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and
ABRAHAM BALDWIN AGRICULTURAL COLLEGE
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and

SOUTHERN GOLF ASSOCIATION

FOREWORD

The Fifteenth Annual Southeastern Turfgrass Conference was a great success. This conference, like the ones in the past, was successful in the same degree that those who worked in planning it and in contributing to it in any way gave it wholehearted support. The weather was good; the interest was keen, and the program was superb. The Conference could not, therefore, have been anything but a success.

The members of the Grass Breeding and Turf Departments recognize the degree of dependence placed on outside individuals and organizations. The confidence so placed in others has been entirely justified as is indicated by the progress made by this phase of the Station's work and by your loyal support to the program.

We hope that it will be possible for each person who attended the Conference in 1961 to attend in 1962. It will be our pleasure to have you visit with us again.

Frank P. King, Director
Georgia Coastal Plain Experiment Station

C O N T E N T S

SOILS

Marvin H. Ferguson
Mid-Continent Director and
National Research Coordinator
USGA Green Section
College Station, Texas

Soils upon which turf is to be established deserve considerable attention whenever rebuilding or remodeling is contemplated. Putting green soils are so often the source of turf trouble that the USGA Green Section began about 10 years ago to sponsor research dealing with the physical relationship of soils. This work has been done at Beltsville, at Oklahoma State University, at UCLA, and more recently at Texas A. & M. College.

There are four primary functions of a soil. It provides support, nutrients, water, and air (oxygen). In addition to these primary functions, the soil used in a putting green must fulfill other peculiar requirements. (1) It must resist compaction under traffic and during all kinds of weather conditions. (2) It must hold a properly played golf shot, yet be firm enough to resist the pitting caused by golf balls played with a high trajectory. (3) The soil must provide the primary requirements to a plant handicapped by the attrition of traffic and constant close mowing.

Soil is not an inert material but is rather a complex chemical, physical, and biological system in which all factors must be considered in their relationship one to another. Thus, among the functions that a soil performs, there are numerous interactions. A few examples will serve to demonstrate this fact. (1) Air in the soil affects the plant's ability to take up water and nutrients and to use them in its growth. (2) Air affects the depth and distribution of roots and in turn influences support as well as nutrient "foraging" ability. (3) Water and air in the soil vary in inverse proportion.

The discussion of air and water content of a soil leads to a consideration of pore space characteristics. We have evidence that a good agricultural soil is composed of about 50% solids and about 50% pore space. The pore space in turn is divided about equally between capillary pore space (which may be thought of as the space which holds water) and non-capillary pore space (which may be considered air space in a well drained soil).

The above description of a good productive soil will fit a well-tilled loam. This is where the imposition of putting green requirements begins to intrude upon accepted thought. A putting green cannot be tilled and the preponderance of relatively small particles which when wet are crushed and are pressed together by foot traffic causes the larger pore spaces (air spaces) to be excluded from the soil. Consequently there is an imbalance between non-capillary and capillary pore space.

The use of a higher percentage of sand will tend to balance the relationship between large and small pores but this addition of a high percentage of larger particles brings about a reduction in total pore space. Thus, it appears that 34 to 38 per cent is the maximum total pore space obtainable in a good putting green soil. This appears adequate, however, if the amounts of large and small pore spaces are about equal.

The considerations of pore space are important as they affect drainage and aeration of a soil. These soil characteristics are closely related. Both are affected by underlying strata. A layer near the surface may impede the movement of water, creating a false water table and causing roots to be shallow. On the other hand, layers of gravel at depths of as much as 12 inches may be desirable because a false water table at this depth may prevent "drouthiness" in a sandy soil.

The synthesis of a suitable soil for putting green use can be accomplished quite effectively by the use of appropriate laboratory measurements. These measurements are (1) mechanical analysis, (2) pore space amount and distribution of sizes, (3) permeability (measured as inches per hour with a .25 inch hydraulic head), and (4) moisture retention. The use of these measurements upon compacted trial mixtures of soil together with careful interpretation will permit the making of a putting green soil that will maintain its suitability over a long period of time.

The actual putting green construction procedure should conform to the following outline:

1. Lay tile in a suitable pattern after the subgrade has been established. The contours of the subgrade correspond to the planned contours of the finished green.
2. A gravel blanket (1/4 to 1/2 inch aggregate) should be placed over the tile lines and over the entire surface. Minimum thickness for this layer should be 4 inches.
3. Because of the tendency of soil to migrate downward into gravel, a layer of coarse sand 1-1/2 inches in thickness may be used over the gravel blanket.

This is particularly desirable if the underlying gravel is coarse. If fine gravel is used, the sand may not be necessary.

4. Mix soil off the putting green site. Place carefully on the prepared base.

5. Save an ample supply of the soil for future topdressing.

6. Sterilize putting green after soil is in place by the use of methyl bromide or other suitable sterilant.

7. Firm the soil, rake it smooth, and firm it again until the surface is smooth and uniformly firm.

8. The green is now ready for planting.

The procedures which have been outlined may increase the costs of putting green construction, but it is believed that subsequent maintenance ease will more than offset this initial cost.

DETERMINING THE BEST SOIL MIXTURES FOR GREENS

James E. Jackson, Agronomist-Turf
Southern Turf Nurseries, Tifton, Georgia

The importance of correct soil mixtures for golf greens has rapidly come into focus during recent years. Many courses have reported problem greens which become excessively compacted, resulting in poor air diffusion, poor water permeability and which consequently cannot support growth of healthy vigorous grass regardless of other management practices.

In recent years the United States Golf Association has sponsored research in the field of soil physics in an effort to arrive at a method for determining the correct amounts of topsoil, sand and other amendments needed for optimum greens topsoil.

Laboratory techniques have evolved from these studies which can be used to measure permeability, pore space relationships and moisture retention characteristics of compacted soil mixtures. Various mixtures are made in the laboratory from samples received, with an effort being made to provide a satisfactory, economical soil mixture. By subjecting these mixtures to appropriate laboratory determinations, one can be selected which meets the pore space and permeability requirements recommended by the U.S.G.A. Green Section.

The laboratory techniques involved in making these determinations are outlined in the September, 1960, issue of U.S.G.A. Journal and Turf Management, pp 30-32.

A Tifton loamy sand topsoil was mixed with varying amounts of sand and peat and subjected to these analyses. It was found that permeability of a mix containing a high proportion of topsoil was only .12 inch per hour. This contained 7.5% large and 27.4% small pores. A mix containing a high proportion of sand had a permeability of 7.8 inches per hour. This contained 23.5% large and 11.9% small pores. Other mixes were used giving intermediate results which were both satisfactory and economical.

It is felt that the greatest need for these determinations is in connection with new greens construction or renovation, although value can be obtained in many instances in using these methods to determine a proper top dressing mix.

Panel Discussion

SUGGESTIONS FOR PLANNING AND PROGRAMMING OF WORK

James B. Moncrief, Discussion Leader
Southeastern Agronomist
U.S.G.A. Green Section
Athens, Georgia

One of the most important factors of training and directing the golf course personnel is the daily planning and programming of work by the golf course superintendent.

Long Term Planning - In the annual year's planning, tentative schedules for new construction, fertilizing, cultivating, and weed control work should be set up. The program for the greens, tees, fairways, and roughs should be planned so one event will aid or lead into the next scheduled event.

The use of fertilizer is less in the winter than in other seasons. The time spent in mowing fairways, tees, or roughs should be reduced considerably. Plans should be made for tree plantings, trimming of trees, to repair equipment, and to do the many other winter jobs. This time of year should be planned so the personnel is kept busy. They should not play card games at the maintenance shop.

Spring work should include plans for fertilizing, cultivating, top-dressing, mowing and seeding or sprigging worn areas. Planning and taking advantage of proper weather conditions before going into action has helped many superintendents through rough times. Addition of temporary new personnel (before summer work begins). It is the policy to keep the same personnel the year round.

Summer is a good time to be in a position so maintenance practices of mowing, spraying, watering, fertilizing, and trimming will be your major concern.

In the fall you should be in position so regular maintenance and minor adjustments in preparation for winter will be of little concern. In the South, this is the time for overseeding greens, tees, and other areas for winter months. This is also a good time to work the personnel vacation time into the program. The superintendent should be informed of all tournaments so the monthly program may be planned around the golfing activities. The greens should be mowed before the play starts every morning. Edging bunkers or fertilizing the fairways on a day of a tournament is bothersome to players. Plan these jobs earlier and have them completed so that fairways, greens and tees are at their peak of condition for these events. Have bunkers edged and cleaned before the tournaments, not during it.

Consider normal circumstances in weekly planning of work. Plan spray schedules for greens, tees, and other areas. Plan for every day maintenance.

The following points are important for daily planning.

Have an assistant or a foreman with whom you can go over the activities that are planned for the day. Before the day is completed, go over its operations and discuss in detail the plans for the next day. Be sure the program is understood, as the better informed the personnel are the more efficient they will operate. Also, the superintendent may be interrupted by visitors, such as salesmen, members, friends, or even the chairman of the green committee. If all workers stopped working and started waiting for instructions, the green committee chairman would not be too impressed with personnel management.

The daily maintenance should be planned so the work will least interfere with play. Always perform jobs that may interfere with play when play is light. The aeration program should take place when the club is closed or when play is light.

The larger jobs should be started and completed in a reasonable length of time. It is not advisable to have so many projects that you cannot complete any of them. The day of the torn up golf course is over.

Do not plan to topdress greens or spray herbicides on fairways when the weatherman predicts rain. If inclement weather is forecast, have some inside work planned.

Place employees on jobs where their abilities, desires, and interests can be used to the greatest advantage. Study employees' abilities to be able to do certain jobs better than others. Learn which jobs each employee prefers to do and use him there when possible.

When a man proves he can do a job correctly keep him on that particular job when possible. Have alternates to be used as a standby in case a regular can't be at work.

A man should know more than one operation. Your personnel should be trained so they can fill in on any job at any time needed. Daily work should be so routine that the employees should know to mow the greens in different directions each day as well as other areas mowed, such as fairways.

Have a list of work items that you expect your employees to follow on daily jobs when mowing the greens. Each new employee should go through a training program so he will do the jobs as you wish them to be.

The more the employees know about the entire operation the better they will perform their job. They will take pride in their job and feel like they are on the team. They will report trouble readily and be helpful in all phases of your operation.

One of the more important parts of a golf course operation often neglected is safety.

The superintendent that gives consideration to all phases of his work will have a sounder management program.

THE AVERAGE DAY AT PEACHTREE

Harry Wright, Supt.
Peachtree Golf Club, Atlanta, Georgia

Before any given day, a superintendent should have two sets of plans--one for good weather and another for bad days. This plan is made for each man, just what that man will be doing each hour of the day. Some of the crew will have regular jobs that he stays on all day. Others, such as green cutters, will have special duties after green cutting is over. Most courses get greens cut as soon as possible to avoid the players.

I am supposed to discuss the morning half of a superintendent's day. Frankly it isn't easy - because I don't know what day, my duties would be different if the day happened to be top-dressing day or spraying day or green fertilizing day. Let's call those abnormal days and discuss a regular day.

On a usual morning green cutters are taken to their respective routes. The trap man rakes footprints from the previous day's play, then he trims trap edges, keeps out weeds and does a general overhauling job the rest of the day. Having 48 traps, by the time he gets around it is time to start over again. Rough and fairway men cut roughs in the morning and fairways from 10 o'clock on. The tee cutters start; this is an all-day job. One man changes hole-towels, tee markers and picks up green clippings. One man trims around trees and rough places where tractors can't go. This is a continuous operation.

After the men start the superintendent has plenty to see about. Speaking for myself - first, I look at my trouble greens. All courses have one, two or three. Then I check each green cutter to see if he is poling properly, repairing ball marks and generally doing a good job. In doing this I see most all the greens every day. It is a good idea to see each green every day. Doing this a superintendent can get the jump on trouble before it gets a head start.

While looking over greens I can see every man on the job. Watching to see if tractor operators are traveling at the proper speed and seeing if all their cutting units are doing a good job. It's easy to ride by a gang unit and pick out a unit that isn't set to cut properly. To me it is very important to keep all machinery running at the proper speed - not too fast and not too slow.

The man changing cups should be checked on. Sometimes he may leave a cup too high or may leave a torn flag to change, that he overlooks. The tee cutter may get careless and cut a tee pointing off line. This can easily be done if a man isn't careful.

After heavy rains trap sand shifts to the low spots, leaving not enough sand in some places. Moving this sand is hard work, so we have to check that closely.

Most shop men or mechanics can get lazy while you're out on the course, so a work schedule has to be made and watched closely.

Even if we are operating with a well trained crew, humans, being what they are, they'll sometimes get careless and do a sloppy job. It is my job not to get careless and see that my crew doesn't.

Very near two-thirds of our budget is labor cost. So it's easy to see that labor management is one of our biggest jobs. Most golf courses do not pay enough to get the best of labor, that is, men that will take an interest and do things other than what has been planned for them.

I dare say there is a superintendent here today that gets as much done when he's away as when he's around unless, of course, he has a good assistant who makes a living wage.

THE HOW AND WHY OF JOB MOTIVATION

Dr. Gene C. Nutter
Executive Director
Golf Course Superintendents Association of America
Jacksonville Beach, Florida
and
Editor, The Golf Course Reporter

Dr. Burton, distinguished guests, GCSAA members, gentlemen, I wish to compliment you upon the great program being presented here today, and I am especially proud of the fine work done by the superintendents in preparing the program. I am very glad to be back in Tifton again to address you during this 15th Turf Conference.

Dr. Burton said that I could talk about anything I liked, but suggested job motivation and I was somewhat taken aback. But, as I began to think about this subject and study it, I became intrigued with the topic of motivation.

Motivation means many things to many people. To a company, motivation research provides the means of motivating people to buy a product. Personal as well as group problems motivate people to find an answer to their problems. Not long ago I talked to the Midwest Cemetary Association and found members really concerned over a serious problem. In their publication "Grave Issues," statistics showed that there were "less deaths in 1960 than in the previous year." This group faced the problem of motivating their members to adjust to this otherwise happy statistic.

Growth in Golf

To bring the subject of motivation closer to home, let us examine the growth and future trends of golf. During 1959-1960 statistics showed a

15% increase in rounds of golf played and a 13% increase in sporting goods sales. Women participated in 50% of the rounds of golf played at private clubs during 1960 and took 70% of the golf lessons. Golf car usage increased 25% nationally over 1959-1960, and figures presented at the recent Toronto Conference by Mr. William J. Freund, Manager of the Electri-Car Division of the Victor Adding Machine Company, show that 42,000 golf cars have traversed the nation's courses to date. Correspondingly, maintenance pressures upon the superintendent have increased. During 1960, 750,000 rounds of golf were played on the 10 New York City courses. At the James Baird State Park course, located some 100 miles north of New York City, players are on the tee at 3:00 A.M. To get the mowing done, fairways are cut with three gang units operating in tandem. Hand in hand with increased play and maintenance pressures are higher maintenance costs which statistics show to be up 45% nationally since 1951.

Therefore, to be successful in the future, the superintendents must become better turf-grass technologists, better business managers, and better public relations agents. In short, they must develop executive ability and a professional outlook. How, then, do we motivate the superintendent to such professional development?

Design for Professional Development

In the design for professional development, whether a golf superintendent, a university professor, a sales representative or a business executive, we must recognize five steps. We must first analyze job requirements; secondly, we must then organize the work plan. Third comes supervision and execution of the work. Fourth comes a review of the results; and fifth, revising the approach to find better methods, choose bigger goals and strive for greater accomplishments. The highest motivation for professional development is the sense of accomplishment from the program itself.

Finally, having demonstrated professional ability and productivity, we must turn to public relations to publicize our productivity and effectiveness, and seek adequate remuneration, recognition and other benefits and requirements for professional satisfaction. So, my design for professional productivity involves both motivation and public relations.

There are two kinds of job motivation that affect the golf superintendent and other men in management--self-motivation (required of the superintendent, employer or managing executive in order to become a leader in his field) and employee or group motivation.

Self Motivation

You cannot lead men (employees) to high efficiency and productivity unless you inspire them. So, it is logical to deal first with self-motivation. What motivates a superintendent or executive to be an effective leader of men, and master of his profession? Basically, there are four human wants necessary to satisfy the cravings of men who are of the management caliber. There are:

1. Financial satisfaction (not security! The executive is not a security seeker. He has talent and ability to sell and he deals on the open market.) is achieved through education and training, proven ability and personal promotion.
2. Career satisfaction (satisfaction that he has chosen his career well, and that he has challenges and opportunities) comes from proper choice of profession, favorable working environment, and pride of profession or organization.

3. Recognition (Basically, every professional man wants to be recognized. This inspires him to reach for greater accomplishment and leadership.) is provided through successful endeavor, advancement, authority and leadership.

4. Sense of achievement or accomplishment (the underlying motivation of all professional and executive leaders--the driving desire to get ahead! Achievement means many things to many people, but in all cases, achievement of projected goals is paramount to life itself.) is earned by witnessing progress along a course of charted goals, by accepting and conquering challenges and accomplishments, and through ambition, education and service to others.

The above plan will develop the most of human resources. Our greatest advances in science have come through the development of material resources, but the greatest untapped source of all energy lies in the development of human resources. The problem is motivation. If we can motivate superintendents to accept the design for professional development, they will become successful managers and leaders. Many problems of the future will then become just good challenges and our profession will truly move ahead.

Employee Motivation

Employee or group motivation is, again, different from self-motivation since it involves a different type of people and a different approach. Employees (certainly as we know them on golf course crews) are basically workers by type or desire, not executives. On the other hand, all workers, regardless of title or status, can be motivated to find easier, better ways of working, if we must recognize that all workers have basic wants, hopes, fears, and pride. If employers will recognize and deal with these traits, a new door to productivity will be opened, morale will be boosted amazingly, and employers will avoid forced motivation such as unions.

The basic wants of workers, psychologically and humanistically true of all workers--even those who cannot read--are 1) to do right; 2) to be secure, financially, socially, and emotionally; 3) to improve working ability (a natural desire unless inhibited by fear); 4) to achieve goals to be proud of; 5) to belong to an organization that achieves the extraordinary, such as a winning ball club, because competition is basic; and, 6) to earn respect for what he is and recognition for what he does. Management must accept these basic workers' wants as the best way to profit from the enormous potential in people.

Satisfying the Wants of Workers

The basic wants of workers are satisfied indirectly by attitude, and directly by approach. Attitude is a funny thing and goes a long way. The manner in which you are viewed by your associates will determine their approach to you and will determine whether you really enjoy or just endure your work. If you are indifferent to your employees, they will be indifferent to you. If you are inconsiderate, they will be inconsiderate. If you are rude, they will be rude. If you are suspicious, they will be suspicious. On the contrary, if you enjoy being with people, they will enjoy your company. So, in order to enjoy life with people, learn to enjoy life yourself.

Employer Attitudes

Employer or management attitude should create authoritative respect. People respect leadership, ability, and appearance. This is why it is so important for executives to study the design for professional development. Another very important attitude in employee motivation is enthusiasm. Employer or leader enthusiasm can set a whole group on fire as in the case of the star quarterback, the anchor man, the group spokesman. People basically follow leaders. Enthusiasm also avoids boredom, the disease of incentive. Fairness or good sportsmanship is another attitude basic to any group endeavor, whether work or play. Lincoln said: "If you would win a man to your cause, first convince him that you are his friend." Thus, friendliness is basic also in directing employee attitude. Lastly, pride of organization or profession, "esprit de corps," and the spirit of competition are important attitudes to workers. For example, your crew should believe that "..our greens are the finest in the city..." etc.

Motivation Approach

The employer approach to group or employee motivation is through incentives. One basic incentive is financial inducement. However, as Chester Barnard, President of N. J. Tel. & Tel., once said, "...Material inducements are weak incentives...," and Lord Forrester, Enfield Wire & Cable, Great Britain, regards them thusly: "Financial incentives are easiest to arrange, but most ineffective and least permanent." Please do not misunderstand me. Financial inducements are necessary in our country of high living standards, but they are often over-emphasized. There are many other valued incentives as well as money.

Another basic human goal is <u>status</u> or position. This is true of even the lowliest worker. To take advantage of this incentive, every organization should provide a ladder of advancement. For example, on the golf course the lowest paid worker should know that he can advance, by good performance, from the lowest rung on the ladder upwards through the positions of special laborer, grass cutter, tractor driver, foreman, assistant, etc. Special project slots should also be designed into this ladder if necessary to offer some form of advancement for all workers.

<u>Delegation of authority</u> is another basic tool of the leader and executive. It is a great worker incentive as well as an obligation to the advancing worker. Furthermore, leaders must realize their obligation to advance workers through the chain of authority and even to send them out to greener pastures when they are ready. There is an old Chinese proverb which states, "Why keep a dog and bark yourself." By delegation, the leader avoids the frustrations of overwork, frees his time for adequate supervision, increases productivity and efficiency, and boosts both his morale and that of his workers.

<u>Encouragement</u> is a great motivator of employee efforts. This can be accomplished by reviews of progress, education and training. Through staff meetings, workers are kept informed. Criticism should be minimized and when necessary done objectively.

<u>Progressive management</u> in the form of new techniques and work simplification is the key to progress. Encourage employees to "work smarter, not harder"; to find "a better method" of doing the job. "The profits of the future will come from the wastes and inefficiencies of the present."

Certainly, this will be true in golf maintenance in view of the trends discussed at the outset of my talk.

In summary of my talk on motivation, I have stressed the importance of this concept and some of the HOW aspects. In closing, may I stress that the time to give new emphasis to motivation, both self and employee, is not tomorrow but NOW.

RESULTS OF RESEARCH ON WEED CONTROL IN TURF

G. C. Horn, Associate Turf Technologist
University of Florida

The phenoxy group of herbicides such as 2,4-D amine, 2,4-D Butyric and 2,4,5-T Propronic acid has a well established reputation in the area of weed control in turf. However, the relative phytotoxic effect of higher than recommended dosages have not been too well established. Also, the autogorustic or synergestic effects of the phenoxy herbicides when used in combination with simazine and atrazine (triazine herbicides) at recommended rates and higher were not known prior to the experiments to be discussed below. Therefore, the object of the experiment under discussion was to determine the effects of three phenoxy and two triazine herbicides at recommended and higher than recommended rates alone and in combination with each other.

The experiment involved 10' x 30' blocks of the following grasses: centipede, carpet, Pensacola and Paraguayan bahia, Fla. #4 and Floratine St. Augustine, Meyer, rugland, manila and "Emerald" zoysia, Tiflawn, common and Ormond bermudagrasses. In addition, the same experiment was tried on dichondra and "Mondograss."

A single nozzle T-jet (#8004) fan type spray was used. The plot size on all treatments except the checks was 18" x 18". The checks were 12" x 18". Due to large number of plots and the extreme difficulty of putting in the experiment in the best of statistical standards, it was decided to sacrifice a little on the design for the added ease of putting out the experiment. The 10' x 30' block of grasses was divided into three replications so an error term could be established. The short side (10' dimension) faced east to west and the long side north to south.

The phenoxy herbicides were sprayed across all the grasses in a continuous 18" sweep north to south. The rates were as follows: 2,4-D amine - 1/2# and 1#, 2,4-D butyric - 2# and 4# and 2,4,5-T - 1# and 2# of active per acre. Between each replication an 18" continuous strip was left unsprayed for a check. The lowest rates closely approximate those recommended and the higher rates are approximated twice the recommended rates.

Simazine and atrazine at the rates of 3, 6 and 12 pounds were applied in a continuous strip 18 inches wide in a north to south direction across the phenoxy strips as well as the east to west check strip. This left two checks in each block of grass that received no herbicide. Including the replications and all treatments there were 2100 plots in the experiment. All of the phenoxy compounds were applied April 8, 1960, and the triazines were applied April 9, 1960. The grasses had been fertilized two weeks earlier with the equivalent of 1 pound of nitrogen per 1000 sq. ft. in the form of an 8-8-8 fertilizer.

All plots were rated three weeks following the application of the triazine herbicides. This was found to be the time when maximum damage was evident.

The results are shown in Table 1. The rating system used was as follows:

4.00 - no damage detectable
3.00 - very slight damage evident
2.00 - moderate damage
1.00 - severe damage - turf mostly killed

The data in Table 1 are self-explanatory.

Table 1. Turf Damage Three Weeks after Treatment from Different Rates and Combinations of Five Herbicides. Each entry is average of 3 replications except check which is average of 2.

	Simazine #/A			Atrazine #/A		
	3	6	12	3	6	12
	Centipedegrass Rating					
2,4-D Amine 1/2#/A	4.00	2.33	3.67	2.00	2.33	2.67
" " 1#/A	3.33	2.67	3.33	2.33	2.33	2.67
2,4-D Butyric 2#/A	3.67	3.00	3.33	2.33	3.00	2.33
" " 4#/A	3.67	2.33	3.33	2.00	2.67	3.00
2,4,5-T 1#/A	3.67	3.00	3.67	2.67	3.00	3.00
" 2#/A	3.67	3.33	3.67	2.33	3.33	2.33
Check (no Phenoxy's)	4.00	3.50	4.00	3.00	4.00	3.50
Check (nothing)	4.00	4.00	4.00	4.00	4.00	4.00
	Carpetgrass Rating					
2,4-D Amine 1/2#/A	3.67	3.67	2.67	3.00	3.33	1.00
" " 1#/A	2.67	3.00	3.00	2.67	2.00	1.33
2,4-D Butyric 2#/A	4.00	4.00	3.00	3.33	3.33	1.00
2,4-D Butyric 4#/A	3.33	3.33	3.33	3.33	3.00	1.67
2,4,5-T 1#/A	3.67	3.67	3.00	3.33	3.00	1.67
2,4,5-T 2#/A	3.67	3.67	3.00	3.00	3.00	1.67
Check (no phenoxy's)	4.00	4.00	3.00	4.00	3.50	1.50
Check (nothing)	4.00	4.00	4.00	4.00	4.00	4.00

Rating system: 4.00 - no damage
3.00 - very slight damage
2.00 - moderate damage
1.00 - damaged severely - 95% killed

	Simazine #/A			Atrazine #/A		
	3	6	12	3	6	12
	Pensacola bahiagrass					
2,4-D Amine 1/2#/A	2.00	2.00	3.00	1.67	2.00	1.30
" " 1#/A	2.33	1.67	2.67	1.33	1.00	1.00
2,4-D Butyric 2#/A	2.33	2.33	2.33	1.00	1.33	1.00
" " 4#/A	1.67	2.00	2.00	1.33	1.67	1.00
2,4,5-T 1#/A	2.33	2.00	1.67	1.00	1.67	1.00
2,4,5-T 2#/A	1.67	2.00	1.67	1.00	1.33	1.00
Check (no phenoxy)	2.00	1.33	1.50	1.50	1.50	1.00
Check (nothing)	3.00					

Table 1 (Continued)

	Simazine #/A 3	6	12	Atrazine #/A 3	6	12
	Paraguayan bahiagrass					
2,4-D Amine 1/2#/A	2.33	1.33	1.00	1.00	1.33	1.00
" " 1#/A	2.33	1.00	1.67	1.00	1.33	1.00
2,4-D Butyric 2#/A	3.00	1.67	2.33	1.67	1.00	1.00
" " 4#/A	2.33	1.33	1.67	1.00	1.00	1.00
Check (no phenoxy)	2.50	1.50	2.00	1.00	1.00	1.50
Check (nothing)	3.00					

Rating system: 4.00 - no damage
3.00 - very slight damage
2.00 - moderate damage
1.00 - damaged severely - 95% killed

	Simazine #/A 3	6	12	Atrazine #/A 3	6	12
	Florida #4 St. Augustine grass					
2,4-D Amine 1/2#/A	3.33	3.33	3.00	3.00	3.33	2.67
" " 1#/A	3.33	3.33	3.33	3.00	3.67	3.00
2,4-D Butyric 2#/A	3.33	3.33	3.00	2.67	3.00	3.00
" " 4#/A	3.33	3.33	3.00	2.67	3.00	3.00
2,4,5-T 1#/A	2.67	2.67	2.67	2.67	2.67	2.67
2,4,5-T 2#/A	3.00	3.00	2.67	3.33	3.00	2.33
Check (no phenoxy's)	4.00	3.50	3.40	4.00	4.00	3.50
Check (nothing)	4.00					
	Floratine St. Augustine grass					
2,4-D Amine 1/2#/A	4.00	4.00	4.00	4.00	4.00	4.00
" " 1#/A	4.00	4.00	4.00	4.00	4.00	4.00
2,4-D Butyric 2#/A	4.00	4.00	4.00	4.00	4.00	4.00
2,4-D Butyric 4#/A	4.00	4.00	4.00	4.00	4.00	4.00
2,4,5-T 1#/A	4.00	4.00	4.00	4.00	4.00	4.00
" 2#/A	4.00	4.00	4.00	4.00	4.00	4.00
Check (no phenoxy's)	4.00	4.00	4.00	4.00	4.00	4.00
Check (nothing)	4.00	4.00	4.00	4.00	4.00	4.00

Rating system: 4.00 - no damage
3.00 - very slight damage
2.00 - moderate damage
1.00 - damaged severely - 95% killed

Table 1 (Continued)

	Simazine #/A 3	6	12	Atrazine #/A 3	6	12
			Manila Zoysiagrass			
2,4-D Amine 1/2#/A	3.33	3.33	3.33	3.33	3.00	3.00
2,4-D Amine 1#/A	3.33	3.00	3.00	3.33	3.00	2.67
2,4-D Butyric 2#/A	3.67	3.33	3.33	3.33	3.00	2.67
" " 4#/A	4.00	3.33	3.67	4.00	2.67	2.67
2,4,5-T 1#/A	4.00	4.00	4.00	4.00	3.67	3.33
" 2#/A	3.67	3.67	3.67	3.67	3.00	2.33
Check (no phenoxy's)	4.00	4.00	4.00	4.00	3.50	3.00
Check (nothing)	4.00					
			Emerald Zoysiagrass			
2,4-D Amine 1/2#/A	3.33	2.00	2.00	1.00	1.00	1.00
" " 1#/A	3.00	3.00	3.00	2.33	2.33	1.33
2,4-D Butyric 2#/A	3.00	2.67	2.33	1.67	1.00	1.00
" " 4#/A	3.33	3.33	2.33	1.67	2.00	1.00
2,4,5-T 1#/A	4.00	3.67	3.00	2.00	2.33	1.67
" 2#/A	3.67	2.67	3.00	2.33	2.00	1.00
Check (no phenoxy's)	4.00	4.00	3.00	1.50	2.50	2.00
Check (nothing)	4.00					

Rating system: 4.00 - no damage
3.00 - very slight damage
2.00 - moderate damage
1.00 - damaged severely - 95% killed

	Simazine #/A 3	6	12	Atrazine #/A 3	6	12
			Tiflawn Bermudagrass			
2,4-D Amine 1/2#/A	2.33	2.00	1.00	1.00	1.00	1.00
" " 1#/A	3.00	3.00	2.67	2.33	2.33	1.33
2,4-D Butyric 2#/A	3.00	3.00	2.33	1.67	1.00	1.00
" " 4#/A	3.33	3.33	2.33	1.67	2.00	1.00
2,4,5-T 1#/A	4.00	3.67	3.00	2.00	2.33	1.67
" 2#/A	3.67	3.33	3.00	2.33	2.00	1.00
Check (no phenoxy's)	4.00	3.50	3.00	1.50	2.50	2.00
Check (nothing)	4.00					
			Ormond Bermudagrass			
2,4-D Amine 1/2#/A	2.33	1.67	1.00	1.00	1.00	1.00
" " 1#/A	2.67	2.33	2.33	2.00	1.67	1.33
2,4-D Butyric 2#/A	2.67	2.33	2.33	1.67	1.67	1.67
" " 4#/A	3.00	2.67	2.33	1.33	1.00	1.00
2,4,5-T 1#/A	3.67	3.00	3.00	2.33	2.00	1.33
" 2#/A	3.00	3.00	2.67	2.33	2.00	1.33
Check (no phenoxy's)	3.00	3.00	2.00	2.00	1.00	1.00
Check (nothing)	4.00					

Rating system: 4.00 - no damage
3.00 - very slight damage
2.00 - moderate damage
1.00 - damaged severely - 95% killed

From the data presented in the table above, it is quite evident that the grass varieties tolerated the five herbicides tested quite differently. It is obvious that atrazine at the higher rate did the most extensive damage to most of the turf species included in this test. St. Augustine grass was damaged less by higher rates of atrazine than any other grass.

All of the treatments killed dichondra. The quickest kill was with all rates of atrazine. The phenoxy's did a complete job but the results were much slower.

The bermudagrasses and bahiagrasses were damaged most by the triazines.

Panel Discussion On

OVERSEEDING BERMUDAGRASS GREENS

DISCUSSION LEADER - T. M. Baumgardner
Sea Island Company, Sea Island, Georgia

Panel Members - Ed Cook, Golf Course Superintendent
Ponte Vedra Golf Club, Ponte Vedra Beach, Florida

Hurley Savage, Golf Course Superintendent
James River Golf Club, Newport News, Va.

Al Warnecke, Golf Course Superintendent
East Lake Golf Club, Atlanta, Georgia

Charlie Wilson, Agronomist and Sales Manager
Milwaukee Sewerage Commission, Milwaukee, Wisc.

Opening remarks by T. M. Baumgardner as follows:

I will open this discussion with a few general remarks regarding overseeding and our experiences with this phase of turfgrass management at Sea Island, then I will call on each of the panel members for their remarks and then the panel will be open for questions and general participation from the floor.

The subject of overseeding of greens has been given additional impetus and greater attention in recent years I believe because of several factors:

First, the increase of pythium or cottony blight disease throughout the entire southeastern ryegrass section led many to seek other grasses for overseeding or other alternatives.

Second, with a great majority of the southern greens now changed over to the fine textured bermudas such as Tifgreen, it has been the logical thing to look for a finer textured grass than rye which would be more compatible and a better companion to the finer textured bermudagrasses.

Third, it is hoped that some mixture of grasses for overseeding might prove better than a single grass, such as rye and that one or more of these other grasses might tend to ease the severity of the transition period in the spring.

South and Central Florida golf course superintendents have, of course, used overseeding grasses other than rye or in combination with rye for many years with some degree of success - their favorites being such grasses as Kentucky bluegrass, Redtop and Seaside or Highland bentgrass. Many of us have tried out some of these grasses for overseeding in Georgia and farther north in an experimental way but results did not seem to merit their use generally, mainly because of their late starting, whereas in the warmer climate of Florida they seemed to develop much earlier and gave good color as supplementary grasses to the basic bermuda throughout the winter season.

In the fall of 1960, O. J. Noer and Charlie Wilson, of the Milwaukee Sewerage Commission, realizing the need for more research and experimentation to develop better overseeding techniques and to try to find other more suitable grasses for overseeding in various areas of the South, decided to institute a series of overseeding trial plots with the cooperation of several southern golf courses. They worked up a series of 25 plots to be seeded with individual grasses and/or mixture of grasses which seemed to them to have promise as overseeding grasses. They furnished the seed and their help in getting the plots planted.

Duplicate plots were established the first year at the Sea Island Golf Club, Sea Island, Georgia, and at the East Lake Club in Atlanta. In the fall of 1960, plots were again planted at these two clubs and also at the Ponte Vedra Golf Club at Ponte Vedra Beach, Florida. The plots consisted of 25 separate plots, each 4 feet by 10 feet in size. Half of each plot was treated with fungicide and half of each fertilized with Milorganite at time of planting. The plots at Sea Island and at East Lake were installed on one of the regular #328 bermudagrass greens under playing conditions.

I will not have time to describe the plots or various mixtures or results obtained in detail. You may ask questions if interested later, and Charlie Wilson will have some slides of the plots to show you later.

The grasses used are as follows: Poa trivialis, Redtop, Seaside, Highland, Penncross and Astoria bentgrasses, Pennlawn fescue, and domestic and perennial ryegrass. These grasses were all planted in the plots both individually and in various mixtures and at various rates. In general many of the grasses and combinations did very well in all locations. Some were better early and some later in the season and there were, of course, variations in the response of the various grasses in the different locations. As far as Sea Island is concerned, the grasses other than rye did not develop fast enough in the fall to give satisfactory color and density in December and January but most of them were very satisfactory from February 15 through the spring months and up until about the last couple of weeks in May or first of June when most of them started to go out. The best individual grass throughout the season has seemed to be Poa trivialis, followed closely by Seaside and Penncross bent and at times Pennlawn fescue, Redtop and Kentucky bluegrass or a combination of these grasses looked good.

Since we had very little disease weather either year we did not get a good test of these grasses disease-wise. We suspect, however, that most of these may be as susceptible to disease as ryegrass.

As a result of these preliminary tests we have decided that, insofar as Sea Island is concerned, where we have important tournaments in early January, we cannot eliminate the earlier developing domestic rye from our overseeding program. We believe, therefore, our best combination may be a combination of domestic rye, Poa trivialis and Seaside bent and perhaps the addition of one or two others such as fescue or Kentucky bluegrass.

This fall we seeded all 27 of our regular greens in mid-October with two pounds of Seaside bentgrass and two pounds of Poa trivialis per 1,000 square feet. Seed bed was prepared by previously aerifying the greens with 1/4-inch spoons and at time of seeding they were Verti-cut fairly severely in two directions and thoroughly spiked with Wolfram 3-gang spiker. The greens were lightly topdressed and seed sowed on top of the topdressing and lightly matted in. Daily hand-watering was practiced until seed was well up. We got a fair stand of these grasses in about three weeks. Ryegrass at the rate of about 45 pounds to 1,000 square feet was planted at an interval of 3 to 4 weeks after the planting of the other two grasses. Greens were not Verti-cut for the ryegrass planting because we thought this would tend to thin out the Poa trivialis and Seaside bent stands too much. The greens at this time were thoroughly spiked with the 3-gang spiker, seeded and topdressed lightly.

We think we have had excellent and uniform greens all season and we believe we have gotten a great deal of benefit from the addition of the Poa trivialis and Seaside bent. The Poa trivialis has been particularly noticeable throughout the greens all season. The greater density of the turf has seemingly resulted in a somewhat finer texture than usual of the ryegrass blades and, of course, the Poa trivialis and bent have resulted in finer texture and general better appearance, and we believe better putting quality of the turf.

We are planning on seeding with this combination again next fall but will probably step up the rates of Poa trivialis and Seaside to at least 3 pounds of each to 1,000 square feet instead of two pounds.

One of the significant results noted in these trials was that Poa annua invasion was worse with the later developing grasses than in the ryegrass and combination of ryegrass and Poa trivialis plot. This would lead me to believe that where Poa annua is a problem some way will have to be devised to eliminate the Poa for those who may wish to use some of these overseeding grasses without any ryegrass. The earlier developing ryegrass seems to tend to discourage to a greater degree the development of the Poa annua and, since it is similar in color to both ryegrass and Poa trivialis, it is not nearly as noticeable in small quantities in these grasses.

I would now like to call on other members of the panel for a brief resume of their experiences and observations in overseeding, and I wish you would hold your questions until after they are through.

Thank you.

WINTER GRASS OVERSEEDING ON BERMUDAGRASS PUTTING GREENS

1/ O. J. Noer 2/ C. G. Wilson 3/ J. M. Latham

Bermudagrass greens in the South are usually overseeded with a cool season grass, or grasses, every fall for winter play. The temporary grass is used for four to seven months, depending on course location.

Domestic ryegrass has been the popular overseeding choice in the past because of rapid growth and low cost. With the advent of fine textured Bermuda strains, many courses have changed from ryegrass to red top and/or bentgrass. Vacationing Northern golfers and low handicap players prefer the putting quality of bent. A good ryegrass green putts slow.

Several problems are associated with the use of either ryegrass or bentgrass alone. When ryegrass is seeded heavily, Bermuda regrowth may be retarded in the spring. When lesser rates of seed are used, the turf may be coarse in texture and putt poorly. Hot weather or disease may cause the ryegrass to vanish suddenly, leaving the turf brown and all but unplayable. It is not uncommon for this to occur during the height of the spring playing season.

The major fault of the bentgrasses and red top is slow establishment in the fall. Although they germinate rapidly, turf quality

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1/ Research Director, O. J. Noer Research Foundation
2/ Sales Manager and Agronomist, Milwaukee Sewerage Commission, Milwaukee, Wisconsin
3/ Agronomist, Milwaukee Sewerage Commission, Milwaukee, Wisconsin

is often poor until late winter. This permits the invasion of annual bluegrass and other winter weeds.

The purpose of this test was to evaluate a variety of cool season turf grasses seeded singly and in mixtures under actual playing conditions.

Materials and Methods

Overseeding trials were established at East Lake Country Club, Atlanta, and Sea Island Golf Club in the fall of 1959(1). Both courses are located in Georgia but under different climatic conditions. Atlanta typifies the more northerly range of Bermuda overseeding with an early fall and relatively cold winter weather. Coastal Sea Island experiences foggy, humid fall weather and relatively mild winters.

Overseedings at both locations were identical. Ten cool season grasses were seeded alone and in various combinations. All were planted to furnish the same number of seeds per thousand square feet, irrespective of variety. The plots were established on Tifgreen Bermuda putting greens under play at both locations. Plots were seeded at East Lake on October 19, and at Sea Island on November 11, 1959. The remaining putting greens at both locations were overseeded approximately two weeks before the trials. East Lake overseeded red top and Seaside bentgrass, and Sea Island used domestic ryegrass adjacent to the trial areas. Varieties, rate of seeding, and plot dimensions are given in Chart 2.

Seedbed preparation consisted of aerifying one month prior to overseeding. Two days before the plots were seeded the Tifgreen

Bermuda was Verti-cut, mowed closely, and fertilized with 15 pounds of 20 percent superphosphate and 3 pounds of 60 percent muriate of potash per thousand square feet. Tests showed soil reaction and levels of calcium and magnesium were ample to support growth.

Overseeding was done by hand inside a plot size rectangular board frame approximately 1 foot high. This prevented contamination of adjacent plots. Fungicide and nitrogen treatments were superimposed on each plot as shown in Chart 2, to determine their effect on disease incidence. The nitrogen source was Milorganite at 25 pounds per thousand square feet.

The trial area was top-dressed lightly, using a sterilized soil mixture. Light hand-watering followed immediately and continued daily until the seedlings were established.

Ratings were made periodically throughout the fall to spring season by the cooperators, the authors, and the golf professional. The latter's evaluation of turf putting quality seemed highly desirable. Each plot was judged on appearance, density, putting quality, and disease incidence, using the designations "Excellent," "Very Good," "Good," "Fair," and "Poor." The seasonal ratings are given in Table 1.

Results and Conclusions

The 1959-60 season was climatically excellent at both locations. As a result, the dreaded "damping-off" seedling disease failed to materialize. Thus, the fungicide applications gave negative results.

The one Milorganite treatment stimulated earlier growth and establishment. Its effect was masked later in the season because of normal fertility practices.

The slower developing grasses like the bents and Kentucky bluegrass seeded individually ranked below the ryegrasses, Poa trivialis, and Pennlawn creeping red fescue. They were subject to Poa annua invasion early in the season.

The two-week delay in seeding may have been a contributing factor. Certainly, Kentucky bluegrass was rated "Poor" on several occasions because of the unsightly appearance of annual bluegrass clumps. Based on its own merits, the color was excellent, although the turf was "stiffer" than most golfers prefer.

Interestingly, Redtop performed better than Highland and Astoria. Penncross was excellent, followed closely by Seaside. The high cost of Penncross coupled with its tendency to persist well into the Bermuda season would make many favor Seaside. The less expensive Colonial bents and Redtop might have a place in the Miami area where the winter season is very short.

The outstanding individual grass at East Lake was Pennlawn creeping red fescue. It was first in becoming established, excellent throughout the season, and vanished without a trace of transition in June, 1960. It was also good at Sea Island early in the season. However, the Pennlawn plot there degenerated in mid-January and was poor thereafter because of Poa annua invasion. Pennlawn at present prices is prohibitive at a heavy overseeding rate. Chewings and other fine leafed fescues will be included in subsequent tests.

Poa trivialis performed exceptionally well at both locations. It was quick to become established and ranked well throughout the season. It behaved similar to ryegrass in presenting a slow putting surface.

The ryegrasses made their best showing at Sea Island, but even there ranked below the better bentgrasses following initial establishment. There seemed to be a slight advantage in using perennial ryegrass at East Lake. The same plot at Sea Island was white from mower tip burn in early June.

Based on these tests, seed mixtures show the greatest promise in providing the longest period of high quality turf. Fast starting grasses like ryegrass, creeping red fescue, or *Poa trivialis* could be included with one or two of the better bentgrasses.

Trials are being continued at Sea Island and East Lake and at two new Florida locations in 1960-61 to give a fuller range of climatic conditions. Staggered overseedings combining the advantages of slow and late establishing grasses are being included. At least two or three additional years of testing will be required before recommendations can be made.

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(1) The authors wish to express their sincere appreciation to Golf Course Superintendents Melvin Warnecke of East Lake and Marion McKendree of Sea Island, and Vice President T. M. Baumgardner of Sea Island for their cooperation in conducting these tests.

Table 1 - Seasonal Ratings for all plots.

		Sea Island Club Dates Evaluated							East Lake C. C. Dates Evaluated				
		12-9-59	12-22-59	1-3-60	1-16-60	2-1-60	4-11-60	6-1-60	11-12-59	12-7-59	1-15-60	3-22-60	5-9-60
1. Kentucky Blue	A.	P	F	F	E	G	G	F	P	F	F	G	F
	D.	P	S	F	E	G	G	F		G	F	F	P
	P.	P	G	G	E	G	G	F			F	G	P
	F.			S	E	E	G	P			E	E	E
2. Poa trivialis	A.	G	E	E	E	E	E	F	F	G	G	V	E
	D.	G	E	E	E	E	E	F			G	V	E
	P.	G	F	E	E	V	F	F			F	G	F
	F.			E	E	E	E	G			E	E	E
3. Red Top	A.	F	F	F	G	P	V	V	P	F	F	F	P
	D.	F	S	S	G	G	V	V			F	F	P
	P.	F	G	G	E	V	F	F			F	F	F
	F.			?	?	?	V	V			E	E	E
4. Seaside Bent	A.	F	F	F	E	G	E	V	F	G	F	V	E
	D.	F	S	S	E	F	E	V			F	V	E
	P.	F	G	G	E	G	E	F			F	V	E
	F.			?	E	?	E	V			E	E	E
5. Astoria Bent	A.	P	F	F	F	P	F	P	F	F	F	F	G
	D.	P	S	S	G	P	F	P			F	F	G
	P.	P	G	G	G	P	F	P			F	F	G
	F.			?	?	P	E	P			E	E	E
6. Highland Bent	A.	P	F	P	P	P	G	G	P	P	P	P	P
	D.	P	P	S	F	P	G	G			P	P	P
	P.	F	G	F	G	P	G	G			P	P	P
	F.			S	S	P	G	G			E	E	E
7. Penncross Bent	A.	F	E	E	E	E	E	E	G	G	F	G	V
	D.	F	E	E	E	E	E	E			F	G	V
	P.	F	E	E	E	E	E	E			F	G	V
	F.			E	E	E	E	E			E	E	E

Table 1 - Continued (a)

			Sea Island Club Dates Evaluated							East Lake C. C. Dates Evaluated				
			12-9-59	12-22-59	1-3-60	1-16-60	2-1-60	4-11-60	6-1-60	11-12-59	12-7-59	1-15-60	3-22-60	5-9-60
8.	Pennlawn Fes.	A.	E	E	G	P	P	P	P	E	E	V	E	G
		D.	E	E	G	F	P	P	P			V	E	G
		P.	E	E	E	E	P	P	P			V	E	V
		F.				?	P	P	P			E	E	E
9.	Domestic Rye	A.	E	P	P	F	F	F	P	G	F	F	P	P
		D.	E	S	P	F	G	F	P			F	P	P
		P.	F	F	P	F	F	F	P			F	P	P
		F.			?		?	E	P			E	E	E
10.	Perennial Rye	A.	E	P	P	F	F	P	P	V	V	F	F	P
		D.	E	S	P	F	G	P	P			F	F	P
		P.	F	F	P	F	F	P	P			F	F	P
		F.			?		?	P	P			E	E	E
11.	Seaside Domestic Rye	A.	G	F	G	C	G	V	F	G	G	F	P	G
		D.	F	G	G	E	E	V	P			F	F	G
		P.	F	F	F	F	F	V	F			F	F	G
		F.			S	E	E	V	V			E	E	E
12.	Seaside Perennial Rye	A.	G	F	G	C	G	F	F	V	V	F	G	V
		D.	F	G	G	E	G	F	F			F	G	V
		P.	F	F	F	F	V	F	F			F	G	V
		F.			S	E	E	F	F			E	E	E
13.	Seaside Red Top	A.	F	G	G	G	F	G	G	P	F	F	P	G
		D.	F	S	G	G	F	G	G			F	F	G
		P.	G	G	E	G	G	F	F			F	F	G
		F.			?	E	?	G	G			E	E	E
14.	Seaside Red Top Ken. Blue	A.	F	G	G	G	F	V	G	P	F	F	G	V
		D.	F	S	G	G	F	V	V			F	G	V
		P.	G	G	E	G	G	F	F			F	F	V
		F.			?	E	P	V	E			E	E	E
15.	Seaside Ken. Blue Pennlawn Fes.	A.	F	G	E	G	F	E	E	V	G	G	V	V
		D.	F	S	E	G	F	E	E			F	V	V
		P.	G	G	E	G	G	E	V			F	V	V
		F.			E	E	P	E	E			E	E	E

Table 1 - Continued (b)

			Sea Island Club Dates Evaluated							East Lake C. C. Dates Evaluated				
			12-9-59	12-22-59	1-3-60	1-16-60	2-1-60	4-11-60	6-1-60	11-12-59	12-7-59	1-15-60	3-22-60	5-9-60
16.	Seaside	A.	F	E	E	E	F	E	V	V	V	F	E	E
	Poa Triv.	D.	F	E	E	-	F	E	V			F	E	E
	Pennlawn Fes.	P.	G	E	E	E	G	E	G			F	E	E
		F.			E	-	F	E	-			E	E	E
17.	Seaside	A.	F	E	G	E	G	V	V	P	G	F	V	V
	Red Top	D.	F	E	G	-	G	V	V			F	V	V
	Poa Triv.	P.	G	E	G	E	V	G	G			F	V	V
		F.				-	G	E	E			E	E	E
18.	Seaside	A.	F	E	G	E	G	V	V	P	P	P	P	G
	Highland	D.	F	E	G	-	G	V	V			P	P	G
	Astoria	P.	G	E	G	E	V	V	V			P	P	F
	Red Top	F.				-	G	V	E			E	E	E
19.	Poa Triv.	A.	F	F	G	E	G	E	V	G	V	F	E	V
	Ken. Blue	D.	F	F	G	-	G	E	V			F	E	V
	Pennlawn	P.	G	F	G	E	F	V	G			F	E	V
	Fescue	F.				-	G	E	E			E	E	E
20.	Penncross	A.	G	G	G	E	E	V	E	P	P	F	P	G
	Red Top	D.	F	G	G	-	E	V	E			F	P	G
		P.	G	G	G	E	E	V	E			F	P	G
		F.				-	E	V	E			E	E	E

Designations:

A - Appearance

D - Density

P - Putting Quality

F - Fungus Disease

Evaluation:

E - Excellent P - Poor

V - Very Good S - Spotty

G - Good C - Coarse

F - Fair

CHART 2 - PLANTING PLAN
1959-60 OVERSEEDING TRIAL

	Calo Clor 4 oz/M	Tersan OM 6 oz/M	Phygon XL 16 oz/M	Captan 50W 16 oz/M + Actidione RZ 1.2 gms/M
Nitrogen Added	1 Kentucky Blue Grass 10 lbs/M	6 Highland Bent 4 lbs/M	11 Seaside 2 lbs/M Dom. Rye 25 " "	16 Seaside 1 1/3 lbs/M P.Triv. 3 1/3 " " Fescue 17 " "
"	2 Poa Trivialis 10 lbs/M	7 Penncross Bent 4 lbs/M	12 Seaside 2 lbs/M P. Rye 25 " "	17 Seaside 1 1/3 lbs/M Redtop 1 1/3 " " P.Triv. 3 1/3 " "
"	3 Redtop 4 lbs/M	8 Pennlawn Fescue 50 lbs/M	13 Seaside 2 lbs/M Redtop 2 " "	18 Seaside 1 lb/M Highland 1 " " Astoria 1 " " Redtop 1 " "
"	4 Seaside Bent 4 lbs/M	9 Domestic Rye Grass 50 lbs/M	14 Seaside 1 1/3 lbs/M Redtop 1 1/3 " " Ky.Blue 3 1/3 " "	19 P.Triv. 3 1/3 lbs/M Ky.Blue 3 1/3 " " Fescue 17 " "
"	5 Astoria Bent 4 lbs/M	10 Perennial Rye Grass 50 lbs/M	15 Seaside 1 1/3 lbs/M Ky.Blue 3 1/3 " " Fescue 17 " "	20 Penncross 2 lbs/M Redtop 2 lbs/M

4' 20' 40' 10'

TURFGRASS MANAGEMENT
Versus
RENOVATION

Tom Mascaro, President
West Point Products Corporation
West Point, Pa.

PURPOSES AND OBJECTIVES

To produce a superior stand of turf on the greens and fairways.

To create turfgrass conditions of better playability for the golfer.

To enhance the beauty of the golf course.

To produce these conditions without materially affecting present expenditures.

To establish a plan of turfgrass management that will eliminate the need for periodic drastic renovation.

To incorporate this program of turfgrass management into the normal maintenance program.

To carry on a program of turfgrass management that will not at any time interfere with the normal use of the golf course.

To carry out a program of turfgrass management that will help establish a workable plan for other clubs to follow.

REVIEW OF THE PROBLEM

In order to produce a playable, acceptable turf for the golfers, certain management practices must be carried out. Although these practices are very necessary, they do interfere with the golfer's use of the course. Much has been written, said, and done to familiarize the golfer with these necessary practices. One, however, must realize that to try to educate an entire golfing membership, their friends and guests is practically impossible.

Therefore, much thought should be given to ways and means of developing a sound program of turfgrass management that will produce the playable turf the golfer desires, and still not interfere with his use of the course. Impossible? Perhaps, but it has often been said that the impossible of today becomes the commonplace of tomorrow. Let's list the necessary practices for good turfgrass management that inferfere with the game of golf.

Greens	Fairways
Renovation	Renovation
Aerification	Aerification
Verti-cutting	Verti-cutting
Top Dressing	Top Dressing
Fertilization	Irrigation
Irrigation	Mowing
Mowing	

We can see from this breakdown that renovation heads the list. Why? The answer is quite obvious. When turfgrass areas are good we are reluctant to do anything that will mar its beauty or alter its playability. Very necessary practices are put off. Before we realize it, that wonderful turf has gone to pot.

The turfgrass areas many times reach a point of little or no return. When this point is reached everyone gets excited. The first wave of excitement carries the word loud and clear— "The Superintendent should be fired!" If the superintendent is fortunate enough to weather this first wave, he can begin to do something about the problem. After much explaining, the golfing membership begins to realize that the loss of turf is of their own doing. If they had allowed the superintendent to do the things he knew should have been done - at the right time, this condition would never have occurred.

The second wave of excitement brings on a new approach. "Our course is a disgrace. The greens are bare. You can't get a good lie anywhere on the fairways. It's going to take a lot of money to get the course in shape again." A lot of money - remember this statement - a lot of money. Along with this it begins to dawn on everyone that the course will have to be closed. Not for a day - or a week - or a month. Six months! Turfgrasses grow slowly. Even in six months the turf is tender - thin - and must be babied. It takes two years, sometimes three, for turf to really become established.

Now, what are the steps that should be taken to prevent all too frequent occurrences like this?

There is one major step that should be taken. That is to change our thinking from Turfgrass Renovation to Turfgrass Management.

A sound sensible program of Turfgrass Management costs no more than a weak unscheduled program plus renovation. Remember the statement: "It's going to take a lot of money to get the course in shape again." If a small fraction of the money spent on complete renovation were added to the normal operating budget, renovation would seldom be necessary and most important of all the course would not have to be closed.

In order to set up a desirable turfgrass program, let's study the two terms "Turfgrass Renovation and Turfgrass Management."

"Renovation" means to renew, or to bring back to its original state.

"Management" as we use it here means to <u>keep in a state of constant usefulness</u>.

Here we have the key to our program. Keep or manage our turfgrass areas for constant use.

In order to establish a program of Turfgrass Management we must first consider the basic reasons for loss of turf. Providing we have the right grass, and an adequate fertilization and irrigation program, we can conclude that the two basic reasons for loss of turf are compaction of the soil and an excess thatch layer on the surface of the soil. Either one or both of these conditions can lead to partial or complete loss of turf. Both conditions restrict root growth.

Compaction of the soil prevents oxygen from entering the root zone. It prevents the free movement of water and nutrients into the root zone. Grass roots are restricted because there are no spaces in which to grow. Dr. Alderfer has made this statement: "Roots do not grow in the soil particles; they grow in the spaces around the soil particles."

Surface thatch is the accumulation of clippings and dead leaves on the soil surface. As this material slowly accumulates, the grass plant is forced to grow taller to get to the sunlight. As the thatch builds up, the mower wheels ride on top of this ever increasing layer. The height of cut is slowly but surely getting higher and higher. The height of cut from the tip of the grass blade to the soil surface is not 1/2 inch or 3/4 inch but 2 and 3 inches!

As the thatch layer builds up it becomes a potential liability. Water cannot penetrate the feltlike layer. It holds water like a sponge. Professor H. B. Musser tells us that thatch will hold up to 700 times its weight in water. It becomes a perfect medium for fungus disease organisms. When optimum moisture and temperature levels are reached, rapid decomposition occurs. Like a pile of grass clippings or wet hay, spontaneous combustion takes place, burning the live turf like a fire.

Thatched turfgrass areas wheel track and footprint badly. The putt of the ball is deflected and the lie of the ball is unplayable. On thatched fairway turf large divots are blasted out. Since thatch restricts root growth the grass plants are not firmly anchored into the soil. A divot then is a group of grass plants that were growing on the surface of the soil.

Our Turfgrass Management program must begin with a planned, sound system of aerification and thatch control.

Fortunately, these two procedures of turfgrass management compliment each other.

When soil is aerified a great many soil cores are brought to the surface. These soil cores when broken up act as a top-dressing. They make intimate contact with the accumulated surface thatch. Decomposing soil organisms break down the fibrous thatch material into rich, usable humus. The humus, rich in nutrients, works down into the root zone through the opening made when aerifying.

One can readily see how soil cultivation and thatch control compliment each other. It is a re-cycling process. Compaction is alleviated, the removed soil is mixed with undecomposed surface thatch. The thatch slowly decomposes into humus. The humus re-enters the root zone. Soil bacteria break the humus down into simple plant foods. These nutrients are again picked up by the plant roots. The grass plant, therefore, re-uses over and over again the same materials.

Turfgrass management, therefore, begins with a program of soil cultivation and controlled decomposition of thatch.

Controlled decomposition is similar to the process that takes place in the old-fashioned compost heap. Soil is mixed with organic refuse to break it down into a rich humus, teeming with beneficial bacteria and other micro-organisms. But to make good compost the old gardener will tell you that you need a few other ingredients. It must not be compacted. Air is vital to decomposing bacterial action. Carbon dioxide given off during decomposition must be allowed to exhaust freely from the soil. Lime must be used to sweeten the soil (meaning, of course, that the pH of the soil should be near neutral) and equally important nitrogen must be added to help feed the decomposing organisms.

So here we have our formula for the control of thatch.

1. Mix soil with the thatch.
2. Give it plenty of air.
3. Add lime.
4. Keep an adequate supply of nitrogen.
5. Physically remove excess thatch.

These, then, are the simple basic fundamental steps that must be taken when planning a sound Turfgrass Management program.

Let's begin with a practical turfgrass management program for greens.

We will list, again, those practices that interfere with the game of golf but we will exclude renovation:

1. Aerification
2. Verti-cutting
3. Top Dressing
4. Fertilization
5. Irrigation
6. Mowing

Before we begin we must bear in mind that what we must do, in order to keep the course playable, is to modify all these practices.

Turfgrass management as against Renovation means not the elimination of any of these practices but rather the modification of these practices.

Let's begin with a modified program of Aerification. Many superintendents are already carrying out a program such as this.

Instead of waiting until compaction is severe and turf is poor, Aerification is done on a continuing basis. Compaction is the result of continued forces. Natural causes, from the texture of the soil, day after day tramping of the golfer, vibration and weight from constant mowing - these are the forces that lead to eventual severe compaction. It is a gradual development. Since compaction is developed gradually, then if we can eliminate compaction as it develops we can constantly keep soil conditions near perfect.

Based on these conclusions then, Aerification should be done more frequently and less severely. Depth of cultivation can be shallow. The number of aerification holes can be less, since complete cultivation of the soil will be accomplished over a period of time. It is doubtful that greens can be ever cultivated without some slight surface disturbance. Therefore, rather than do 18 greens at one time it would be far better from the standpoint of the golfer to aerify one green at a time. The golfer is not going to be too disturbed if only one green is a little off out of the 18. In a month's time all greens will be aerified. This could be done on a continuing basis through the growing season.

Accurate records should be kept so that all greens would be treated to keep up with the compaction that is being created. A man should be trained to do the aerification properly. He should understand what he is doing and why. Each green can be completed in less than an hour. Careful clean up of the green is all important. Ten minutes of the hour should be spent in thoroughly checking the greens, especially the cupping area to make sure the turf is in good condition.

Verti-cutting can also be blended into the aerification program. Thatch, like compaction, builds up gradually. Its control, in a modified turfgrass management program, should be frequent and light. Verti-cutting should be very light and when combined with aerification will pulverize the soil cores.

If we bear in mind that the control of thatch is best when soil can be intimately mixed with the undecomposed material then top dressing should be part of the program. Greens with their dense heavy growth need additional soil for better controlled decomposition.

Thus, if we combine aerification, verti-cutting and top dressing into one operation, turfgrass management of greens can be done efficiently and quickly. Two men with the necessary equipment should complete one green in one hour. A green management program such as this can be incorporated into the daily routine.

Considering the staggering renovation costs even to renovate one green, let alone 18, the cost of a regular greens management program is almost insignificant.

Fertilization, with present day granulated materials and equipment, can be accomplished without materially disrupting the golfer's use of the course.

Greens mowing is a maintenance task that receives a fair share of complaints from the golfers, many of which are women. The days of each man leisurely mowing his nine greens is gone. This job today must be done rapidly and efficiently.

Very early mowing of greens is certainly not the best time to mow. However, it is the only time of day when golfing is at a minimum and, therefore, the logical time to do it. More and more superintendents are using additional greensmowers and cutting down on the number of greens per man.

Two major reasons for this are that (1) the greens can be mowed in less time, and (2) a greens man that has less greens to mow still has enough energy to finish out his day on other jobs.

FAIRWAY TURFGRASS MANAGEMENT PROGRAM

A fairway program differs from a greens program in procedure but not in principles. Since the same principles apply we will again list the management practices necessary for good fairway turf again eliminating Renovation.

The ideal management practices would be:

1. Aerification
2. Verti-cutting

3. Top Dressing

4. Fertilization

5. Irrigation

6. Mowing

Fairway turf differs from greens turf in that we have a higher cut, the turf is not as dense (although desirable), fertilization is not as heavy, top dressing is seldom practiced. Irrigation is lighter, mowing is not as frequent, and grass clippings are not removed.

Suppose we establish a program of continuing turfgrass management for fairways.

Compaction is perhaps more severe on fairways than on greens. Mowing equipment is extremely heavy. Mowers get their traction from the wheels adding forward force to compaction. The players compact the soil, although the fairway area is so large this may be insignificant. The increasing use of golf carts is significant, however, and compaction from these vehicles can be quite severe.

Aerification then becomes a basic management practice. As on greens, compaction is a gradual development and, therefore, should be controlled on a continuing basis. This can be accomplished with modern aerifying equipment. Once a year, or even twice a year, aerifying is not enough to overcome compaction that is taking place day after day. A program of aerification should be set up to cultivate each fairway through the growing season. The average fairway can be cultivated in less than two hours.

To offset this cost, let's assume that the fairways were to be top dressed. The cost of good top dressing to equal the amount of soil brought up by the aerifier would be as follows:

The aerifier equipped with the 1" spoons removes and deposits on the surface of the turf 12 tons of soil per acre.

Southern Courses

Average 50 acres of fairway x 12 tons per acre = 600 tons.

600 tons of soil x 12 times a year = 7,200 tons.

7,200 tons x $10 per ton = $72,000 per year.

Northern Courses (6 times a year)

Average 50 acres of fairway x 12 tons per acre = 600 tons.

600 tons of soil x 6 times a year = 3,600 tons.

3,600 tons x $10 per ton = $36,000 per year.

The aerifier equipped with 3/4" spoons removes and deposits as top dressing on the turf 8 tons of soil per acre.

Southern Courses

Average 50 acres of fairways x 8 tons per acre = 400 tons.

400 tons of soil x 12 times per year = 4,800 tons.

4,800 tons x $10 per ton = $48,000 per year.

Northern Courses

Average 50 acres of fairways and 8 tons per acre = 400 tons.

400 tons of soil x 6 times per year = 2,400 tons.

2,400 tons x $10 per ton = $24,000 per year.

The aerifier equipped with 1/2" heavy duty spoons will remove and deposit as top dressing on the turf 6 tons of soil per acre.

Southern Courses

Average 50 acres of fairway and 6 tons of soil per acre = 300 tons.

300 tons of soil x 12 times a year = 3,600 tons.

3,600 tons of soil x $10 per ton = $36,000 per year.

Northern Courses

Average 50 acres of fairway x 6 tons of soil per acre = 300 tons.

300 tons of soil x 6 times per year = 1,800 tons.

1,800 tons of soil x $10 per ton = $18,000 per year.

A summary of these mathematical calculations would be as follows:

For Southern Courses:

1" spoons	=	7,200 tons	Value - $72,000
3/4" spoon	=	4,800 tons	Value - $48,000
1/2" H.D. spoon	=	3,600 tons	Value - $36,000

For Northern Courses:

1" spoon	=	3,600 tons	Value - $36,000
3/4" spoon	=	2,400 tons	Value - $24,000
1/2" H.D. spoon	=	1,800 tons	Value - $18,000

From these calculations then we can conclude that the value of the top dressing far outweighs the cost of labor, gas, depreciation, and even the cost of the original equipment.

Under the system of turfgrass management not only is compaction relieved on a continuing basis, but more important, top dressing is being incorporated into the accumulating thatch in light amounts for controlled decomposition.

Verti-cutting should also be considered an essential part of a fairway turfgrass management program. Verti-cutting accomplishes the following desirable effects:

Removes excess grain and thatch as it forms.

Helps control weeds.

Promotes the upright growth of grass for better ball lies.

Produces a neat, clean surface pleasing to the eye and the golfer's game.

Verti-cutting, like aerification and top dressing, should also be done on a continuing basis. One fairway a day can be verti-cut. Since verti-cutting can be substituted for mowing, no additional cost is involved for this operation. As stated before, verti-cutting should be very light and material removed.

FERTILIZATION:

Special emphasis should be placed on the fertilization program of turfgrass management. Again, light, frequent applications are very desirable. Since our object is controlled decomposition of accumulating thatch, fertilizer should be applied in light, frequent application to encourage constant decomposition. We are working with a compost layer on top of the soil surface. Constant irrigation or rainfall leaches fertilizer out of the thatch layer into the soil. Heavy applications of fertilizer once a year helps very little in controlling surface thatch. Nitrogen and lime are the two important ingredients for thatch control and turf grass production. Complete fertilizer should be applied once a year as determined by actual soil tests. Total nitrogen for the year should be split up into monthly applications.

Decomposing organisms temporarily use up the available nitrogen, robbing the grass plant of its requirements. Constant replenishment of nitrogen is essential to encourage controlled decomposition and keep an adequate level for plant requirements. Lime should also be applied on a monthly basis. Contrary to popular opinion, lime should be used regardless of the pH of the soil. Our problem is not with the soil, but with the thatch layer <u>above</u> the soil surface. Decomposing conditions must be right in this surface compost layer and lime is the one ingredient that determines favorable conditions.

Again, irrigation and rainfall wash the lime into the soil and must be replenished on a continuing basis. Rate of lime is dependent upon the thickness of the thatch layer. It would be safe to assume that the minimum to be applied per year would be at least 1/2 ton per acre.

Nitrogen and lime can be applied together on a monthly basis. Treatment should be immediately before aerification. The dragging operation along with aerifying will work the nitrogen and lime into the turf. Light irrigation following nitrogen, lime, aerification and dragging will leave a turf condition that is hardly noticeable to the golfer.

This turfgrass management program as outlined is a different concept in the management of our golf courses. It changes somewhat our old system of management. New procedures must be worked out. We realize that we are reluctant to change our way of doing things. But we must realize that drastic changes have taken place in recent years. Golf has increased tremendously. Women have learned to play what was once a man's game. The game that belonged to the idle rich now belongs to the business man, the butcher, the baker and the candlestick maker.

The demand on your ability and time is going to be even greater in the years to come. We must prepare for it. And there is no sense in resisting these changes.

The golf course is not our paradise. It belongs to the members. Our job is to provide what they want. And they want good turf <u>all</u> the time. They want to use electric golf carts. The golfer won that argument hands down, so let's prepare ourselves for the conditions that are already with us. We must think more and more in terms of turf grass management on a continuing basis.

We must also recognize, of course, that renovation is still very much a part of our over-all management program. Adverse weather and conditions beyond our control will make renovation necessary at times. Turfgrass areas that have deteriorated to a point of no return must and should be renovated. The thing we must remember is that after renovation a program of Turfgrass Management should be instituted that will eliminate the need for renovation.

Summary

FIFTEENTH ANNUAL SOUTHEASTERN TURFGRASS CONFERENCE

Tifton, Georgia
April 10-12, 1961

TOTAL REPRESENTATION FROM EACH STATE:

Alabama	18
Florida	32
Georgia	63
New Jersey	1
New York	1
North Carolina	12
Pennsylvania	1
South Carolina	6
Tennessee	1
Texas	1
Virginia	1
Wisconsin	1
TOTAL	138

ATTENDANCE ROSTER

Name	Affiliation	City
ALABAMA		
Berdeaux, C. G.	Elmwood Corporation	Birmingham
Brazeal, D. B.	Univ. of Ala., Supt. of Grounds	Tuscaloosa
Brooks, Tate, Jr.	The Amer. Agric. Chemical Co.	Opp
Curtis, B. P.	Tennessee Coal & Iron (US Steel)	Fairfield
Godwin, George F.	Dothan Country Club	Dothan
Hill, Tommie	Parks and Recreation Board	Birmingham
Kennedy, W. T.	Montgomery Country Club	Montgomery
Lawrence, Doyle	Maxwell Golf Course	Maxwell AFB
Morey, Ruth Elaine	Riverside Country Club	Lanett
Morey, Virgil E.	Riverside Country Club	Lanett
Nixon, M. C.	Nixon Zoysia Grass Farm	Auburn
Roberts, James	Yeilding's	Birmingham
Rumore, Ross	Parks and Recreation Board	Birmingham
Shelton, Roy	University of Ala. Golf Course	Tuscaloose
Soutar, Bill	Woodley Country Club	Montgomery
Sturkie, D. G.	Auburn University	Auburn
Wendling, M. J.	Parks and Recreation Board	Montgomery
Wilson, Clarence M.	U. S. Steel Corporation	Fairfield

Name	Affiliation	City
FLORIDA		
Baker, Chan W.	Baker Grass Industries	Miami
Billett, Robert W.	O. E. Linck Co., Inc.	Valparaiso
Brown, Max A.	University of Florida	Gainesville
Burke, R. E.	DuPont Company	Winter Park
Carson, Richard L.	Hollywood Gardens, Inc.	Hollywood
Cook, E. E.	Ponte Vedra Golf Club	Ponte Vedra Beach
Derzypolski, Marion S.	Capital City Country Club	Tallahassee
Dowling, Elmo	Rainy Sprinkler Sales	Gainesville
Glover, Norwood	Hector Turf & Garden Supply	Miami 47
Grondzki, Thomas J.	Ocean Reef Country Club	Florida City
Hamilton, Thomas A.	Hamilton Turf Equipment	Miami
Hatch, Robert F.	West Point Turfgrass Equipment Corp.	Miami
Hess, Delbert C.	Eglin Air Force Base	Valparaiso
Horn, G. C.	University of Florida	Gainesville
Irwin, Jack D.	Irwin Grain Company	Kendall
Lyerly, W. A., Jr.	The Amer. Agri. Chemical Co.	Pierce
Mascaro, Charles	West Point Products	Miami
Meyers, Robert V.	Riviera Golf Club	Ormond Beach
Newton, E. S., Jr.	Zaun Equipment, Inc.	St. Petersburg
Nutter, Gene C.	Golf Course Supts. Assn. of America	Jacksonville Beach
Ousley, J. E.	Ousley Sod Company	Pompano Beach

FLORIDA (Continued)

Name	Affiliation	City
Palmer, Walter	Riviera Country Club	Coral Gables
Pearson, Carl R.	Pine Crest Country Club	Largo
Richards, Russell F.	Geigy Agricultural Chemicals	Orlando
Schmeisser, Otto	Gulf Stream Golf Club	Delray Beach
Smalley, Ralph R.	University of Florida	Fort Lauderdale
Smiley, Howard F.	Buckner Manufacturing Company	Jacksonville 7
Wilcox, David	Irwin Grain Company	Kendall
Willcox, Ward W.	Lakewood Country Club	St. Petersburg
Williams, Henry, Sr.	Daytona Beach Country Club	Daytona Beach
Wilson, Frank	Agricultural Extension Service	Gainesville
Yuzzi, Joseph	Biltmore Golf Course	Coral Gables

GEORGIA

Anderson, Hal	Dublin Country Club	Dublin
Barnhart, George E.	Cherokee Town & Country Club	Atlanta 5
Baumgardner, T. M.	Sea Island Company	Sea Island
Bell, M. B.	Green Island Hills Golf Club	Columbus
Booterbaugh, E. E.	Druid Hills Golf Club	Atlanta
Branch, Donald J.	Green Island Hills Golf Club	Columbus
Burton, Glenn W.	Ga. Coastal Plain Exp. Station	Tifton
Carter, R. L.	Ga. Coastal Plain Exp. Station	Tifton
Churchill, Richard	Stone Mountain Memorial Assoc.	Stone Mountain
Collett, Claude M.	Standard Club Supt.	Atlanta 7
Culpepper, Sam H.	Georgia Institute of Technology	Atlanta
Donaldson, George P.	Abraham Baldwin Agric. College	Tifton
Douglas, L. E.	Augusta Golf Club	Augusta
Dudley, J. W.	Athens Country Club	Athens
Evans, Thurlow, Jr.	Stovall & Company	Atlanta
Forbes, Ian, Jr.	Ga. Coastal Plain Exp. Station	Tifton
Galle, Fred C.	Ida Cason Callaway Gardens	Pine Mountain
Goldthwaite, Howard	Toro & Turf Supply Co.	Atlanta
Good, J. M.	Ga. Coastal Plain Exp. Station	Tifton
Greene, Roger O.	Golfland, Inc.	Macon
Greenway, Carlos D., Jr.	Landscape Architect	Alma
Hall, C. Randy	Stovall and Company	Atlanta
Hammond, Curt	Reynolds Kiwanis Golf Club	Reynolds
Harvey, J. Ernest	Ga. Coastal Plain Exp. Station	Tifton
Haskins, Fred	Country Club of Columbus	Columbus
Holden, Preston L., III	W. A. Cleary Corporation	Smyrna
Jackson, James E.	Southern Turf Nurseries	Tifton
Jensen, E. Ray	Southern Turf Nurseries	Tifton
Jones, H. Lewis	Mayo's Nurseries, Inc.	Augusta

GEORGIA (Continued)

Name	Affiliation	City
King, Frank P.	Ga. Coastal Plain Exp. Station	Tifton
Lam, John	Coosa Country Club	Rome
Lambert, Jimmy	Evans Implement Co.	Atlanta
Lambert, Paul W.	Stovall and Company	Atlanta
Lawrence, Lester	Fort Benning Country Club	Fort Benning
Moncrief, James B.	U.S.G.A. Green Section	Athens
Morcock, J. Cooper	Nitrogen Div., Allied Chemical Corp.	Atlanta 3
Murray, Dixie	Patten Seed & Turfgrass Co.	Lakeland
McGowan, D. R.	Valdosta Country Club	Valdosta
McKendree, Marion	Sea Island Golf Club	St. Simons Island
McMullen, LeRoy	Wyandotte Chemical Corporation	Atlanta 5
Newton, J. P.	Georgia Experiment Station	Experiment
Norton, Lyman C.	Southern Turf Nurseries	Tifton
Presley, Alton E.	Dallas Lawn Farms	Dallas
Rhodes, R. L.	Augusta Golf Club	Augusta
Roland, Larry	Transco Chemicals	Atlanta 6
Roquemore, W. A.	Patten Seed & Turfgrass Co.	Lakeland
Scoggins, Edward	Route 3	Athens
Shields, E. A.	Capital City Country Club	Atlanta 19
Skinner, Robert E.	Russell Daniel Irrigation Co.	Athens
Smith, Joe W.	Evans Implement Company	Atlanta
Strong, John J.	Patten Seed & Turfgrass Co.	Albany
Tatum, A. R.	M. P. C. Corporation	Gainesville
Thompson, Ashton A.	Ansley Golf Club	Atlanta
Todd, Leamon W.	Glen Arven Country Club	Thomasville
Walls, Carroll E.	DuPont Company	Atlanta 6
Ward, Joe	Idle Hour Club	Macon
Warnecke, Melvin J.	East Lake Country Club	Atlanta
Wells, Homer D.	Ga. Coastal Plain Exp. Station	Tifton
Wilson, Perry	Forest Heights Country Club	Statesboro
Wofford, Irvin M.	Southern Nitrogen Co., Inc.	Savannah
Woods, M/Sgt. Robert	Armed Forces Golf Club	Augusta
Wright, Harry	Peachtree Golf Club	Atlanta 19
Zink, Harold L.	Armed Forces Golf Club	Augusta

NEW JERSEY

Wiley, Robert	Aero-Thatch	Rahway

NEW YORK

Grogan, D. A.	The Amer. Agri. Chemical Co.	New York

Name	Affiliation	City
NORTH CAROLINA		
Barker, Bruce	Stryker Golf Course	Fort Bragg
Freeman, W. Ralph	Henry Westall Co.	Weaverville
Greer, Al	U. S. Marine Corps	Camp Lejeune
Helm, Marshall S.	The Amer. Agric. Chemical Co.	Greensboro
Land, Harold N.	Tanglewood Park	Clemmons
Mann, W. E.	Camp Lejeune Golf Course	Jacksonville
Maples, Palmer, Jr.	Charlotte Country Club	Charlotte
Merchant, Garland C.	Myers Park Country Club	Charlotte
Phillips, M. S.	R. F. D. 2	Newton
Sapp, Ralph B.	Old Town Club	Winston-Salem
Welch, Jim	E. J. Smith & Sons Co.	Charlotte
Weldon, Winfred E.	Mid Pines Club	Southern Pines
PENNSYLVANIA		
Mascaro, Tom	West Point Products Corporation	West Point
SOUTH CAROLINA		
Alexander, Paul M.	Clemson Agricultural College	Clemson
Berlinger, Bob	Shaw AFB Golf Course	Shaw AFB
Fulmer, J. P.	Clemson College	Clemson
Ready, E. L.	The Amer. Agric. Chemical Co.	Johnston
Ripley, C. R.	Anderson Country Club	Anderson
Stewart, C. F.	Columbia Country Club	Columbia
TENNESSEE		
Thorsberg, Arthur D.	Toro Manufacturing Corp.	Memphis 17
TEXAS		
Ferguson, Marvin H.	U. S. Golf Assoc. Green Section	College Station
VIRGINIA		
Savage, Hurley	James River Country Club	Newport News
WISCONSIN		
Wilson, Charles G.	Milwaukee Sewerage Commission	Milwaukee