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1968

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

Under the Auspices
of the
Extension Service - University of Maryland

Holiday Inn - Downtown
Howard and Lombard Streets
Baltimore, Maryland
January 8 and 9, 1968

INDEX

The Conference Opens	Page 1
Turf Developments in Maryland - 1967 Dr. Elwyn E. Deal	2
Fertilizer-Pesticide Combinations Henry W. Indyk	3
Address by The Honorable Spiro T. Agnew, Governor of Maryland	5
Nematodes in Turf Grasses Dr. J. M. Good	6
Developing Trends in Virginia's Greens Fertilization Program John F. Shoulders	6
The Irrigation Installation at Westwood J. B. McClenahan	6
Plant and Soil Water Relationships Dr. Edward Strickling	7
Problems With Automatic Irrigation Russell Roberts	8
Golf Course Conditions In The East Alexander M. Radko	10
Roots - The Forgotten Half Douglas T. Hawes	12
Winter-Kill in Bermudagrasses William B. Gilbert	13
Winter-Kill in Cool Season Grasses Charles G. Wilson	14
Highlight of the Conference - A Summary Dr. Fred V. Grau	15

ANNUAL CONFERENCE OF THE
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HOLIDAY INN-DOWNTOWN, BALTIMORE, MARYLAND
JANUARY 8 AND 9, 1968

With more than 200 in attendance, the annual conference of the Mid-Atlantic Association of Golf Course Superintendents was called to order by Dr. George S. Langford, State Entomologist, University of Maryland. A highlight of the conference was an address by the Honorable Spiro T. Agnew, Governor of Maryland, at the luncheon. His warm humor captivated everyone and he identified himself unmistakably with TURF, especially as regards to golf. Dr. Gordon M. Cairns, Dean of Agriculture, University of Maryland, opened the conference with greetings and a welcome from the University of Maryland. Dr. Cairns sounded the keynote of the conference by stressing cooperation, sharing of information and stimulation of thinking. He urged all to aid in work to preserve open spaces and natural beauty. "Turf", he said, "is akin to our great natural resources". Angelo Cammarota in his Presidential Message, likewise, welcomed the Golf Course Superintendents to the conference. He was warm in his praise of the University of Maryland faculty members for their continuing role in aiding with the conference. He praised suppliers for their supporting roles. He observed that "The Mid-Atlantic [region] is a tough place to grow grass because the area is TAINTED - 'tain't North and 'tain't South - it's in between".

The Annual Banquet followed a delightful social hour sponsored by F. W. Bolgiano & Company, G. L. Cornell Company, Gustins Baltimore Toro, Inc. and National Capital Toro, Inc. The speaker at the banquet was Dr. Charles P. Ellington, Director of Service and Control, University of Maryland. Dr. Ellington filled the "spot" vacated by the Governor. The Governor was originally scheduled to speak at the banquet, but through unforeseen circumstances was forced to make his appearance at the luncheon. Dr. Ellington opened his address with a dry wit that had everyone convulsed with laughter after which he reviewed the work being done by the Maryland State Board of Agriculture. His color slides were excellent. Special guests at the banquet from the University of Maryland included Dr. Frank L. Bentz, Jr., Vice President of Agricultural Affairs, Dr. Gordon M. Cairns, Dean of Agriculture, Dr. Robert E. Wagner, Director of Extension, Dr. James R. Miller, Head, Department of Agronomy, Dr. William E. Bickley, Head, Department of Entomology and Mr. C. W. Jackson, Head, Information and Publications. Honored at the banquet was James Reid, former superintendent of Suburban Club of Baltimore for his many contributions to the Mid-Atlantic Association. He was presented with a beautiful silver tray. Four scholarships were presented to students at the University of Maryland who are specializing in turf work at the Institute of Applied Agriculture. The awards came from the Golf Course Superintendents Association of America. The honored recipients were: Earl L. Becraft, Robert E. Blackert, Gerald G. Gerard, Jr. and Thomas G. Haske. This is the first time such scholarships have been awarded to University of Maryland students.

The program committee consisted of: Sheldon R. Betterly, Elwyn E. Deal, Lee C. Dieter, Russell W. Kerns, George S. Langford, L. Robert Shields, George B. Thompson, Robert C. Milligan, Chairman and Edward F. Dembnicki, Co-Chairman.

TURF DEVELOPMENTS IN MARYLAND - 1967

Elwyn E. Deal, Turf Specialist
Agronomy Department, University of Maryland

The year 1967 brought welcome relief from the drought problems we have had for the past several years. But, while the drought was less of a problem, certain other things such as weeds and diseases were more of a problem than previously. Outlined below are some of the developments which have occurred during the past year or two.

New Grass Varieties

A. Kentucky Bluegrass

1. Belturf, released at Beltsville, has looked good for several years in this area. More disease resistant and drought tolerant than many other varieties.
2. Pennstar, released at Penn State, formerly known as K5(47). Disease resistance, especially to leafspot, attractive color and good density are desirable characters of this variety.
3. Kenblue, seed grown in Kentucky and certified by that state to be native grown common Kentucky bluegrass.
4. South Dakota Certified Common Kentucky bluegrass, similar to Kenblue but produced in South Dakota.
5. Fylking (0217), a promising new variety but insufficient data are available now to justify placing it on the recommended list. Fine texture, disease resistance and dark green color make it attractive.

B. Bentgrass

Pennpar, released by Penn State recently for putting green turf.
Reproduces vegetatively - no seed available.

C. Bermudagrass

Tifdwarf, released by Georgia Coastal Plain Experiment Station about two years ago, is fine textured and has many desirable qualities. Its lack of winter hardiness severely restricts its use in Maryland.

D. Perennial Ryegrass

Several new varieties available now - Norlea, Pelo (NK-106), NK-100 - have been released in recent years by commercial seed companies. Manhattan variety was released in 1967 by Rutgers University. None of the perennial ryegrasses are currently recommended for use as a permanent turf in Maryland because they lack sufficient heat and drought tolerance for good summer growth and development.

Tufcote Bermudagrass Management

Research studies currently underway at the University of Maryland indicate that Tufcote does best when mowed 2 to 3 times per week at 1/2 to 1 inch. Taller and/or less frequent mowing produces stemmy and less attractive turf.

Fertilization studies indicate that all sources of nitrogen (ureaform, urea and natural organic) can be used effectively if rates and frequency of application are managed properly. 1 and 2 lbs. N/1000 sq. ft. at 1 to 2 month intervals have been quite satisfactory. Applications of N made according to appearance of the grass rather than by a schedule has been best.

Broadleaf Weed Control

Not much new to report on chemicals. Silvex, 2,4-D and dicamba continue to be our best herbicides for postemergence control of broadleaf weeds. 2,4-D at 1 to 1 1/4 lbs. per acre plus dicamba (Banvel-D,T.M.) at 1/8 to 1/4 pound is one of the best 'broad spectrum' herbicide combinations available for turf.

Problems caused by incorrect use of herbicides around ornamental plants continue to appear. This problem is discussed by Dr. Henry W. Indyk elsewhere in these proceedings. The use of chemical materials has been used otherwise. The results of the chemicals being applied would not have been used otherwise. Bromoxynil has recently been released by two companies for control of broadleaf weeds. It must be applied to broadleaf seedlings before they pass about the 4-leaf or seedling stage of growth. It appears to be rather safe on seedling turfgrasses but many questions about its use remain to be answered before it can be generally recommended.

Crabgrass Control, Preemergence

A greater acreage of turf is being treated each year with preemergence herbicides to control crabgrass. Some very good chemicals are available now at fairly reasonable prices. Increased emphasis on quality turf often justifies their use on large areas.

Four herbicides are currently recommended by the University of Maryland. They are: Dacthal (DCPA) good to excellent control of annual grasses but sometimes thins red fescues. Lower cost per pound in 1968; Betasan or Pre-San (Bensulide) consistently good control with about 15 lbs. per acre. Some thinning of red fescues; Tupersan (Siduron) control has been somewhat erratic at low rates but extremely safe on bluegrasses and fescues; Azak (Terbutol) fair to good control of crabgrass. Injury noted on bluegrasses and fescues.

Other preemergence chemicals are not recommended because of poor or erratic control, turf injury or animal and human toxicity. For more detailed information on crabgrass control, see Agronomy Mimeo 63 and the February 1968 issue of The AGRONOMIST. Apply herbicides to putting greens according to label directions only.

Contact my office if you would like more information on these or other subjects related to turf management.

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FERTILIZER-PESTICIDE COMBINATIONS

Henry W. Indyk

Extension Turf Specialist

Rutgers - The State University, New Brunswick, N. J.

Interest in the establishment and maintenance of attractive home lawns and other turfgrass areas is at an all-time high. The impact of this intense interest has been rather far reaching. Aside from its stimulating effect on the non-farm use of fertilizers and a wide variety of other chemicals, it has led to the development of new products.

One of the developments which has gained wide popularity is the combining of turf fertilizers with other additives. Available today is a wide array of products which include not only combinations of fertilizers with various herbicides, but also insecticides, fungicides, soil amendments and trace elements.

Combination materials have become popular as a method of (1) reducing the chore of applying different materials individually - (demand), (2) satisfying the demand for such products, and (3) gaining a competitive advantage for specific products - (promotion).

The primary advantage of combination materials is convenience - particularly from the standpoint of the amateur lacking in experience and available time. As a result of the convenience feature, the use of chemical materials has been stimulated. Many of the chemicals being applied would not have been used otherwise. The results of this usage can be either beneficial or detrimental.

Observations have indicated a number of problems associated with the use of combination materials. Included among the more common problems are:

1. Timing - inappropriate time of application for most effectiveness and/or safety of each individual ingredient of the mixture. The problem becomes increasingly complex as the number of ingredients in the product increases.
2. Need - the specific situation or problem did not necessitate the use of each ingredient of the combination.
3. Concentration - the concentration of one or more of the ingredients inadequate or excessive.
4. Form - the dry form of combination materials most commonly available. Turf herbicides such as 2,4-D and 2,4,5-TP as well as fungicides are more effective when applied in liquid form. The effectiveness of the dry forms can be increased when applied to wet turf. However, this is prohibitive when in combination with a fertilizer.
5. Formulation - differences in physical characteristics of the ingredients of blended formulations may result in separation of particles in the process of blending, bagging, handling, or application. Impregnated materials are more desirable from this standpoint.
6. Toxic accumulations - repeated use of certain products with long residual effect may result in accumulation of toxic concentrations.

In addition to the above mentioned factors, other considerations are compatibility, synergistic effects, labeling, and economy.

Certain combination materials can be used to definite advantage if:

1. The time of application for each ingredient is appropriate.
2. A definite need exists for each ingredient.
3. The concentration of each ingredient in the formulations is adjusted so that each is applied at the proper rate.
4. Physical condition is such that separation of ingredients does not occur.

Unless these assurances can be provided with a combination material, the fertilizer and each of the other ingredients are best applied individually.

Combination materials have become popular as a method of (1) reducing the chore of applying different materials individually - (2) satisfying the demand for such products, and (3) gaining a competitive advantage for specific products - (promotion).

ADDRESS BY
THE HONORABLE SPIRO T. AGNEW
GOVERNOR OF MARYLAND

Gentlemen:

I thank you for having me as your guest today. I have long admired the work you do and want you to know that you have destroyed my confidence ever to break a hundred.

Six years ago, before I started to play golf, before I even knew I owned a natural slice, I was a peaceable man of reasonably sound mind and equilibrium, not subject to thoughts of self destruction, enjoying things much less complex than trying to plink a little white ball into a little green cup. There was a time when I thought relaxing was reading a book not written by Palmer or Nicklaus. There was even a time, and I can still remember it, when I would spend all of every Sunday with my wife and family.

I didn't think about golf. I figured it was something people did when they didn't have anything better to do. Besides, I was just becoming active in politics. And golf, my political instincts warned me, went out in 1960 at the end of its second term.

I think about my pre-golf days many times. I think about them when I am with people. I think about them when I am all alone--in the rough. I have walked parts of some courses their superintendents haven't even motored through. I even think about my pre-golf days on the few occasions my ball discovers a fairway. They were sane days. They were good days.

Now I am one of those unsettled, disturbed, and humiliated millions with his head down, his left arm straight, his hips loose, and his seat planted on some imaginary stool. I have the position down pat. The pro says I have a pretty good swing. And one of these days I am determined I will even hit the ball farther than some of the thirteen-year-old girls who play the same course.

Golf is a diabolical thing, the great leveler of egos. It enslaves businessmen, governors and presidents. In the world of Sunday golf, only the caddy is king.

My major fault, I suppose, is taking the game seriously. But I want you to know that I am always in control of my emotions. I never fail to replace a divot and, no matter how bad my score, I am always considerate of the course. In fact, in the interest of good groundskeeping, I will sometimes move an obstructing stick or rock a little to the left or right of my ball, when I believe swinging with it in the way will cause needless damage to the course, and when I am perfectly sure my partner isn't looking.

At this time, I would like to make a public statement of great importance, and I hope it will be duly noted by the press. It is not true that all of my major appointees in Annapolis are golf players. It is not true that every time I am called out of State to a governors' conference that I take along with me a pre-handicapped foursome. And it is not true that I will not allow anyone to serve on my personal staff who shoots a better game than I do. After all, I have to have some staff. These are outright fabrications and distortions, without basis in fact. On the other hand, I will not deny that I have played golf with members of my staff. I will not deny that I know each and every one of their handicaps. And I will not deny that I insist upon proper protocol at all times and at all places. I think that just about sums up the situation.

In a few days, the 1968 session of the Maryland Legislature will convene, and the serious business of your governor and elected representatives will leave little time for other than a few practice swings in the odd and seldom hours of inactivity. I have truly enjoyed being with you today in a relaxed and fun way and hope that when we meet again, I will be able to say that the state is shooting par, that it's burning up the course with better laws, and that as good as its first round was, its second was even better.

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NEMATODES IN TURF GRASSES

Dr. J. M. Good

Plant Industry Station, USDA, Beltsville, Md.

Dr. Good, in his discussion on nematodes, pointed to the capability of nematode damage to turf. He left little doubt about the potential for destruction. Dr. Good emphasized the importance of sending sod samples to the University or other appropriate agencies for nematode identification when nematodes are suspected. Dr. Good stated that he thoroughly enjoyed the opportunity of attending the conference. Those in attendance benefited from his talk.

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DEVELOPING TRENDS IN VIRGINIA'S GREENS FERTILIZATION PROGRAM

John F. Shoulders

Extension Turf Specialist

Virginia Polytechnic Institute, Blacksburg, Virginia

Professor Shoulders using Kodachrome slides, discussed winter fertilization. He gave evidence to show that it benefited root growth, provided green color in winter and contributes to a tough, wear resistant turf. Dr. Fred Grau, in a summation of Professor Shoulders' talk said "John Shoulders injected fresh thinking into turf fertilization."

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THE IRRIGATION INSTALLATION AT WESTWOOD

J. B. McClenahan

Superintendent

Westwood Country Club, Vienna, Virginia

J. B. McClenahan described, with illustrations, the irrigation installation at Westwood. With considerable humor he told how the installation was made with his own crew. He inferred that if he had to do a similar job on another course, he would probably contract the job and might not use steel pipe. He also discussed briefly some of the increasing maintenance costs with irrigation.

PLANT AND SOIL WATER RELATIONSHIPS

Dr. Edward Strickling

Agronomy Department, University of Maryland

The passage of water through the plant cannot be related to any life functions of the plant. It appears to have little useful function except to maintain turgidity of the plant. The plant appears to use water mainly because the plant requires an efficient CO₂ collecting mechanism in the leaves and this mechanism, the stomatal system, allows the water to be lost at the same time the plant is absorbing CO₂ which it converts into plant tissue with the aid of the energy from the sunlight.

Only a very small fraction of the energy from the sun is used by the plant in photosynthesis. Part of the energy is reflected or reradiated back to the atmosphere while the remainder is used to heat the leaves and to provide the energy to convert the liquid water of the leaves to water vapor which passes into the atmosphere. If the energy supply required for evaporation is eliminated the plant will not lose water nor will it grow.

The energy supply used to evaporate the water comes mainly directly from the sun's radiation in the Eastern United States. A small amount of the energy comes from the heat carried in by the air moving around the leaves of the plant but this can only occur if the leaf temperature is below the temperature of the air. Heat does not flow from a material with a low temperature to a material with a high temperature. The evaporation of the water in the leaf will tend to reduce the temperature of the leaf but the radiation from the sun will tend to increase the temperature. This is vividly illustrated every time we place our bare hand on an automobile that has been sitting in the sun.

Reduced amounts of water vapor in the air or increased air movement will make it easier for the water vapor to get away from the water surface in the stomates of the plants. This will increase the rate of evaporation and lower the temperature of the leaf. The lower temperature of the leaf will increase the amount of heat the leaf extracts from the passing air and reduces the heat radiated back to the atmosphere which results in an increased percentage of the energy of the sun's radiation being used for evaporation. Thus the net effect of wind and reduced water vapor in the air is to increase water loss from the plant.

Water loss from an acre of ground is dependent upon the amount of energy received on this acre and used in evaporating water. Thus doubling the plant population usually has a very small effect on total water loss from evaporation and transpiration (commonly called evapotranspiration). If the surface of the soil is kept wet the acre will lose about as much water by evaporation as it loses by evapotranspiration when it is covered with plants, therefore, any water within the acre that evaporates uses some of the energy that might otherwise evaporate water from the plants and serves a useful purpose in reducing the water requirement of the individual plants. Dew, that evaporates from the leaves of the plants, or irrigation water, that evaporates in the air above the plant, reduces the water requirement of the growing plants.

Since water loss from an acre of growing plants is dependent upon the incoming energy, it is obvious that there isn't any substitute for water if the plant is to be kept turgid and growing. At the same time, it is also clear that an excess of water over that required to keep the plants turgid will only increase the water in the soil which may interfere with aeration of the plant roots or the water will be lost through drainage.

PROBLEMS WITH AUTOMATIC IRRIGATION

Russell Roberts

Russell Roberts Company

Gaithersburg, Maryland

Cost - First major problem.

2 row - fairways, tees and greens - \$115,000.00.

1 row - fairways, tees and greens - \$100,000.00.

(Deduct \$6,000.00 - \$7,000.00 of above for hydraulic)

Manual fairways, automatic tees and greens - \$70,000.00.

Of this amount, approximately \$20,000.00 is for the automatic on tees and greens. A manual popup system on tees and greens would mean a further reduction of approximately \$5,000.00 or \$6,000.00.

I know these figures represent a lot of money to most clubs and they are going to increase at about 5% a year. However, all other costs are going up too, so the ratio of system cost to money saved will remain about the same.

It is reliably estimated an automatic system will pay for itself in from five to ten years. I think the latter figure is the most realistic one for our area, but this does not take into consideration more efficient use of water and power, less maintenance traffic on the course, fewer interruptions to play, larger areas watered - areas that are often neglected such as green and tee banks and slopes.

Another problem has been poor design and installation. Your best insurance here is to select people with a past experience of good work and insist on only first quality materials from reputable manufacturers. Learn all that you can about the various systems and their components, but don't expect to learn all there is to know about irrigation systems in a few days. They can be very complex and new developments are coming at a furious pace. I would suggest you choose an engineer and/or contractor from the mid-atlantic area to design and install your system. The conditions and requirements of a system are much different here than say on the West Coast, or even an area three or four hundred miles away.

Mechanical damage

1. Airifiers and vertical knife mowers are rough on popup sprinklers.
2. Lightning does not appear to be much of a problem other than the nuisance of burned out fuses. The chances of lightning damaging the solenoids out on the course in an electrical system (contrary to what you may have heard) is very remote. Lightning could conceivably damage a controller, but they are no more susceptible to damage than any other electrical appliance and even then would probably not do any extensive damage.

Malfunctions

This is probably the greatest headache and is caused almost 100% by dirt in the system. This is particularly true in new construction. The incidence of malfunctions are much less after the first one or two years after the system is broken in. It also appears the more the system is used, the better it operates. This is one reason it is now recommended the controllers be allowed to run all winter. Damage due to freezing is no problem in this area. Water hammer and surges are no problem in a well designed system. The only exception would be where there is a long run to the last popup on a green or tee. And this only appears where there is excessive pressure and can be controlled by throttling the automatic valve or installing a flow control device.

Maintenance

Automatic systems are not maintenance free, but it is mostly a wintertime chore and if anything is less than a comparable manual system. Some maintenance items are:

1. Sprinklers screens to be cleaned
2. Wear rings to be replaced
3. Seals to be replaced
4. Pumps need bearings repacked or replaced.

Tees and Fairways

Automatic irrigation of tees and fairways is doing a tremendous job with the only problem being the occasional malfunction which can be expected with any mechanical equipment.

Greens

Automatic irrigation of greens in this area has been very well received and I am sure no one who has a good automatic greens system would even consider returning to the old hose bit, but it has not been without some problems concerning sprinkler placement and coverage. The whole concept of automatic irrigation is to apply water evenly over the whole green only as fast as it is absorbed by the soil. Remember the movement of water in the soil is always straight down under the influence of gravity, except of course in a situation where the soil is completely saturated. In theory then if the water is applied evenly over the whole green and only as fast as it is absorbed by the soil, we can do a perfect job of irrigating the green. However, it is not quite that simple in actual practice. There are many other factors to take into consideration.

1. Different portions of the greens may absorb water at different rates so you can apply water only as fast as the most impervious portion of the green will absorb it. You may have to airify and introduce soil amendments into certain areas of the green to bring the overall green into an acceptable range of permeability.
2. High portions of the green receive more air, hence dry out faster.
3. Some portions of some greens receive more sun than others.
4. Some portions of a green receive more wear, hence more compaction, less permeability.
5. Sudden downpours which may penetrate very little on the high portions of a green, yet completely saturate the low areas.
6. The physical shape of greens and adjacent traps may present a problem in locating sprinklers for even coverage.
7. Greens with a high sand content in the soil mix or which have areas of high sand (this is quite often due to sand blowing out of traps) are susceptible to localized dry spots. Once these areas have dried to the wilting point they are very difficult to rewet. So once a localized dry spot forms you have no alternative but to break out the hose. To try to alleviate a localized dry spot with popup sprinklers, even where you have individual control of the sprinklers is a waste of time and you would probably upset the moisture balance over the whole green. By rights you should attack the cause of the dry spot which is an area which does not have enough water holding capacity in relation to the rest of the green.

Water distribution on greens is not as simple as we would like it to be, but any problems you have can be licked without too much effort. You must monitor the sprinklers on each green and by adjusting the sprinklers and the automatic valve you can come up with an acceptable precipitation pattern on each and every green. This is not something which can be accomplished in a

few minutes. It has to be done over a period of time. Some greens will be fine right off the bat when the system is installed; others may require a season or two before you get it down pat. Even after you have the system wrung out, you must monitor the soil moisture on each green. I know that on practically all controllers you can program you irrigation 14 days in advance but is there anyone so naive as to believe you can tell how much water a certain green is going to require two weeks in the future? Automatic irrigation is automatic only in the sense that it enables you the Superintendent to control the irrigation and you can do it remotely. You don't have to physically be there and you don't have to perform a lot of manual labor to irrigate your course. But please don't expect an automatic system to think for you. This is what you are getting paid for. An automatic irrigation system is a piece of equipment just like a new fairway unit and how well you use it is going to be direct reflection on how well you do your job.

Irrigation equipment manufacturers are making tremendous strides developing new equipment and improving old. However, there is much work to be done. We need more knowledge on how to use these systems and their long range effect on soils and turf. How important is the wetting and drying cycle to soil tilth? Is slicking of the soil surface a factor in compaction? What is the preferred watering schedule - frequent light watering, infrequent heavy soakings, or a combination of both? Our universities are working very hard on these problems but the bulk of this information has to come from you, the superintendents, and can be gained only through experience. Automatic irrigation is the irrigation of the future and it is here today. Problems, sure there will always be problems, but the greatest problem is lack of knowledge.

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GOLF COURSE CONDITIONS IN THE EAST

Alexander M. Radko
Eastern Director, USGA Green Section
Highland Park, New Jersey

1967 was a good year for golf courses and superintendents. A good year doesn't mean an easy one, for there are no easy years in a profession where extremes in weather are not only commonplace but have such an important bearing on day-to-day decisions while hordes of golfers are funneling over the course trying to beat it to death. This isn't a complaint, it's a challenge -- for after all, isn't our job to keep the course playable under any and all conditions? Problems and play only make it more interesting and more of a challenge for that perennial student of fine turf-grass culture, the golf course superintendent.

Golf is a game played on grass! To update that oft-made statement we say that golf is played only on well-groomed grass. On a poorly groomed course, when the ball cannot be controlled, the game isn't golf; it's more like golf spelled backwards "FLOG!" There are general specifications for greens, fairways, tees, and roughs and the golf course superintendents' job is to reconcile management practices to best suit the requirements of the game. The superintendents' job then transcends merely growing turf for esthetic value alone, and the most important consideration is that it be groomed for golf first. All other considerations are secondary. So it's important for a superintendent to know golf -- to know whether a green is slow or fast, to know whether a fairway is tight and firm or lush and soft, to know whether his tees are good enough to allow the golfer to tee the ball to the height of his individual liking, to know whether the sand traps play fairly and uniformly. Don't take these things for granted, play the course occasionally, there's no other way to see it or to tell for sure whether it is or isn't a good playing turf. It isn't your job to be a champion golfer, but it is your business to know what championship golf conditions are. If you don't, it would be a good topic for conversation with the pro, the better playing members, your fellow superintendents, and learn as much about the game from them as you can. This will work to your benefit and will help keep all your members happier playing golf.

Competition among clubs is getting keener all the time and this means that competition among superintendents also is getting keener all the time. The significant thing is that golfers now are associating the name of the superintendent also when they mention the club. The isolated course is a thing of the past, members of one club now guest at most others, and they all come away with a mental note as to how your course compares with theirs. They have a firm opinion about how good the course plays, and they base this only on one thing--general grooming--because they know little or nothing about grasses.

1967 was a wet year and problems and conditions were so diametrically opposed to conditions of the last five dry years that it was an entirely new ball game for some. Superintendents had to reach back into their memory for the requirements of wet year management. Some officials apparently were confused too because they thought the frequent rains would allow them to suggest reducing the labor staff because there was less need to irrigate. It is somehow difficult to get across the point that a 100-acre fine turf plant isn't ever overstaffed with 8 to 11 men no matter how the weather breaks. Whether you're irrigating or mowing doesn't make any difference in man total hours required--it's just a matter of a shift in job assignments.

It was impossible to stay ahead of mowing this past year. It seemed to be a continuous job of mowing play areas while roughs, ditch banks, and slopes fell behind in the schedule. Members complained much about tall grass this year. The most serious problem in a wet year is the depressions, the pot holes, areas where settling occurred. These areas were impossible to stay up with--the grasses in depressions grew so fast that a perfect drive could stop in a pot hole and come to rest in grass 3 inches deep. This meant someone's golf could have been ruined for that day, but more important these things have a way of mushrooming into a conversation piece for the rest of the year. Everybody takes a good lie for granted nobody forgets a bad one!

With the steady rains, we experienced more cloudy days and these too had an adverse effect on turf growth. Grasses didn't have their normal good color and vigor, the turf was softer and weaker because of the excess cloudiness.

Diseases too were more prevalent. Brown patch was again a problem in some areas. Dollar spot and Helminthosporium were strongly evident also. Together with wet wilt, much Poa annua was lost. Preventative disease programs are becoming standard fairway treatments and those who discontinued them because of the rains did not fare as well as those who religiously applied these materials during the season.

Weeds are always a potential problem no matter how wet or dry the year--it is just a matter of what weed you must contend with. In dry years, it is knotweed principally; in wet years, it is crabgrass, clover and chickweed. Common crabgrass is relatively easy to control with postemerge materials, so when it came it was effectively dealt with; however, silver crabgrass cannot effectively be controlled except by pre-emerge herbicides, so when it came on in unexpected areas, it was a serious '67 problem. Weeds generally, however, are becoming less and less a problem on golf courses. Great strides have been made over recent years and we now have excellent controls for just about every weed that has been considered a serious problem. Silver crabgrass, common crabgrass, knotweed, clover, chickweed, dandelion, plantain and spurge now can be effectively controlled. Good strides are also being made in controlling Poa annua.

There was a great increase in earthworm activity on fairways--so much so that for the first time in years worm casts gathered on rollers and made a difference in fairway mowing. This is where it pays to have a competent veteran crew,

observant enough to know when they are not getting a true cut and why. Insects too presented some problems--there was a carry-over of chinch bugs from the dry years that caused some damage in isolated areas. Fruit flies were present in abundance and we occasionally see damage that seemingly cannot be attributed to any other cause. In the Metropolitan-Long Island area, a weevil problem of a few years' standing appears to be getting worse, the injury now is more widespread and control measures presently uncertain, but Cornell University now has a grant to study the problem and we feel sure that this problem will also be under control.

The final problem that I shall mention is labor. Except for the limited few clubs that keep their crew on all year, everyone admits that labor is their number one problem. This is a topic unto itself for discussion another time--but one quote seems to sum up the attitude of the times: "Why try so hard to be a success, when one could live so comfortably today as a failure!"

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ROOTS - THE FORGOTTEN HALF

Douglas T. Hawes, Instructor
Institute of Applied Agriculture, University of Maryland

Roots, like the submerged part of an iceberg, must not be overlooked. For if forgotten by an unthinking superintendent, the lack of them may sink his ship. One would be wise to remember: any operation that affects the tops will also affect the roots.

Let us look briefly at what the roots do to keep the grass plant healthy. Then let us see what the tops do to keep the roots healthy. The roots absorb minerals and water; and provide anchorage for the tops. The tops in return supply energy in the form of carbohydrates and building materials for maintenance and production of cells. Neither half can live long without the other.

What then are some of the principal factors which affects roots? I would like to note here that I will discuss first the effects on cool season grasses (bentgrasses, bluegrasses and fescues) and later mention briefly effects on zoysia and bermuda.

Three principal factors affecting grass roots are height of cut, temperature and nitrogen. First, height of cut--the effect of this factor can be summed up quite easily by remembering that the lower the height of cut the shorter the root system. The shorter root system is the result of a cutback in carbohydrate production caused by the reduction in size of the photosynthetic factory. Therefore, by raising the height of cut in the summer on our cool season grasses we help them through a rough season.

One can attempt to summarize the effect of temperature by saying that the higher the temperature the shorter the root system, but to do so is to ignore half of the picture. Cool season grass roots grow between 32 degrees F and 85 degrees F. The optimum temperature for growth of roots is usually 10 degrees lower than that for the tops. This means the roots are usually growing at their most rapid rate when the tops are growing only slowly.

Growth of annual bluegrass roots is best at a soil temperature of about 55 degrees F while Kentucky bluegrass roots grow best at around 65 degrees F. The roots of creeping bentgrass have been found to do best around 70 degrees F. Growth for the individual species is most active between 10 degrees above and below the

optimum temperature. The fact that annual bluegrass roots do so well at relatively low soil temperatures explains its ability to predominate in a putting green or fairway during the late fall, winter and early spring.

Like temperature, you can have too little, just the right amount or too much nitrogen for optimum root growth. What rate is just right for one season may be wrong for another. There are also variations in the rate which is optimum for different species too. Creeping red fescue certainly needs much less nitrogen than Merion Kentucky bluegrass.

For irrigated turf in spring and summer one would probably have the best root system possible under existing conditions if you kept the nitrogen available to the plant at or under one-eighth pound per 1000 sq. ft. per month. Now that is a lot less than most of you are putting on. But, have you looked at your root system lately!

In late fall and winter you can go somewhat above this one-eighth pound per 1000 sq. ft. per month and still have an excellent root system. High or moderately high nitrogen rates stimulate top growth at the expense of root growth. In the late fall and early winter nitrogen keeps the grass dark green and it continues to produce carbohydrates but, the cool temperature holds the tops to a slow rate of growth. The roots which grow at lower temperatures can thus make use of the carbohydrates and the result is a healthy plant.

Other things that may be harming your root system are: nematodes, fungi, 2,4-D, other broadleaf herbicides, preemerg herbicides, lack of oxygen under compacted conditions, and perhaps too high levels of phosphorus. Potash on the other hand is helping to keep the roots healthy by increasing the flow of carbohydrates down from the tops.

Bermuda and zoysia varieties have had very few root studies conducted on them. Their roots are without a doubt similarly affected by height of cut. Their optimum temperature for growth is very high and in this area our soil temperatures only get up this high in July and August. High nitrogen has not been reported to adversely affect root development of these two grasses. Some of the other factors mentioned can severely injure and reduce the root systems of Bermudas and zoysias. Preemerg crabgrass herbicides can severely injure their root systems.

Remember to take care of the roots of your grass so that they can help you take care of the tops.

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WINTER-KILL IN BERMUDAGRASSES

William B. Gilbert

North Carolina State University, Raleigh, North Carolina

The effects of certain management procedures on winter-kill of bermudagrasses were discussed. These procedures were part of the experimental program at North Carolina State University.

Tifgreen (T328) bermuda was found to have a 50% survival at increasingly low soil temperatures from September (28° F) to February (18° F) as the grass became more acclimated to cold. This process is readily reversible, as shown by the March data, with the grass being killed when the soil temperature was experimentally lowered below 22° F.

Mulches of 3 inches of pine straw and excelsior gave complete protection to the grass, while black poly bleached the grass and clear poly caused too early greenup.

Overseeding procedures indicated minor damage to T328 by verticutting and close mowing, with increasing damage with deeper cultivation just prior to overseeding.

Controlled traffic when the experimental green was not lightly thawed nor too wet did not damage the bermuda, but reduced the stand of ryegrass, thus permitting faster recovery of the bermuda in the spring due to lack of competition.

A study of the effects of different ratios of N, P, and K on the low temperature killing point of Tifgreen and Tifdwarf showed a 4-1-5 ratio of nutrients was optimum of those tested for increasing low temperature survival. Plants which had received a high N treatment were the least resistant to low temperature, but the addition of P and K improved cold tolerance.

WINTER-KILL IN COOL SEASON GRASSES

Charles G. Wilson, Agronomist
Milwaukee Sewage Commission

Charles Wilson in his discussion on Winter-kill in cool season grasses stated that there is no such thing as a turf plant that is winter-proof. He emphasized that only good management practices and protection devices will make it so. He stated that the consensus seemed to place the primary blame for our most seriously injured plants on poor drainage and doing our darndest to baby the wrong grass - Poa annua. He said that if we were to name the two basic culprits for winter problems, they would be too much or too little water. The first relates to inadequate drainage and the second to desiccation or drying out on exposed wind swept areas.

He stated that disease, nutrition, grass species and temperature especially as it relates to a succession of late winter quick freezes and rapid thaws are inter-related factors. Foot, cart and snowmobile traffic also takes its toll of winter turf when frost is starting to form and before it is completely out of the ground. Only completely frozen ground seems to make little difference to the grass, no matter how much pressure is applied.

Dr. Wilson emphasized that the superintendent was the key man assaying problems that contributed to winter injury and everyone should back him.

Snow removal, soil warming and mulching, ice melting, latex sprays and diseases and fungicidal treatments were items that were given attention. He mentioned that excess water in the crown of the plant is critical and stated that balanced feeding is important.

HIGHLIGHTS OF THE CONFERENCE - A SUMMARY

Dr. Fred V. Grau, Consulting Agronomist
College Park, Maryland

Dr. Gordon N. Cairns in his "Welcome" sounded the keynote of the conference by stressing Cooperation, Sharing The Information, and Stimulating Thinking. Especially interesting was his plea for all to help preserve Open Spaces and Natural Beauty. "Turf," said Dr. Cairns, "is akin to our great natural resources."

Angelo Cammarota, retiring president of the Mid-Atlantic Association of Golf Course Superintendents, was warm in his praise of University of Maryland faculty members for their continuing role in conducting the annual conferences. Suppliers received commendation for their supporting roles in making the conferences so successful. In Angie's Words, "The Mid-Atlantic is a tough place to grow grass because the area is TAINTED - 'tain't North and 'tain't South - its in between."

Dr. Elwyn Deal ranged widely in covering Recent Developments. Among New Grasses we now have Certified Common Kentucky bluegrass from Kentucky and South Dakota. The Certified seed will not produce any better turf - it simply guarantees the state of origin. This is a protection for the buyer so that, when he buys Kentucky bluegrass, he will not get mostly Newport which produces inferior turf in this area.

Weed control continues to advance but damage to ornamental plants grows too. Specific recommendations for the several herbicides will be contained in University of Maryland releases. Activated charcoal was mentioned as an agent to overcome toxic effects of chemicals, especially Betasan, but it is not yet recommended.

Mr. A. M. Radko characterized the 1967 season in the East as a good one but not an easy one. Fairways received maximum attention. A golfer who successfully directs his tee shot to the fairway is entitled to a perfect lie. In order to evaluate playing conditions the golf course superintendent must play golf.

Weeds are no problem with chemicals at our disposal. Nutrients are no problem - all are plentiful. Diseases can be controlled. Now even Poa annua is being evicted in favor of better permanent grasses.

Insects can be controlled. The new "clover weevil" may have a short life now that \$18,000 in research money has been made available.

Labor and the human element are shortcomings. Two-way radios are becoming more common for instant communication.

When Dr. Henry Indyk had completed his message nearly every man there had made a note to store all potentially dangerous chemicals in a locked room with each one clearly labeled.

Synergism was a new word to many. It is the increased effect when two chemicals are mixed. He cited cases where much turf died because two materials were applied together to "save time."

For effectiveness with chemicals we must consider TIMING, NEED, CONCENTRATION, FORM of chemical, FORMULATION, ACCUMULATION (buildup), COMPATABILITY and ECONOMICS.

Dr. Good's discussion on Nematodes left little doubt concerning their potential for destruction but he gave few solid recommendations for their control in the Mid-Atlantic area. In sterilized soil their populations "explode." Organic fertilizers appear to suppress them. When nematodes are suspected send sod samples to your University. Treat only TEST areas - do not go "whole hog" at once.

Dr. Edward Strickling threw a "bombshell" when he said that "Nutrient uptake is not related to Water intake in any way." The key to plant growth is Energy which is supplied by the sun and converted by photosynthesis. Excess water, too easily

supplied by modern "automatic" systems can be more harmful than a deficiency. When plants wilt a light syringing intercepts energy and keeps them turgid.

Jack McClenahan convincingly, and with rare humor, cited the pros and cons (with pictures) of using galvanized steel pipe and installing it with his own crew. Were he to do it again on another course he would contract the job and might not use steel pipe. He cited increased maintenance costs with irrigation. If members are not fully prepared it is a cruel hoax.

Russel Roberts stressed the item of increased costs of maintenance, something for which many clubs are poorly prepared. Poor design and poor installation are two main causes of disappointments. He feels strongly that AREA people should install AREA systems. Many outlets are damaged by maintenance equipment. "Automatic" systems are not truly automatic. The inviolable rule in irrigation is to apply water no faster than the soil will absorb it. Localized dry spots indicate variations in infiltration rates. Each turf area should be monitored every day. Lack of knowledge is our greatest problem. More and more water will be ALLOCATED. Perhaps in the future the data from soil moisture blocks, humidity sensors, rain gauges, temperature (soil and air) will be programmed through a computer. Then we will have automatic irrigation - but, tomorrow is not yet here.

The appearance of Maryland's Governor, The Honorable Spiro T. Agnew, at the luncheon, capably arranged by George Gumm and Angelo Cammarota, truly was the highlight of the conference. The good-natured free and easy banter between the Governor and the head table delighted the audience. Few were prepared for the warm humor that captivated everyone. He identified unmistakably with TURF especially as regards golf. (The low hundreds was an error; there may be a new speech writer).

Mr. Cammarota made a ceremony of presenting to the Governor a copy of the Pennsylvania Turfgrass Survey the first of its kind in the United States (or anywhere), remarking that a similar survey in Maryland would be very useful. The survey was sponsored by The Pennsylvania Turfgrass Council, conducted by the Crop Reporting Service, backed by the Secretary of Agriculture.

Dr. Charles Ellington filled in admirably as a "pinch-hitter" banquet speaker when the Governor was forced to change to the luncheon spot. Dr. Ellington's dry wit had everyone convulsed - then he got down to the business of what his State Board of Agriculture does. Time did not let him tell all - but few in attendance had any idea of the complexity of his job. His color slides were excellent as was his running commentary. No one should have missed his talk.

John Shoulders injected fresh thinking into turf fertilization. Data on charts, supported by Kodachrome slides, convinced many that WINTER fertilization is here to stay. It favors root growth, provides greener color in winter, and adds to wear resistance.

P and K are applied as needed by soil tests. Winter feeding is concerned with Nitrogen only. He showed how each form of nitrogen can be used effectively - Ureaforms, Natural Organics, and Solubles, alone or in combination. It is most important to avoid further stimulating growth in spring when natural growth produces more grass than needed.

Winter N is like adding a charge to a battery - it is a form of Energy.

Dr. Hawes traced the inverse relationship between roots and height of cut. This is necessary information but, in a sense, academic. Turf in use must be mowed at a height that is favorable to the play. We must find ways to grow roots in spite of height of cut. He cited many factors that affect roots, mostly adverse, including chemicals (2,4-D especially), compaction (lack of oxygen), fungi, nematodes, excessive phosphorus. Potash is very helpful to roots in maintaining a free flow of nutrients from leaves to roots.

Dr. Gilbert clearly showed the positive relationship between winter kill of bermudagrass and the density of overseeded cool-season grasses. Bentgrass is being used more and more for year-round putting greens to avoid the unsightly and inconvenient "transition period." Cold tolerance of warm-season grasses is lost when there is a mid-winter warmup that starts new growth. Potash at 5 lbs. to 1,000 sq. ft. and Phosphorus at 3 lbs. a year seem to be optimum for North Carolina warm season turf. Nitrogen should be applied as needed. This, in effect, creates BALANCED FERTILITY.

Charles Wilson reported on part of a published paper on Winterkill in Cool Season Grasses developed from a recent symposium on the subject. No plant is winter proof. Poor drainage is the worst offender. It doesn't pay to protect the wrong grass. Courses in the North must be closed at times. The Superintendent is the key man and everyone should back him. Fungicides, covers, snow removal, warming cables, ice melting, latex sprays, cup positions and many other contributing factors were discussed. Excess water in the CROWN of the plant is critical. Balanced feeding is most important.

In his summary statements Dr. Grau warmly congratulated all who have helped to maintain the high standards of The Annual Conference. His first contact with the Mid-Atlantic was in 1931 when he joined the U.S.G.A. Green Section at the old Arlington Farms. At a meeting in Wheaton that fall he tried to draw Chemistry and Turf closer together. Many of those who started the annual conferences no longer are with us.

The Chemistry of Turf is more essential today than it was in 1931. Golf course superintendents must "go to school" again to learn the names of all the chemicals they use. It is not enough to know only the trade name.

Water continues to be a prime topic. Dr. Grau first opened the subject of possible water shortages and controls nearly 20 years ago when Dr. R. P. Thomas (recently deceased) was a staunch supporter. It seemed trivial at the time - but no more.

Note-taking seems to be a lost art. Ballpoint pens are given away but there seems to be a paper shortage. It is hard to take notes when slides are shown but a pen with a built-in light is a help. Ask Angie Cammarota. Do we need a course in note-taking? Should speakers provide copies of summarized notes?

The many new, young, fresh eager faces in the audience should remind us of the constant need for REVIEW. Bring them up-to-date on historical events and changes in recommendations (as from the acid theory to the use of lime) so that they can appreciate their present position. We should not lose the Sense of History.

No new grass, no new chemical, nor no new practice may be considered PROVED until the golf course superintendent has satisfied himself that it works for him on his course and is an improvement over that which he had before.

The more sophisticated our systems become and the more automatic our controls become, the more we need intelligent thinking superintendents to control the controls. Machines do not think. They operate only as they are programmed. Sometimes they go berserk.

Incontrovertibly, the reviewer and summarizer gets more out of a conference than anyone. I am indebted to all for the privilege of serving in this capacity.