

Annual Conference

MID-ATLANTIC ASSOCIATION

GOLF COURSE SUPERINTENDENTS

Held at

THE LORD BALTIMORE HOTEL

Baltimore, Maryland

on

January 5 and 6, 1960

Myron M. Skolnick Reporting Company
208 E. Lexington Street
Baltimore 2, Maryland

I N D E X

Membership Relations by Mr. Charles Smith	4
Golf Advancement by Mr. Herb Graffis	14
Soil Testing for Turfgrasses by Dr. James R. Miller	31
The Turfgrass Plots at Rutgers by Dr. Ralph Engel	41
Effect of Pre-emergence Chemicals on the Germination and Growth of Turfgrasses by Dr. Felix V. Juska	48
Crabgrass Control by Dr. Dayton Klingman	59
We Opened a New Golf Course Moderator, Dr. Fred V. Grau	64
Panel, Mr. John Burt	65
Mr. George C. Gumm	68
Mr. Louis Lamp	72
Mr. Fred Sappenfield	76
Mr. Bert Yingling	83
The Use of Pesticides for Gnat and Mosquito Control on the Golf Course Dr. George S. Langford	86
Mr. L. R. Shields	102
Mr. George C. Gumm	107
Bermuda Grasses by Mr. E. Ray Jenson	109
The Introduction of Bermuda Grasses in Existing Fairways Moderator, Mr. James E. Thomas	112

Panel, Mr. Eberhardt R. Steiniger	114
Mr. L. R. Shields	116
Mr. Tom Doerer, Jr.	120
Mr. Frank P. Dunlap	121

Problems and Accomplishments in 1959 on the Golf Course by Mr. Charles K. Hallowell	124
---	-----

Wetting Agents	
Mr. James A. Reid	132
Mr. Robert A. Moore	136

Air and Water Management for Better Turf by Mr. O. J. Noer	141
---	-----

Turfgrass Conference's Contribution to Golf Course Maintenance by Mr. T. T. Taylor	156
--	-----

MEMBERSHIP RELATIONS

MR. CHARLES SMITH, Chevy Chase Country Club, Chevy Chase, Maryland:

Good morning, gentlemen. When James Thomas at first asked me to address this group this morning I was a little pleased and perplexed at the same time because - Why me? What do I have to say to bring to the attention of golf course superintendents? They are out of my field. Certainly I am not going to undertake to teach you fellows the technical aspects of your business and certainly I am not going to take a scientific approach to some of your problems. We are going to be here two days for an exchange of operation.

I'd like to say something that Galileo once said, "You can't teach a man anything; you can only help him to find it within himself." On another occasion he said, "Lend them a little faith until they have time to accumulate some of their own." That phrase applies to me this morning.

Let me say, I come to teach, not to talk. Lend me a little faith until I have time to accumulate some faith in myself this morning for the task that lies before me.

Making a speech, is pretty much like having a baby, it is easy to conceive but hard to deliver. Talks are pretty much like ladies' clothing. There is the hat talk. A man comes in and his talk is full and flowery and touches on everything. There is the hoop-skirt talk. It goes around and around and around and seldom touches the talk. There is a brassiere talk. This is dainty, brief, strong, and manages to cover the main point very effectively. I'd like to stay with the latter talk if I can.

Let's see if we can get down to a little business. Business, as far as I am concerned, is human business and, as a last resort, we are going to accomplish our successes through other people and therefore people become a prime interest to us. Our viewpoint is most important before we start on any task or assignment given to us.

One thing I'd like to make very clear; to the man that hasn't met you, you're nobody. And so the attitude that you take in that first contact is going to set up a series of reactions with the people that you are going to deal with. You can be an entirely negative individual with the whole thing. You know some of the people that are that way. Their feeling is that everybody is out of step but me.

Then you have the positive approach. You have heard some people say, "Don't worry about it; you can't get out of this world alive." I will propose a more positive approach to the matter than that.

You have heard the cigarette ad, "A thinking man's filter". There is a paraphrase to it, which goes like this, "Think like a man of action and act like a man of thought". Or, to say it another way, "To have that certain something, you must have something certain."

And still another positive approach that says it very well, "The shadow is always behind the man who walks toward the light". These are nothing more than positive approaches to the job that we have at hand.

So let's be positive and be active. I firmly believe there is no reason for you or I to commit moral suicide because somebody else lacks

imagination and perspective.

We have a big job to do. If we are going to do it daily, we are going to have to do it right, if we are going to keep the job. It involves good imagination from a lot of people from all walks of life. To do the big job we must first sell ourselves. You can't sell anything if you don't know the product you are selling. This product is you.

For a moment, I'd like to suggest answers to questions that I'd like to place before you. Are you approachable? That is, can you be talked to? Are you popular? You say, what makes a popular person? From my observation of the popular person, he is one who holds out a great promise and still is capable of making come true the worthwhile achievements from those people for whom he works. Are your manners all they might be? Are you indifferent? It could be that being indifferent makes us indefinite too. Are you inclined to take yourself too seriously? Do you jump at conclusions before you learn the whole story? Are you satisfied with your lot? Nothing destroys like dissatisfaction.

Now if you are really convinced that you like what you are doing, that you want to be a golf course superintendent, and that you want to do that job well, then you must accomplish your success primarily through other people.

Let's get down to business and start selling you and your job. Now, to whom must you sell yourself? Well, first to the club manager. Why? Because he is politically important to you. He is in on the know. He has the most regular contact with the official club family. He, or his office, maintains your records, your company's records and your pay roll records. You can't avoid him so let's win him over. That is a pretty easy job.

The club manager, if he is doing a job well, he is spending a lot of time. So much so that his own personal life pretty well boosts aside his club job, and his home becomes uppermost of importance.

With that type of reasoning, it makes a very simple thing to approach him. You might approach him from the basis of giving him a little advice on his home lawn. You might offer him a pruning shear or a special tool. You can offer him some help or you might suggest some if he comes by and picks up the tools in his car. Stop in his office and chat with him. Just say hello and what's cooking? You might offer your aid in special events such as cutting down the Christmas tree. Offer the club member the truck. Rope off the area where the fireworks are going to be held.

These are things that you are going to have. Why not take the initiative? Think it over and be gracious about the work that is going to be done, but this is an approach that could be put into effect with the club manager with whom you are working.

This isn't a one-way street, not in any sense of the word. The club manager is a very human person. He is going to reciprocate with information you'd like to have. Perhaps, information about the committeemen that you are working with, the board members, to help on vacation schedules, perhaps some additional school problems, particularly when you want to ask for some more information.

The manager attends the board meetings, he knows the temper of the board. He is in a position to help promote superintendent plans, the accounting costs, inventories. All of that information can be passed along. Also, advance notice of

outdoor events, especially golf events because they are going to start first in the committee and then move on to the manager and the grounds superintendent. This interchange between the superintendent and manager will soon develop a whole series of beneficial, mutually beneficial items.

For example, the superintendent sees that the leaves are cleaned up and the parking area is swept on the day of the board meeting. The manager's office is going to be happy about it because as managers we'd like to have the house in tiptop shape. Also, the manager is going to see to it that he doesn't plan an egg hunt the day after the superintendent has set out all the Easter flowers.

The superintendent, in turn, makes sure that there is no grass seeding done on the day of large lawn parties. No matter how hard you try to keep the swimming pool area neat and clean--unless the superintendent is backing him up with some background information, it's still not as nice as it could be. No clearance should be done on the day of the holiday parties.

On the other hand, if information can be passed along from the superintendent to the manager on how the caddies are behaving while they are on the course, it is a great help for the manager to have the liaison with the caddy master, to help the situations which are not right. The general landscaping that is done around the grounds is very important to the manager.

We have a lot of visiting firemen, I mean, visiting club managers, prospective members. When we take them on the tour of the clubhouses and grounds, it is very comforting to know that they are in first-class condition. These are things, again,

that are of mutual benefit to both the superintendent and to the manager.

Well, now that we have sweetened up the manager a bit and we found out how they can have beneficial information in work between the superintendent and the manager. Let's work on the grounds, and with the golf committee.

First, I suggest that you offer to attend the committee meetings as a polite gesture when the committee is first formed, but there is a very strong second suggestion.

I'd suggest you get the idea across that you'd like to have the information come from the chairman and committee. Then I think you should indicate as quickly as you can to the chairman and to the committeemen individually, if necessary, these things.

I am thinking now about each year when we get a new committee. You have a new committee. You offer to attend the meetings. You hope the information will come directly from the chairman, and you want to let them know about your past performance.

Remember what I said when I first started, "To the man that hasn't met you, you are nobody." Let's meet him. Let him know what your past performance has been. Let him know what the status of your staff has been, what your hopes and aspirations are for the club and grounds, the limitations that are imposed upon you by policy, perhaps what you can buy. It has to become a committee matter. How many people you are going to hire. How much you will be paying before it becomes a committee matter. Certainly, not the least of these things is the condition of your equipment.

Then I would find out from the golf shop if you don't already know it, if your committeemen play golf. And then I would plan to be around. I would plan to be seen often, but for the most part, just out of voice range.

Now, why do you see most committeemen? Your work has a high degree of mystery and romance in it. It amazes them. It is something they haven't done. It is something that they don't quite understand, and so why spoil it? Let's keep the mystery and romance in there.

Then, keep records, lots of records. Committees love records. Keep all sorts of records, whether you think they are important this particular year or particular season or not. For example, how much white sand went into the south trap? How much it costs to put the single bridge in that goes across No. 14? Things like that seem rather inconsequential at the moment.

The committees love to develop facts and figures, which makes this particular committee accomplish a lot in the club organization. They are going to come back to you for records. Let's keep a lot of them on the lawn.

It is only common sense to plug the things that are great. Fertilizers and chemicals are important to an attractive lawn. Let's talk about the tractor and the mower. That is good common sense.

Avoid misunderstanding if it is at all possible. Avoid misunderstandings with the committee that you are going to be working with. Misunderstandings create more work, more grief, more headaches. As a matter of fact, let me tell you a little happening I had this morning.

I stopped at a filling station, and a rather agitated woman was there. She was asking for everything. She wanted her antifreeze checked. She wanted her tires checked. There was an aged attendant doing the very best he could. He had his head down under the dashboard cleaning up the mess, and she was standing behind him and she said, "Do you have a restroom?" The little fellow who had his head down didn't understand what she said. He thought she said, "whiskbroom". He said, "No, I ain't, but if you wait a minute, I will take you over the air hose and we will blow it out." Let's try to avoid misunderstandings.

Now, to membership relations. This is a bit different. Membership relations, you are talking about a group reaction. You are talking about a very highly stylized self-satisfied group of people who are flatteringly calling themselves "golfers".

I realize that many dress as though they were clowns in the circus and some behave even worse. From the clubhouse view, many of them look like animated ditch diggers. But, again, there are a lot of them--bless their hearts--they are truly jewels, be that as it may, they are your members and my members. We have got to sell ourselves and our job to them, but there are many times in handling a group, the best "sell" is an indirect "sell".

Let me draw an analogy, if I can go back to my filling station episode for just a minute. When you go to the station, is it just gas alone that you expect? I think not. You expect the attendant to check your battery and your antifreeze, and do a multitude of little services. The members expect the same thing of you at the golf course.

One of the best methods of selling you on the job without having them demand it first--for example, rain shelters, see that they are kept clean at all times. Possibly, a rack for wet shoes, an appropriate place--the landscaping, the ladies' room, make sure that there are sturdy steps around inclines, the trash recourse, water fountains, if it is there, see that it really works, and ball cleaners that work properly. But these are indirect services, these are extras. These are things that members expect. Many of them aren't going to say a word, a few of them will accept them and let it go at that. All of them will let you know that you are. All of them will sell you even though your presence isn't there.

Finally, I would like to say you must use applied psychology. For example, if there is something bad to say, for instance, the course is closed--no golf today. Post a sign. If there is something nice to say, tell the person; it works. Smile and possess a ready attitude of a positive approach to your work. Be friendly.

As a matter of fact, I'd like to read a very short verse. I think it says much to managers and superintendents on this particular subject. Its title is, "It Shows In Your Face".

It shows in your face.
You don't have to tell how much you live
each day.
You don't have to say, do you work or play?
A tried and true barometer serves that free.
However you live you would show in your face.
The faults and the deceits will not stay
inside where it first got its start,
For sinew and blood are a thin veil of lace.
What you wear in your heart you wear on your
face.

If your life is unselfish, if for others
you live,
For it is not what you get but how much
you can give.
If you live close to God and his infinite
grace,
You don't have to tell, it shows in your
face.

So let's smile, let's be happy, be positive.
Be willing to smile and render a service.

So, gentlemen, this is one manager's
opinion. Very specific human relationships are
very essential.

In closing, let me relate one last story
which I think sums up the plea that I make this
morning. The title is, "And Together They Might
Work".

The story regards a fine old farm couple,
very capable fishing folks, but both of them a wee
bit stubborn. The old gentleman came in from the
field one day without a word to say. His wife
prepared dinner and they ate without a word to say.
They retired without a word to say.

The next morning he arose, had his break-
fast and went to the field. Again, not a word passed
between them. A little later in the morning he came
in and changed his clothes, and he announced, "I'm
going to town." She said, "I'm going too." So they
hitched up the horses, climbed up on the wagon, and
started into town.

They sat there in silence. They watched
the smooth effortless effect of the rippling muscles
on the back of the horses. They went across the land,

forged up and down the hills, and across the muddy zones. Finally the old man was prone to say, "Why can't we pull like those horses do? Why can't we be a team?" The old lady thought for a moment, and then she answered, "We could if there was but one tongue between us."

Gentlemen, that is my appeal, one tongue, unity, mutual understanding--you name it--but that thing which causes superintendents and managers to act together, to serve better their members and their courses.

Thank you. It has been a privilege to be here.

GOLF ADVANCEMENT

MR. HERB GRAFFIS, Editor, Golfdom Magazine:

Gentlemen, we have just heard some history. Charlie, every fellow in this room has heard a lot of talks about the manager and the superintendent. That they should be playmates and teammates, but yours is the only one that I have heard in 209 years of listening to them that has kept me awake, and it has been very specific and it shows an acute realization of the realities--the minute you remind the boys that the records are kept in the clubhouse--so let's be pals.

You reminded them that the records are kept in the clubhouse, which accounts for a lot of the curious records on golf course maintenance, and when they have looked at the costs and found the swimming pool, bath towels and everything else in the cost of golf course maintenance, they are going to have your remarks to confirm it the real hard way.

At least, as a reporter that has heard a lot of managers speak on the subject, you have finally made the talk that gets right down to what makes sense, and that is more money.

Now, we have heard Mr. Smith talk about the relationship with the men. I will go into the market end of it because we are all in a marketing business. In doing it, I would say, to look at the superintendents' achievements, you are doing a marketing job in a very successful way because the growth of golf has been more substantial than that of any other sport comparatively, although boating, of course, is still the big growing sport.

This Spring will see more than 6,000 golf courses in the United States being played by more than four and a half million golfers. Now, we consider a golfer as somebody who plays ten or more times a year. That is a given figure that we more or less arbitrarily decided on as indicated by somebody who means something to the market.

These golfers will spend considerably over a half billion dollars--probably about three-quarters of a billion dollars--in pursuit of happiness at golf courses.

The strictly golf percentage of this spending--the spending for course maintenance, playing equipment and caddie fees--will be much less than half the cost of playing golf.

Obviously our game of golf is a big business. Its growth, its present situation, its trend and future are matters that control our individual plans but it is difficult for any of us to get an accurate picture of our business for the reason that the figures about the golf business are

so frequently inaccurate.

I have heard, as you have heard, that there are 10,000,000 golfers and, of course, that is not so; there is not nearly that many, except about 9,000,000 of them that show up on the day that you don't expect them.

Few of us ever really know what the score is in golf as a business. And strange to say, conspicuous among those who know the least about what the score really is in golf as a business, are highly successful businessmen who are officers of golf clubs.

The private golf club is a durable institution to be able to survive the errors of policy and operation that would soon wreck a substantial private business.

Every superintendent, every manager, and every professional has received orders from Ohio after committee meetings that he knows are going to be very expensive and contrary to his own experience and judgment, but they come from these successful businessmen, and he has to carry them out, and that frequently accounts for the extravagancies in running golf courses.

All of you fellows are acquainted with the costs of making revisions on the course because some chairman or some committeeman insisted on them being made. In a few years later somebody else makes the same sort of a costly revision. They wouldn't do that in a private operation, but they will invariably do it on golf courses. Invariably, you get some place like Pine Valley where they let it stay pretty well, and don't keep fooling around with it.

In the past 12 years there has been a 24 percent increase in the number of public and semipublic golf courses, but the private courses have just about held their own, notwithstanding the fact that between 10 and 20 percent of the courses built each year of the past five have been private clubs that are elements of real estate developments bordering the courses. That is the big thing now and it is not particularly new because of the great golf courses, some of them were part of a real estate development. One I can recall is the Garden City Golf Course, which was back in the nineties. There are a great number of them that have been in the association of golf real estate operations.

Taxation and irresistibly high offers for older private club property to be converted into residential and commercial areas has accounted for the loss of a number of courses.

Highway building also has been a factor in the destruction of golf courses, other recreation areas and attractive suburban sites. The highways figuring in this destruction will be out-of-date in ten years but the damage will be permanent.

With a strong and opulent lobby and powerful political connections, the highway operations, instead of making courses more convenient are cutting up the courses, and it does not seem that the recreation and esthetic values and potentialities of the countryside can be protected from this ruthless, mercenary attack.

The private club situation shows points that need study and corrective action. In fact, they are overdue for attention. The cost of private

club membership is dangerously high considering the tax picture, and the average age of members.

This Spring the private clubs will be fewer than 3,100 of the total of about 6,050 courses of all classes. Of these private clubs more than half are nine hole golf courses.

That leaves a few over 1,500 private eighteen hole or larger clubs of the character that might be expected to provide a golf course superintendent with the sort of a job that a first-class experienced man must have to keep him in the business of golf course management, or hold forth promise of earnings that would attract desirable young men to this business.

In the past 12 years while the population of the United States has been increasing about 20 percent, the number of municipal courses has increased a little bit less--about 18 percent.

The big increase--from 1,076 to 2,047--almost double--in the past 12 years has been in the privately owned daily fee courses where businessmen are getting into it, and they are making money out of it. Some of these are tied in with real estate operations involving the sale of bordering homesites on the basis of their location with a golf course as the front yard.

Incidentally, that development, I have seen in some cases as having a favorable influence on the earning capacity of superintendents, and it's giving more trouble too, because some of these more advanced deals are having lawn construction and maintenance and particularly the estate deals as a part of the purchase of property.

What the increasing number of public golf courses will mean to superintendents' earnings is anybody's guess right now. As a general thing, municipalities, park systems and other public authorities are not notoriously for overburdening their workers with money.

However, I have noticed in the past several years a definite trend to raise the salaries of public course superintendents in recognition of work very ably done in maintaining courses under the severe handicap of the heavy wear that public courses get. The exhibition of good, efficient work in public service that municipal course maintenance often presents is excellent advertising for a political administration and as such, also deserves a reward.

The man in charge of golf course maintenance has developed through several stages. The greenkeeper pro stage, where he had to do almost everything--design and build the course, grow turf on it, maintain the course, make clubs, teach, and sell the equipment. Then there was the foreman stage where a man came up and took over a maintenance job that had become too much to handle correctly, along with pro duties. After that came the greenkeeper and the birth of a specialized, highly technical department of golf business, and now the superintendent who has to be a sound combination of executive and operating man.

A great many people in many businesses, including golf, are taking bows for market development that is primarily due to population increase.

Golf's decided growth during the past decade has been due to availability of more courses, to take care of the increase in the population or the

shift in population. In the South, as we all know, there has been quite a few pretty good courses put in the neighborhood of smaller towns as an attraction for industry.

There is a saying that to me is quite interesting. "Every year you always read something about the Government being fussier about expense accounts. In looking into city and suburban golf club memberships, well, one of the fringe benefits that is being offered to a lot of employees to get them into new areas is golf club memberships." And so, on one side there is a jaundice look being taken at golf club memberships. On the other side, you find it very definitely an attraction for business.

The National Golf Foundation--and Harry S. Eckoff knows of this. He is in charge of this territory--and most of you know that he is doing a marvelous job in helping people transform a wish for a new golf course into a reality.

The National Golf Foundation, the game's promotion bureau, financed mainly by makers of playing equipment, has worked wisely, vigorously and effectively in helping people transform their wish for a new golf course into a reality. This has meant a tremendous increase in the market for clubs, balls, bags, course maintenance equipment and supplies--and new jobs for superintendents, professionals and managers.

Incidentally, this furnishes competition for the best available personnel. I know of a number of cases, and you fellows know of more, where some new good layout, wanting to get a superintendent, has made offers for a man at present in a pretty fair job, and he's had his salary increased to keep him

there. That is the surest way of a superintendent getting the money that is really due him for his responsibilities and performances.

The Foundation's organization and stimulation of junior golf in collaboration with the PGA has introduced more than a million acolytes who have stayed playing golf. Possibly an equal number of juniors who promised to be active golfers haven't continued in the game because of the inconvenience of playing facilities, the unduly long time it takes to play and unnecessarily high costs.

Strange thing about that is that the family as it gets larger now, it is a tougher deal for a golfer, of course. The average man and his wife have three children. When they go out to play golf, it takes the whole day.

Furthermore, it takes really too much money at a private golf course to be the soundest sort of a deal. Unless the young man happens to be on an expense account--you know from your own experience, when you are away from a young family Saturday or Sunday there is going to be a "storm" at home. Now, that's a situation that has to be corrected in some way.

The one factor in it; I have referred to it, and that is the increasing age of the private club membership. The private club picture isn't as healthy as it should be because mainly the older, wealthier businessmen can afford private club memberships and they condone, if not encourage, wasteful operations and assessments that socially desirable younger people cannot afford. However, the profits of the golf courses are almost doomy, if you look at that situation in that light. And

then if you look with a happier eye at the list-- at the waiting list of golf courses--and never in the some years--never in the so many years that I have been in the golf course business--have golf clubs had the long waiting list that they now have.

Senior golf is having a tremendous boom. The seniors have money and time and spend both for golf. They are spending at their tournaments, according to an informed estimate, twice as much as the total of prize money on the pro tournament circuit.

The seniors, many men golfers of 50 years and older, will account for the higher percentage of new top quality golf club purchases than the proportion of their group to the total of golfers.

The seniors mainly are accountable for a new development in golf operations; the golf car. The richer the golf club or the more expensive the resort, the more golf cars there will be if topography of the course permits. There is no need to fight him any more. The superintendent might as well relax. If it is inevitable, it will do the best for him.

Car operation means more problems in course maintenance and the superintendent might as well get reconciled to that. There are numerous indications that the golf car problems would have been minimized if the superintendent had been brought into the picture quicker as a practical consultant.

Now, everybody in the golf car business and the club officials have taken a look at it by getting the newspapers to find out how to take care of this problem, what regulation changes or

what design changes may be needed to make car operations more satisfactory.

There still is the debate about having black-topped or other paths at the sides of fairways for golf cars. I have heard superintendents say these paths don't interfere with golf play and within a few minutes have seen shots bounce on the paths and go 50 yards out of line.

Golfers are more important than grass--even to golf course superintendents--so the superintendents will find the answers to the car traffic problems; all except the answer to the problem of the half-witted, selfish driver who is careless on golf courses just as he is on highways.

I suspect that the golf car eventually may be designed to answer its own problem. It may have spiking or aerifying devices on some wheels and still be able to carry the load of players and clubs. Maybe the car manufacturer will go into the golf car business.

I am sure that there will be, before many years, a gas operated golf car that can be folded into the luggage compartment of a player's automobile, which can be setup to provide transportation on the course for a player and his clubs. This seems ridiculous. I have seen inventors' sketches and models of such devices, and they didn't look any more grotesque than the first golf car I ever saw.

Another phase of golf's advance that is meaning new problems and increased importance for the superintendent is the growth of women's golf. This year women probably will account for somewhere between 25 percent and 30 percent of the almost 90,000,000 rounds of golf that will be played in the United States.

The increase of women's golf has meant a rearrangement of schedules for course maintenance and an increase in costs. But thusfar, the women have meant proportionately fewer troubles for the superintendent than men have. That is, in most cases. Of course, in a few cases I have heard superintendents who have taken to drugs or drinks to get away from some gassy old broad that has got some complaint. Women, generally, are not the crybabies about rough and a temporarily bad green that men are. Incidentally, the worst crybabies about rough and greens are tournament professionals who don't pay one cent in dues to support the course they complain about.

In one of the early golf directories, published in the first decade of this century when there were about 1,000 golf clubs in the United States, I think that was about 1927, I noticed a number of clubs had women officers. That situation may return and I am not particularly alarmed about the prospect. Golf business could stand an improvement in its household management. Women have more time than men to give to club business. Certainly some of them might be nuisances, but aren't a number of men officials?

Incidentally, when Charlie was talking about the clubhouse grounds, I have noticed one little thing, that maybe it is significant--it is possible it isn't true--but the places that have the best maintained golf courses is where the superintendents get the most salaries; those are the places that are the neatest. You can go into the place and the housekeeping is marvelous, the minute you turn off the road. There is the kind of a guy that must drive superintendents nutty because a lot of golfers are slobs. It is the barometer of course ratings.

One advance in golf that I thought I would be seeing right about now hasn't materialized as much as I hoped it would. With all the new construction of courses--311 regulation new courses and enlargements from nine to eighteen holes in 1959--I thought the standard of construction would be higher. Everybody in the business has learned that a good part of the mystery is the result of bad construction in the old days.

And the weather--with good construction you can offset a good part of the weather.

Some guy goes out to build a golf course now. He has to work with an economical price. They have done that since golf started in this country. If the price is so low that the guy has to take a cut, the green construction, then he is sure laying up a headache for some guy in 20 to 25 years for now we see that the original bad construction has to be done over, and a lot of it was just somebody's good idea of something that didn't turn out to be sound.

We all know that false economies to produce the winning low bid figured in a lot of golf course construction 25 to 35 years ago. That bad construction and the immense increase in traffic with resulting compaction and wear are a combination that has raised hell for superintendents in the past few years.

It used to be that the golf courses were just like churches. They get big business over the week end, maybe one prayer meeting a day, but now even on Monday there is pretty fair play on private clubs. Tuesday, Women's Day; Wednesday, the doctors are out; Thursday, there is usually some groups out; Friday,

the women get back again; in fact, the women are on the courses all of the time; every time they can get there. Saturday and Sunday, you get headaches. So you are running practically an airport traffic. You are still, however, having the problem of the aftermath of mistakes in construction. I don't see that too many of them are being avoided in the construction that is now going on.

I have talked to architects and builders and they said that \$25,000.00 would give them a chance to do so much more on the whole course, but they just can't get it. A lot of these golf courses are going in where the fellows are trying to use something instead of money.

So with this object lesson abounding in golf I thought there would be stronger insistence on higher standards of construction than I have seen in evidence at a number of places. In some of the jobs \$5,000.00 would be the difference between eighteen greens that would be first-class and eighteen greens that are going to be expensive to maintain and never will be consistently good.

The greatest advance in golf has been the extension of practical science. Between the research fellows and the progressive, scholarly superintendents the standard of course maintenance has been raised so high that it keeps the superintendent constantly in peril. You are never going to like that because the better you make your course, the more they are going to expect.

Some players I have seen--I guess they were going around in 100 par--and they would scream about two lousy greens where they missed desired six foot putts that might have got them 300 par. That is what

you are up against in your business. So, you just simply can't win a lot of times.

The value of this collaboration of the superintendents, the field and laboratory research men and the manufacturers' experts has been of infinite value to golfers and club officials; very few of whom have the slightest idea of what is being done for them by the authorities in golf turf development and maintenance. Charlie brought that one out, that the guy that doesn't know you, you are really an unknown.

And the next advance and one that is already started is the job of making the superintendent's achievements better known to the players. They just go out and take the courses as a mere matter of course. I think in the Mid-Atlantic I have seen the greatest thing that has happened in the application of this service.

I don't know whether you are continuing those visits to clubs and reporting on them as you have done in previous years. I used to get those over every month, and they would take them around, when talking to club officials, and say, "Well, here is what happened in one section." And these men, a lot of the fellows that have big plans said, "They wished to God they could get something like that going in their own business where they could get other plan superintendents to come around and look over their place and make suggestions."

And one great thing about that Mid-Atlantic operation was the attitude that the other fellows had. I think the older fellows in this business can recall very clearly the day when the superintendent didn't want anybody else coming on his course and telling him what might be wrong because the guy thought most of the

time that the visitor was looking for his job, for he would say, "Why doesn't he stay home and take care of his own damn job?" You know that type of attitude. Some fellows have a really sound, helpful, scientific attitude.

Scott Valentine and all the older guys remember when if you saw another superintendent on the course, he was over to borrow some equipment or he was up to no good. Now that has changed considerably. This factor between the University of Maryland Fellows, the green section, the manufacturers' men and the superintendent has been a unique thing in golf.

There is no way of definitely comparing the standards of golf courses today with those of 25 years ago. But, offhand, gentlemen, from my observation, I would suggest that the standards of golf courses has improved a whole lot more than the standards of play, which is an indication of the success of superintendents' work.

Now, you have advanced to this point and just, I think, generally, touched on it, and Charlie touched on it here, that the superintendent now is being recognized as a fellow who is a human being, and whose work determines the success and the profit of the operations in every other department of the club.

If the course is in good shape you get a lot of bar business and a lot of restaurant business. Incidentally, there is a lot more meals sold and a whole lot more rounds of drinks at the bar than there are rounds of golf at the golf course. But if the golf course is in good shape, you get a lot of house business. The pro shop gets a lot of good business.

If by the act of God or man is what puts the golf course in a lousy shape, there are not going to be the good bunch of spending drunks standing at the bar. Namely, there will not be any Charlie Smiths to spend their money there, and there would not be any money to enable the pro to pay his bills and get himself another Cadillac. So you are the basic guys. But, substantially, as that advance has been made, there has been a little reminder.

Last year I noticed in talking with a lot of fellows, the young, old, and medium smart guys, that they cannot escape the simplest things in this search to get some scientific thing that will be a great answer.

Even the little things--a guy was talking to me, he said that he was having trouble with a green and thought it might be air circulation. He just happened to think as to how long it had been since he cut down some trees and some shrubbery. He said that he just happened to have some records, and he went back and found it had been 11 years. He said, "No wonder the same trouble we had before was coming back." Eleven years passes like a couple of days when a fellow is busy on the golf course.

Another thing that I have seen this year or heard rather, from a lot of very successful and lucky guys--I admit they are lucky in this business, superintendent business--and one that is the simplest thing in the world, and that is accurate measurements and one you are talking about--how committees like records.

The measurements of the areas of greens, tests, traps, fairways--in golf courses accurate

measurements just don't exist in a lot of places because, in the first place, the superintendent seldom has time to have them made. Now, I think there has been a great improvement in that because of the more extensive use of chemical treatments. A guy can't guess too much any more.

But here is another thing that popped up this year that all of you fellows know better than I do, and that is about the directions on the label. Some fellows have told me that in so many cases where they have good luck in avoiding misery, that preventive treatment was applied heavier than the directions recommended. There was apparently in the manufacturers' recommendations and in the users' practices, generally, overemphasis on economy. That overemphasis was disregarded by the men who spent a little more but were lucky enough and got what their members wanted. Of course, on this, not being a technical man, I mention this with fear.

I want to repeat that I am not qualified, and certainly don't want to urge anyone to make a practice of exceeding manufacturers' recommendations.

I am passing along this information from those older fellows that have experimented quickly or have taken a chance successfully. Excessive preventive works successfully in offsetting unusual adverse conditions.

It takes a man who can defeat disaster under adverse conditions to hold a superintendent's job. Any bum can run a golf course if God is with him all of the time and nature smiles on him. When things are tough, it takes a real superintendent to run it. It always has and it always will be that way, regardless of any glorious degree of advance

that the business may make.

Thank you, gentlemen.

SOIL TESTING FOR TURFGRASSES

DR. JAMES R. MILLER, University of Maryland:

Let us discuss the essential elements required by plants. Nitrogen, phosphate and potash are referred to as the major plant food elements. You buy them as commercial fertilizers every year. A Bluegrass turf will take up during the growing season about 39 pounds of nitrogen, 15 pounds of phosphate and 45 pounds of potash.

Secondary elements are calcium, magnesium and sulfur. Calcium and magnesium may be supplied through limestone. Also, there is a certain amount of calcium in the fertilizer as an impurity. For example, phosphate is supplied through your calcium phosphate. So, you will get a certain amount of calcium in the fertilizer as such. Sulfur also comes as an impurity, so to speak, in the fertilizer. Of course, it is essential to plant growth. For example, superphosphate contains about 11 percent sulfur. So, when you combine all of your analysis of fertilizers, you get these materials in them.

To get back to Bluegrass turf, remember it contains 14 pounds of calcium, 5 pounds of magnesium and 4 pounds of sulfur. This is a calcium, magnesium oxide removal. The amount removed is not as large, and often these materials are not as much of a problem becoming deficient, but occasionally they do show up.

The last group here are referred to as trace or minor elements. The reason they are referred to as "trace" elements is for the reason that it doesn't take much to grow a plant. In Bluegrass turf, zinc only removed .06 elements of a pound, copper .02 and manganese .23.

So we have in the trace or minor; iron, zinc, copper, boron, manganese and molybdenum.

I think this is important to you men that are using fertilizers to know a little bit as to what happens to them when they are applied on a soil. We have this real fancy term we use, "Exchange Capacity", that the soil chemists like to use. This means nothing more than the building of the soil to hold clay content. To break it down a little further, we mean, to hold plant food. Some soils will hold more plant food than others.

What is the material in the soil that is responsible for holding the plant food and the lime? It is clay content and the organic matter. These are the two materials that hold the plant food that is added to the soil. And, of course, the more clay you have in the material, the more organic matter, the more fertilizer it can hold. Yet, too much of these materials, too high clay content can cause a poor condition of the soil, and you cannot expect this poor soil content to hold the plant nutrient.

Let's take one of these clay particles. They are in various shapes, such as the thick and triangle shapes that we have here. Let us visualize one clay particle. This clay is charged with the negative charge here; in other words, on the surface. Now, what happens when we add fertilizer to this material? Well, for example, let us start out with

potassium, or let us call it potash, which is K_2O . This has a plus charge. When you add potash to the soil it can be held.

Another element is calcium. It, too, has a plus charge. It can hook onto the soil and hold.

Magnesium is another one having a plus charge. These two, of course, are added in the lime.

Then we have hydrogen. Of course, this is nothing more than the material that causes the acid in the soil. Most of our soils have some acid in them.

These materials are all charged so they will all hold the clay. What happened about the phosphate? Well, phosphate is held differently. It is held as what we call a precipitation. It is held as iron and aluminum phosphate, and it is held tightly in the soil. It is a matter of a chemical precipitation in the soil. The more acid in the soil, the more iron.

The ability of soil to hold nitrogen depends upon the form of nitrogen. Ammonium nitrogen has a plus charge and is held by soil. When soils are warm and moist, soil bacteria act on forms of nitrogen such as ammonium and organic matter, changing them to nitrates, these nitrates having a negative charge do not combine with soil which also has a negative charge.

The plant uses nitrates but often not fast enough and as additional water moves in and through the soil, it takes the unattached nitrates down and away from the roots of the plant. This is known as leaching. Therefore, any nitrate form of fertilizer remains in the soil a comparatively short time if soils temperature is 80 degrees or higher.

Selecting Samples

With a new soil uncovered, get sample from top six inches. For a soil covered with turfgrasses, the top three inches may be used for sampling. Past treatment and color of the soil enter into sampling soils. Be sure the sample is a representative of each area to be tested.

Slides illustrated how tests for acidity, phosphorous, potash and soluble salts are made in the laboratory.

Lime supplies calcium or calcium and magnesium, depending upon the form of lime that you used. As I mentioned, some of our soils are low in magnesium and a high magnesium lime is necessary. In addition to supplying calcium and magnesium, lime also increases the availability of the plant food in the soil, especially phosphorus. This is very important. It also increases the availability of nitrogen in some of your other elements.

Another importance of lime is the fact that it is necessary for the breakdown of the organic matter, so that the elements become available again to the plant that you are growing.

Now, there are various forms of lime that can be used. There is burnt lime, hydrated lime and ground limestone. Now, the burnt and hydrated lime will react somewhat faster in the soil. However, on top pressing treatment on a turf that has been established, burnt lime and hydrated lime can occasionally cause burning. In other words, they are more soluble. It can cause burning. Ground limestone, in most cases, will react fast enough

without raising the soil's acidity to give the result you want. However, when buying limestone, you want to make sure that you get lime of the proper fineness. In other words, if it is a coarse material, it is not going to react when it is applied to the soil. So, we feel that when purchasing limestone, you should get a material that 100 percent will pass a 20 inch mesh and about 50 percent to 100 inch mesh.

The next slide will show the importance of bringing the feedings of the soil up. I realize that there are a lot of curves here. Let us look at the soil PH. This is the soil PH on this axis and this is the number of wheats after applying the lime. Now, the original PH was at 5. You will note with the 20 mesh material that after six weeks the PH is hardly brought up any at all, about 5.4. You see, with 20 mesh material it does not react too fast.

However, with 100 mesh material you can see that the reaction of the ground to the limestone is almost immediate. So to get reaction of the lime with the soil, to neutralize acidity, you have to have the proper fineness.

Now, we were discussing the availability of the nutrients. You will note the change in PH going from PH-4 up to 8. Now, the width that is noted here indicates the amount of availability. In other words, at the narrow end here the material is not nearly as available as it is up in this right.

Let us take a look at nitrogen. You will note in this change, 6 to 7, that the nitrogen is quite available. Potassium, the same is true. Magnesium, calcium, phosphorus; note here at PH-5 how the availability of phosphorus drops. The

availability increases with PH. This is the reason why there can be a problem with trace elements at times. In other words, you can get into the range of seven and a half, and you can get into a deficiency; poor iron and manganese and some of the other elements. Too much lime can do as much harm as not enough. So, it is very important to get your PH up to the range of six to six and a half. The optimum range is six to six and a half. It is true that some of your grass will grow lower. The total earth's acid is PH-5. As a matter of fact, the turf produced is not too great.

Next. I realize that you wouldn't grow orchard areas in a turf mixture, but this points out very readily what you will get with lime. The same will hold true with Bluegrass. For example, this is no lime matter. This is with a PH of 5.3. This is with a PH of six, and with a PH of six to seven. This work was conducted at Pennsylvania and it shows the amount of growth that you get with different PH levels.

Now, here are some samples that were sent to us last year to the soil testing laboratory. These samples were from one Montgomery County, which is near us at the University there, and it is the summary of the PH readings for soils from lawns to be planted, and established lawns.

In other words, these were both started out with a lawn from scratch. These were from lawns that were already established. Now, in this case, this represents an average of 50 lawns, and this represents an average of some 308.

In other words, we can get a pretty good picture in this one county alone for the trend for

lime. Let us note, on the lawns to be established we had 11 percent in the range of three and a half to five. From 5.1 to 6 we had 57 percent. Just note here; we had some total of 68 percent of the samples sent to us that needed lime. In the range of 6.1 to 6.5 where we feel that we want to get the PH up to this level, we had 25 percent.

Now, once the lawns were standard, the situation was not quite as bad but there was still a need for lime--some 58 percent of the soils, although the PH was low, a PH of six. This represents quite a number of lawns, over 300. It is that much in Maryland. We do have a few that are above 6.8.

Next slide. Now, what are the PH readings for fairways, greens and tees in the test samples that are sent to us? This is the summary for last year's results. This represented, I believe, about 140 and this one was in the range of 40 samples. It does give us a trend. Now, in the low PH-6 we had 55 percent; 55 percent of the samples sent to us were below this range. Greens, 23 percent and tees, 33 percent. In other words, lime appears to still be an even rate manganese on your turf areas. We are just not using enough.

Next slide. Now, what are the amounts of lime recommended to bring this PH up to 6.5? That is what we feel is the optimum of PH. Well, as I mentioned earlier, this will depend upon the texture of the soil and from what area that is obtained in our State.

The loamy sands or sandy loams, of course, become a smaller amount of organic matter, a smaller amount of clay, and for this reason require less lime to bring the soil to PH-6.5 than the heavier soil.

Let us note, for example, if you sent a sample to us with PH-5.5, the amount of lime to bring it up to 70 percent will be five pounds. This amount is for the top six inches of soil. If it were for an established area we would recommend one-half of the amount. Actually, the amount does not move readily in the soil. You will only affect the top three inches.

Let us look at the heaviest soils. Here the amount recommended is 100 pounds. With a soil of a PH-5 and with a soil from the Piedmont and mountain area, about 200 pounds.

Now, a little bit about how we would apply this lime. If you were starting with a new area, it would be important that the lime be mixed with the entire top six to seven inches of soil, because lime does not move as readily as it does in the sandy loam soils. I will illustrate it in the next slide.

Here is some work that was conducted in Beltsville on a sandy loam soil. It shows with 40 inches of bleaching, which is a normal rainfall-- in Maryland we normally get around 40 to 50 inches. When limestone was applied in the treated area, after bleaching with 40 inches of water, we still had 77 percent of the limestone in the treated layer. Twenty-three percent had moved down to one inch below the treated area. Below this there was no lime.

This points out that within a year under the conditions in Maryland, you are going to get the lime to move about one inch to an inch and a half. This is why it is so important to fix the PH up into the entire topsoil when you are starting out with a new lawn or new golf greens.

Now, in the cases where we cannot--in other words, the area has been established--we did not take care of the PH. The best we can hope for is through top dressing in the application. You will get this movement of about one inch per year. With hydrated lime the movement is still a little greater but still not significantly greater over the limestone. It is essentially the same thing.

Next one. Now, this is a summary of the phosphate and potash soil test results for lawns to be planted and established lawns. Now, let us study the results for the phosphate. This is the percent of samples tested; low, medium, high and very high. In the new lawns we had 38 percent testing low; 40 in the medium; 6 in the high and 16 in the very high.

Now, let us take a look at the lawns that had been established for some time. You will note that we are getting a greater number up in this area. As I mentioned to you earlier, you can build phosphate up in the soil. It does not move. When you apply it, it stays where you put it. So, you can see what is happening here. We are getting a build-up over the level that we had additional in these other lawns.

What about potash? We had 25 percent low; 51 medium and so forth. Again, on the established lawns, keep in mind that this represents over 300 samples. We have the potash level also building up; only four percent testing low; 36 medium; 28 high and 32 very high. Potash can be built up somewhat in these soils.

Next one. Now, what is the significance of phosphate on fairways, greens and tees? Well,

we have some 46 percent of the samples in the low to medium category. In other words, we know that these areas need phosphate. For example, with the soil testing medium, the probability here of getting response is about 50 percent with turf.

Now, the greens. You will notice that we are getting a build-up of phosphate. With tests, this value here, of course, is based on an average of some 40 samples. So we have to note this with care. We have quite a few of our testings up in this upper range.

Next slide. This is a summary of the potash results. Now, you will note that we are getting some of our soils in this range. Let us first study the fairways and greens here. Here we are not getting a build-up of potash as we were with phosphate. For example, with the fairways we have 2, 25, 37 and 36. With the greens we have 40, 31, 12 and 17.

Now, I have studied soil test summaries that Dr. Daniel has worked up for the turf soils from the Midwest, and he has found very similar results for those soils there. He finds that the potash does not build up to as near a high level as the phosphate. Also, he has found that the potash in greens does not build up as rapidly as it does in the fairways. Of course, I think there is good reason for this.

In the case of the greens, you are often removing the clippings. Of course, the clippings are high in potash. For each 1,000 square feet during a season, you will remove about three pounds of potash. In the case of the fairways the clippings are not often removed so the potash returns to the

soil. So, this is the reason that you do not get as many falling in this range for the greens as you do with the fairways.

Now, with the test--this data is a little hard to explain. I want to bring out the fact that there were not a large number of samples involved here. So, you could get the results that you would want to not put a lot of confidence in.

Now, does that about complete it? Oh, we have one more shot yet. I just wanted to show this one to bring out the fact that a well rounded soil fertility program is important in producing good turf. Here is an area with no treatment. This is lime, molybdenum, potassium and phosphate. This is in the case of nitrogen, phosphate and potash. Here is lime, nitrogen and potassium. Lime, nitrogen and phosphate. This is not a good idea of giving good attention to one element but a matter of a well rounded program.

The factors I have pointed out here this morning have been the reactions of lime in the soil. I wanted to give you a few fundamentals that are involved here.

Thank you very much.

THE TURFGRASS PLOTS AT RUTGERS

DR. RALPH ENGEL, Rutgers University:

The turfgrass program in New Jersey began in the mid-twenties. Musgrave made the first plantings--some trial plots. Dr. H. B. Sprague followed with his enthusiastic interest and activity as head

of the Agronomy Department. Dr. E. E. Evaul was a graduate student during the early part of this period and became a full time turf worker by the early thirties. Dr. Longnecker was a graduate student during the thirties; following this he worked full time on turf until 1947 except for the war years. In those earlier years the New Jersey research program gave understanding of turf-grasses for our area and contributed classic information on the use of lime in turfgrass production. You will recall the benefits they demonstrated for liming:

1. Improved moisture conditions of well limed soils.
2. Better decay of organic residue with proper liming.
3. The slow penetration of lime on established turfgrass.

In other words, we have heard it said that a well limed soil is more draught or draft resistant, and Dr. Longnecker's work helped explain this. By the way, Dr. Miller was very much interested with your results of lime and potash, and I have summarized our results. I didn't publish them, but they follow your picture very closely. At the time I was rather chagrined at the various tees and lawns that needed seeding. I think we can stay with the fundamentals when we start to do some work with the turf grass here.

I came to New Jersey in the Summer of 1947. I worked research, teaching and extension in turf-grass management. Part of the funds for my salary came from golf course subscriptions until July, 1954. In the Spring of 1957, a full time extension specialist, Dr. Skogley was appointed, and I was assigned to full time research and teaching in turf-

grass. Last year we had our first full time position for turfgrass plot foreman. Thus, we have reached a stage where extension and the plot research program are no longer on a part time basis.

This may not seem like a Cinderella story, but we are thankful for our progress. It takes time to sell turfgrass as a commodity and then establish a program in the face of a major depression, a World War, and austerity programs with public money.

A few States have developed the mechanics of their turfgrass program more rapidly, but others are still looking for the start. We like to tell our story, not as an example, but to show progress can be had with continued planning and persistence.

Some of you have heard me tell or you have read of some more recent work that has occurred at New Jersey since World War II, wetting agent use with turf herbicides, potassium cyanate on Bluegrass turf, turfgrass cultivation, nitrogen carrier stimulation, and goosegrass control results have been given at your conference and various meetings. Today I wish to tell you of some more recent results.

Our nitrogen carrier studies have been continued. You will recall that at the National Meeting in Washington, we reported more uniform growth stimulation from repeat applications of ureaform than from an equivalent amount in a single application. Also, we found significantly less dollar spots with Milorganite than with equivalent amounts of other nitrogen carriers.

In other words, the type of nitrogen we use would not serve as a control but it is very interesting to find something like this. We know there are other things in nitrogen besides fertilizer.

We know what the effect would be if we could unscramble and find and determine, and tack down the side effects. Possibly we would have some base for a nice development in the future.

These results with ureaform and some field performance observations led us to take a deeper look at this type of nitrogen carrier--namely, the various fractions or contents. A preliminary step was comparing the short term stimulation from a single generous application of ureaform with a generous fertilizer program with a soluble carrier.

A single application of ureaform at eight pounds of N (20 pounds) per 1,000 square feet was compared with repeat applications of ureaform at a rate of three-quarters of a pound of N at two week intervals. Most men would shudder at this latter soluble fertilizer procedure during the warmer part of the season. This graph shows the ureaform was far more potent in stimulating growth during the first four weeks than the one and a half pounds of soluble nitrogen. Thus, we believe the 6, 8, 12 pounds of N type of ureaform fertilization can be heavy nitrogen feeding in the first four to six weeks.

I hadn't particularly thought of it that way, as distinctly, until we had this experience. How often it would occur, I don't know, but it happened to us this year.

An evaluation of the components found in ureaformaldehyde was conducted as a second phase of our study on these nitrogen carriers. The most insoluble fraction (slow portion) and a low solubility ureaform was observed for growth stimulation.

Note the great surge of growth that occurred at four weeks plus with these materials--even greater than we obtained with one and a half pounds of soluble nitrogen or the more soluble ureaformaldehyde. Some of you that are closer than I might have been to the slide might be able to show the low solubility. The ureaformaldehyde gave us a lower push than it did at that stage of the season. To us it shows the insoluble fraction of ureaformaldehyde can release with a wallop. Thus, the slow steady stimulation of the larger application of ureaform is not realized at all times.

Thus, where steady growth is desired with ureaform we suggest that it be used on a smaller repeat application basis. Until it is known with assurance that surges in growth can be avoided, the large application is too risky on turf situations where lushness may be fatal.

These remarks should not prevent recognition that ureaform can be applied in large, heavy, single applications with greater safety than most types of nitrogen carriers. In some cases, the more carefully controlled nitrogen level may not be essential. Where this procedure is desirable or tolerable it can be used.

Pre-emergence Crabgrass Control

Pre-emergence crabgrass control is destruction of crabgrass by chemicals applied prior to emergence which act on the crabgrass at or near the time of germination. This is the ideal method of control since it destroys the weed before it has time to harm the turf. This is not a new endeavor.

You will recall that on previous occasions we suggested that if you are using chlordane for grass,

you should apply this treatment before mid-April. In other words, time the chemical treatment with the germination period, especially for the lower rates of the period.

We have applied the arsenate of lead and it has been used by golf course superintendents for many years. Chlordane has been studied in varied degree for about eight years.

Calcium arsenate, while used in the past, has found revived interest in the past two years. Improved calcium arsenate preparations with lower content of soluble arsenic and less lime burn are partially responsible for the latter.

We first tested chlordane in 1955. Our results have been good and poor. We have best results when the chlordane is applied dry at a rate of 60 to 80 pounds per acre. We have had essentially no results with spray application. Also, we feel the application should be made in the last half of March in the New Jersey area. Before we recommend chlordane for general use, we would like to know conditions that insure consistent results.

Lead arsenate has been applied on a number of occasions at 20 to 25 pounds per 1,000 square feet. We have never had a high degree of control and we have had many failures with this treatment. We are not enthusiastic over its possibilities.

Calcium arsenate gave very good control in 1958. No readily apparent injury occurred even with rather high rates. We know that control and injury tends to fluctuate sharply with the phosphorus level and possibly other factors.

Dacthal and Zytron are two new pre-emergence crabgrass herbicides that appeared this past season. We had some very excellent results with both. We might get similar results on bent grass. We shouldn't look down on it until we have given it a try.

To sum up: Mid-April looks slightly better than August for application. I don't know how it would work out in your area, but there might be a similarity.

What is New Jersey's stand on pre-emergence for 1960? We will not recommend pre-emergence crabgrass control for general use for the coming year.

What will be the decisive factors in the pre-emergence crabgrass?

1. Predictable and consistently good control.
2. Injury to turfgrasses cannot be tolerated in general use. Grasses differ in tolerance. Bent and Poa annua are among the most sensitive.

Safety to turf is a major factor. We are dealing with potent chemicals that give control over a period of months. Most of these will have direct or indirect effects on the turfgrasses.

3. The chemical treatment must permit reseeding by the following September at the latest.

These are some of the factors that will help make our decision on general recommendation of pre-emergence crabgrass control.

Season of Fertilization on Zoysia

We found that zoysia was difficult to establish on some sites in New Jersey and at the same time we observed that season of fertilization had pronounced influence on zoysia development.

We established a mixed planting of Meyer zoysia and Merion Bluegrass in 1951 and 1952. A complete fertilizer has been used at rates that give 0 to 6 pounds of nitrogen per 1,000 square feet at different seasons.

Our data from this study of zoysia Bluegrass fertilization shows:

1. September-October appears to be the best time to fertilize Kentucky Bluegrass.
2. Fertilizer has not greatly enhanced zoysia establishment at our location.
3. If benefit is obtained from zoysia fertilization, mid-spring to early summer appears best.

EFFECT OF PRE-EMERGENCY CHEMICALS ON THE GERMINATION AND GROWTH OF TURFGRASSES

DR. FELIX V. JUSKA, U. S. Department of Agriculture, Beltsville, Maryland:

My particular interest has been not so much in the control of crabgrass as to the effect some of the chemicals may have on the seedling grasses. For instance, reports have come up or people may have used some of the chemicals and then seeded turf species two or three months or four months later and did not obtain a stand. Of course, it could be due to weather or some other condition.

But the two experiments I am reporting on are based to see if we can determine how long some of the chemicals will be toxic.

A Greenhouse Experiment

Thirty-four flats and seven chemicals were used. Some were applied at different rates. Soil was high in organic matter, had a PH-6.1, and it was high in phosphorus and potash.

Among the chemicals were chlordane, calcium arsenate, arsenate of lead, fenac (2,3,6-trichlorophenylacetic), chlordane plus lead, a commercial arsenical (Pax). We also included D.M.A., the post-emergence chemical. The reason for that being that we had many inquiries come in about it. I spread D.M.A. on the crabgrass. When using D.M.A. you see it immediately.

Also, chlordane on vermiculite (Halts) were applied to the soil surface at several different rates and also at rates recommended by the manufacturer. The grasses that were used were Kentucky Bluegrass, Poa annua. We seeded crabgrass which wouldn't germinate for us. In the last two months Bent grass was included.

Bent grass and Bluegrass behaved very similarly under greenhouse conditions as did the Poa annua.

To try to substantiate; many of you folks have seen this experiment on the field. We setup another study in the field, and in this case we included the two new chemicals, or three chemicals in this case; a product by the Lilly Pharmaceutical Company; the Dacthal--I will not try to pronounce these names--by the Diamond Alkali; and Dow product,

Zytron. To broaden the scope of the number of grasses that we used, we included Merion, Poa annua, crabgrass (which didn't germinate), red fescue, Bent grass, and tall fescue. Those were the seeded species. Of the vegetated we used U-3 Bermuda, Zoysia and Arlington Bent grass.

Slide. Greenhouse work. On the left, labeled "No. 1" is a flat containing the check and on your right is a treatment--40 pounds of arsenate of lead per thousand square feet - quite a heavy dose. The two grasses on the inside, between the two flats, are Bluegrass, and the next one would be Poa annua. Bluegrass...Poa annua; Bluegrass...Poa annua. You will note the 40 pounds of arsenate of lead held back the Bluegrass. It is difficult to tell the check plants from the treated plants with respect to arsenate of lead. It didn't seem to have very much effect in inhibiting the germination.

The same setup again. In this case we have D.M.A., zoysia, calcium arsenate. Bluegrass here--Bluegrass here. You will notice very little injury.

I should remark at this time that these plantings were made immediately after the chemicals were applied and then at monthly intervals for four months. This would be the second planting. This is our comparison with D.M.A. and calcium arsenate. This is calcium arsenate at 12 pounds per thousand square feet.

You will notice that in the second row Poa annua had turned yellow and then died. Later on, you will notice we are getting recovery and the injury is not so severe.

Next slide. This one is the commercial arsenical. You will notice that we have a reduction in the stand of Bluegrass. In the first planting Poa annua came up, turned yellow and died. As the arsenical became more active, the second planting is just up and turning yellow will die. Here are the plantings - the second planting - the second month turning yellow, and by the end of the experiment they will die. In order to get our data, we made one and found out some of the plants did die and discarded those. And then we made another one and found some of the plants that did not die, and we used those at the end of our experiment to obtain our data.

Next slide. Chlordane. For some reason chlordane is quite specific for Bluegrass and Bent grass. Notice the Bluegrass and Bent grass and the germination. This is the first planting immediately after the chemical was applied. We do have some coming up here. As time went on, under greenhouse conditions, we didn't get as much improvement as we'd like with chlordane treatment. Very little effect on the germination of red and tall fescue.

Next slide. This is an experimental chemical, rather hot. As you can see, the grass has germinated and turned yellow and soon died. This is the fenac that I mentioned previously, four pounds per acre.

Next slide. This data is for Bluegrass planted under greenhouse conditions, and here we have the planting date. One hundred seeds were planted to obtain this data. Here is the check or control for November, December, January and February. The fenac, numbered "1" here, as you can see, was quite effective in keeping everything down.

Let's take chlordane. As a whole, you will notice on Bluegrass we have a large reduction and we didn't get any pickup, even at the end of four months. So that is how long it remained toxic and prevented the germination of Bluegrass under greenhouse conditions. These plants were watered with a fine nozzle sprinkler. Even the areas where the plants did not come up were watered as thoroughly as the others, and they were kept uniformly watered.

Here we have lead - 10, 20 and 40 pounds. You will notice in the first month there wasn't too much effect. First and second month, somewhat down from the check and I would say, naturally, it is reduced somewhat, but not too seriously; that if you planted a seedling you'd get a pretty good stand of Bluegrass.

Pax is a commercial arsenical. You will notice what is happening with that, and these are plant counts - 23, 3, 7 and 17. It is perking up a little bit at that end. However, the plants were harvested, as I mentioned, four months after the treatment began, and I don't know but what some of those may have died if they would have stayed in there longer.

D.M.A., applied as a pre-emergence, and it is a post-emergence chemical; reduced the germination perhaps a little but not enough to be significant.

I might call your attention to Halts at the bottom. It behaves as the chlordane did up here, all the way for the four month period.

Slide shows Poa annua planted in the greenhouse. Take all three of the chlordane treatments

together. It did not effect the germination of the Poa annua as severely as it did the Bluegrass.

Arsenate of lead. Calcium arsenate was effective about the third month, and at the heavier rate we had two-thirds control in December and, again, due to the ideal conditions, we did not get the control of Poa annua that we did out in the field. In the field we obtained much better control with calcium arsenate at the 12 pound rate.

Pax is consistently performing as it has previously. D.M.A., no effect. Halts, very little effect. Little in the third month here as far as Poa annua is concerned.

Next slide. On this axis we have the plant count. Here we have the chemicals. I picked out about four or five chemicals to include in the chart. These are the planting dates.

Let's take arsenate of lead. You will notice, except for one month, January, that's the second month that the control we obtained was not too different from the check. Apparently, more of the lead became soluble or some other thing happened with the chemical. It is more effective. We got quite a bit of reduction on the Bluegrass in the second month.

Calcium arsenate. Significantly different than the control.

Next slide. Here is a picture with Poa annua. Here are the planting dates again. Arsenate of lead, D.M.A. and decontrol - no significant difference here. However, we run into a difference when we use calcium arsenate. We are getting a reduction of germination and the commercial arsenical

is down in this area here.

Chlordane reacted somewhat differently; in that, I believe, that is the first month, November. It didn't inhibit germination very much at all but, as time went on, it lowered down to about 50 and 45 percent.

Next slide. Field Work Grasses. Merion Bluegrass, Poa annua, crabgrass, red fescue, bent grass, tall fescue. In the last are the educated; U-3, zoysia, Arlington Bent. These were planted, the seeds as well as the vegetated material, immediately after the application of the chemicals.

Calcium arsenate. No response as far as germination. Fescue is starting to come up here. U-3 Bermuda is holding but the vegetated zoysia is burnt very badly.

The next strip is arsenate of lead. You will notice the Bluegrass showing up quite well. Poa annua is coming. Red fescue very little. Notice the lead at 25 pounds does not inhibit germination very severely across the line.

Now, the next slide. Chlordane type. Notice it is taking the Bluegrass up and taking the bent grass up here. There is a little bit over here. It seems quite specific for Bluegrass and bent grass. Red fescue and tall fescue comes through very well with the treatment of chlordane. Not too much effect on Poa annua.

Next slide. These are the remainder of the chemicals. We had five previously. We have five more here. Zytron is very effective in holding down the germination of all the grass species, turf species, that were seeded. Except for U-3 Bermuda,

we didn't see too much grass--vegetated grasses coming.

The known alkali Dacthal is another hot chemical. We did get some of the Bermuda and zoysia coming here and some of the Arlington Bent. That was four pounds per acre, rather than the recommended amount. I believe it is 12 pounds. The Dow material was put on at 20 pounds on established turf.

Here is the arsenical Pax. Even U-3 had quite a time with it, and it persists quite awhile in the soil.

Chlordane on vermiculite or Halts is specific for Bluegrass and bent grass.

This slide was taken in September. This is the September seeding, calcium arsenate. Notice the effect of calcium arsenate is still persisting in the soil. There may be many reasons for it. Perhaps the organic matter in the soil may be as high as can be. The PH was about 5.5 - a little low.

So, there are many factors. And, in our situation, I think that the weather conditions were so poor in the Fall, in September and August, to get seedlings that we had to discard that data as far as making our table, and getting this material to publish. The results of it were too graphic to be consistent.

Next slide. Chlordane in the field reacts, apparently, considerably different than in the greenhouse. At the end of four months we are still not getting the germination of the grass species.

By the way, the same five are seeded there; Merion, Poa annua, red fescue, bent and tall fescue. So, at the end of about four months chlordane doesn't seem to effect the germination too much out in the field.

Next slide. Here is the Dow material. At the end of four months we are getting some of the seeds through. Apparently, the Bluegrass is still being affected. The strange part about it is we have another seeding made in October. That is one of the plots in which we used the Dow material as well as the calcium arsenate, which were severely affected even in October.

Now, either the site or the location was just slightly higher. Either it was not watered as uniformly as the rest of the area or when it rained, the rain did not wash the material away. So, we do have that difference even between applications.

Next slide. Commercial arsenical. That will hold true to form. At one of the meetings in the Mid-west I talked to several golf course superintendents who have applied calcium arsenate instead of the Pax here. They were unable to get a seedling in their fairways. I was wondering if calcium arsenate might have been in effect after the type of Summer that we had.

I'd like to briefly summarize what we had so far and reiterate again that chlordane seems quite specific in inhibiting germination of both Bluegrass and bent grass. So, if a person applies it in the Spring, it may depend somewhat on the weather as to whether you may or may not get a good seedling in the Fall.

With respect to *Poa annua*, we had a decrease in germination reading. However, it had little effect on the other species. Apparently, it seems to do a better job on *Poa annua*.

D.M.A., no effect as far as germination was concerned.

With calcium arsenate, as you may remember, under greenhouse conditions we had pretty good germination; perhaps a third reduction, when you consider there were about 2,000,000 seeds per pound, say, of Bluegrass and about nine of bent grass. The third reduction would not be too severe. You still should get a pretty good stand. This did not occur under present conditions. In time it will inhibit it. The germination lasts somewhat longer.

Another thing I did, which I have not completed in its entirety; that is, to take a sample of the leaves with these various treatments; that is, the arsenical treatments, to see whether or not we have a reduction in the amount of phosphorus that is being taken up when the arsenical is applied.

I believe Bill Daniels and some others may have done some work, indicating there may have been a reduction in taking up the phosphorus and taking up the arsenicals.

As you see, you will see grass. I have observed plots at Beltsville that have been treated two years ago, and the second year they looked as bad or worse than they did the first year.

When I was in Ohio at their field day, we looked at some plots over there. I asked

Dr. Davis if he had observed any injury. We hadn't gotten out to the plots that were strung out. They were treated the year before. You could pick out the Pax plot. There was a thinning in the turf.

I would like to mention just a word or two about the October seedling. When compared to the check, calcium arsenate had still reduced the germination of the five grasses. We planted five species, approximately one-third. That was in October - October seedling.

Chlordane results were somewhat erratic and seemed to be more effective on one species than another. We had some reduction with the Zytron.

With the Pax material we had, approximately, one-third reduction in germination. However, I went out the other day, just before coming up here, to see what the yellow seedlings were doing and they were all there. So, with the cold weather and the effect of the chemical they had died. So, our results with Pax have not been too good from the standpoint of obtaining a seedling.

Perhaps some of you have used Pax in the Spring and then overseeded in the Fall. You may have wondered why you did not get a stand. The conditions may have been different. These chemicals should be watched, and we should do more work with them before you go to the laymen and go out and use them.

Thank you.

CRABGRASS CONTROL

DR. DAYTON KLINGMAN, U. S. Department of Agriculture:

Questions are numerous for controlling crabgrass.

I want to reiterate it is important to practice good lawn management in any weed control program. We must start with a good vigorous turf if we are going to make any progress with the weed control procedures.

As you well know, if you will follow good lawn management, many of the weed problems will not exist. However, there are always slips or other interfering processes that cause breaks in the turf and you do have weeds occurring, and it is for this reason that many of the weeds that are problems have to be corrected or have to be controlled.

So, then we have to start with a good soil condition, good soil texture, adequate drainage and liming and good soil fertility. We have to use adapted species. We have to control insects and diseases.

Many of you are also well aware of the importance of height in cut on the vigor and health of many turf species. Bluegrass, at least, should not be cut down within three-quarters of the inch, three-quarters of the surface, if you expect to maintain a vigorous turf. The vigor is reduced and weeds come in equally and are equally encouraged. Close cutting of turf not only reduces the vigor of the grass, it reduces the temperature of the soil and, equally important, it increases the ability of the turf grasses to compete.

Crabgrass, being an annual species, depends on seed germination each year for establishment. Crabgrass cannot tolerate deep shade. If you can maintain adequate cover and shade on the soil, crabgrass will not be much of a problem.

May we have the first slide, please?

Slide. You will notice the percent of herbicide and check treatments on the left, the date applied in the center and the mowing height in the two columns on the right. The mowing rates are three-quarter inches, and two and a half inches. You will notice that the other check there was 58 percent crabgrass when a height of mowing was three-quarters inch.

By the way, these mowing machine tests have been applied three years. This was the third year of the experiment. The height of cut at one and a half inches only had 18 percent crabgrass in 1958.

D.M.A. (disodium meta arsenate) is pretty good for control of crabgrass after it has been established. Treatments also must be repeated at seven to ten day intervals for two or more treatments.

Do not use D.M.A. during hot weather when the soils are dry. Often there is some discoloration resulting from treatment but usually the turf outgrows this within a few days if growing conditions are favorable.

Chlordane is only moderately effective for crabgrass control in our experiments at Beltsville. We get considerable variation.

For that reason we made it moderately effective. It is most effective if treatments are put on a short time before germination of crabgrass seeds and when combined with a good turf cover. It is also effective for the control of grubs.

Let's see Slide No. 2. This is Dr. Juska's experiment. I wanted to show you there the control we got on crabgrass with one and a half pounds per thousand of chlordane, 52 percent control. The calcium arsenate gave satisfactory control at 12 pounds per acre. Eight pounds would be considered marginal. This is considered an average of three different dates of treatment that Dr. Juska had worked out. It is for an average taken in the Fall, Winter and Spring treatments.

The Fall and Spring treatments were slightly superior to the Winter treatment with these chemicals in this experiment. The calcium arsenate has given good control of crabgrass at the rate of 10 to 16 pounds per thousand, depending on the soil texture and the phosphorus in the soil. Heavier rates may injure turf.

Zytron is a trademark name put out by the chemical people as a new organic chemical showing promise for crabgrass control when applied at about 20 pounds per acre. It has relatively low acute oral toxicity for dogs and cats. It is primarily effective through root absorption although there is slight contact activity when applied for post-emergence to crabgrass.

Both granular and spray formulations were effective in experiments that we had in Beltsville.

Zytron has been reported to be effective for control of nimble Will. We are now talking about nimble Will, but many of you have had trouble with this weedy perennial. Thirty to forty pounds per acre can be applied on nimble Will for control without appreciable injury to the Kentucky Bluegrass.

Kentucky Bluegrass appears to be highly tolerant to sprays of Zytron as is also Bermuda grass and Zoysia.

There was considerable discoloration and development of a purple colored foliage of red fescue in the experiments we had in Beltsville this year. The red fescue recovered to some extent. I can't say we killed the red fescue, we definitely discolored it with the treatments.

Contact injury is reported for centipede grass, St. Augustine grass and bent grass. Injury symptoms are usually outgrown within a few weeks.

Dacthal is a trademark name for another long named chemical. It is put out by the Diamond Alkali Company. It has shown promise for pre-emergence control of crabgrass in turf. Because of its low solubility in water, it remains at or near the surface of the soil for a long period. It has very low acute toxicity.

We will have some more data on Zytron and Dacthal.

Here is an experiment also run in 1959. You will notice that this data shown here is average of estimates made on October 6, 1959. The percent of crabgrass shows the percent of control. Actually, the ratings were made as percent of crabgrass and subtracted from 100. Therefore, it shows

18 percent control for a check. That means we only had 82 percent covered in the check.

The calcium arsenate at 10 pounds per thousand gave 94 percent of crabgrass and 12 percent reduction in stand and vigor of Kentucky Bluegrass and about two percent on Zoysia. That is an estimate.

Calcium arsenate at 16 pounds per thousand gave perfect crabgrass control but severe injury on Kentucky Bluegrass, and even some injury on Zoysia.

Zytron, as a spray at 20 pounds per acre, gave 74 percent control of crabgrass with no appreciable--no visible injury on Kentucky Bluegrass or Zoysia. The same on the granular portion gave the same result.

Dacthal at seven and a half pounds per acre gave 92 percent control of crabgrass. The ten pound rate gave better control of crabgrass and, probably, will be required to give the kind of control that most of us would like to have.

Chlordane, again, gave a relatively poor control, only 48 percent control. I want to reiterate that with this experiment almost all of the crabgrass germinated and became established in July. It was on a rather droughty site, sandy soil, and the rains were infrequent during the spraying and we didn't have crabgrass established in these plots.

Under the conditions we had this year we got rather good control.

In conclusion, may I again say that any weed control program should start with the best lawn management practices available to assure a good cover of vigorous turf grasses.

Crabgrass can be killed by supplemental treatments of D.M.A. and P.M.A. applied post-emergence.

There are a number of herbicides that show promise as pre-emergence treatments for control of crabgrass:

1. Calcium arsenate. Follow instructions on the label.
2. Zytron. About 20 pounds an acre.
3. Dacthal. About 10 pounds an acre.

Pre-emergence herbicides, generally, are injurious to new seedings of grasses. If pre-emergence herbicide is used, delay seeding grasses until the following Fall.

Thank you.

WE OPENED A NEW GOLF COURSE

DR. FRED V. GRAU, Chief Agronomist,
Nitroform Agricultural Chemical Company, Woonsocket,
Rhode Island:

In preparation for this panel, I sent to each member a questionnaire asking certain pertinent questions, basic questions, fact questions, concerning the beginning of the course: Who was the architect and who built it?

My first act is to introduce each member of the panel.

JOHN BURT, Turf Valley Country Club,
Ellicott City, Maryland.

GEORGE C. GUMM, Ocean City Golf and Yacht Club,
Berlin, Maryland.

LOUIS LAMP, Winchester Golf and Country Club,
Winchester, Virginia.

FRED SAPPENFIELD, Willow Oaks Country Club,
Richmond, Virginia.

BERT YINGLING, Beaver Creek Country Club,
Hagerstown, Maryland.

DR. GRAU: John Burt is first. John, when did you come on this job?

MR. BURT: June 15th of this past year, Doctor.

DR. GRAU: How long after the course had been built?

MR. BURT: Construction was started in January of 1958. The planting was done a year ago this past Fall. The construction was completed when I took the job as superintendent.

DR. GRAU: Ault & Jamison were the architects and Sam Pistorio built it. What was seeded on the tees?

MR. BURT: The information I have is 40 percent Merion, 55 percent Illinois fescue and 5 percent Highland Bent. That is on tees. On the fairways, it was 20 percent Merion, 25 percent Kentucky Bluegrass, 50 percent red fescue and 5 percent on the Highland Bent.

DR. GRAU: Do you see any indication that the Highland Bent is taking over the other grasses?

MR. BURT: The Merion is more aggressive.

DR. GRAU: How about your greens?

MR. BURT: The greens were planted to stolons C-1, C-19 and C-7 in equal parts. The back nine were planted in August-September, 1958 and the front nine in October-November, 1958. When I took the job in June they had 100 percent coverage with the exception of one or two greens with a few bare spots.

DR. GRAU: How do those grasses seem to be blending?

MR. BURT: Good. I let them get a little off-color. I slipped up on the fertilizer for a week.

Question: How many bushels were planted per thousand?

Answer: Ten bushels per thousand.

Question: What about the fairway fertilizer?

Answer: Fairways was one ton of 5-10-5 per acre in the seed bed. That was followed up with 800 pounds per acre of the same 5-10-5 in the Spring, 1959. In the Fall of 1959 we used 700 pounds of the 5-10-5.

Question: Now, your soil mix for the greens. I noticed you have one part topsoil. Is that clay loam?

Answer: It is more of a silty loam in that area.

Question: One part sand. Was that coarse or fine?

Answer: It was concrete sand, also one part peat.

Question: All three were mixed on the site?

Answer: Yes.

Question: What about the drainage under the greens?

Answer: There was none under the greens. They were so constructed that they have excellent surface draining. There are four or five different angles that the greens do drain. They dry out very readily.

Question: I noticed you report there was only slight erosion.

Answer: When I took the course over, there was no erosion.

Question: Very fine. Now, I ask the question, what would you do if you were to be on another new course that was going to be built? What sort of things would you like to see done that would make your next course even better than this one?

Answer: These are just minor things. There are a couple of items. One is eliminate roadways during construction. I notice that there are two or three former road areas in very bad shape. Another one I listed, don't rush the construction of tees. By that I mean the seeding

mainly. In several of our tees it is evident they were planted too soon, and now they have settled and are very uneven.

One other thing I'd like to see or I think should be done is traps on new construction. I think they should be completed at the same time the green is completed. Completely dug out, edged, and formed, and any chemicals to be used to eliminate your weeds should be used at that time because I found that it is a big job later on. Right now we are doing a lot of damage on the course getting those traps in shape.

Question: Apparently, you are quite satisfied with the irrigation system?

Answer: Yes, sir. I have had a complete fairway system, including the landing area, approach area and then risers at each green.

AUDIENCE: What was the depth of the rooting medium, the topsoil mix?

Answer: I think it is about 12 inches.

DR. GRAU: The next member of the panel is George Gumm. George has a few slides.

You gave me a very complete rundown here, George. First, let me get a few facts and fundamentals out of the way. Construction was started May, 1958 and you opened the course June 27, 1959. Now, were you there when the construction was started?

Answer: No, I came when everything was done, February 15, 1959.

Question: The course architect and builder was William F. Gordon and Son.

For the tees, there was planted Kentucky Blue, Creeping Red Fescue, Kentucky Highland Bent and Red-top; 200 pounds of seed to the acre. Are you sure that was enough?

Answer: Yes, the tees were beautiful.

Question: The fairways were Kentucky Bluegrass, Creeping Red Fescue, Highland Bent and Red-top, the same mixture at 150 pounds to the acre. How do they look?

Answer: Fair.

Question: I beg your pardon? Did I hear right?

Answer: That course was built--first, I will tell you the course is flat. The approaches at three fairways are Merion Blue, and at this point they are beautiful.

Question: How old is that Merion Blue now?

Answer: About two and a half months.

Question: The greens were seeded with Pencross at a pound and a half to a thousand square feet. How do they look?

Answer: They were seeded in September and the water system wasn't on due to an electrical difficulty. Before the water was turned down, I think it was 14 days, they had a severe storm. So, you can imagine what happened--soil and seed moved

on the greens.

Next slide. We opened all greens June 27th. Eight greens were opened on May 30th. They were all covered. There were no bare spots, fortunately.

Next slide. That is Senator Chandler and me on the green. You see all these little plugs there? They're not air fired holes. That's the plug. All these greens washed into the low areas and drained off. We had to come out--our nursery is 6,000 feet and we couldn't use it. It wasn't good enough for the turf, no roots. So, we came out and any place we can get grass, we would take the plugs and move them around. We had four men doing that and that is the result.

Next slide. One green was rebuilt in November, 1959, with tile, stone and some sand. I used the same top dressing--that was on the green--plus about 80 yards more of our own mix of sand, humus and soil. We resodded that green one week before Christmas.

They say, "Where is the water in the other greens?" It is still in them. We are having more trouble with our greens today than we have had all Summer. We have had good greens in the Summer because it was dry weather. Right now our traps are even with the bottom of the greens and they are holding so much water that it is rotting out the bottom of the green. The seventeenth green I had no trouble with it all Summer. Right now I am having trouble with it. It is closed.

We are in the process now of tiling all our sand traps. That is going to be expensive. We are low. We have a lot of problems, as any course

has.

I want to read about the rainfall. In April we had five inches; May, nine-tenths of an inch; June, 2.9; July, fourteen and a half inches of rain in one week; August, 2.7; September, not a drop; October, 6.7; November, 5; December, 4.9. That gives you an idea what rainfall will do. If it wasn't for the fairways, I guess we'd all be better off if it never rained, wouldn't we?

All our tees are about 3,000 square feet. They're seeded in the same mixture as the fairways, double rate. Of course, we want to go to Bermuda. We are experimenting with it now. We have some U-3, 328 and Meyer Zoysia working.

What would I do on a new course? I would tile and stone all the greens. All greens would be 7,000 feet and large putting greens would be about 12,000. I would have a water system turned on when seeding and three outlets to a green. I would mix the soil off the site.

Question: What about fertilizers?

Answer: Our fertilization cost in the Spring was \$4,671.46; in the Fall, \$4,350.00. Next year we expect to spend, approximately, \$4,392.00. This includes lime, of course, which was \$1,000.00 this Fall.

Gypsum for the greens, lime for the greens, 20-20, ureaform nitrogen fertilizer for the greens and a 20-10-10 analysis on our fairways at about 100 pounds an acre of 20-10-10. The tees receive about four pounds of ureaform nitrogen. We have a very nice setup down there, something we are very proud of.

DR. GRAU: Louis Lamp from Winchester Golf and Country Club.

Construction of a second nine was started October, 1956 and the course opened May 24, 1959. What took so long?

MR. LAMP: There was just the three of us and we had to maintain the first nine and build the new one.

Question: You constructed this new nine hole course?

Answer: Yes, even clearing the land.

Question: Finley and Loving were the architects.

Tell us about the tees.

Answer: We sodded the tees with Bluegrass and seeded them with Bermuda.

Question: Where did you get the Bluegrass?

Answer: On the land I had on the property.

Question: How old was the Bluegrass?

Answer: Old pasture land. This farm we purchased was a grass farm and its been in Bluegrass for years.

Question: Is is a limestone soil?

Answer: It is. As a matter of fact, very

thin soil.

Question: How did your Bermuda take?

Answer: Taken fine and had good coverage. Bermuda was planted in June when we started the tees in 1957, and gave a good cover.

Question: Tell us when greens were seeded and with what seed?

Answer: Labor Day. I planted all nine greens in one day, using less than a pound of Pen-cross per 1,000 square feet.

Fertilizer applied was 400 pounds of 10-6-4 for an average green of 5,000 square feet the day the seeding was done.

Question: Tell us about your soil mixture for the greens.

Answer: It is shaley soil. We have a lot of hilly ground and the soil, say, in years past has washed into the hollow. We found one hollow that was filled up 10 or 12 feet with soil. We dug this soil out of the hollow and hauled it to the site.

We put our base in and contoured the grade. We put our top soil in from 18 to 20 inches deep. We had plenty of it. We added from 40 to 60 tons of coarse sand to each green.

Then we took a two horsepower plow backwards and forwards, and that was in 1957 and then we laid off until 1958. We rolled them and plowed them, and harrowed them and dug them just like you would a field, and rolled them and seeded them.

Question: How long did you give those things a chance to settle?

Answer: Two years, two seasons. Every time any vegetation showed a weed killer was applied.

Question: I want to know a little bit about this shale. This is one of the first times that the word, "shale" has come into the conversation here in building greens. Is this shale a well drained material?

Answer: It is when you dig it out. In getting it out it is solid. It lays in crevices and it lays in these hills and it is very tight. Once you get it out and broken up and on the ground, the water runs off of it. It has very good drainage.

Question: Apparently, you feel pretty good about the Pencross Bent grass. You stated it is good in every way. It holds the color, takes little maintenance, has deep roots and resists disease. What else do you give as your reason?

Answer: I sprayed this course on the average of once a month all during the Summer.

Question: Once a month?

Answer: One a month on the new nine. On the old nine, I sprayed every seven days. On the new greens I had to cut down the roots which were deeper than the bottom of the cup.

The reason it took time to build the course was I had to maintain the old course, so I took my time. If it wasn't right, I didn't finish until I got it right. I drove the bulldozer and the

front end loader. My boy helped me. When I wasn't driving, he was driving. We'd work two or three days and we'd have to get back to the old nine, and get it ready for the week-end play. As far as particular care, it was to take time. It is the only way. The new course is far better than the old one.

I'd like to add it was very inviting to the Club. They didn't think we could build it. We purchased our own machinery. We bought the bulldozer. We paid \$2,226.00 for it. We did a little work on it. We had a couple of hundred dollars repair bill. We used it three seasons, then spent a little over \$800.00 on it and sold it for \$2,200.00.

Question: Didn't you have the Mid-Atlantic Association members there at your course?

Answer: They played the course in July and were enthusiastic about the new greens.

Question: How deep was the shale under the 18 inches of topsoil?

Answer: It was a contour running anywhere from two foot to five foot of solid shale.

AUDIENCE: Any organic material in the mixture?

Answer: From six to eight tons of rooted sawdust.

DR. GRAU: That is a masterpiece of work. You had that on the course that was nearby. What about the sand?

Answer: It was 12 miles away. We used six to eight tons per green.

DR. GRAU: Fred Sappenfield, Willow Oaks Country Club, Richmond, Virginia, reported on a completely different territory. We are getting into the Bermuda territory. We are going to leave that beautiful shale.

Construction started in January, 1958. Nine holes were opened in September, 1958 and the eighteen, which were the permanent greens, the 13th of June, 1959.

Architects were William F. and Dave Gordon. Builders were William F. and Dave Gordon. Construction was by Frank Durant.

There was wet weather during construction.

MR. SAPPENFIELD: All tees were planted to common Bermuda at the same rate as the fairways, which was 100 pounds of Arizona Bermuda to the acre.

Question: You got one tee of Tifgreen Bermuda. How does that stack up against your common Bermuda?

Answer: I believe that Tifgreen in our area gives the finest tee possible. We had some U-3 Bermuda in the area, but Tifgreen heals very much faster.

Question: Is it greener?

Answer: Yes. Tifgreen as compared to common Bermuda is greener much earlier in the Spring. This year it was the 15th to 20th of December before it lost its greenness.

Question: Your greens are Cohansey, ten bushels of stolons to the thousand. Any special method of planting?

Answer: Usual method. It was scattered evenly.

I'd like to give you just a little data on the Club. It might embarrass some of our friends that build so cheaply. This Club was organized in the Fall of 1957 with \$375,000.00. It was understood that no construction would begin unless this money was in the till. They were able to secure that stock and, in addition, on January 1st, with no hopes of a golf course that year other than playing on temporary greens, we had 800 members' dues paid in as of January 1st. The initiation fees for Class A members, of which we had 350 plus, was \$600.00. The lowest classification we had was a child membership with an initiation of \$225.00. That sounds like a lot of money. So, we decided to disburse with it immediately.

The original property was \$236,000.00; the golf course, including architect fees, \$158,000.00; equipment, \$17,000.00; a new addition to the old building was \$175,000.00 plus; swimming pool, \$48,000.00; tennis court, \$7,000.00; house furnishings; \$13,000.00; office equipment, \$4,000.00; dining room and kitchen, \$29,000.00; sewage plant, \$21,000.00, for a total of \$717,000.00 and we still do not have a locker room.

This picture shows the clubhouse that was purchased and there was one outbuilding. It was used as a double garage and also the servants' quarters. And into this promising layout these 800 members began paying their dues on the 1st of January, 1958. We can offer them refreshments in the snack bar. The backside of the clubhouse, if you will shift it to the other

side, you will see the new clubhouse addition. This is the \$175,000.00 plus new addition built onto the old building. Having no golf facilities at all and construction having begun in January of 1958, I came on the job in April, and began planning a putting green of Tifgreen.

Here you see an area in front of the clubhouse that later had become the parking lot and that is as it appeared. We have everything; crowfoot, dandelions, anything you like is on that plat. Sodium arsenate was used to kill broadleaf weeds in that plat.

Next slide. Having about \$100.00, we hired this tractor with operator for \$6.00 an hour. This is 28 tons of sand, coarse; sharp sand on about 3,000 square feet. Peat is already in the soil and the operator is beginning to spread the sand.

Next slide. This is the hard method of putting in Bermuda grass or any grass. This is Tifgreen being planted in rows. Fifty-eight man-hours were required to complete the 3,000 square feet. This is four weeks' growth.

Next slide. This putting green was started the latter part of May, and this picture shows the putting green on July 15th when opened.

Next slide. Meanwhile, construction on the golf course was rapidly going ahead. This is No. 14 hole as I saw it on April 15th.

That is No. 7 green. You are looking right toward the tee.

Next slide. This is the No. 1 tee, and

herein is probably a fault of not having the proper person in on specifications. It is such a tight tee that only about 20 yards of the fairways (the right-hand side) is playable because of the overhanging limbs on these oak trees as they protrude some 30 or 40 feet into the fairway. This is a sharp dog-leg to the left; therefore, you have to play it away from the hole in order to have a shot at it.

These next two pictures will show the construction of the No. 2 tee, which to me was quite a feat. I don't know why he spent so much time on it but he did explain later. Perhaps as we go along we will see the purpose for it.

This soil was hauled some 500 yards distance in order to build up this tee.

Next slide. I just wondered if he would make that turn, and he did and he went right on into the next slide.

This is the same tee with the general subsoil, all green. Very poor white clay, almost impervious to water as are most of the greens on the topside. His purpose for spending so much time, and I thank him for that, was to have that tee which you see way in the background. That was the particular tee that we saw him working on and it was to get it up to where most of the green would be visible for a tee shot.

Next slide. This is our water supply. We are fortunate in having a three and a half to four acre pond, 75 to 80 feet deep, along the premises and it is not a stagnant pond. There is a break to the left of this quarry. It is an old abandoned quarry. That is a real good stream of water.

The water system consisted of 11,000 feet of galvanized pipe. This is a four inch main going out to the center of the golf course.

All tee outfits are an inch and a quarter pipes to three-quarters of an inch outlet and they are snapped down to the coupling. All green outlets are an inch and a quarter with the Skinner type hookup.

All fairway ditches where the pipeline was built were tapped down with this hydraulic affair to prevent settling and it certainly did prove its worth because in the areas where it was not used, the settling was as much as six to eight inches. It would have been a problem if you left the fairways in that condition.

The next two slides will show you some of the topsoil.

Three hundred yards below that, we are in the bottom land. That is completely silt. You can see the water seepage as he bulldozed.

About six or seven acres on the upper ground was a turf area that consisted mostly of weeds, some Bluegrasses, but very little. They had never been seeded; never been farmed; never been graded in the last 25 years.

Liming progressed as fast as the land could be prepared.

This is superphosphate and fertilizer, which is to be applied at the same rate, 600 pounds of 20 percent superphosphate per acre. The fertilizer was a 5-10-5 commercial type, and the rate of application was enough fertilizer to supply two and

a half pounds of nitrogen per thousand square feet.

This was the first area seeded, and you are seeing about four weeks' growth of Bermuda and the rate it was seeded was 100 pounds per acre. This is, probably, four weeks after the first rain. There was no germination until we had rain.

This is just adjacent to the same area; it is about six weeks' growth.

Tees were way behind time in being seeded. In most cases, a September seeding was made and the seed was a common Bermuda. We had no grass to survive the Winter.

The method of mixing topsoil was a one and one mix of sand and soil. All soil was obtained on the course. It wasn't a very good soil. My one objection here is, although it is probably a very good way of mixing, the bucket, it probably holds as much as two cubic yards of soil and two cubic yards of sand. One bucket was put in one pile and then the other on top of it. And that was the only mixing, except to load it on the truck and carry it on the green. Today, we have difficulty getting a cup in the ground because of the huge rock content in the ground, in the greens.

The soil was carried to the green side in dump trucks. Specifications called for a nine inch loose measurement of prepared mix on each green. It is certainly inadequate. Today, we are lucky if we have five inches of topsoil on our greens.

There was no provisions in the specifications for the treatment of greens. The green's average is 6,000 feet.

Greens were stolonized on September 15th. Here you see the man on the right is dropping and spreading the stolons. The man in the foreground is rolling the stolons. The man on the truck is preparing the sawdust out of the truck into the buckets, and those men near the truck are top-dressing by hand out of buckets.

Sand was carried to the traps. As often as we could possibly get a truck to the course, there were 47 traps on the course, it required seven trucks, six to seven tons to a truck. We were able to get the sand in Virginia at \$3.10 a ton.

There is no tile drainage on any of the greens. The drainage was a problem.

All traps were deleted from the contract in order to save money, about \$10,000.00, but this additional work that will have to be done later, if you don't do it during your construction, will mean additional expense.

If you have trees close to greens, you will certainly have roots. This was a shining example to me. This picture and the next are two right angled pictures at the 15th green, which was the preceding hole that you saw in the shade in the fairway. This is merely done because of the water pipeline. We can certainly see that we are going to have troubles in those areas.

We are fortunate in that we had very good results with Bermuda sod in the lowland. I believe this was the first Bermuda that the Gordons had planted on the golf course, so I am informed, and excellent results were obtained with Bermuda fairways.

Question: What plans have you made to

remedy those greens which are unsatisfactory?

Answer: We practically lost one green. We are quite certain that at least one will be rebuilt in the coming year. We intend to aerify intensely and top-dress with much sand in the mixture.

DR. GRAU: Our next panel member is Bert Yingling of the Beaver Creek Country Club, Hagerstown, Maryland.

Bert's construction started May 8, 1958 and the course was opened July 18, 1959. The architects were Hines, Young and Yingling. Is that you?

MR. YINGLING: That's right. The builder was Rueben Hines.

Question: And you had dry, hot weather during construction. What caused all the erosion?

Answer: That came after the course was finished. It happened in January. We had about two inches of rain in about 20 minutes which left us pictures like you see in the Grand Canyon; many large ditches. We were pretty sick the next morning, believe me.

Question: I bet you were. You have a rather sloping course.

Answer: Yes, we do.

Question: You are in clay loam in Hagerstown, Maryland, limestone origin. The tees were seeded to Merion and Kentucky-31, fescue 50-50 mixture.

Answer: Rate of seeding was heavier than on fairways which was 85 to 90 pounds per acre. The tees are good.

Question: You planted your greens to Cohansey, ten bushels per thousand square feet.

Answer: That's correct and we are very proud of them. In designing the course, we put most of the green on rocky ledges having limestone rock layer. Now, we are getting a very good underdrainage besides having a good surface drainage.

We pushed at least 12 inches of topsoil right on the green sites. We took, I think it was, three parts sand, two parts soil and one part peat, (about 20 bales per green). As we are cutting cups now we find a very good mix throughout.

Question: How about your roots?

Answer: Our roots are down from several inches.

Question: Tell us about the fertilizer where you planted your greens.

Answer: We mixed in about ten pounds of 10-6-4 fertilizer to each thousand, and we added lead arsenate and also limed the soil. After the grass started, we fertilized with 10-6-4. We were mowing greens in November.

Question: Now, I think somebody already mentioned what they did as a correction of that severe erosion as you had in your fairways. Would you care to elaborate on what you did to overcome that and put it into play?

Answer: We were up in the air. We had to disk up some of the front nine and reseed it. We used some Red-top and K-31, and we got a fair stand until the dry, hot sun hit. We used our watering system on it.

Question: When did you do the reseeding?

Answer: That was in April, with a little in May. Then in the Fall of the year, after not having any grasses for the Summer in the fairway, we reseeded with Merion and K-31.

Question: Any questions on that procedure? Did you use any special tools?

Answer: I was just going to say, incidentally, we tried aerifying. Someone told us it was good aerifying with a steel dragnet. The ground was too hard to get much out of that. We were very fortunate in purchasing an alfalfa drill.

We took it and fertilized and then watered at night, softening the ground up, and then we would prepare, approximately, as much as we could see the following day. Then we would take the alfalfa drill, and with the ground soft enough, it would give us ample coverage for our seed. To me, it is about the only way that I believe you could seed an overseeding and get a terrific job out of it, as we have done.

Question: Did you employ a brilliant seeder at any time?

Answer: Not in the latter stages.

Question: You feel that the alfalfa drill put your seed in where it had a chance to correct that?

Answer: Definitely.

THE USE OF PESTICIDES FOR GNAT AND
MOSQUITO CONTROL ON THE GOLF COURSE

DR. GEORGE S. LANGFORD, State Entomologist,
University of Maryland:

We have with us Mr. Bob Shields and
Mr. George Gumm who are going to talk about some
insect control on the golf course.

As a background of that, I might say that
I believe all of our green superintendents know some-
thing about insects and the need for the folding of
certain insects on turf. For example, all of you
have had grub problems, and have had chinch bug
problems and many bug problems.

In addition to that, today in some of
our localities, we have reached the point where we
are having trouble with insects where they might
affect the player. That is a condition that is
coming to the forefront more and more in certain
of our areas and some of us are going to have to do
something about that.

As I said, we have had the situation and
we have some people that are doing something about
it, and we thought today it would be worthwhile if
we could hear from some of those people and know
something of their results.

But, as a background of that, where
insecticides are used, we have other problems, and
I might say that they are somewhat personal problems;
they are problems of people. Some of them are,
probably, deserving of some consideration and others

might be more of an emotional type of thing.

We all know that all insecticides are poisonous and, if improperly used, they can kill man and they can kill other animals. There are a lot of half-truths being spread around and there are some people who read those things, and magnify them and become unduly alarmed.

I just want to illustrate because these will come to your attention if you start using insecticides on your golf course. Most golf courses are not going to be disturbed one way or the other.

I am just going to mention some things that are coming to the forefront, especially in the light of some of the cranberry problems we have been having recently. The information I am going to give you is general and I hope it will be more or less of a factual nature.

I think all of you are somewhat acquainted with some of the problems that the U. S. Department of Agriculture have had in connection with gypsum moat work. You, probably, were at the Audubon Society meetings in connection with fireworks and other types of things.

Now, to give us just a little bit of background information. I am going to just "throw out" a few remarks here that may have come to your attention or they may not have come to your attention. I am trying to talk with some of your people if you have some of these problems come up.

As a background of that, I might say that I have been talking on the telephone a good many years to a lot of people, a lot of different kinds of people, and there have been a lot of times when

some emotions were involved and some strains, and that type of thing.

It was only within the last year that I have ever had anyone to hang the telephone up on me and that was in connection with the use of insecticides, in which a lady felt they might be killing all the birds in the area. I don't think there is any background for a lot of talk. She thought I was trying to sell a proposition in favor of the insecticide people. When I mentioned the fact that there might have been some mitigating circumstances there, she hung the telephone up. She said, "I can see you are siding with the insecticide people." And, that was that.

There are some people that have the feeling, for example, when a farmer out in Ohio, Illinois, or even up in Washington or Frederick County, might be spraying his crops to protect them from pests, naturally, he puts a little insecticide on the crop and on the soil. There are folks that are thinking in terms that these insecticides will, probably, reach from the soil, collect in little branches of the rivers and what have you, and eventually reach the Gulf of Mexico, Atlantic Ocean or some place like that and, probably, upset some of our fish life. That is just the type of thing that is being considered now by some folks and it is something that we have got to think about. I know these things haven't been proven yet. I am just going to mention a few of them here.

I mentioned the question of gypsum moat work. You recall as of last year, I believe it was in 1958, that is the last year there were a group of people on Long Island. They brought suit against the Secretary of Agriculture to prevent that work on the basis that it was destroying the wild life.

Of course, they lost the case but there is a rather interesting thing happening. We won't say that some of these insecticides will not kill wild life. When improperly used, they probably will.

The point I want to make here is that there are so many guards put up to prevent insecticides from hurting a human or wild life or anything else that when they are properly used, there is a very small chance of anything happening.

Right at this time, I want to just show you the controversial issues that come up. Just following this law suit, I will say, there was a big article in the New York Herald Tribune which said, "Sportsmen Encouraged by Increase in Quail". That is a matter of record in the paper. At the same time there was a suit in the courts saying that insecticides eliminated the wild life in the area.

A lot of folks, probably, because insecticides have been used, infer that some of the losses in wild life may have resulted from insecticides and there is no proof in back of it.

I'd just like to read you a little story that was in the newspaper. It says, "1958 Called Disastrous Bird Year". That was the same year that this other article appeared that there was an increase in quail. Of course, there are other birds involved here.

"Last year is termed a 'year' of disaster of Eastern land birds. Ornithologists made the assessment on the basis of a year long survey. They cite reports of enormous losses of birds, especially during migration last Spring and on counts conducted during migrations southward last Fall. Hardest hit were the Eastern bluebird, then the hermit thrush and

Eastern phoebe. A score of other species also were hard hit." The report is contained in the newly published Audubon Field Notes, sponsored by the National Audubon Society.

These apparent reasons for the bird mortality rate were listed:

1. The destruction of migrants over the Gulf of Mexico during the storms in mid-April.
2. A quirk in wind direction that caused an absence of tail winds to help the migrants northward.
3. An insufficient food supply, resulting from severe cold and snow, even in southerly latitudes.
4. The poisoning of birds by pesticides.

This suggestion came from New England, from Long Island and other parts of New York State. It didn't say that they caused it, but they suggested it.

The U. S. Department of Agriculture of Food and Drug Administration and most health people now are giving it real thought, a lot of consideration, and are doing a lot of experimental work.

DDT is something that you, probably, have to talk about when the question comes up. Just to illustrate, another problem I had a couple of years ago was in one of the Maryland counties.

A young lady thought that DDT made her sick. When the facts were all in--as a matter of fact, we worked with the doctor and we gave him samples of DDT to determine whether allergies of that type of thing were involved. When the facts

came out, it was found that one property was sprayed that was adjacent to her and the insecticides that were used didn't even hit on the premises of where she lived. Yet, she believed it and she thought that DDT made her sick. DDT has been said to be safe by some of the medical people.

I would like to read here a little note so that you might have it in mind.

DDT Safety Factor Established

"Present levels of DDT (dichlorodiphenyl-trichloroethane) in the diet of American consumers are not injurious to health, according to a research report appearing in the Journal of the American Medical Association.

"The experiment was carried out with 51 men volunteers, one-third of whom received 3.5 mg. per day, and the remaining group 35 mg. per day (about 200 times the average daily rate of DDT in the normal diet). During the course of the experiments, 126 complete sets of examinations were carried out on the men.

"The subjects were given complete physical examinations, including weight, blood analysis, heart rate, blood and pulse pressure, and plasma cholinesterase level and all that type of thing."

And it said, "During the entire study, no volunteer complained of any symptoms or showed, by the tests used, any sign of illness that did not have an easily recognized cause clearly unrelated to exposure to DDT. The results indicate that a large safety factor is associated with DDT as it now occurs in the general diet."

You folks, probably, remember or read something about the great controversy that has been going on down in the South in connection with the fire ant chemicals and the destruction of wild life that might be associated with it. There is a difference of opinion there, apparently. People that are undertaking the work are feeling that there is no great hazard, that there is no great loss of wild life.

I think there have been some times when accidental poisoning did occur. Those that are using the material argue that the fire ant will destroy more birds, particularly land birds, by destroying the nests of the land birds, than any of the insecticides that are being used.

I have here a news note. It was published in the Washington Post and Times Herald as well as other papers.

Scientist Denies Peril in Fire Ant Chemicals

The reason I'd like to read that is it comes from a U. S. Public Health Service.

"A U. S. Public Health Service scientist said yesterday that chemicals used to exterminate the fire ant are not a hazard to people in the affected areas of the South.

"The scientist, Robert F. Witter, was questioned about a charge made by Irston R. Barnes, President of the Audubon Society of the District, that the chemicals, dieldrin and heptachlor, pose a threat to human health.

"Barnes made the charge in a letter to Secretary of Agriculture, Ezra Taft Benson, attacking

a Department film, 'Fire Ant on Trial'.

"Witter, chief biochemist of the PHS' Toxicology Section at Savannah, Georgia, said the chemicals are not a danger even to the men who apply them so long as standard precautions are followed.

"The medical director of the section, Dr. Wayland Hayes, has said previously that, 'apart from the same qualification, Agriculture's planned program' offers no hazard to the health of anyone."

The article continues along the same line.

Now, here in Maryland last Spring you folks, probably, remember that there was some discussion in the newspapers regarding the fact that spraying for mosquitoes was, probably, causing some fish killed down in the Chesapeake Bay and some of the estuaries. I'd just like to read the article involved.

Land Sprays Eyed As Key To Fish Kill

"Spraying projects on land may have caused the death of thousands of fish in the Chesapeake Bay, Tidewater Fisheries Commission biologists report.

"They are looking into this possibility in the effort to learn the cause of the destruction of menhaden, perch, toadfish and some eel.

"Although we have no direct evidence that mosquito control spraying is causing the fish kill, said Edgar Hollis of the TFC, the fact that

both activities coincide gives us reason to look into the relationship, if there is one.

"It is possible, Mr. Hollis said, that the spraying could have resulted in the poisons being washed into the waters by rain or carried along by wind in the case of aerial application.

"The kill affected fish of little economic value and was fatal to varieties no bigger than 12 inches. Rockfish and crabs were not harmed. In fact, they benefited as they foraged on the smaller fish.

"Biologists also are checking several other factors which may have caused the fish destruction. Some of the deaths were due to a fungus infection."

You folks know that there are just a couple of things wrong with that. In the first place, DDT had not been used in any of the areas where the fish were dying. The mosquito control operations had just started, and started after the fish began to die.

More important than that, I might say, we collected both fish--that was later--both fish and water and had them analyzed and they did not show the presence of chemicals. But, as a background of that, I would like to say this, those of us who lived along the Bay know it and, as long as I can remember, there have been times and there have been occasions when these rockfish and other fish have died. You could see them almost by the billions and just about as far as you can see. At times you can see dead fish lying there and they will be so thick that you can hardly put your finger down.

We had a situation similar to that. We haven't tried to deny the controversies. But we do have and did collect fish and water and have them

analyzed.

I am taking too much time here, but I'd like to mention one other item here that might be of interest. Some of you who are interested in birds will know something about the great controversy that existed between the Audubon Society and some of the other people that are using insecticides. I am not going to comment on the merits.

There was a man by the name of Wallace who did some work up in Michigan, who found through his researches or felt that certain insecticides used to control the Dutch elm disease was dissipating the robin population in the area. As I say, that has been a controversial issue.

Recently, Mr. J. A. Dietrich, who is a well-known tree specialist up in Connecticut, tended to deny that. I told you that Mr. Wallace felt the sprays were dissipating the robin population.

I'd just like to read an article that appeared in the Detroit Free Press answering--well, quoting Dietrich in attempting to answer Wallace. It says;

"A leading tree specialist doesn't think so.

"J. A. Dietrich, who addressed the National Shade Tree Conference Tuesday at the Statler-Hilton Hotel, told delegates that most antispray arguments are based on misconceptions.

"Misinformed sources have scared many reliable city officials who are charged with responsibilities of insect control. The general public is geared to a state of hysteria.

"Dietrich, Park Superintendent of Greenwich, Connecticut, reopened the antispray argument begun in 1958 by Dr. George A. Wallace, Professor of Zoology at Michigan State.

"Wallace has charged that the DDT spray which kills beetles carrying the Dutch elm blight also is killing off the robin.

"Dietrich said Wallace's statements were 'dramatic and exciting', but somewhat 'emotional'.

"A pioneer in Dutch elm disease control, Dietrich, 52, listed the following points to counter unfavorable publicity resulting from the wide use of DDT:

"1. Agricultural chemicals are regulated by Federal and State laws which guard against possible hazards to wild life.

"2. In answer to charges by an Illinois conservationist that DDT had destroyed the bird population of Batavia, Illinois, a special bird census was taken. It showed that there had been little or no damage.

"3. Thirteen years of spraying in Greenwich has not produced some of the dramatic catastrophes portrayed by some critics. Birds still migrate, fish still populate the streams, wild life is active.

"Despite such evidence, reliable and thoroughly tested chemicals which have performed a remarkable job in the interest of mankind are being shunned as the result of this unwarranted, needless and contradictory propaganda."

In that same connection this is in regard to the cranberry situation that has come up. I think

we are going to assay some of our thinking regarding some of the toxic materials that are in some of our good foods. When we get into these problems--all pest insecticides are toxic and we might consider them as such. But, if we will read the labels and follow the instructions provided by the Department of Agriculture and by the Pure Food and Health people, generally speaking, we would be at all times on safe grounds as far as their use is concerned.

There have been some people that have lost their lives from the misuse of certain insecticides but I don't think there is anyone that has ever been hurt when it was used correctly, following an application--the use or application, so to speak, of an insecticide.

I might say that I think it is true that some of our good foods; for example, you can probably kill more birds--not birds, but chickens with sodium chloride than you can with DDT.

Along that same line there just appeared in the paper the other day a remark or an editorial in one of the medical journals, and the headline as it came out in the paper said, "Cranberry Ban Rapped". I will now read it all.

"The Government's recent action against sellers of cranberries, chickens and products colored with charcoal was criticized today by the editor of the Journal of the American Medical Association as causing undue alarm among the American people.

"In an editorial in the Journal, Dr. John H. Talbott made this comment on aminotriazole, the cancer causing herbicide that prompted the Government to halt the sale of cranberries shortly before Thanksgiving."

I am reading this, probably, because some of you people have been opposed to it. This is what he says:

"If turnips and cabbage were included among the vegetables served or mustard was used as a condiment, minute quantities of aminotriazole might have been ingested by the Pilgrims more than 300 years ago.

"The United States Agriculture Department, after analyses begun in 1956, pronounced the compound suitable for use on cranberries, yet 18 months later the implication that the chemical could cause cancer prompted another Government department to ban the sale of cranberries.

"Little stress was placed on the well documented evidence that aminotriazole occurs naturally in vegetables, notably cabbage, turnips and broccoli, as well as in mustard or that in which the antithyroid action is described in current textbooks of therapy.

"Carbon black was recorded in the Federal Registry, December 9, 1958, as a permissible food adulterant but omitted a year later."

He added, "A fortnight after this action a supplementary document by the Food and Drug Administration permitted the processors and the users of charcoal in food and candies a three month period of grace to produce evidence that burned toast is harmless."

I just read that because it is just another factor and a controversy that is going around.

Now, you know a lot of this business. In making these statements, I am not trying to discuss

the pros and cons. I have got to look at this business fairly. I think as some emotional situations arise, I feel that anything that might contaminate or injure foods should not be premitted--and your wild life, as far as that is concerned.

As a matter of fact, I am sure that the gunners are doing more damage in crippling and injuring the birds than some of the pesticides that we are using.

A rumor--these things that are put in the papers--a rumor is something we need to consider.

I am just going to read you something here so that I hope this will better enable you to talk with any of the people in case some of these problems come up.

"A rumor is a specific proposition for belief, passed along from person to person, usually by word of mouth, without secure standards of evidence being presented. Various personality factors enter into a rumor."

Mrs. Adams to Mrs. Beck: Where is Mrs. King today? Is she ill?

Mrs. Beck to Mrs. Clark: Mrs. Adams wonders if Mrs. King may not be ill.

Mrs. Clark (who does not like Mrs. King) to Mrs. Davis (who does): I hear Mrs. King is ill. Not seriously, I hope.

Mrs. Davis to Mrs. Ellis: Mrs. Clark is saying that Mrs. King is seriously sick. I must go

right over and see her.

Mrs. Ellis to Mrs. French: I guess Mrs. King is pretty sick. Mrs. Davis has just been called over.

Mrs. French to Mrs. Gregg: They say that Mrs. King isn't expected to live. The relatives have been called to her bedside.

Mrs. Gregg to Mrs. Hudson: What's the latest news about Mrs. King? Is she dead?

Mrs. Hudson to Mrs. Ingham: What time did Mrs. King die?

Mrs. Ingham to Mrs. Jones: Are you going to Mrs. King's funeral? I hear she died yesterday.

Mrs. Jones to Mrs. King: I just learned of your death and funeral. Now, who started that?

Mrs. King: There are several who would be glad if it were true.

I just read that because you see how these things accumulated as they passed from word of mouth.

Now, I am going to read this. This comes from a gypsy moth area where there is a lot of spraying going on. It says, "From a Berkshire Garden". It was a lady who, apparently, was backing all the antispray work at one time.

"We don't know how other sections have fared during the past few weeks but the gypsy moth has descended upon our part of Cornwall in a dark tapestry of destruction.

"They hang from the trees like bead curtains, pattern the buildings, get in the hair, on the person. They have almost defoliated our flowering quinces, flowering crabs, roses and are now working their way through the maples. They have even moved into the house and are on the ceilings, walls, in the bedding and on the food. The other morning we found one on the living room table, thumb to nose, getting a good laugh out of the Connecticut Agricultural Experiment Station's 'Control of the Gypsy Moth'."

I am not criticizing the Station's spraying either. I don't think the Connecticut Agricultural Experiment Station had a thing to do with it.

"Heretofore we have been firmly antispray and have given tongue to the same patter as all the rest of the antispray faction; the gypsy moth is on the wane; natural predators are getting them under control; they are no longer a threat and most of the spraying has been unnecessary anyhow.

"Well, we have come down out of that ivory tower fast. In this, as in most other matters, it makes a lot of difference whose arm is being twisted, whose garden is being defoliated.

"And, ironically enough, this current invasion has presumably come from a part of our own woodland which, last year, was pronounced an incipient danger point. Did we want to spray? No. We did not believe in sprays. Besides, the peak year was over and natural predators, et cetera, ad nauseam.

"Right now the most beautiful sound in the world is the drone of the helicopter as it works back and forth over adjacent woodland. We can't wait for it to get overhead and give us our money's worth of purification."

With those few remarks, I hope you folks will take them in the light that I hope I presented them--two sides of a somewhat controversial issue, and as something that might enable you to talk with your people in a somewhat factual manner without emotion and try to give them both sides of a controversial problem.

We don't feel that pesticides, if used properly, create any great danger. Particularly that is true if you read the label and follow those directions.

MR. L. R. SHIELDS, Woodmont Country Club, Rockville, Maryland:

We have been concerned with the problem of gnats or blackflies for some time and have learned something about them through Dr. Langford and Charlie McComb at the University by observing and reading the literature available.

We have always known that they are very annoying when they fly into the eyes, ears, nose and mouth, so we set out to see if we couldn't do something about stopping them from doing it. They don't taste good.

First, we used our hydraulic sprayer and sprayed trees and shrubs with DDT or chlordane, but with little success.

I discussed the problem with Dr. Langford at one of the Baltimore meetings and he sent Charlie McComb, one of his entomology students out to the Club to do some research. Charlie waded into the stream and showed me how they lay their eggs on sticks and rocks projecting into the water. Then,

as the larvae hatch, they cling to objects near the water until their wings dry; then fly away.

We actually found tiny worms under water that were about one-eighth of an inch long and about as thick as a hair. To kill these before they hatched, we rigged bottles of chlordane so that when turned upside down drops of the chemical would slowly fall into the water and be taken on downstream.

Results were when we tried to find larvae in that stream later, we couldn't but then we had no check so we don't know if we killed them or they hatched out and flew away.

If you care to try this method, do it early in the season, March or April, and don't use excessive amounts or you will kill your fish, if you have any.

Charlie worked on this project more than I did, and perhaps he should be making this talk instead of me. I'm sure he is more familiar with the subject. He made regular visits to the Club that Summer every week or so to spray or fog the area and to check results.

The chemicals he used were Benzene Hexachlorida or DDT, or a mixture of the two, and a special kind of oil to create the smoke or fog. We sprayed at different times on many days, but finally concluded that the best time was in the late afternoon, just before or just after dark. There was less wind at that time and the chemical stayed in one place longer, giving a better kill. The smoke sometimes stayed for hours, especially if there was no wind.

We checked results by catching gnats and placing them in net boxes at different spots around the course. We got complete kill in these boxes, even though some were placed 600 yards down wind from the path of the sprayer.

The next day or two, after each spraying, we were not bothered by gnats. So, from then on, we covered the area on Thursday or Friday nights in an effort to please the greatest number of players over each week end. We couldn't understand why the results didn't last longer, why gnats came back so soon, but Charlie finally came up with the logical explanation.

In his travels, he found that the Potomac River to the west of us was the breeding ground for great clouds of these troublesome insects and that each time we made a kill, the prevailing winds would bring us in a new batch.

He learned that Montgomery County, Maryland State, and the Federal Government were all well aware of this situation, but none would take the responsibility for adding chemical to the river, and we can't blame them, because it is the source of supply of drinking water for the District of Columbia and most of the surrounding area. After explaining this to the Club officials, they said, "Let us spray", and that's just what we have been doing.

We purchased a John Beane Model 50 Roto Mist blower. We selected this particular model because it works in conjunction with our present regular greens sprayer, and saved the cost of another pump and tank. We rigged the blower on our one and a half ton truck and fixed a trailer hitch on behind for the sprayer.

The chemical is pumped through the hose up to the blower and is blown out by the big fan. Kerosene is used to create smoke which acts as a carrier.

We used two gallons of 50 percent Malathion to 150 gallons of water every Friday night and got good control over Saturday and Sunday.

It also kills flies, mosquitoes and Japanese beetles. We circle the property once, then crisscross until we run out of material. We don't try to cover everything but, instead, try to put up a cloud of vapor that will drift and come in contact with the insects.

This has worked out fairly well for us as a temporary control for week end play, free of gnats.

Charlie's discovery that blackflies were killed 600 yards away has added to the golfing pleasure of Woodmont members and they are most grateful to him and to the University.

MR. REYNOLDS: I was wondering how windy a day you can do this on.

Do you need a certain amount of wind?

MR. SHIELDS: We found it was better if you didn't have any wind or any wind noticeable. If it were very windy, we didn't do it because we felt we'd lose the material as it would be blown away. By doing it late in the afternoon, when the wind died down, we got better results.

AUDIENCE: Did you determine how far they

were being blown from the breeding grounds?

MR. SHIELDS: They found them over in Ellis Park, ten miles from the Potomac, which we assume isn't the breeding ground.

AUDIENCE: Can that attachment be used with an older type, five or six year old tank sprayer?

MR. SHIELDS: Yes, sir. Any sprayer that might have a hose outlet can be used on this particular blower. It has a hose connection at the end of the pipe that feeds up into the blower.

AUDIENCE: Did you find that Malathion took out your cells on your sprayer, your pump?

MR. SHIELDS: No.

AUDIENCE: You didn't have any bad results with your sprayer?

MR. SHIELDS: No, I blamed it on the age of the sprayer. It was ten years old. I had to do it anyway. That is regular routine maintenance.

AUDIENCE: After you put them in, you sprayed once a week?

MR. SHIELDS: Once a week and I haven't had any trouble with the newest sprayer that is about three or four years old. The older one was ten years old and I didn't have trouble with it.

AUDIENCE: I'd like to know about the love life of the tsetse fly. How about the life cycle of this particular insect mating three or four times a season?

DR. LANGFORD: There are several broods. It is the blackfly that we are concerned with. They breed in swift running water. Generally speaking, there are many species of the blackfly. They have the biting fly through the New England area. We are fortunate in that this particular fly we have does not bite or seldom bites. Very few people are troubled with the bite.

There are several broods through the Summer, those that attack the fodder and the crops and the flies that come up off the river we have concern with.

I'd like to ask you, Bob, do you think you have had good worthwhile results from your operation?

MR. SHIELDS: I feel that we did, yes.

MR. GEORGE C. GUMM, Ocean City Golf and Yacht Club, Berlin, Maryland:

We opened our new golf course officially on June 27th, after dry weather for two months. In the first two weeks of July there was, approximately, 14 inches of rainfall. In a short time mosquitoes appeared and the heavy rains produced numerous ideal breeding areas.

An acroplane was used to spray an insecticide on and around the course with good results. The cost of \$165.00 per application was too great to continue the needed weekly sprays.

Ocean City loaned us a sprayer which we used 55 times to spray a solution having a twelve to one ratio of B.H.C. and Malathion. Our costs for

sprayer repairs, materials and labor were \$2,873.93.

The frequency of spraying depended on weather conditions--daily application being necessary on wet humid days. Golfers were enthusiastic about the spraying which we endeavored to do in the morning prior to play or as the early golfers were starting.

The source of the mosquitoes was from nearby marshes where there was an accumulation of standing water. These nearby areas were ditched by C. C. nearly 25 years ago, and late this Summer and Fall they were reopened by the Department of Entomology, State of Maryland.

The State's budget being \$213,000.00 their expenditures being in counties matching State funds. The State supervised work included ditching, spraying and guidance to communities who supplemented the State's program. The reason for ditching being to allow the tidewater to move.

It is known salt marsh mosquitoes breed following a high tide. The adults lay their eggs in mud and if the marsh dries out the eggs continue to lie in the dry mud.

When there is a moon tide or weather conditions produce an unusual high tide the marsh is flooded. In about five days there is a flood of young mosquitoes. The movement of tidewater through the ditches takes off any sheet water rapidly which removes one of the ideal breeding areas.

Control of mosquito includes ditching for improved drainage, spraying and informing the local people what is important for them to do and what the State and local governing bodies are doing.

We believe with the concerted action and our spraying, the golfers will experience satisfactory playing conditions.

BERMUDA GRASSES

MR. E. RAY JENSIN, Southern Turf Nursery, Tifton, Georgia:

As interest increased in better Bermuda grass for turf purposes down in the deep South, a few basic facts were discovered, and there are vast variations in Bermuda grasses.

Fertilizers are important, especially nitrogen fertilizers as they affect the performance of Bermuda grass.

It was learned that quality turf was susceptible to and suffered damage from various insects and diseases.

It was learned that some Bermuda grass had superior turf characteristics and produced much higher quality turf than others.

With knowledge in these three fields, research workers succeeded in getting Bermuda grasses from the pastures and onto the golf courses.

By using 100 pounds of actual nitrogen per acre per year on Bermuda grass fairways and 500 pounds per acre of actual nitrogen on greens, it was found is practical to improve their sod density, color characteristics, and weed resistance.

Some golf courses are now using up to four pounds of actual nitrogen per 1,000 square feet per

month on greens--this is during the growing season--and some are using up to--50 pounds of actual nitrogen per acre per month on fairways.

Where Winter grasses are used on fairways, the rate of nitrogen is often reduced on the fairways to create a more open type sod. Often no fertilizer is applied after July so as to allow an opening of the turf by Fall.

The applications on the greens, of course, remain the same through the growing season since they are top-dressed with fresh soil.

Control of sod-web worms and Army worms in the middle and late months of the Summer is very important.

The differences in Bermuda grasses are vast. There are Bermuda grasses with leaves as large as St. Augustine grass and some with leaves nearly as fine as Mascarene grass.

Plots side by side will often show considerable variation. One will be completely covered with disease while another will be scarcely affected. Some will tolerate concentrated herbicides, some close mowing, and some heavy traffic, while others will not.

There is a new grass anticipated for release by the Georgia Coastal Plan Experiment Station and the U. S. Department of Agriculture, and which may be of interest in this area. It is named Tifway and is used for fairways. Prior to being named it was referred to as Tifton 419.

Tifway is a chance hybrid between cynodon transvaalensis (African Bermuda) and cynodon Dactylon (common Bermuda). It appeared in a lot of seed

supplied Dr. Glenn Burton by a Dr. Meredith of South Africa in the Spring of 1954. This grass has shown excellent turf characteristics as a fairway grass. I observed it at least once a month for the past two years.

Its color characteristics are very superior. Its texture, disease and weed resistance is definitely good. Whether or not it may loosen up enough in the Fall with light Summer fertilization to allow poa annua to come through or easy for rye grass overseeding, I do not know. Those results, more than likely, will have to be determined by studies in a particular area.

There is a need for varieties with more cold tolerance, frost resistance, and with a fairly open type sod that will allow Winter color from either poa annua or overseeding.

Slides were used showing the effect of frost and cold on different strains of Bermuda, how superior the quality of turf of Tifgreen and Tifway were to common Bermuda.

Also showed effect of correct soil sterilization prior to planting greens and quickness of coverage--for instance, a green planted in late June and producing a good putting surface in six weeks. A fairway planted on August 20th to Ormond Bermuda being in good playing condition the first week in October.

Pictures emphasized the importance of correct grading when renovating fairways. This was done with a York rake and drag.

A series of pictures illustrated greens soil preparation, fumigating with methyl bromide,

broadcasting stolons at the rate of ten bushels per 1,000 square feet, top-dressing and watering.

The use of machinery when planting Bermuda in fairways was illustrated. These included a straight disk planter and using 150 to 200 bushels per acre.

Pictures showed the importance of prompt watering following planting and continuous daily watering until grass was rooted in comparison with infrequent watering.

THE INTRODUCTION OF BERMUDA GRASSES IN EXISTING FAIRWAYS

The Moderator for this panel will be:

MR. JAMES E. THOMAS, Army-Navy Country Club, Arlington, Virginia.

MR. JAMES E. THOMAS: Thank you. I think you already heard the topic mentioned as to "The Introduction of Bermuda Grasses in Existing Fairways".

I would like to introduce the panel:

MR. EBERHARDT R. STEINIGER,
Pine Valley Golf Club,
Clementon, New Jersey.

MR. L. R. SHIELDS,
Woodmont Country Club,
Rockville, Maryland

MR. TOM DOERER, JR.,
Fort Belvoir Golf Club,
Fort Belvoir, Virginia.

MR. FRANK P. DUNLAP,
Baltimore Country Club
Baltimore, Maryland.

These gentlemen are all going to tell you about their experiences in introducing Bermuda in the existing fairways. I am going to let them give you their case histories.

I have an outline on some things that I think are necessary if we are going to have an establishment of a satisfactory sod of Bermuda grass.

One of the conditions that is favorable for a good standard of Bermuda grasses is full sunlight, preferably, around the clock. I can walk on my own course at this time of the year, when the leaves are off the trees, and I can definitely show you where our Bermuda stops because it is beginning to have competition from shade.

Bermuda is much like crabgrass and it won't tolerate shade. If you have excessive shade you are not going to have Bermuda. So, that will bring up the question as to the area suitable for the establishment of Bermuda. A southern exposure is highly advantageous to it. You will have better success wherever Bermuda is planted in this area and well exposed to the south.

Drainage, as in all cases, must be adequate. In making a selection of grasses, we must be sure that we have a suitable strain; one that is desirable. It must have the qualities for density,

texture and appearance.

At this time I am going to ask Eb to tell us one of his experiences.

MR. EBERHARDT R. STEINIGER:

Slide. This is a picture of Pine Valley, just to show you where we are located. It is a little hilly country with valleys and hills. It is so different from the rest of Southern New Jersey, which is flat. You see, we have quite a forest around there. That, of course, means we have a lot of shady areas.

Next slide. This is also taken about-- over ten years ago, when we first started to introduce Bermuda. You can see it in the center and it is starting to creep now.

Next slide. Now, this will show you the kind of stuff that will grow down in our place. Along in the roughs and in the woods, and along our fairways, Wild Hawthorn and heather. This is a cactus. It has a pretty flower when it is in bloom, but it is the damnedest thing.

Next slide. We haven't been able to raise grass on the slope, although the right side is perfectly surfaced. The left-hand side has given us some trouble. We had Bermuda all the way up to the woods and we have been using some Zoysia. We have some Zoysia in there. As a matter of fact, I think the Zoysia will take over this area by-and-by. It shows that Bermuda is just going to grow where it likes to grow. There is nothing you can do about it.

Next slide. This is the Zoysia fairway. It is being aerified and mowed. It is about 60 or

67 percent Zoysia in this fairway. It is a pretty good turf.

Next slide. This is a nice machine to open the grass. We use it once or twice a year, especially before a tournament. These are vertical cuts and it has blowers on it to pick up the clippings and it really makes a fine job.

Next slide. This is a fairway model. You really can thin out your Bermuda. After that, we let it dry out and use our blower on it, and use the fairway sweeper on it and sweep the fairway clippings. After it is mowed, you wouldn't even think you were on it.

Next slide. We have one of those small machines. It shows how much stuff this thing will take out. I just want to show you what a little machine will do on a tee.

Next slide. We are still carrying out, with something new coming up. These are plots coming up this year. I haven't got that much to say about this.

We had a late tournament. We had the International Senior Championship in the middle of November. I thought we ought to throw a little dye on there to show the Englishmen and Canadians the different colors. It didn't make any difference.

Next slide. Here is another dye.

Next slide. This is another, our greatest. The third hole. This, also, is taken from the tee.

Next slide. Well, this is a close-up. I just wanted to tell you in case someone wondered why

we had sprinklers in the traps.

Even in the middle of the Summer we have to keep the traps cool or we won't be able to raise any grass on the green. The heat is so terrific we have to cool the traps off. It is an interesting job. That is why I have been there 33 years.

MR. THOMAS: Next is Bob Shields, Woodmont Country Club, Rockville, Maryland.

MR. L. R. SHIELDS: In those pictures of Eb's all he showed you fellows was what I had in mind; what I am trying to get. I'd like to have some of that thatch that Jim Thomas was talking about this morning.

I am going to speak on The Introduction of Bermuda Grasses in Existing Fairways.

There are many ways of introducing Bermuda grass into existing fairways, and I think we have tried them all at Woodmont in an effort to find a way that would meet the following standards of criterion:

Fast. We put speed first because we didn't want the job to drag on all Summer, interfering with other routine work.

Easy. We knew it had to be simple and easy or we wouldn't get it done.

Inexpensive. I've heard it said that Woodmont has all the money. That is definitely not true. We must watch our pennies and dollars the same as you to see that we get the best possible return for each dollar spent.

With little interference with play. A player

will go along with interference if he knows it will result in a better golf course next year, but sometimes it might take a year to get across to him the information on what we are trying to do. We chose not to interfere so we wouldn't have to explain, unless he asked.

Finally, we had to be assured that we would get a good percentage of "take" so our labors wouldn't be for naught.

To meet these requirements we checked over the different methods of planting, such as plugging, hand-sprigging, strip sodding, plowing and disking. All were either too slow, too expensive or there was too much interference with play.

One of the first big problems we ran into every time we wanted to plant Bermuda was the harvesting of planting material, whether sprigs, stolons or sod. As you know, the grass is rather stiff and wiry with stolons close to the ground and hard to get at to cut.

We tried rakes, hoes, pulling by hand; then later the West Point Verti-cut and they all worked pretty good but not good enough for large scale fairway work because they were too slow and expensive.

The problem of harvesting was overcome when a former Mid-Atlantic member, Jim Roach, an Aero-Thatch salesman out of Rahway, New Jersey, demonstrated his machine on a tee. I knew the Bermuda harvesting problem was solved.

It filled every requirement--fast, easy, inexpensive (after the machine was paid for) and with no player interference. It even made possible

the use of our regular tees as nurseries.

Thanks to Burning Tree and Columbia, we were able to buy the machine immediately. They had purchased some bent grass stolons from us, so we had the money to buy the machine without having to go to the club officials. We put it to work at once and planted about four acres more of nursery with material from tees, using the broadcast method, to make sure we would have ample stolons when and if the club decided to put Bermuda in fairways.

The decision came about a year ago but we still didn't know how we were going to do the actual planting. We had spent all the money in our little fund and couldn't buy a planting machine. So, we made our own from scrap iron, a used subsoiler blade and a couple of colter wheels from the plow.

It works on the three point hitch behind the Ford tractor and is very simple. One colter wheel makes a cut in the sod, and the subsoiler blade runs in that slit, making it wider (about three-quarters of an inch) and deeper.

A man rides on the planter and drops the stolons down through a piece of stovepipe and they fall on the slit. The second colter wheel follows behind in the cut, pressing the sprigs down into the ground. The cut is closed by the tractor wheels the next time across. Then we start the sprinklers.

Not counting watering time, which I reasoned we would have to do anyway, the operation required three men; one driving the tractor, one on the planting machine and one harvesting and delivering the stolons in bags or baskets from the nursery.

We planted across the fairway in cuts about a foot apart and dropped sprigs about every foot so that we had plants on one foot centers. This spacing could be changed by regulating the speed of the tractor, but I thought the foot spacing would be about right. We stopped planting about ten feet from the green.

The amount of material used was, approximately, 50 bushels per acre or a total of 1,500 bushels for the 30 acres of fairway. The entire project was accomplished in the month of June and required a total of 450 man-hours at a cost of \$592.43. Add to that the cost of the planting machine, which was \$67.45, to get the total cost, but keep in mind this does not include watering, which was a big item.

Results were far from spectacular due, mostly, to the fact that June was a very dry month. The first dozen strips got rain the day after planting and were way ahead of the rest, which didn't get any rain for a month.

This Winter, now that the crabgrass is dead, the Bermuda shows up a lot better and I believe we have a pretty good stand. The end of this coming year will tell the tale, but I'll continue to plant any area that looks like it might have died out.

Our future plans call for the development of another planter. So, we can plant our other two nines even faster this coming Spring by running two machines. On our fourth nine now under construction, we intend to plant U-3 Bermuda on all fairways by using the broadcast method. This will be done in June or July, and I believe we can have playable fairways by the end of the Summer.

I don't know anything about 328 Bermuda. I think it is to my advantage to concentrate on U-3 since we have six acres, approximately, rather than to establish the new Bermuda and wait for it to come up.

MR. THOMAS: Thank you, Bob. That was most interesting.

MR. TOM DOERER, JR.: I didn't hear much mention about soil. We have at Fort Belvoir, unfortunately, compacted soil of a clay nature with a lot of gravel.

I will speak on Tifgreen Bermuda. I tried it at Fort Belvoir on some very, very difficult places, which was entirely as hard as that floor, where a disk wouldn't penetrate the floor ground. I used Tifgreen clippings and scattered it around. After four weeks I had a little bit of grass showing. I find this Fall it has covered quite an area.

I also found rock underneath the sod. I imagine any Bermuda grass builds up its own soil. I found in the clay silt which we have there that I got complete coverage on a 50 by 100 foot lot in six weeks and very dense. We cut that to a height of three-quarters of an inch.

Tifgreen has a dense texture and holds the ball up on the fairway very well, but the appearance of hitting the shots off of this type of grass in the Fall or early Spring is more of a psychological thing than anything else. To change the psychological effect--I think it would be an educational program in this area to educate golfers that you still have a good playing surface without green color.

In closing, Bermuda grass is the coming

grass in this area. My favorite is Tifgreen.

Slide. There is a spreading machine we use at Fort Belvoir to spread the surface. We purchased it for about \$600.00. It does a very good job. It is very similar to the one that Bob Shields presented before us. This is one we got out of St. Louis.

We did three acres in six hours, just two men, and you can see the hopper on the left. That is where our stolons come down through there and drop into the chute and the slit is made by the knife in front. You have the disk in the middle and in the back you have the roller to compress it. So, you don't know you are going across the fairways.

AUDIENCE: What was the distance between the rows?

MR. DOERER: They were put in 15 inches in the center. The rows were 15 inches wide and stolons were 15 inches apart.

Slide. That shows the mechanical operation of the machine.

MR. FRANK P. DUNLAP: Some of you may suspect that I have been rattling around in this racket for 40 years, and in those years I have seen fairway renovation programs, and fairway planning programs. I guess I have seen everything that can be done and have done most of it myself.

I did a complete renovation at the Country Club and, in my own case invariably and everyone else's, within a year to five years at the most, we were right back where we started from. We had poa annua, chickweed, clover and dead grass in

the summertime and it was just a losing fight and an expensive one.

When I came to the Baltimore Country Club we had a patch of U-3 on the hill in front of the 15th green that Bob Scott put in there. It was a beautiful covering of grass in a place that I was given to understand had never had turf on it.

Now, this U-3 was not maintained to its best advantage, due to the fact that it was a small area and the rest of the fairways being Bluegrass, it was always cut at a higher level than U-3 should be cut. Nevertheless, it was the finest piece of turf that we had on the course in the Summer and early Fall.

So, I began talking U-3 Bermuda and we discussed the subject back and forth for a couple of years, and finally the committee and myself got the committee to say, "Well, let's go for the program."

The first thing I did was to talk to Eb Steiniger. I thought he had, probably, as much experience as anyone to decide which method we would use. After talking to Eb, it was his opinion and mine that the use of plugs was the surest and the cheapest plan, without losing the turf when you put it in.

This Summer we hired four colored boys from Manpower, Inc. I put one of my men with them to supervise the job. We put in 170,000 plugs in the fairways at five different times. The ones that went in in May have increased in some instances as much as ten inches of solid turf and in some cases 20 and 25 inches of runners beyond that solid turf. This job took us from May to November.

I have about two and a half or, probably, three acres yet to do. I am doing 100 plugs a month each month through the Winter, just for my own information, to see whether Winter plugging is satisfactory and whether those plugs will come through.

I think that all of us going into this program, when we get solid coverage of all our fairways, are going to have a lot to learn about the maintenance of this thing.

Some of the things that Eb brought out, unquestionably, have to be done--the close cut, verti-cutting and flexicombs will aid in removing mat. I think that more courses are going to make some drastic changes in their fairway mowers in order to do an adequate job on this grass.

In an adequate fertilizer program, probably, high nitrogen is necessary. I was very interested in Eb's remarks about the potash, and certainly he, apparently, has a point and is arriving somewhere at the elimination of Winter kill.

Just what the point of nitrogen is--we know the U-3 Bermuda will use practically all of it that you can give it, but how much it ought to have is something that I think is still to be worked out in the future.

The important thing about U-3 Bermuda is good playing turf at that time of the year when golfers are playing.

PROBLEMS AND ACCOMPLISHMENTS IN 1959
ON THE GOLF COURSE

MR. CHARLES K. HALLOWELL, Mid-Atlantic
Director, Green Section, United States Golf
Association, Jenkintown, Pennsylvania:

Golf Course Construction

Twenty-four new golf courses are being constructed in Pennsylvania at the present time. While eight new courses were opened during the past year in Pennsylvania and seven in Virginia, Virginia now has eleven courses under construction which rates them ninth in the United States.

Research

Turfgrass research was active at three centers, namely:

Beltsville, United States Department of Agriculture under the direction of Dr. Juska.

Pennsylvania State University, Experimental Station with turfgrass plots being relocated under the direction of Dr. Joseph Duich.

Virginia, at Virginia Agriculture Experiment Station at Blacksburg, Virginia, being directed by Dr. Blaser and Richard Schmidt.

Seed Situation

Seed supplies are plentiful with two exceptions, Kentucky Bluegrass and Tall oats grasses (Alta and Kentucky 31 fescue). The 1959 yield being 15 to 20 percent less than the 1958. Nine million plus pounds of Kentucky Blue season is the reported

total for 1959. This is in comparison to 64,000,000 pounds in 1958.

Bent grass slightly higher yields and both chewings and red fescue and common rye and red-top a definite increase. The 1959 crop of Merion bluegrass was the largest produced, being 2,721,000 pounds.

General Maintenance

Weather again featured the maintenance program in 1959. It is weather and wear that golf course superintendents are continually planning to meet and to keep ahead of. It is weather and wear that causes them to attend a conference such as this and conference on both national and local levels.

Superintendents go to meetings and compare notes and discuss their problems, most of which are due to the effects of weather and the wear on the grasses resulting from players, machinery and other causes.

Weather Extremes

The cold Winter of 1958-1959 brought many problems, especially in areas where it was usual to have snow and there was nothing but continued cold weather. Ground was frozen for more than three months and winds dried out the grass. It was most difficult to revive the grass, some seeding had to be done, nurseries were put into use and the grass that was brought back slowly during the season was then hit with hot, humid weather plus disease in mid-July.

Rainfall Variations

For instance, after a very dry May and

June with 59 consecutive nights of watering, the 14 days in July--Atlantic City reported 14 inches of rainfall. Ocean City, Maryland had an extremely dry Spring and early Summer showing a total rainfall from April to late October to be 26 inches with more than half of it in the month of July (10 inches falling in the week of the 13th of July) and none during September. There were other areas reporting four to five inches of rainfall in 24 hour periods and seven inches during one week. The rain was usually accompanied by high temperatures and considerable humidity. All three being detrimental to proper growth of grass.

Soil

Soils suffered from heavy rainfall in the Summer plus wear on them when they were wet. Again, it was obvious that lack of adequate drainage intensified the problem. This was noticeable on greens, approaches and low fairways. Poor soil compositions being another factor that intensified problems, as soon as surface dried compaction became severe. Greens having a good mixture of sand, soil and peat properly drained underneath and on surface came through the unfavorable weather in a satisfactory condition..

GRASSES

Greens

The improved strains of creeping bent thrived well. These include Arlington, Congressional--mostly these are mixed--Cohansey--occasionally Old Orchard--all these being propagated by stolons. The new Pencross seeded greens showed a good advantage.

Bermuda shows various methods of propagation.

Fairways

Improved strains of cool season fairway grasses are limited. The only one being Merion bluegrass which is showing to a good advantage on occasional courses.

Merion bluegrass germinates slowly and its early development is also slow, once established and cut at, approximately, one inch it is giving good coverage. Proper companion grass does not seem to be entirely clear. Where Kentucky 31 fescue has been used in equal parts with it at Seaview Country Club, the fairways are most satisfactory.

On a few courses 70 percent Merion bluegrass and 30 percent Pennlawn fescues have been seeded with satisfactory results.

When Merion bluegrass makes up 50 percent of the seed mixture including other cool season grasses except bent, Merion will be the predominating grass. An evaluation of cool season turfgrasses alone and in mixtures seeded in October, 1953, by representatives of Crops Research Division, U. S. Department of Agriculture, Beltsville, Maryland, indicates good turfgrass will continue through the season when Merion is seeded at sufficient amounts to keep ahead of other grasses.

Merion showed its superiority over common bluegrass, red fescue and the tall fescue. Only when bents were included in mixtures did Merion take a second rating. The liberal amount of nitrogen encouraged the bent to predominate.

Since the height of cut was one and one-half inches or more the bents developed a mat in a few

seasons. The mat resulted in smothering the bent, allowing weeds to come into the plot. Kentucky Bluegrass was hampered by attacks of leaf spot in the Spring, being most severe in 1956.

After checking the plots and diagnosing the summary, either a mixture of 75 percent Merion and 25 percent red fescue or Merion alone should produce a superior turf when adequately fertilized and properly maintained.

Kentucky Bluegrass had less leaf spot the past Spring. This gave several hopes that it was a grass to depend upon. Past history indicates leaf spot attacks are slight in one out of ten years. Where golfers have demanded close clipped turf, bluegrass fails to qualify.

Courses in this area, depending entirely on cool season grass, have turned from Bluegrass and fescue to bents. Heat, humidity and heavy rainfall were unfavorable for the growth of bents during July and August. Where bent predominated as the result of a successful renovation program severe weakness appeared this past Summer. Three courses applied fungicides to check disease and found this practical. The Colonial strains of bent are too weak to withstand the 1959 growing conditions.

The Research Project at Penn State to breed a stronger strain of Colonial needs full support and it is hoped the program moves rapidly. The weakness in Colonial bent stimulated the Bermuda planting program that we heard about yesterday.

Poa annua, as is usually the case, weakened as the temperatures became higher and with wear from machine and foot traffic, plus continually rains disappeared. Any stimulation of growth of *poa annua*

during hot weather causes leaf growth that the limited root growth fails to support.

Any fairway renovation program calls for checking seed of poa annua in the soil prior to reseeding. Results secured by spraying sodium arsenite on the soil while preparing the seed bed was described in the July, 1958 issue of the Golf Course Reporter.

William Mellon of Lancaster Country Club renovated seven fairways this past September, using the arsenite and effective disk and leveling harrows prior to seeding a mixture of 75 percent Merion bluegrass and 25 percent Pennlawn fescue. With his efficient irrigation system, germination was quick and play was on mowed fairways three weeks after seeding.

Fertilizers

The slow acting nitrogen fertilizers again showed to an advantage. This being noticeable when temperatures were high and diseases present. Ureaform nitrogens are finding a place. It is customary to make two applications a year, early Spring and again in September by splitting amount used for entire season.

When the Ureaform nitrogen is used in this manner then 0-12-24 or 0-20-20 is applied in the Fall and if soil tests show the need, in the Spring. In general, eight pounds of actual nitrogen per 1,000 square feet produced sufficient growth.

Diseases

On greens the two diseases giving the most trouble were Helminthosporium--the melting out--and

Pythium. Both are difficult to control. Again, where drainage was adequate and the nitrogen was withheld, the disease was less. For controlling these diseases, the following program aided:

1. Well drained greens, both below and on the surface.
2. Soil mixture having a high percentage of sand.
3. Washing off surface of greens each morning but endeavoring to keep the soil slightly dry. This was difficult to do during July and August due to frequent rains.
4. Aerify if soil shows surface compaction, using one-quarter inch spoons to dry out surface.
5. Spiking of the soil surface weekly is a helpful aid.
6. Withhold all forms of nitrogen when temperatures are high. Recent research studied indicate bent will not extend roots when temperature is 90 degrees or above. Nitrogen applied to poa annua during unfavorable growing periods produces soft leaf growth that is subject to attacks of disease.
7. Use fungicide regularly. The mixture of Thiram and Actidione showed promise in trial plots.
8. Hydrated lime dusted, five pounds per 1,000 square feet, proved helpful. Lime must be applied when leaves are dry, then poled into the surface soil and water withheld for 24 to 36 hours.

Insects

Grubs continue to be observed in different areas. If Aldrin, Dieldrin, Chlordane or Heptachlor are applied by late August or early September, the grubs will do very little damage to the grass. However, the insecticide may be applied any time the ground is not frozen. Keep in mind that the younger

the grub when insecticide is applied, the less it takes to poison the grub.

Cutworms and sod webworms were severe in most all areas but with the small amount of insecticide in the fungicide sprays the injury was kept to a minimum. These two insects in their adult form feed only on the surface and for control the insecticide must be on the leaf surface.

Tees

There were efforts to improve by rebuilding and establishing an improved grass. Warm season grasses being the most efficient grass where there are a number of days with temperatures in the 90's and play is heavy.

Cool season grasses giving good performance are creeping bents with Arlington having high rating and Merion bluegrass. Correct grading at the surface important and proper management a MUST.

Roughs

There was a definite movement for improved roughs.

Limestone every four or five years and superphosphate, 400 pounds every two years, supply sufficient essential nutrients to maintain a uniform growth of good grasses. By improving the roughs the weed control problem is reduced.

MR. DOERER: Thank you, Mr. Hallowell.

WETTING AGENTS

MR. JAMES A. REID, Suburban Club of
Baltimore County, Pikesville, Maryland:

Although I like to think of myself as a "progressive" superintendent, I must admit I scoffed at the idea of using wetting agents when first approached by a salesman. But now I am glad I let the salesman talk me into giving it a try.

We know that one of the main functions of water in the soil is to carry or transport fertilizers and other nutrients to the roots of plants and grasses. An additive which will make water wetter increases its capacity to supply these roots with nutrients. It is like using a ten ton truck to carry a 500 pound load. We can certainly improve efficiency by loading the truck to its full capacity.

A wetting agent added to water does just that--it improves the functioning of a given quantity of water so that plant nutrients are more evenly distributed in the soil, and they remain available to the plant roots for a longer period of time. As a result we get much more satisfactory plant growth with less water.

Wetting agents have been in use for many years in certain fields of science and industry, but have not yet really come into their own in golf course use.

During 1959 a comparatively small number of superintendents produced a turf that was denser, better rooted and more disease resistant. It was tougher in relation to wear, temperature, humidity and wilt.

It should be emphasized that wetting agents cannot produce overnight miracles. Satisfactory results involve long range programs, and any turf must be given a satisfactory growth time to take advantage of the improved soil conditions. We who have used wetting agents for one or more seasons are fully convinced of the advantages to be gained with a properly administered long range program.

There are at present a number of companies manufacturing wetting agents and this number will, probably, grow as the use of wetting agents becomes more widespread. Each company will, no doubt, conduct its own experimental program and come up with a set of directions to be followed to gain the best results from the use of its product.

We urge you to adhere closely to the manufacturer's instructions. Failure to do this may prove disastrous. Not only will you fail to gain the favorable results expected, but you may even cause extensive and expensive damage.

You will recall the recent to-do about the cranberry crisis. In the midst of the confusion and controversy caused by Secretary Flemming's statement, one thing is most significant, that the chemical involved was not used in accordance with the manufacturer's instructions.

For the past three years we have been using a non-ionic wetting agent on all our greens, collars, approaches and tees. This year we've had more play than ever before and we haven't had a bad green. We've had no wilt and the turf showed no signs of wear. Our collars no longer wear out from mower turns since we started this program.

The mechanical benefits of this treatment were quickly observed in two ways:

1. To our members in that it was the first time they could take a divot in the fairway.
2. By an incident with our sprinkler and golf carts.

Permit me to cite a personal example. Last year I sprayed ten acres of fairway with a wetting agent, Aqua-Gro, using approximately six gallons per acre. We diluted the material ten to one and gave two applications, then turned on the traveling sprinklers. Where the sprinklers hit, the results were fine. Where they missed, we had burned the fairway so completely that these areas had to be reseeded.

The instructions plainly state that Aqua-Gro used in this concentration must be watered in. My failure to do so caused me a lot of trouble and expense.

Joe Sylvester from North Hempstead, Long Island, reports the following program:

He mixes one gallon of Aqua-Gro per 100 gallons of water for normal spraying of tees, greens, approaches and high spots on the fairways. In his fungicide program, for every 100 gallons of water he uses only eight ounces of Aqua-Gro along with one pound of Calo-Clor, three pounds of Tersan and six pounds of sulfate of ammonia or other soluble fertilizer. This mixture was applied normally once a week.

You will note that I gained excellent results by diluting ten to one for initial application, followed by extensive watering.

Joe Sylvester gained similar excellent results by diluting 100 to 1 in one instance, and 200 to 1 in the second instance. Here the follow-up watering was not necessary.

Whichever method of application you prefer should be used according to the following general program:

1. Every year apply a total of 24 to 32 ounces of non-ionic wetting agent per 1,000 square feet. Each application should be at the rate of eight ounces per 1,000 square feet, requiring three or four applications per season. This is for normal conditions. Under severe conditions, apply eight ounces per 1,000 square feet at monthly intervals.
2. To promote deeper rooting, make both a Spring and Fall application.
3. For maximum results, keep your program on schedule. These rates of application are based on using a blend of non-ionic wetting agents made up of 100 percent active ingredients. Your average yearly cost for such a program should be in the neighborhood of \$2.00 to \$3.00 per 1,000 square feet.

As we look to the future we are sure to see new applications of wetting agents. We know that large cities have increasing problems each year with water shortages during the dry months. Water rationing for irrigation purposes is now in effect in many areas, and it has been predicted that in the near future the watering of lawns will not be permitted unless a wetting agent has been used on the lawn. The words, "non-ionic wetting agent" may come into daily use in every home in the country.

MR. ROBERT A. MOORE, Aquatrol Corporation
of America, Bryn Mawr, Pennsylvania:

In December of 1959 many of you might have read this news item that appeared in quite a few newspapers:

"Two scientists observed the planet Venus from a balloon 15 miles in the stratosphere. The evidence brought back was the first direct scientific evidence of water on the planet. This could upset the old belief that Venus is a dead planet."

How universal the word water is. Here we see the very evidence of water on a planet suggesting "life". You gentlemen all know too well, how the correct or incorrect use of water can mean life or death to your turf. And yet, all our lives and for centuries before us, one has dealt with water as if it was sacred--as if nothing could be done to change it.

As recent as this past year, one of the most severe years in turf history, we have heard about it here today and I think we all knew it before we came here--with respect to weather conditions.

"These situations and the critical problems which be in their aftermath point up the fact that, despite our modern age of science and technology, Mother Nature is still very much in command."

Our textbooks, our theories, our research, our whole thinking remained corralled by the accumulated weight of what we have learned--a learning that has been based on the use of plain water. In the last day or two we have seen several slides with response curves. These charts should show response curves at both low and normal soil moisture tensions.

The few superintendents in your midst who openly advocate the use of soil wetting agents will some day topple this giant. The fact is that these soil moisture tensions can be changed. Clearly, two factors stand out as fundamental in growing a superior turf:

1. The rate at which water displaces itself in a soil.
2. The availability and rate of utilization of water and nutrients as evaluated in terms of soil moisture tensions.

Ultimately then, given any soil condition, what has to be proven is that a plant's physiology is effected by the soil moisture tension of its environment, and the tension of this environment is directly effected by non-ionic wetting agents. Some day I'll feel a lot better when you fellows don't say, "What! Use a wetting agent on No. 7, why that's my best green."

Most of us are familiar with the mechanical aspect of non-ionic wetting agents where the reduction in the tension of water allows water to penetrate more readily and uniformly into problem areas such as hard spots, thatch, localized dry spots, banks and so forth.

At this point one can easily get lost in a tangle of dissension as to what the problem is and how it should be solved. For instance, should we change our fertilizer program; aerify these areas; aerify and apply soil wetting agents or should we renovate and try new grasses? Is the problem one of soil composition? This, gentlemen, can and does go on and on. But here, the giant we speak of is still sleeping. At this stage he still knows little of what happens what a plant is grown under low tension soil moisture.

Dr. Peters' experiments at the USDA experiment station in Urbana, Illinois, studied the effects of soil moisture tension. His findings in Agriculture Research, in the May issue of 1957, showed that soil moisture tensions controlled:

1. The movement of both water and nutrients in the soil.
2. The uptake of both water and nutrients by the plant.
3. Nutrient starvation sets in under high tension conditions before water starvation (or wilt as we know it).

Dr. Peters said that, "New knowledge of this complex relationship points the way to better management of water and nutrients."

From this and the above information, we may say that a plant's growth can be determined by the tension of the soil moisture in which it lives, and that these tensions can be controlled by non-ionic, wetting agents.

Let us turn for a moment to the ornamental nursery field where a great deal of information is now available, and more will be published this year. What happens to nursery stock grown under low soil moisture tensions? No university has any available information on this subject, but still something is taking place.

One big advantage in the nursery field is that one is able to take plant material and follow its development over a period of months and years. The plants, grown consistently under low moisture tensions, make better growth, are denser, are more disease and wilt resistant and develop better root systems.

You can take the best prepared soil and physically change the soil moisture and you will get a result that is new in the history of man. These same results are being obtained by the superintendents who have maintained their turf under low moisture tensions.

These results raise such questions as:

What does constitute a proper soil mixture for a green?

What is the most effective fertilizer program?

What grasses are most desirable?

To each question we can point to case after case where changing the physical characteristics of water gives us a new insight into our use of this basic ingredient of life itself--WATER. This requires a reevaluation of all the good maintenance practices that have been developed over the years--reevaluating them in terms of soil moisture tensions.

It can truthfully be said that this is a new philosophy of growing plant material. Belief in these results means that one must grow under low soil moisture tensions. But, gentlemen, these results do not happen overnight. As Jim stated, a program must be followed, just as you now do, with your use of fertilizers, fungicides, herbicides, and so forth. A blend of non-ionic wetting agents must be used, and they must be used according to the general program outlined.

When the non-ionic wetting agents are diluted sufficiently, one ounce in one gallon of water, or approximately 100 to 1, you may apply as much of this solution to an area as you wish and there will be absolutely no damage. A complete tank full could be put on a green with no harm.

We hear, as we've heard in the last two days, the cost records of the various turf programs. You will be interested to know that the cost of the program to maintain low tensions in your greens, collars, approaches and tees on an eighteen hole course will average less than \$450.00 a year.

What can be expected from following such a program on your turf? After consistently growing under these low moisture tension conditions, superintendents have essentially eliminated syringing. They report very little evidence of wilt; their fungicidal program and control are more effective; their turf is denser; more resistant to wear and deeper rooted. During 1959 they have had more play than ever before and their greens are better than ever.

These results certainly require your own individual investigation. Take some portion of your course this year and follow a program. For instance, try it on your tees; use it when reseeding or resodding; try it on your collars and approaches; treat your worst and best greens, et cetera. Find out for yourself.

Let's not limit our thinking at this time to past experiences where wetting agents have been used sparingly. We are talking today about growing at low soil moisture tensions. This is not a one shot proposition, it is a program.

Thank you.

AIR AND WATER MANAGEMENT FOR BETTER TURF

MR. O. J. NOER, Milwaukee Sewerage
Commission, Milwaukee, Wisconsin:

I am going to try and cover a few of the highlights of the 37 years that I have been associated with turf grass.

Of course, you must remember that the impossible of today becomes the commonplace of tomorrow, and I don't presume to tell you that you should live in the past because I don't think any of us should do that.

On the other hand, there are basic principles and there are lessons in the past that will go on and will help us over some of the rough spots in the future, and I think that is one of the things that we must remember.

I can recall in my youth that I thought some of these old fellows, John McNamara, Fred Burkhardt and so on and so forth, were all wet and yet from them and Joe Valentine I have learned to respect them, and they have taught me a great deal through the years, and I want to take this opportunity of thanking them for the contributions they have made to me.

In 1922 George Mortimer, who has passed on long years since, and I established some fertilizer plots on a piece of old pasture turf at the University Farm and as we were making these fertilizer applications, B. D. Leit of the Agronomy Department happened by, and he said, "How much is this costing per acre?" I told him, "We don't care. We are not interested in costs at this moment." But he persisted and wanted to know and when we told him about what the cost would be per

acre, he said, "I can rent ten acres of pasture land for what that stuff is going to cost that you put on." And yet, it was the beginning of something that has paid dividends, even in that field.

Slide. I think you can see the white spots on the plot in the background, and that is clover and it is volunteer clover. There was no clover seeded on the plot and the plot looked about the way the foreground did before the fertilizer was applied, and that is the result of what happened when we used 400 pounds of 50 percent muriate of potash to the acre. Just look at the excellent stand of volunteer clover. And, of course, what we should do is tell you, "Don't use potash because clover is a weed in turf grass."

On the other hand, I might show you another plot on that series in which we use 400 pounds of potash and we use 400 pounds of ammonium sulphate and there was a beautiful stand of grass with almost no clover in it. And to me, the answer or the lesson to be learned from that is, so far as we are concerned, remember that potash is essential and use it so as to satisfy the demand of the grass, but don't try to produce pasture turf on a golf course.

When Tuckaway was built in Milwaukee in the early 20's, the fairways were seeded with 125 pounds of grass seed to the acre. The mixture was, approximately, 80 to 85 percent Kentucky Bluegrass and 15 percent of red-top. We established some fairway fertilizer plots going across the fairway that is on heavy soil.

Slide. Here is the unfertilized plot.

Slide. The next one is where we applied

superphosphate at 100 pounds of actual phosphoric acid per acre, and notice the uniformity of the stand on that plot. That is the reason why we have always advocated general use of phosphate before seeding because, particularly on heavy soils, one gets a stand of uniform turf or of grass. Then the problem of developing good turf is simplified.

Slide. The next we used 100 pounds of nitrogen, in addition to the 100 pounds of phosphoric acid, and you can see that there is more vegetated growth as a result of the use of nitrogen along with the phosphoric acid.

Slide. On another plot we used potash but there was no difference. When Blue Mount was built in about 1924 we established some fertilizer plots on several of the approaches to the greens and we used 100 pounds of nitrogen and 100 pounds of phosphoric acid. The area you see in the background and the area in the foreground was seeded at the same time.

The picture was taken in the Spring following the seeding and there had been a lot of Winter kill on the unfertilized area in the foreground. The young seedlings did not get off to a good enough start so that they could survive the heaving action of Winter frosts.

Slide. When this course was built at Fort Washington, I was up there and told them that if they didn't fertilize the fairways there, probably, would be no grass because they were going to be so late seeding in the Fall.

There were several farmers on the committee and they made this statement, "Why, whoever heard of fertilizing pastures or a grass seeding? All he's trying to do is sell you a bill of goods because he

wants to sell it." So, no fertilizer was used for seeding. Next Spring one of the directors called me and said, "Your prediction has come true and I am going to pay for the reseeding of the fairways or abandon the golf course. What shall we do?" I told him to fertilize the landing areas and the approaches and not to fertilize the other areas. Of course, I don't need to tell you what happened as a result of the phosphate and nitrogen which were used on those areas.

Slide. Here is one of a number of fertilizer plots on one of the courses in Philadelphia and if you don't think we can grow good dandelions there, you should have been in our area in the days before 24 D. But notice that there are fewer blooms between the two white lines and on both sides and that was due to suppression of the dandelion as a result of fertilization.

Slide. That was the basis which was used when Milwaukee Country Club put in a water system and got mostly clover and weed. We told them that fairways could be changed by fertilization.

Slide. This is a picture of grub control with lead arsenate in Connecticut. Now, I think that it shows that where the lead went on there was good control but it certainly was a lousy job of application.

When Dr. Leach worked out the method for grub control, at one of the green section meetings, he made the statement that lead arsenate was the answer to the weed problem.

Now, he was maybe a little overzealous with his remarks but, at least, it created an interest and, probably as a result of those remarks, Monteth

and Fred Grau began to do some work on selective weed control, and the use of arsenicals go back to that work which Fred Grau did in Washington.

Slide. Now, the next picture is one that we never use. It shows poa annua control. Here is John Darrah at Beverly Country Club. If you will notice the outline, he is standing in the area on which lead arsenate was applied in March or April in the Spring at 250 pounds per acre.

There wasn't a spear of poa annua in that treated area and we thought, "Well, there is the answer to the poa annua problem." The following year he repeated the treatment but it didn't work and, as a result, we have never before showed this picture. It does illustrate that maybe lead arsenate has some virtues and we don't know all of the answers as to how to use it.

Slide. The first big job of fairway. Weed control was done at Toronto Golf Country Club by Purdy. He used arsenic acid. He and the chairman came to Washington. They talked with Montieth and Grau and then had courage to treat all eighteen fairways--something that I never would have advocated. They transformed these weed infested fairways with the spraying and fertilizer into some of the finest fairways that I knew of on this continent.

Slide. The next one shows the discoloration from the arsenic acid. The unsprayed area on the right and the sprayed on the left. They sprayed about three times.

Slide. Here is one of the roughs--many of you have seen this picture--At Sunset Ridge in the Chicago area. A very fine crop of dandelions, with good turf on the fairway, which was mostly bent, and

the dandelion cleanup there was done with sodium arsenite and the rate was about 12 pounds per acre. They sprayed two or three times.

Slide. And the next picture should show that same rough the next year. A Bluegrass takes a bad beating. It discolors badly but it withstands the treatment.

Slide. The next picture will show plots which we established at Brynwood in Milwaukee. The spots on the left were sprayed with applications of sodium arsenite. The ones on the right were where we applied milarsenite.

Slide. And this is Northmore where Frank Donnelly used sodium arsenite at 12 pounds to the acre for the roughs, to cleanup the broad-leaved weeds, and he used milarsenite on the fairways, and you can get the difference in the discoloration as the result of the dry and the spraying method with really heavy rates of sodium arsenite.

Slide. And here is another picture of those same plots at Brynwood showing excellent control of clover with milarsenite and sodium arsenite.

Slide. This is a picture of one of the fairways at the course in Milwaukee, and I think you will all agree that it is a very fine crop of clover. The fairways have not been fertilized, as you can suspect and, of course, they were worried about the clover. The players couldn't find the ball because of the white, particularly when it was in bloom.

Slide. We established some plots with milarsenite. I think you can see that with the two applications--the one application only in the back--

that there was a very good cleanup. And that is the way this course, along with some fertilizer, got clover under control.

Slide. I remember that when we started with milarsenite, I visited Marshall Farnham. He said, "O.J., evidently you don't think much of milarsenite. You have got to put something in with it to do the job." So I said, "Is that right, Marshall?" When I came back I found him playing with it. So, Marshall was one of the first to do a lot of work with arsenicals. This is one of the fairways on the old course which, I believe, had been treated the year before.

Slide. I presume this is one of the reasons why bent was used on that golf course. Before the open, which was played there, I think the outline of this fairway was changed; part of the rough was converted into fairways.

When that was seeded, instead of using Bluegrass only, there was some bent in it. Notice the turf on the right as compared with the turf on the left.

Slide. Brynwood had fairways that looked like this, and when they got a little more affluent they decided to do something about it. They treated one fairway with milarsenite and fertilized it. They used about a total of a ton of fertilizer to the acre and part of it in the form of milarsenite, two applications at 400 pounds per acre each time, which was about 12 pounds of sodium arsenite because there was three pounds of sodium arsenite in each hundred pounds of milarsenite.

Slide. The next one is the same fairway a year or two later. So, they went over to scrape

fertilizer and for several years I was giving milarsenite credit that it did not deserve for controlling clover.

Slide. The next picture will show what finally happened to the turf. Even with a considerable amount of fertilizer, clover started to creep back into those fairways. I said, "Les, I think we better get to doing some work here before these Jewish officials begin to jump your frame. What about the clover?" So, by that time 2-4-D and 2-4-5-T were available. Some plots were laid down with milarsenite, with sodium arsenite and with arsenic acid, with 24-D and 245-T.

Slide. The next picture will show the plot which was the 245-T. As a result, these fairways now are sprayed once year year with about a pound of 245-T and a half a pound of 24-D each year. They receive about 70 to 75 pounds of nitrogen in the Fall and another 50 to 60 pounds in June, and the June application ordinarily goes on in the last half of the month. They used to put on all the fertilizer in the Fall.

These are unwatered fairways and when they got leaf spots pretty bad, I felt maybe we were short-changing the grass on phosphorous or potash, and we laid down some plots using the 0-14-14 at 1,000 pounds per acre. Then we used nitrogen across these plots at about 30 and 60 pounds to the acre.

In June I happened to be out and noticed that leaf spots were taking its toll but there were less leaf spots where the nitrogen had been applied than it was alongside of it and, as a consequence and the result of those, these fairways had been getting some nitrogen during the last half of June and since then up to now, leaf spot has not been a serious

problem on the fairways, and the June fertilizer helps hold the color on those fairways as we go into dry weather in the Summer.

Slide. Here is your able President when he was at the Country Club of Cleveland, and this is the sprayer which he used on the renovation project at the country club. At that time, I think the rates were, probably, in the range of three or four pounds to the acre, three or four treatments, and then followed with seeding rates which are much lighter than are being used today.

Slide. This will give you some idea of the discoloration and the burn and, in many of those areas, it was due to clover.

Slide. I was at St. Clair one time when Dave had bad fairways and he was running around trying to keep the poa annua alive. I said, "You are crazy. Let the poa annua die." The club insisted they do something with it. We encouraged him to renovate one fairway. Dave thinks if one pound of fertilizer is good, ten pounds is that much better. So, instead of using a couple of pounds of sodium arsenite, he went out with 25 to 30 pounds of sodium arsenite to the acre.

This is how the fairway looked. It looked like an old wheat field. Then he seeded, and instead of 20, he used 30 pounds of seed, with good results.

Slide. A couple of years ago, when Sciatooc renovated their fairways, they used 24-D and 245-T in June to get the broadleaf weeds, along with the clover. In August they came back with a heavy dose of sodium arsenite at 30 pounds to the acre. Then the fairways were fertilized and a week later they were sprayed again with about five pounds of sodium

arsenite because some poa annua was starting to germinate. Then, after seeding, they were sprayed again.

Slide. The following picture will depict a fairway three weeks after the seeding job. The seeding rate there was in the range of 80 to 100 pounds of seed to the acre of a mixture of about equal parts Highland Astoria and Seaside Bent.

Slide. These fairways at Sciatocc, incidentally, came through very well in 1959. How they are going to fare in the next four or five years, I can't say. I hope in that time we can find the answer to maintenance of a fairway of that kind in the belt where Columbus is located.

This is one of the approaches at Wingfoot. It was sprayed with about 25 to 30 pounds of sodium arsenite to the acre two years ago in order to thin out and get the poa annua, and then the Thaxter was used to introduce bent into that approach. I was at Wingfoot in July and there was more bent in that area than before this job was done.

Slide. Milwaukee Country Club developed good fairways as a result of fertilizer. Weed insecticides were unknown at the time, but chickweed became a problem on these watered fairways. Clover has never been bad and there has not been too much poa annua in these fairways.

In the early days milarsenite was used to keep the chickweed under control. The treatments were made in September, October, and sometimes even in early November. From two to three treatments are needed to get a satisfactory kill.

Slide. The next picture is one of the

original plots at Washington and you will notice that this work was done by horticulturists, not by turf grass people, because they speak in terms of thousand parts per minute. But there is the first plots--the picture of the first plots at Washington with 24-D. I saw them and was very much impressed. And the minute I got back to Milwaukee, I hiked out to Milwaukee Country Club and we laid out some plots along the edge of No. 15 fairway, partly right in the fairway and partly in the rough.

Slide. Here we are back at Farnham's course, when he was doing the renovation deal with milarsenite and 24-D had come into the picture. You may correct me if I am wrong, after seeding or immediately before, 24-D was sprayed on the area on the right-hand side and it was not used on the left-hand side.

Notice the effect that 24-D has had upon suppressing the new growth of seed. For that reason we have always tried to get people, on a renovation job, to use 24-D or 245-T in June, so that the effects would be dissipated by the time seed is put into the ground in August or September.

Slide. Here we are back in Milwaukee. We tried out ammonium sulphate and different materials. The hanlite and other products were not then available. I think you can notice what has happened to the bent along the edge of that fairway from a spraying, using one and a half pounds of 24-D to the acre.

As a result of these treatments, the fairways at Milwaukee Country Club never got 24-D until they changed chairmen. As long as Ted Booterbaugh was on the job 24-D was never used.

Slide. We, of course, wondered if 24-D

should be substituted for milarsenite to control chickweed on these fairways and so we laid down plots. This is the ammonium sulphate; it got no treatment. A was sprayed once; B twice and C three times with 24-D.

Slide. The next picture shows adjacent spots in which we used milarsenite at 200, 300 and 400 pounds per acre, three times, and you can see the grasses, even in the Fall, it is a little greener as a result of the nitrogen in the milarsenite. And because of these treatments, the fairways; sodium arsenite was relied upon to control chickweed.

Slide. Joe Valentine, I have to apologize for this picture. It was a very poor black and white picture in the days before we had Kodachrome and I guess I wasn't too good a photographer at that time. I was out at Merion at one time and over on this nursery which, I think, was Washington bent. When I saw it, I said, "Joe, what fungicides did you use on the right which you didn't use on the left, where a dollar spot is so bad?" He pulled me aside and said, "I will tell you if you won't tell anybody because I might get fired for using lime." That was in the acid era of turf maintenance. He said, "All of that area you got over there was gone over with a little hydrated lime about three weeks ago." There was no dollar spot on that, and it was blistered on this left-hand side, and it impressed me.

Slide. When I was a Troy, New York, one time--and this is a fescue unwatered fairway--and I noticed this green line up on the crest of the hill and a similar one down at the bottom of the hill. So, I asked Fred Shultz, "What did you do here on these two places that wasn't done on the rest of the fairway?" He said, "We had a local rule which permitted the

player to improve his shots on the hillside and we put down a lime line so as to show them the area in which the ball could be lifted."

Notice how that lime has helped the turf withstand drought.

Slide. The next picture shows Fred in the background. This was taken in June, 1954, at Brookline Country Club in the Boston, Massachusetts area.

I noticed a green line of turf around every green on that golf course and it puzzled me. When I asked the superintendent--I said, "I can't understand this." He said, "Maybe if I tell you what was done it will become clear to you."

When the last open tournament was played at Brookline, which was 20 years to the month before, they did not use ropes to confine a gallery; they laid down a lime line to show the gallery where they were to stop. That soil I tested around there, and it had a PH of about 5 and I noticed that the effect of that lime persisted for 20 years.

Slide. The next is a picture of some plots which we had in Brentwood. An old tennis court was converted to a practice green in Brentwood. I think you will notice that the strip on the right is practically free of clover. Now, this piece of turf had been neglected and I told our boys, I said, "Well, I am going to do something here that ought not be done. I know it is wrong but we are going to do it anyway and see what happens."

We put on milarganite, 60 pounds per thousand square feet, 60 or 70 pounds. Notice what it did. When the turf and the soil is as poor as

the soil is there, one can do that with impunity, but if the turf is growing at a good level and if the levels of fertility of the soil are up where they should be, an application of that kind could be disastrous, particularly in mid-summer.

Slide. This is a fertilizer plot at one of the courses in Milwaukee, and I think you can notice the dollar spot on the unfertilized as contrasted with the area on the left.

Slide. The next picture will show the plots. The sign shouldn't say, "No Fertilizer", it should say, "No Nitrogen". Phosphorous and potash was applied over the entire area. Here you can see the different fungicides and you can notice it took with Caloclor, four ounces, to stop the dollar spot. Thiazine and special semesan weren't doing much of a job under these conditions.

Slide. The next will show the area on which nitrogen was used. Notice one to two ounces was doing a good job with Caloclor, and the results with others were better and they were doing a more satisfactory job of controlling disease.

Slide. This is just a closeup of the "No Nitrogen". The Caloclor, 1, 2, and 4 ounces a thousand.

Slide. The next picture is the one where we used, roughly, a pound and a quarter of nitrogen per month on this strip, and notice how the fertilizer has helped make Caloclor a good fungicide. Some of you condemn a fungicide and you may not be fair in doing it because conditions may be such that no fungicide will operate as intended.

Slide. This is at Bel Air and Superintendent,

Joe Martinez. This is a very fine example of iron chlorosis on a bent green in the Los Angeles area, and I am sure there would have been no loss of turf had iron been applied promptly.

It isn't a matter of saying, "We will do it tomorrow." It is a matter of doing it yesterday. The minute you see it, get it on and stop the chlorosis.

Let's go on to the next one.

Slide. Here is a 30 inch mower with a grass catcher at Hercules Country Club. Here is the part that's been converted over to U-3. That is the way the other tees looked before the conversion. I think it is important to use a mower with that kind of a grass catcher if you want to make your golfers happy. It costs more money but you are there to give them a good golf course.

Slide. This is the Bermuda on the practice field at West Point Military Academy. They are limited in their practice field. We tried Kentucky 31 and every kind of grass and never had any luck. These were seeded with pregerminated Bermuda.

Slide. The next picture will show the stadium at Philadelphia two years ago. This is about the middle of September.

Slide. Right after I took this picture I went to West Point. I told Colonel Blaik, "There will be no alibis so far as the turf is concerned. The turf will be perfect. It is up to you to produce the team." He did. He beat Navy, and then he had sense enough to resign. That is what Casey Stengle should have done last year.

Slide. The next picture will show how the No. 2 fairway looks. You can see where we had burned the area. The Y arrow--we had to go back and do it twice more. The next Spring, by doing that, we got almost 100 percent control of the Y arrow.

At the meetings last year John Gallagher told about 2445-TP. He told me that was the answer to the arrow problem. As a result we laid down some trials alongside No. 18 fairway, as you will see in the next picture.

Slide. Here is the results we got--controlling Y arrow with 245-TP. We used three-quarters of a pound to a pound and a half of 2445-TP to an acre. Notice the cleanup.

MR. DOERER: Thank you.

TURFGRASS CONFERENCE'S CONTRIBUTION TO GOLF COURSE MAINTENANCE

MR. T. T. TAYLOR, Northeastern Agronomist, Green Section, United States Golf Association, New Brunswick, New Jersey:

MR. T. T. TAYLOR: I hardly think it is necessary to say that this conference is an example of the value of TURFGRASS CONFERENCE'S CONTRIBUTION TO GOLF COURSE MAINTENANCE.

"What are the contributions of turfgrass conferences to golf course maintenance?"

At first the answer seems obvious--disseminate information for producing better turfgrasses. But to the inquisitive mind, which may happen to be that of the chairman of the green

committee or the club treasurer, this may not be sufficient to approve a \$200.00 to \$500.00 item in the budget for conference attendances, which, incidentally, may be one reason why some clubs are not represented at conferences.

Some sober and serious thinking may bring the answers into a clearer perspective.

It is the purpose of this discussion to explore in a serious vein those contributions which are less obvious.

First and foremost, it is the golf course superintendent who benefits most, and in several ways, as an individual and as a professional turfman.

As an individual he broadens himself culturally, socially and intellectually on both regional and national levels. Culturally, what better examples could be cited than the national conferences which have been held in Washington, Louisville, Chicago, and other cities which are centers of culture in the arts and in the sciences.

Such an atmosphere provides opportunities to learn from art galleries, museums, libraries, and other noteworthy institutions. These are the means by which we grow into a well-balanced individual.

During the forthcoming national conference in Houston, opportunities will be provided for sight-seeing tours into Mexico. Imagine the possibilities available for learning something about the customs and traditions of our neighbors to the south and your own responsibility of being ambassadors of goodwill from the United States. By all means visit Mexico, if possible, you will find it a unique and unforgettable experience.

Professionally, the opportunities to grow are unlimited through attendance at turfgrass conferences. It seems hardly necessary to dwell at great length on this phase of conference contribution, but it is, nevertheless, worthy of some consideration.

Reflect for awhile on the topics which have been discussed at this conference; then, in addition, review in your mind discussions presented in previous conferences in both the scientific and the practical aspects of turf management. You will, probably, conclude that there is no better method of obtaining progressive information than to get the facts direct from individuals interested in scientific developments and from others with experience in practical application.

Socially--you experience contact and intermingling in a wide range of economic and social levels, and through this medium the individual develops a democratic attitude so necessary in human relations.

At what stage of development in maintenance standards would we be without knowledge of the use of chemicals in weed and disease control, and fertilizers, and an infinite number of cultural and management practices of various types of grasses if turfgrass conferences were not the instruments of progress in meeting the demands of the golfer of today?

No golf course superintendent can remain static in his professional development. Progress must be his incentive or ultimately he will fall by the wayside. Turfgrass conferences may be used as a springboard to leadership in his profession. Active participation in conference programs, either from the platform or from the floor, provides a means of developing confidence in yourself and respect for your capabilities from others.

The golf course superintendent is a professional man and, as such, is a member of a fraternal group banded together to promote turfgrass maintenance as a profession. Only by strengthening this group in both numbers and quality can you achieve a more stable position as a profession. Here again the turfgrass conference is an instrument of progress by attracting increased numbers in attendance, and by providing opportunities for self-improvement.

Conferences are also an instrument for publicity, which focuses the spotlight on the profession and helps to establish the profession as an authority in your field of endeavor. "In unity there is strength" and a closer bond of professional fraternalism is not the least of the advantages provided by turfgrass conferences.

Recognition of the capability of the golf course superintendent has as its first source the chairman of the green committee and club officials. To evaluate properly the capabilities of the superintendent, the chairman should have some knowledge of his own responsibilities and of the problems involved in producing turf to meet the requirements of the club's standards. He is the go-between in the channel of information between the superintendent and the members.

To accomplish his task he must have both the "golfer's viewpoint" and the superintendent's viewpoint clearly in mind. These viewpoints are necessary to explain why certain projects or maintenance practices are necessary as well as to fortify himself with sound information for obtaining budget approval.

Do not delude yourself into believing he is not interested in progress in turfgrass development. More and more chairmen and club officials are attend-

ing turf conferences each year. To the chairman his job is an avocation, but one which he finds intriguing and rewarding. He usually is a business or professional man and naturally can devote only a limited time to the golf course job. Nevertheless, he is the man in top authority on the golf course and the one to whom the superintendent is responsible. He will, as time permits, attend conferences and meetings in a conscientious endeavor to keep up with progressive ideas in turf management. Frequently, he becomes President of the club, a position which carries considerable authority.

With both the superintendent, the chairman, and other club officials fortified with information obtained from turfgrass conferences, it is a logical conclusion that the members, in turn, will derive the benefits.

All of these are contributions of conferences which are national in scope. But what about conferences at the regional and local levels? Regional conferences, such as this Mid-Atlantic Conference, are the culmination of a series of local meetings held throughout the year and serve the purpose of bringing together the various groups for solving or discussing mutual problems, and this mutuality develops an intimacy and a more relaxed freedom of expression between men in the practical field and those in scientific research, so that the endeavors of individuals and of groups are brought together in a combined effort to gain their use objectives.

In a recent issue of "The Golf Course Reporter", Elmer Border stated in the "President's Message" to the G.C.S.A.--"Progress is our Business". I should like to add that "Knowledge is Progress" and that knowledge is turfgrass conferences' most important contribution.