it becomes more evident every year that he is a determining factor in successful golf club operations. This is true because most of the variables in other departments of the club are subject to man-made rules, while the growing of grass is subject to the rules of nature and are not always under our control. The superintendent wears many hats and must have a working knowledge of many subjects such as soil chemistry, agronomy, plant pathology, entomology, landscaping, labor relations, purchasing, record keeping, accounting and mechanical drawing.

The superintendent must have the know-how and the ability to work with many problems and in solving them he becomes the focal point of any club. This fact is not readily accepted by club officials, but by continuing to do as good a job in the future as has been done in the past, the superintendent can make even greater progress toward swinging officials to his way of thinking. Many club officials know little of the work or qualifications of a superintendent and would be hard put if faced with the task of replacing their present superintendent.

The superintendent must first of all be a grower of grass. He can't make grass grow, but he can create or try to create conditions favorable to the growth of grass. Here's where his technical training and experience is put to the test and superintendent is meeting this test. Over recent years near perfect putting greens are found everywhere and green failures are rare exceptions rather than every summer occurrences that at one time were taken for granted. Fairways are still a problem to many of us especially on unwatered courses, but we are making progress by planting grasses capable of withstanding the low cut expected by golfers and by installing the much needed fairway water systems. This past exceptionally dry summer did much to help sell the idea of fairway water to many clubs. Even the duffer could see the need for water. Many fairway systems will be installed as a result of this dry weather. The superintendent is proud of his ability to produce good turf under a great variety of conditions. To do this he must know the desirable grasses and their culture, as well as the weedy types and how to discourage or eliminate them without killing good turf.

Marvin Ferguson has this to say about a superintendent. "In conjunction with his primary duties of producing a turf which will be usable and pleasurable, a superintendent must be a general maintenance man. He must be capable of supervising or wisely contracting the construction and repair of parking facilities, shelter houses, bridges, installation and repair of drinking fountains, roads, walks, barns, sheds and fences. He must supervise the planting and care of trees, shrubs and flowers and he must supervise the installation and repair of irrigation and drainage facilities. He says these are the obvious requirements of a golf course superintendent. However, the requirements lack a great deal in giving a complete description of the job. He must have some ability as a business executive. He supervises a plant which represents a large investment by club members and which is worth a great deal of money. It is worth money because of the excellence of the turf, the beauty of the trees, shrubs and smooth operation of the maintenance facilities. The worth of such an establishment is, however, dependent upon constant vigilance and constant maintenance. Businesses which deal with inanimate subjects may be suspended for short times without serious decrease in value. A temporary suspension of operations in golf course maintenance would be disastrous."

It is often pointed out that a knowledge of chemistry is very helpful to a superintendent, but if this is lacking, then the service and advice of a good chemical man or chemical firm would be the next best thing. Superintendents should thoroughly test any new material or chemical on the nursery or some out-of-the-way place before using it on valuable playing areas, so as to be sure he was familiar with the product and that it would do what he wanted it to do. A good rule to follow is: take no recommendations without experimenting first. Make no abrupt changes in methods, amounts or procedures.

In a recent paper Tom Mascaro said "Knowledge alone does not spell success. We must also sell ideas." But what is salesmanship? It is merely the art of finding out what people want and then helping them get it. Tom says as superintendents we are selling our services - to our committees, to our workers and to every member of the club. Golfers want a low score, so we help them get it. Non-golfing members want beauty so we try to create beautiful landscape views and pleasant surroundings. Tom says we are seldom paid for anything before it is done. It is only after we have accomplished something that we receive compensation. He suggested we increase our responsibility wherever possible to make our position worthwhile. Be a salesman and sell ourselves."

A superintendent has to be a salesman. How else could he convince the chairman, pro and member that the ground is too soft for carts, that maintenance work must go on every day and is not done just to harass the lady golfer on ladies' day, that aerification and top dressing must be done when greens are at their best without waiting for trouble to develop, that he needs a new tractor mowing outfit so he can keep out of the way of play and that it was necessary to add that last man to the labor crew? He has to be a salesman to sell his services to the members, and to sell an increased budget during a bad year. Grass knows no depression.

The successful superintendent must understand how grass grows, and then supply the nutrition to keep the plant growing and healthy. He must know fertilizers, and use the one he thinks is most satisfactory and most economical for the desired results at any particular time. This is especially true on golf courses where grasses are subjected to unnatural conditions and then are expected to perform the same under all conditions of weather and traffic. On a golf course we shave greens down to $\frac{1}{4}$ " or even $\frac{3}{16}$ ", which is within a fraction of an inch of the life of the plant. Then we subject it to heavy traffic in the form of human feet and mowing machines. We drown it with water and pack the subsoil by walking on it, making it necessary to water again to soften the ground. Golf balls are fired at it all day. On Monday morning a green is pock marked like the face of the moon. Cigarette butts burn holes in it, putters are pressed into it while supporting a 200 lb. golfer, or are slammed down in disgust over a missed putt. But that's not all - we poke the surface full of holes, then cover it with soil and drag a mat back and forth over it. A hole is cut in the center and everybody plays ring-around-the-flagstick to music of Who's Away. We squirt it with a long list of chemicals for this and that, for ills we have and for ills we don't want, for insects we have and for those we might get, for weed seeds before they start to grow and again for those that grew anyway. We add one to make the grass greener and another to make the water wetter. Even after all of this some say a putting green is the miraculous work of nature. It is a miracle that a growing thing can be subjected to all this unnatural treatment and still survive, but this is a credit to the superintendent, not nature. Did you ever see a natural putting green? Wasn't it a mess? Could you play golf on it? Nature alone cannot produce a putting green. It can't even produce a good lawn without the help of man. To produce the very best golf course, the man must work with nature as neither can do the job alone. By being familiar with the rules of nature and having the knowledge that refers to each specific task, then being able to apply the knowledge correctly, the superintendent can maintain his turf area in the best condition.

The superintendent must be a doctor. The grass plants are his patients and they must be watched carefully. He must diagnose each case of trouble very accurately.

He must recognize the symptoms that indicate something is wrong, find the cause of the trouble, prescribe the cure and then nurse the plant back to health. If death should overtake the patient, the superintendent tries to learn the cause so that in the future it may be prevented.

The modern golfer is more critical of turf conditions than his predecessor ever was. At one time, players were happy if greens were good. Now good greens alone won't get a superintendent very far. Players want good tees, fairways, traps and rough - perfect lies every time, everywhere. The man who is responsible for supplying this quality turf is the golf course superintendent. It is his duty to furnish it within the limitations of the budget. This is a big order, especially at times when insufficient funds are provided, but thanks to many years of experience and application of time and "know-how", the superintendent has been able to meet the responsibility, but it takes him 7 days a week to do it.

To be a good superintendent a man should attend monthly educational meetings of the Mid-Atlantic Ass'n. of Golf Course Superintendents, the National Turfgrass Conference and Show sponsored by the Golf Course Superintendents Ass'n. of America, of which he is a member, and subscribe to publications pertaining to his profession. It wasn't very long ago that the superintendent was referred to as the forgotten man in golf, but today the superintendent is slowly coming into prominence. He still does not mix with the members in the grill room, nor is he on a first name basis with the member at any time, but the few members who know him know he is a pretty decent fellow who is sincere in his efforts to be of service to his club.

The superintendent works closely with the golf professional. In many cases this gentleman is our most direct link with the player, and if relationships are not on the right plane the superintendent's position is bound to suffer. Superintendents know that the pro is an intelligent man who has spent many years acquiring his skill as a player and teacher of golf. The pro also knows that it takes years of concentration and effort to acquire the skill of a golf course superintendent and is quick to give credit where credit is due.

At one time the superintendent was just a man with a strong back who scattered a few seeds around, handled smelly fertilizers and pushed a lawn mower. Not so today. Today he is a trained club employee, responsible for some very expensive real estate, and is responsible for the preparation and utilization of the club's second largest budget and the accounting therefor.

A superintendent is called upon to perform many tasks around the club that have nothing to do with grass. He does painting, electrical work, carpentry, glazing, cement work, tree repair and planting, logging, lumbering, black topping, septic work, tennis court maintenance, road work, land drainage and sometimes has to worry about the swimming pool.

In closing may I add that I think the superintendent is as happy as any man in golf and wouldn't trade places with anyone. Our many different chores and responsibilities only add variety and challenge to our daily lives and make us feel younger by keeping out monotony. The superintendent is on the threshold of a bright prosperous future as officials begin to realize the vital role we play in golf. The challenge to us will be great as we try to keep up with progress and change, but the rewards will make the effort worthwhile.

As we go forward, each superintendent must ask himself what he thinks a superintendent is and then try to improve on his own definition. There is bound to be change, but it must come from within the mind of the individual superintendent, for a superintendent is what each of us think a superintendent should be.

COMMUNICATION

Frank H. Cronin
Physical Education, University of Maryland

Gentlemen, my remarks to you this afternoon will be brief. As a matter of fact there is only one thought I would like to leave with you. I am going to ask your indulgence in the development of this thought. At the end of World War II, I decided to resume my education at the University of Maryland. I had as one of my courses the philosophy of education. On one particular day our Professor asked this question of the class. "In your opinion what one invention or development had the greatest influence on changing our civilization from that of pre-historic times to the highly developed technological society we now live in?" The answers were many and varied from the invention of the wheel to the harnessing of nuclear power and back to the invention of flush toilets.

Now let's give the answer to this question a moment of your thought. Because in the answer to this question is also the answer as to why you are here today. The answer is communication. I am sure that not one of us here would be present had you not received communication either verbally or in the written form to the effect that there would be a conference of the Middle Atlantic Greens Superintendents on January 11th and 12th at the Holiday Inn located in Baltimore.

By the same token the Conference would be meaningless if it were not for the fact that information could be exchanged from the speakers to those in attendance and also the fact that individuals could communicate one with the other.

I can bring home the importance of communication easily to some of you here in the audience who perhaps like I while in the service experienced the language barrier in a foreign country. Some of you here were in France, Italy, Germany, North Africa, India, Japan, etc. I am sure that some of you had experiences similar to the one I encountered while in Japan.

I was given the responsibility of putting on the first football game to be played in Japan. One of the things that had to be done was to line off a football field and erect goal posts. I had the advantage of an interpreter, but still the task which was a relatively simple one was extremely difficult because of communication and understanding. The job was completed but consumed a great deal of time because of the Japanese labor.

Now to bring this matter of communication closer to home and relate it to the operation of a golf course. There are three principal parties involved.

1. Management
2. The Greens Superintendent
3. The Golf Professional

It is imperative to the smooth running and efficient operation of this golf plant for all three parties to understand the language of one another. It is also important that they realize the problems that confront each area of this operation and that a sincere effort be made on the part of all concerned to effectively solve the problems that they are mutually concerned with. Gentlemen, this can only be effected by a free flowing communication between the three parties concerned.