Northwest TURFGRASS TOPICS

Vol. 23 No. 1 PUYALLUP, WASHINGTON April 1980

THE PRESIDENT'S MESSAGE

by Earl Morgan

The second week of January 1980, Mr. Jim Chapman and I met with the management of Sun River Properties, at Bend, Oregon regarding the 34th N.T.A. Conference to be held there in September. With the help of Joe Lymp and Chas. Harger, resident supervisors, the committee feels all will be in order when the conference time comes.

In February, I was one of many from the Pacific Northwest who attended the National Golf Course Sup't. Assoc. Conference and Show in St. Louis. One of our own directors, Mr. Carl Kuhn, was a conference speaker, and a good one too. Mr. Ed Rodgers, of Northwest Mowers of Seattle was the recipient of a National Award from Jacobsen Mfg. Co. We are most proud of both of them. St. Louis happens to be the city where I grew up. We had a very good time visiting friends and places. I even went out to the golf course where I caddied during highschool days, there was snow on the ground but the old caddy shack was still there.

The program at a National Conference has to be very broad so as to be interesting and informative to the 7000 or so registered from all over the world. As I remember the topics, I realize how fortunate we are to have our own Northwest Turfgrass Assoc. Conferences where we are able to discuss subjects that are more specific to our area.

We welcome Dr. Goss's return from New Zealand. Am looking forward to the annual field day at Puyallup. I wish you all a busy and rewarding summer and do plan on coming to Sun River in September, you won't regret it.

SYSTEMIC FUNGICIDES

Gary A. Chastagner and Ralph S. Byther

One of the most significant advantages in chemical control of plant diseases was the introduction of systemic fungicides. Tersan 1991, Proturf DSB, Fungo 3336, Bromosan and Spot Clean are examples of systemic fungicides used to control many disease on turf. Fungicides which penetrate or move within plant tissue are generally referred to as systemics.

Systemic fungicides generally move from the site of application upward and are transported with water within the plant. This results in a buildup of the fungicide at points where water is lost from the plant, namely the leaf tips and margins. Most systemic fungicides exhibit very limited movement within a plant so that their fungicidal activity is limited to tissue very close to where the fungicide is deposited on the leaf. The improved disease control shown by systemic fungicides is related not only to their systemic nature, but also to their high degree of activity and the residual activity of these fungicides. More effective disease control has thus been possible using less fungicides and fewer applications.

Many users of the systemic fungicides available today have the misconception that applications of these fungicides cure plants of disease. Most commonly, these fungicides are used and perform as protective treatments rather than curative treatments. The ability of a fungicide to cure a plant of a disease is dependent upon the length of time between infection and application of the fungicide, the degree of systemic activity exhibited by the fungicide, the dosage applied, the method of application, and the sensitivity of the fungus causing the disease to the fungicide. Most often, because of limited uptake, systemic fungicides do not accumulate in sufficient quantities in the plant to cure a disease. Only about 5% of the fungicide applied as a foliar spray enters the plant because penetration is seriously limited by the cuticle of the plant. The 95% remaining on the surface of the plant acts as a protectant. Because of absorption and degradation in soil, uptake by roots is limited.

Often disease control in turf may be misinterpreted as curative. Since new shoots and leaves are continuously being produced, it may appear the disease has been "cured", when in reality only new growth has been protected. A closer examination would reveal the old infected leaves have either died, or been removed by mowing, etc. The overall picture would indicate the disease has been cured and there is no longer a problem. However, individually infected grass blades were not actually cured, but new growth was only protected resulting in a recovery of the diseased area.

In conclusion, systemic fungicides can be expected to give better disease control because of their increased and prolonged activity, but proper coverage and timing is still very important to successful disease control.

A NEWCOMER'S VIEW OF NEW ZEALAND TURFGRASSES

by Roy L. Goss

In the last issue of *Turfgrass Topics* I related a few experiences that I have encountered here with New Zealand turfgrasses. After spending an additional 3 months from the date of the last writing, the entire turgrass picture comes into focus a little better. When I listen to turfgrass managers discussing their problems, whether they be on golf courses, parks or sports fields here in New Zealand, it sounds exactly like the problems in the Pacific Northwest. The entire problem boils down to finances, manpower and equipment. Really, the whole picture boils down to finances because with the right amount of money we can buy any amount of labor and equipment.

Technology is catching up quickly in New Zealand, but frequently the turfgrass manager has to look at this advanced technology with mixed emotions. In other words, the turfgrass manager would like to do some of these nice things to his turf, but with the labor he has he couldn't keep up with the growth rate or do these other tasks necessary to really put the icing on the cake. For example, little or no nitrogen is ever applied to golf course fairways and little nitrogen is applied even to sports fields. The major amount of plant nutrients are applied to golf course putting greens, bowling greens, and in third category, to sports fields.

Throughout the entire summer period only minor attacks of brown patch (*Rhizoctonia solani*) and a bit of red thread was all that has been observe. Red thread is ever-present here in New Zealand due to the fact that nitrogen levels are kept rather low. And, this is a point that we must all pay particular attention to in the future. In spite of the low levels of nitrogen application in this country there are still some good quality turfgrasses produced. They may not have quite the deep green color and they certainly do not have the lushness as turfgrasses in the Pacific Northwest. There isn't any question but what our research in the Northwest has proven that excessive levels of nitrogen will stimulate turfgrass diseases. The turfgrass manager in New Zealand is concerned with maintaining sufficient density of turf necessary for its intended use.

Surveys of a number of turfgrass facilities throughout the entire length of New Zealand (about 1300 miles) has definitely indicated that high levels of phosphorus equate to high levels of *Poa annua* for the most part. Although this country is a phosphate-deficient area, phosphate levels have been kept entirely too high and this has been due primarily to agricultural fertilizers being the most available product for turf use. They obviously use more phosphate in the agricultural industry because of legume production in pastures. Some of the turfgrass managers (golf course superintendents) have been on a program to reduce phosphate application. There is no question but what their facilities show this in reduced *Poa annua.* Some of the golf course putting greens examined contain as much as 98% bentgrass and 2% or less *Poa annua*. This speaks very well

Continued on page 5

1980 I.P.A.A. CONVENTION

Pesticides in the 1980's, as viewed by some people in important governmental and research slots, will be the focus of this year's annual convention of the International Pesticide Applicators Association.

Although the group's meeting is not to be held until Oct. 1, 2, 3, the program already is firmed up, according to Bill Harlan, Eastside Spraying Service.

Bill tells *Turfgrass Topics* that Robert DeLano, president of the American Farm Bureau, and Dr. John Davies, member of the EPA Science Advisory panel, will be a couple of the guest speakers.

After registration, a boat tour of the Seattle Harbor and a cocktail party Wednesday, Oct. 1, the more formal portion of the program at the Sea-Tac Red Lion Motor Inn will begin Thursday, Oct. 2.

Besides DeLano, participants will hear from Senator Frank Hanson, chairman of the Washington State Senate Agriculture Committee, Slade Gordon, Washington State Attorney General and U.S. Senate candidate, and others.

Friday, Oct. 3, will feature some of the Washington State University Extension scientists as they preface a discussion on 2,4,5-T and 2,4-D issues.

Panel members for this discussion will include Dr. Gordon Edwards, San Jose State University, one of Thursday's speakers, Robert Poss, from EPA's Region 10, Erritt Deck, with the Washington State Department of Agriculture, and others.

Member costs for the convention will be $115 for a couple, and $80 for a single registration. Non-member costs are slightly higher. Single day charges are $50.

Registrations are being accepted and can be addressed to IPAA at Box 681 in Kirkland, Wash. 98033.

UNDERSTANDING SLOW-RELEASE NITROGEN

by Dr. James Wilkinson

Reprinted from Weeds, Trees, & Turf Magazine, June 1977, Harvest Publishing Co., 9800 Detroit Ave., Cleveland, OH 44102

The use of slow-release nitrogen (or water-insoluble nitrogen [WIN]) fertilizers on turf has grown steadily over the last few years. Despite the high cost of WIN compared to water-soluble nitrogen (WSN), WIN fertilizers continue to grow in popularity.

The characteristics of WIN and WSN fertilizers are summarized in Table 1. WSN fertilizers do offer some advantages over WIN, including rapid initial response, low cost, and high water solubility for liquid application. The use of such rapid release materials does have drawbacks, however: high potential for burn; production of a flush of growth after application at anything greater than moderate rates; relatively short residual, resulting in the need for frequent application; and the potential for significant N lost due to surface run-off and leaching.

Most of these problems associated with WSN can be minimized using any one of several commercially available WIN sources. WIN offers the primary advantage of a longer residual (longer response time) compared to WSN, allowing for higher application rates, together with reduced frequency of application and reduced labor costs. Other advantages of WIN include low burn hazard, and reduced potential for loss due to surface run-off and leaching. Disadvantages of WIN include the high cost per unit of N, and slow initial response.

There are five categories of wIN fertilizer available today:

1) ureaformaldehyde (UF)
2) isobutylidene diurea (IBDU)
3) sulfur coated urea (SCU)
4) plastic coated fertilizers
5) natural organics: activated sewage sludge, process tankage, seed meals, fish scrap, etc.

Many turf fertilization programs utilize a combination of WSN and WIN, taking advantage of the desirable characteristics of both. In order for the turf manager to effectively utilize slow-release N sources as part of a complete turf care program, he must be fully aware of the factors influencing N release from these material. Factors such as soil moisture and temperature play a large role in the N release characteristics of the WIN fertilizers. If the influence of these factors is not understood, many people will be disappointed or misled as far as what type of turf response to expect.

A detailed description of each WIN source is summarized in Table 2. The following is an explanation of the N release mechanism involved for each WIN source to help the turf manager better understand the type of turf responses to expect from each material.

UF — Nitrogen is released from the insoluble fraction of UF as the result of microbial degradation. Therefore, any factor which increases or decreases microbial activity will have a similiar effect on UF-nitrogen release.

UF-N release will reach a maximum when:

a. soils are warm (generally above 55° F.),
b. soil moisture is adequate, but not excessive,
c. soil oxygen is plentiful, and
d. soil pH is near neutral.

These same factors have a similar effect on the growth rate of turf. As a result, N release from UF is maximized under conditions which are ideal for turfgrass growth. This could be important, for example, during a summer drought stress period. Cool-season turfgrasses will go dormant under these conditions, while N release from UF will be minimal because dry conditions minimize microbial activity. Excessive N release during such a period may be detrimental and hinder turf recovery when moisture becomes available.

Most UF materials contain a WSN fraction. Turf response to this fraction is not dependent on microbial activity. As a result, a rapid turf response can be expected, especially at higher rates. Most UF's contain at least 30 percent of their total N as water soluble.

It should be emphasized that all UF materials are not identical in terms of water solubility and N release characteristics. Some contain considerably more WSN than others. The solubility characteristics of UF materials are expressed in either of two ways: a) activity index, the traditional manner used to express UF solubility characteristics, and b) ureaformaldehyde ratio, a more recently used expression of UF solubility characteristics.

Activity index: UF materials traditionally used for turf fertiliaztion can be broken down into three fractions based upon solubility. Solubility is governed mainly by the length of the UF "chains", shorter chains being more soluble.

Fraction:

I. cold water soluble nitrogen (CWSN).
II. cold water insoluble nitrogen (CWIN).
III. hot water insoluble nitrogen (HWIN).

N release from Fraction I is rapid and similar to soluble N sources. Fraction II is insoluble in cold water but soluble in hot water. N from Fraction II is slowly available over a number of weeks. Fraction III is insoluble in hot water and becomes available to turf over a number of years.

The rate of N release from different UF materials can be expressed as an activity index:

$$A.I. = \%CWIN - \%HWIN$$

The higher the AI, the more rapid the N release rate. A satisfactory UF should have a minimum AI of 40. A UF material with an AI below 40 would have very slow release properties. Many UF products such as Nitroform and Ureaform traditionally have been characterized using AI.

Ureaformaldehyde ratio: A more recently used expression of UF-N release characteristics is the ureaformaldehyde ratio. This ratio can be varied significantly during manufacturing and can result in large changes in the characteristics of the resulting UF material. A 1.3:1 ratio, typically found in materials such as Nitroform, yields a material with approximately 1/3 WSN and 2/3 WIN. A 1.9:1 ratio, as used today in materials such as Scott's Proturf line, has approximately 2/3 WSN and 1/3 WIN.

Numerous manufacturers are now beginning to produce UF materials with widely varying release properties. Nearly any combination of WSN and WIN can be achieved if careful controls are placed on the manufacturing process.

Continued on page 6

TURFGRASS FIELD DAYS

Don't forget to mark your calendars again for the Turfgrass Field Days. A special field day for golf course superintendents or those closely allied with the golf course industry will be held on Tuesday, June 17, 1980. The field day will begin at 10 a.m. at Farm 5, six miles east of the Research Station and will conclude at approximately 1 p.m.

All research that is ongoing will be viewed by all in attendance at that time. Bring along any friends, administrators, club officials or anyone else you wish to bring to the field day with you.

A public turfgrass field day will be held on June 19, Thursday, for all other segments of the turfgrass industry including homeowners, parks, cemeteries, schools, etc. The program will be slightly different for this group since more emphasis will be given to lawn-type turf.

See you for field days in June.

Continued from page 2

for reduced nitrogen application, reduced phosphate application, adequately high amounts of sulfur and carefully controlled irrigation. This seems to be the proper recipe for good bentgrass culture. Most of the golf courses that do hand watering of their greens have less *Poa annua* than those with automatic watering systems. Ammonium sulfate is the chief source of nitrogen here in New Zealand on most golf course putting greens; therefore, adequately high levels of sulfur are always available. Most golf course superintendents apply as much as 6 to 10 lb of available nitrogen per 1000 sq. ft. per year. Some, of course, apply less. For the most part these people apply fertilizer, nitrogen especially, about once each month throughout the year.

On a collection tour of soils and management data on the South Island during February, we were pleased to have Sam and Jerry Zook from Overlake Golf Club on this tour with us. Sam was equally as impressed as I have been here that these people seem to do as good a job tending their golf courses as they do with very small labor forces and a minimum amount of equipment.

During February we were also pleased to have as visitors old friends and neighbors from Anderson Island, WA, Mr. and Mrs. Harold Kooley, who rented a small motor home and were touring both the North and South Islands before going on to Australia and home. It was certainly good to see old friends after several months away.

One of the bigger problems of the New Zealand turf manager is the availability of either proper machinery or products. Localized dry spot on putting greens on golf courses has been one of the most serious factors observed in my visits here. Not to mention, of course, thatch problems, but these are all over the world. Few good surfactants or wetting agents are available in New Zealand; hence, there is little choice of material. Such things as endothall and bensulide (pre-emergence herbicides) are not being imported at present; therefore, two excellent means of controlling various pests are not available to the turfgrass manager. Crabgrass is certainly on the increase all over New Zealand and unless they attempt pre-emergence controls in the near future, it will be a very serious turfgrass problem. The slicer-seeder for direct seeding into turf has not appeared on the scene in New Zealand at this time. It would be a most useful piece of equipment on the sports fields and golf courses as well.

This is enough rambling for now and we look forward to coming back home and getting back to business and trying to apply some of what we have learned here in New Zealand. We look forward to seeing you the first part of May.

Continued from page 3

One should always take care to be cognizant of the properties of the UF material he is considering for use. No one ureaformaldehyde ratio or activity index is optimum for use all the time. The ideal ratio will vary with season, turf species, location, and results desired.

IBDU — IBDU is a compound which goes into solution very slowly. The two factors primarily controlling the rate of N release are: a) soil moisture — the more moisture available, the more rapid N release: and b) particle size — IBDU is available in both coarse and fine particle size, with the finer material having a more rapid N release rate. Also, release rate may be slightly faster under acid conditions. Temperature does have a limited effect on N release, but low temperatures do not substantially limit IBDU-N release as they would with UF.

IBDU repeatedly has been shown to provide a poor initial turf response. Turf response is minimal for the first 2-3 weeks after application. Once this period is past, however, response to IBDU appears excellent. Because of limited dependence on temperature for N release, fall applied IBDU will provide an excellent turf during late fall and spring.

A 3-year study conducted at Ohio State University compared UF (1/3 WSN, 2/3 WIN) and IBDU at various rates and dates of application. When applied to Kentucky bluegrass in April at 4 lb N/1000 ft^2, UF gave a rapid initial response (both quality ratings and yield) compared to IBDU (Figure 1). This was due to the WSN fraction of UF. During the summer and fall, however, turf response to the single spring application of UF and IBDU was similar.

When the materials were aplied at the same rate in the early fall, both provided an excellent turf resonse within a month after application. The big difference occurred the following spring, when IBDU produced an excellent turf resonse in early spring, while the turf did not resond to fall applied UF until the soil warmed up in late May.

SCU — Sulfur coated urea has been in the experimental stage with the Tennessee Valley Authority for a number of years and has recently become commercially available. N release rate is based upon the thickness of the sulfur coating, moisture, and temperature. N is released by degradation of the sulfur coating and/or diffusion of urea through pores in the coating.

Release rate will increase with increasing soil moisture and temperature. The response to temperature is not due to microbial activity, but accelerated degradation of the sulfur coating. As a result, one drawback to SCU may be rapid N release with high temperatures when cool-season turfgrass become dormant. Turf research at numersou universities, however, has shown SCU to be an excellent N source.

Rate of N release from SCU is expressed as a 7-day dissolution rate. The higher the dissolution rate, the more WSN available. Turf research has been conducted at numerous universities on experimental SCU materials having 7-day dissolution rates ranging from 14 to 33 per cent. Commercially available SCU has a 7-day dissolution rate of approximately 30 per cent. As a result of this high dissolution rate, a rapid initial response can be expected.

Plastic Coated Fertilizers — Plastic coatings are used to encapsulate soluble sources of N, P, and K. Release of the fertilizer nutrients occurs when water dissolves the fertilizer salts, followed by diffusion of the salts out of the granule.

Continued on page 7

Continued from page 6

Release patterns are varied by changing the thickness of the plastic coating. In addition to coating thickness, release rate is governed primarily by temperature (increase release at higher temperatures). Moisture has very little influence on release rate, unless extremely droughty conditions prevail. Under droughty conditions, N release will be halted unless damage occurs to the coating due to drying. If coating damage does occur, N release will be very rapid.

Mechanical damage to the coating, creating rapid release of the nutrients, is a problem with plastic coated materials. Damage during shipment, application (especially with drop type spreaders), or by mowing after application (both the mower wheel traffic AND damage by the reels or rotary blades) can seriously alter the slow-release properties of plastic coated materials on turf.

Natural Organics — Despite their high cost and low analysis, this group of slow-release materials continues to be used extensively as a slow-release N source on turf. The materials are by-products or waste materials. Analysis of these materials varies widely and even varies considerably for any one product. Materials used include activated sewage sludge, process tankage, fish scrap, seed meals, dried manure, etc. Milorganite, an activated sewage sludge, is perhaps the most widely used natural organic fertilizer on turf.

N release is by microbial breakdown, therefore, the same factors effecting N release from the WIN fraction of UF will influence N release from the natural organics.

One slight advantage to the natural organics is that they may supply some micronutrients, but this varies widely depending upon source. They usually contain small amounts of P and K in addition to N.

The main advantage of WIN over WSN sources is their longer residual, allowing for the use of high N rates applied at a reduced frequency. One application per year of Win, however, generally has not proven to be satisfactory in terms of year long turf quality. Research has shown that at least two applications per year of most WIN sources is necessary to maintain an acceptable level of turf quality. There appears to be no real advantage to more frequent application. These general conclusions regarding the application frequency of WIN sources most likely would not apply to intensively managed turf (i.e. golf greens) where extremely careful control is required over N nutrition.

Dr. James Wilkinson is currently director of research for Chem-Lawn Corp.

FROM THE MEMBERSHIP OF THE NORTHWEST TURFGRASS ASSOCIATION

WELCOME HOME!

Marcie and Roy

KNOW YOU'VE BEEN MISSED!!!

Your Aide has been reclassified as "Shepherd I"
Your shepherd stick is in the delivery barn.

"No blessing lasts forever!"

TABLE I. Comparison of WSN and WIN fertilizers.

WSN	Characteristic	WIN
quick	response time	slow
short	residual	long
frequent	application frequency	infrequent
high	burn potential	low
high	water solubility	low
low	cost	high
high	surface run-off and leaching potential	low

TABLE 2. Comparison of several WIN fertilizers

	UF	IBDU	SCU	Plastic Coated Fertilizer	Natural Organics
% N	38 (% may vary in newer products)	31	32	Varies (10-20)	Varies (2-6)
Basis for Insolubility	Urea reacted with formaldehyde forming insoluble compound	Very low solubility in water	Urea encapsulated in sulfur (and sometimes wax)	Soluble fertilizer encapsulated in plastic	Nitrogen part of organic complex
Expression of Insolubility	Activity index or urea-formaldehyde ratio		Seven day dissolution rate		
Basis for Nitrogen Release	Microbial degradation	Slow dissolution	Microbial degradation of coating, and diffusion of urea out of granule	Diffusion of soluble fertilizer out of plastic coating	Microbial degradation
Primary Factors Influencing Rate of Nitrogen Release	Any factor influencing microbial activity; soil moisture, temperature, pH, nutrient content, oxygen.	Particle size, moisture availability	Coating thickness, moisture and temperature	Coating thickness, temperature, (moisture to a lesser degree)	Any factor influencing microbial activity; soil moisture, temperature, pH, nutrient content, oxygen
Primary Drawbacks	Low nitrogen recovery first 2-3 years of use	Poor initial response	Rapid release at high temperatures	Handling and application may destroy coating	Low analysis, high cost
Advantages	Some soluble nitrogen	Excellent low temperature response	More rapid initial release than most other WIN sources, some S provided	Complete fertilizers available	P and K often provided, may supply some micronutrients
Manufacturer/ Distributor	Hercules, O. M. Scott, plus numerous others	Swift Chemical Co.	Canadian Industries Limited	Sierra Chemical Co.	Numerous
Trade Name(s)	Nitroform, Powder blue, various ProTurf products, plus numerous others	Par Ex	Gold-N	Agriform (Osmocote)	Milorganite and many others

REMEMBER

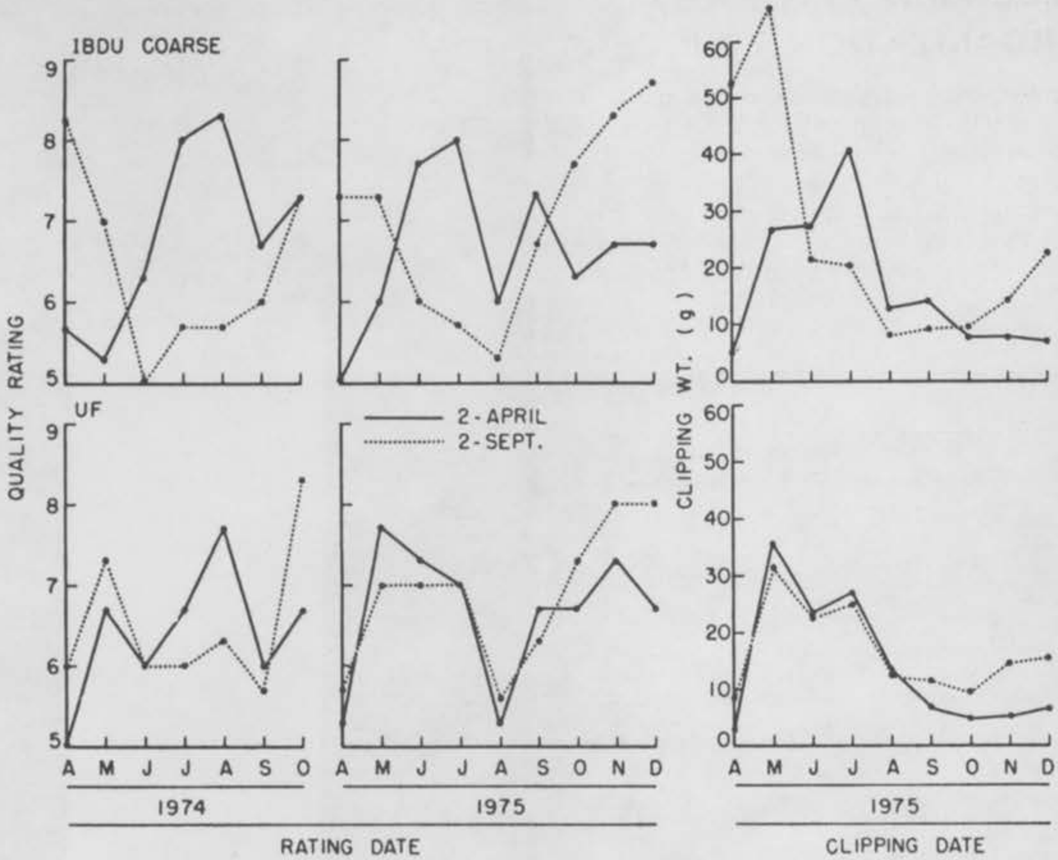
Turfgrass Field Days

June 17 - 19, 1980

N.T.A. Conference

Sept. 22 - 25, 1980

Sun River, OR.



Turf quality and clipping wt. response of Kentucky bluegrass to April and September applications of IBDU and UF, each at 2 kg/are (4 lb./1000 square feet.)

MEMBERSHIP IS THE KEY TO AN ORGANIZATION'S SUCCESS

Without membership, organizations would not exist. There are many benefits in belonging to the NTA and you too can help advance the technology and recognition of the turfgrass industry. A valuable prize will be awarded the individual who brings in the most new members in 1979. Use the blank below to sign up your new member. Additional application forms can be obtained from John Monson or the Editor.

MEMBERSHIP APPLICATON FORM

Name of Applicant ____________________

Address ____________________

City ____________ State ________ Zip ____________

Type of business or firm (Individual, school, golf course, park, cemetery, etc.)

____

Recommended by ____________________

Northwest Turfgrass Association Membership Dues $30.00/year.
Make check payable to Northwest Turfgrass Association and mail to:
John Monson, Treasurer
P.O. box 274, Redmond, WA 98052
Dues include: 1) reduced conference registration, 2) Turfgrass Topics, and other mailings.

NORTHWEST TURFGRASS ASSOCIATION
P.O. Box 274
Redmond, WA 98052

Mr. Tom Cook
Dept of Horticulture
Oregon State University
Corvallis, OR 97331

Officers of the Northwest Turfgrass ASSOCIATION

Earl Morgan .... **President**
Dick Schmidt .... **Vice-President**
John Monson .... **Treasurer**
Dr. Roy Goss .... **Exec. Secretary**

NORTHWEST TURFGRASS TOPICS is sponsored by the Northwest Turfgrass Association and financed through funds of this organization. Any communications concerning distribution of this paper or association business should be directed to John Monson, P.O. Box 274, Redmond, WA 98052, or Roy L. Goss, Western Washington Experiment Station, Puyallup, Washington 98371.

Communications concerning content of this paper should be directed to Dr. Roy Goss, Editor, Western Washington Research and Extension Center, Puyallup, Washington 98371.