January/February 1990

Our 65th Year

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IMPORTANT ENVIRONMENTAL ISSUES – PAGE 4

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PRESIDENTS MESSAGE

ARE YOU READY FOR THE 1990's?

During much of the 1980's our local and national golf course superintendent chapters expended a great deal of effort in informing our members as to how we are "Professionals" or we are "Turf Managers". We Golf Course Superintendents may very well be "Professionals", but **sometimes** I am one superintendent that doesn't feel like one.

As I look at the business of maintaining a golf course, I see the need for skills in management that were not included in my education. In the early 1970's how could anyone envision computerization, time management, organizational ability, environmental awareness, budget forecasting, public speaking, writing, safety awareness, purchasing, legislative awareness, etc. as being fundamental to our business as growing grass and running a crew. It's hard to believe that anyone over the age of 35 years could have forseen what was needed to simply take care of a golf course.

The MBCGCSA Board will begin the 1990's by giving all of our members the opportunity to educate/reeducate ourselves in the practical skills (Non-turf) to do our job, and present ourselves in a Professional manner. Your Board will facilitate group discussions, writing, speaking, seminars. Your Board will attempt to meet the needs of public course members and municipal course members as well as private clubs.

As a member of MBCGCSA you have the ability to ask any question, make any statement, provide guidance to the Board. But, you also have an **obligation to participate**. The MBCGCSA has as many talented and reknowned Superintendents as any chapter in GCSAA and it is essential that we make good use of this great resource. When you are asked to participate, please do and in a timely manner.

Becoming President of this great association is something that makes me very proud. I want the ability to do something for my profession and my friends. Your Board wants the ability to help our members become all that they can become. Our members want to be educated and feel as though they **are** "Professionals". Those outside our profession **need us to be** "Professionals".

Tom Mason

"A PATCH OF GREEN"

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SPEECH BY JACK D. BAILS, DEPUTY DIRECTOR MICHIGAN DEPARTMENT OF NATURAL RESOURCES

January 16, 1990
for: 60th Annual Michigan Turfgrass Conference

Thank you for the opportunity to speak to you today.

I asked that the Department of Natural Resources be represented in this conference. We have found ourselves increasingly in conflict with golf course owners and developers, and under growing pressure by the public for tighter regulations of golf course development. It is my perception that this conflict and pressure are unnecessary. With relatively minor changes in management practices and development plans, I believe that you can avoid the potentially difficult times that lay ahead for the golf course industry. The focus of my discussion will be "tips" on how to work with the Department and suggestions on ways to increase public conference in the management of golf courses. Chuck Wolverton and Tom Rohrer will follow up with a detailed explanation of regulatory issues.

Let me begin by assuring you that the Department of Natural Resources recognizes the importance of golf to the tourism and recreational industry of the State. We are involved in not only regulating the management and development of golf courses, but also assisting in financing the development of public courses. The Michigan Natural Resources Trust Fund and the Protecting Michigan's Future Bond Program, administered by the Department, can be and have been utilized to assist communities in the purchase and development of golf courses. The Department also administers the Farmland and Open Space Act which has benefitted some golf courses by establishing their property taxes as if the land was undeveloped.

But, as I said, the DNR is coming under increasing pressure by the public to more stringently regulate the development and management of golf courses. I think this pressure is a result of a **perception** that golf course chemicals and fertilizers are polluting our waters and that golf course developers have a disregard for unique and fragile resources. Let me emphasize it is largely, I believe, a perception problem but one that must not be ignored by the golfing industry. While this concern appears to be growing, I have seen no corresponding response from the golf course industry. Permit problems with the DNR pale in comparison to alleviating the public concerns about your golf course operation or your plans for expansion.

CONTINUED PAGE 20

SUPERINTENDENTS FOCUS ON PROTECTING NATURAL RESOURCES

The environmental impact of golf courses will be a major topic of discussion when golf course superintendents gather at the 61st International Golf Course Conference and Show held in Orlando, Florida, on February 19-26, 1990. Sponsored by the Golf Course Superintendents Association of America (GCSAA), the conference and show will feature seminars, speakers and forums for GCSAA members to enhance their understanding of environmental management. More than 15,000 professional turf managers and other industry leaders are expected to attend the conference and show.

Some of the environmental topics to be discussed are: water quality and conservation, integrated pest management, hazard communication, underground petroleum tanks and the storage, disposal and recycling of chemicals. Expert presentations on these and other topics will be made during the Friday session on "Managing Today's Enviroment."

A special government relations open forum will also be held at the conference. Attended by GCSAA members, federal regulatory officials and leading scientific researchers, the forum will detail ways to monitor regulation and inform and educate government personnel on the day-to-day management practices at golf courses.

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AN OPEN LETTER

To: All Golf Course Superintendents

From: The New Mexico Golf Course Superintendent's Association

Subject: THE "ACHILLES' HEEL" OF **OUR** WATER CRISIS

1. The absence of a strong rebuttal to articles in national publications written by prominent leaders containing the accusation "that Golf Course Superintendents tend to OVER-WATER", (not to mention numerous player complaints) causes us to wonder:

a. Are we too "chicken" to respond when prominent leaders make such outrageous statements?

b. Do we believe this statement to be true?

c. Are we content to say it must be someone else that the statements refer to?

d. Or, are we ill-qualified in this irrigation management area of our profession and, despite our disagreement, find it impossible to intelligently reply?.

2. For the record, we believe the answer to the above is (d), and include ourselves in this sad, but solvable situation.

3. We wish to share with you a summary of our discussions/thoughts/ideas/questions on irrigation management with the intent of providing a catalyst that will result in focusing NATIONAL ATTENTION on our ACHILLES' HEEL as relates to **The Water Crisis.**

QUESTIONS THAT NEED ANSWERS

1. The Irrigation Association, several years ago at a seminar we attended in Dallas, Texas promised to produce a consumers guide which would provide an in-depth comparison of irrigation products in the market place; the value of which is obvious — the absence of which causes some very real questions?

2. When have you ever seen an irrigation design/-plan that provided the following:

a. Guaranteed uniformity of application and/or efficiency of application expressed as a PERCENTAGE.

b. Cost to apply, (for example), ¼ inch of water based on local energy rates/water purchases.

c. ACCOUNTABILITY of the designer as relates to system performance verified by testing subsequent

to system installation.

d. Approval by manufacturers, (pump station and irrigation equipment) attesting to the accuracy of their equipment and its performance as specified on the plan as relates to water and power consumption?

e. Guaranteed "as-builts" and complete instructions for system operation relative to demand placed on pump station/stations, guaranteed total 'run" time based on "worst" condition: analysis of the control system and its capability for daily management — strengths/weaknesses.

3. Name a Turfgrass School that **really** prepares a Turfgrass Manager in the thorough understanding of **Irrigation Management** — Pump Stations, Systems Hydraulics, Head Spacing, System Operation, Equipment Comparisons, Fundamentals of Equipment Operation and related subjects.

4. When is the last time you, or have you ever, tested your irrigation system for: a. Uniformity of water application (catchment tests)? b. Performed night long (duration of system run time) pressure tests on battery powered graph recorders at key points on your golf course and in the pump station to determine uniformity of PSI/GPM supply and effective/efficient use of pump station/stations?

5. Why do we continue to see the same sprinkler with the same nozzles on different spacing from one golf course to another (too often on the same golf course?) There can only be one spacing for a given nozzle set that is truly efficient — in addition, put those same size nozzles in a different brand sprinkler and there is only a SLIM possibility that it will perform the same — IN OTHER WORDS, the often used "or equal" is a MYTH!

6. Where are the COMPUTER PRINT-OUTS of water application profiles of the various brands of sprinkler heads, each with their various nozzle combinations at the various wide range of pressures that the manufacturers list in their catalogs? the expensive decisions we make for our employer in the absence of these PRINT-OUTS MUST BE CONSIDERED UNPROFESSIONAL!

7. We believe improvement/accountability in system designing and an overhual of most existing systems will yield between a 20% to 55% savings in water usage. BELIEVE!

8. Other than **YOU**; who is accountable for the performance of these expensive, complex and in most MOST CASES (IF NOT AT ALL) very inefficient and wasteful systems???

9. Future discussions/concepts might well be enhanced by remembering that in total, an irrigation system is a piece of equipment or tool, among the many that we use with which to manage our golf courses. YOU would not consider using a tee mower to do the job of your greensmower; yet BOTH CUT GRASS. WHY have so many of us been content with systems that **SQUIRT** water instead of demanding EFFICIENT systems that can not only apply an even curtain of water, but have the controls necessary for effective management of same; seven days a week!

10. If you think because your system is new, therefore none of this applies to you — THINK AGAIN! IF YOU REALLY CARE and all this talk about a water crisis is not just a popular topic and so much hot air — THEN, GET INVOLVED — TEST YOUR SYSTEM — NEW OR OLD.

SUMMARY

We believe that the WATER CRISIS will soon put you and your water distribution system under the "microscope". If you don't believe. . . check the direction and control in Arizona — already using words like system efficiency expressed as a percentage.

Soooo — we can sit back and hide — give "lip service" to the problem and await the inevitable — EXPOSURE for what we are — wasters of water!

OR —

1. Each Association give top priority to establishing an irrigation education and testing project. Help one another evaluate every system in the area.
2. Lobby for National — to recognize the need for research and education.
3. Demand "print-outs" from the manufacturer, on YOUR particular brand of equipment, with YOUR particular nozzles, on YOUR particular spacing, with YOUR particular pressures at the base of the head — then TEST & COMPARE — EVALUATE.
4. Urge Professors to incorporate, as an integral part of turfgrass management courses, comprehensive irrigation management classes that will fill the void which now leaves us so grossly unprepared to intelligently cope with this water and energy waste.
5. Discuss the fact that; EVEN DROUGHT TOLERANT TURFGRASSES WILL REQUIRE IRRIGATION! **IN ADDITION:**

a. By improving the efficiency of water systems NOW — we can save 20% to 50% TODAY which will be a tremendous savings during the 5 to 10 years predicted for seed production of drought tolerant grasses; and, only then IF the 13,000 or so existing golf courses choose/can afford to over-seed.

'NUFF SAID

We don't have all the answers — but those we don't have, we know where to look, what to ask and how to proceed.

Please do not hesitate to write our Association and share what you find — we will be happy to share our progress to date.

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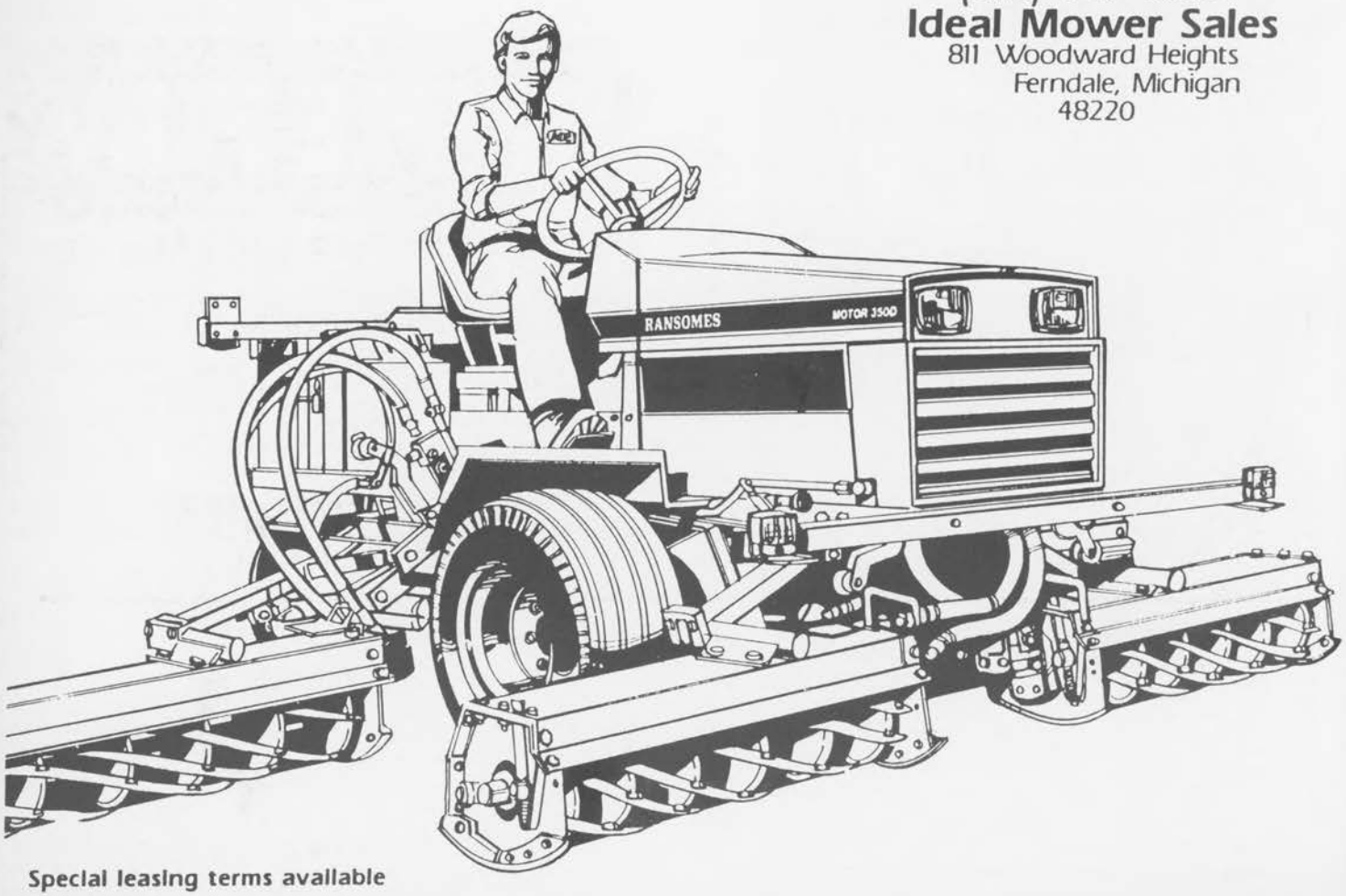

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Biostimulants Can Enhance Turf Growth, Hardiness

EXTRACTS INCREASE NUTRIENT UPTAKE

By R.E. Schmidt, Ph.D.,
Professor of Agronomy at Virginia Tech

Interest in biostimulant materials for turfgrass management has grown in the past few years as research has shown that biostimulants enhance turf growth and tolerance to certain environmental stresses.

Results obtained from the fertilizer-biostimulant studies will have economic as well as environmental impact on the turfgrass industry.

Although research pertaining to the use of biostimulants for turfgrass culture is limited, the results are positive. As more knowledge is obtained, biostimulation will become an important cultural practice in producing and maintaining modern turfgrass facilities.

The main biostimulants that are under study on turfgrass at Virginia Tech are cytokinins (plant regulating hormones) and cytokinin-like materials.

In the mid-fifties, cytokinins were first identified as a constituent of plants and have since been isolated in at least 40 plant species.

At first, the cytokinins were thought to be associated with cell division and differentiation. More recently, cytokinins were implicated in reducing plant aging, thus indirectly enhancing plant growth.

Although cytokinins occur naturally in plants, concentration varies with species. Cytokinin concentration in seaweed is high and extractions may be used for exogenous applications to other plants.

In addition, seaweed also contains low concentrations of other biostimulants such as auxins, gibberellic acid and micronutrients.

SEAWEED EXTRACT

Seaweed extract containing cytokinins at approximately 175 ppm and applied at 1 gallon per acre has stimulated turfgrass foliage and development.

From our experience, it appears that seaweed extract via a cold water process is more active than when extracted with a hot water process. Evidently, high temperatures denature some of the biostimulants.

In addition to the hormonal activity of seaweed cytokinins, seaweed has been thought to play a role in chelation of metals to give soluble complexes and

CONTINUED PAGE 22

MICRONUTRIENTS FOR TURFGRASS MANAGEMENT

By Dr. Roy L. Goss
Extension Agronomist-Emeritus
Washington State University
Puyallup Research and Extension Center

The health and vigor of turfgrasses and their ability to endure stresses are totally dependent upon their environment and management programs. The factors of soils, temperature, limited growing season, rainfall and humidity are a few of the environmental concerns. Many factors make up management programs and, although there are close interrelationships between these factors, this discussion will attempt to bring out in some detail the role of micronutrients.

THE SOIL FACTOR

Any discussion of micronutrients is more meaningful once we have considered the soil factor. Several aspects of the soil factor are briefly discussed as follows:

Texture. Soil texture, being the percentage composition of the components of sand, silt, clay and organic matter, can vary from sand to clay. Clay, organic matter and, to a much lesser extent silt, are the components that determine the cation exchange capacity of a soil. The cation exchange capacity is an expression of the potential of this soil to hold plant nutrients. It is important to remember that only ions with a positive charge are attracted to the exchange complex on clay and organic matter particles. Likewise, it must be noted that most of the micronutrients are cations and are held closely on the exchange complex.

When we compare the ability of sand to hold nutrients as compared to clay, there is no comparison. Basically, sands have little or no cation exchange capacity; hence, no nutrients are held or bound on the exchange complex on the surface of sand particles. Another factor in determining the availability of micronutrients to turfgrass plants is the soil pH factor. Micronutrients are notably more available in the acid ranges than they are in the alkaline ranges (pH over 7.0). Soils with very high pH values can frequently develop micronutrient deficiencies. Although iron is not usually considered as a micronutrient, it is a classic from the standpoint of deficiency symptom where iron is literally bound by the high pH factor and is essentially unavailable to the grass plant.

One other factor worthy of mention with respect to the soil factor is the leaching rate of nutrients with respect to the texture. The leaching rate is considered to be the rapidity with which water can pass through the profile and carry nutrients with it. Obviously, sand particles, being much coarser with much larger spaces between them, will leach or drain significantly faster than heavier soils with fine particle sizes.

Structure. The soil structure is simply the arrangement of the soil particles. When soil structure is destroyed, there are few if any air spaces available and most of the root zone is composed of noncapillary (water containing) pores. Even when structure is not destroyed, the soil is well aggregated, and the drainage rate is normal for that particular textured soil, the drainage rate of sand is significantly higher than that for a heavier soil containing reasonable amounts of clay, silt and organic matter. For this reason, the leaching of nutrients, including micronutrients, would be significantly faster in a sandy soil.

Depth. The depth of the soil becomes the final factor with respect to nutrient storage. Obviously, the greater the depth of profile, the greater the root system that can be developed and explore more area for nutrients including micronutrients.

MICRONUTRIENTS

Any practice or program that severely restricts the root system of the grass plant can significantly influence the uptake of all nutrients including micronutrients. Extremely close mowing induces a very shallow root system thereby restricting the root system to a very shallow profile where the nutrients can be removed, although at a slightly lower depth there may be adequate plant nutrients. Even when we are sampling soils for laboratory testing at a depth of 3 inches, this may be an unreliable test since the root zone may be restricted to the upper 1 inch where the nutrients have been removed; whereas there is literally a banquet awaiting the root system at a depth of 3 or 4 inches. Factors other than mowing height that will influence the root system and rooting depth would include soil compaction and poor drainage. When oxygen is restricted to the root zone, there will be little or no root development, which

CONTINUED PAGE12

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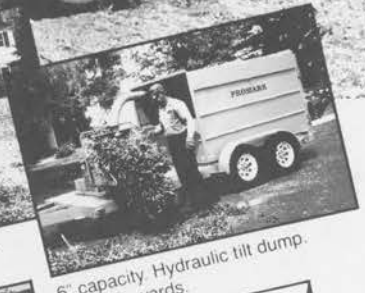

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restricts the ability of the plant roots to absorb plant nutrients. Most soils have adequate supplies of these micronutrients since the plant requirements are relatively small; however, certain sandy soils and those with extremely high organic matter levels may be deficient in certain micronutrients.

The modern trend in putting green maintenance includes the use of high quantities of sand. In some instances, the entire root zone up to 12 inches is composed of pure mineral sand with no organic matter amendment. Micronutrient deficiencies can occur on root zones of this nature very readily. It should be pointed out before any discussion of micronutrients also that high levels of many of these micronutrients can become toxic to the grass plant, notably ions such as boron and copper.

Visual deficiency symptoms of micronutrients is often misleading and before remedial treatments are begun, the turfgrass manager or golf superintendent should have soil or tissue analyses conducted to verify the presence or absence of micronutrients. For example, a sulfur deficiency can very closely resemble both an iron or nitrogen deficiency symptom.

Boron. Very small amounts of boron are usually found in soils except in arid regions and are required in extremely small amount by grass plants. Boron availability is very limited in alkaline soils but is readily available in acidic soils which may account for its deficiency under highly leached acidic conditions. The function of boron, although not well understood, is more in the meristematic (young growing points) and in leaf tips.

Copper. Copper deficiencies are very common in highly alkaline and/or organic soils. Sandy soils can also be deficient in copper since they have little ability to retain this nutrient. Copper is very toxic when it occurs at levels greater that that required for plant growth. Copper is very essential in a number of enzymatic systems within the grass plant and can result in the death of the grass plant if the deficiency is severe.

Molybdenum. Molybdenum is a very important factor in the enzymatic system that functions in the reduction of nitrate. Deficiencies in molybdenum can result in accumulation of nitrate in the plant with impaired protein synthesis and can possibly lead to toxic concentration of nitrates. Molybdenum is required in very small amounts and, unlike a number of other micronutrients, is more available in the alkaline range due to its solubility at these pH values.

Manganese. Manganese is required in very small quantities by the turfgrass plant and its solubility is partially controlled by acidic soil conditions and anaerobic conditions. Due to this very factor, manganese becomes significant in the formation of black layer due to the combinations of sulfide ions and manganese ions which results in a black precipitate. Manganese is very important to the turfgrass plant in chlorophyll synthesis and is involved in a number of other enzymatic systems as well.

Zinc. Zinc is required in small amounts and is associated with a number of enzymatic functions. It is believed to be associated with certain growth

hormones and auxins and deficiency can affect leaf development.

Iron. This element is probably the one most deficient in turfgrass management programs. The deficiency is most often associated with insolubility rather than an absence of the element. Iron is most deficient in alkaline soils or those high in manganese, zinc and certain other elements. Iron can also be deficient in soils with extremely high levels of phosphate; therefore, excessive applications of phosphate should be avoided. Other deleterious effects of excessive levels of phosphate, especially with their effect upon **Poa Annua** and seedhead formation, have been noted; hence, phosphate levels should be kept to a minimum plant requirement. Iron is not a constituent of chlorophyll although it is extremely important in the formation of chlorophyll.

Chlorine. Although the role of chlorine is not well understood today, it has been accepted as the last essential micronutrient. There is little information available on the level of chlorine to be supplied, but rarely has there ever been observed any deficiency of chlorine. In general, the chlorine ion exists as an impurity in a number of fertilizers; therefore, there are frequent applications of chlorine, generally resulting in no deficiency.

SOIL AND TISSUE ADEQUACY OF MICRONUTRIENTS

It has previously been stated that the availability of micronutrients is strongly regulated by the soil reaction (pH). Only a very few of our nutrients are more commonly available in the alkaline range; hence, we should carefully guard this factor closely. In general, turfgrasses will respond better when the soil pH is in the mildly acid range. In general, the writer has not observed any problems with nutrient availability in bentgrass or **Poa annua** putting greens with pH values as low as 5.5. Bentgrasses usually respond very favorably to pH ranges between 5.5 and 7.0. It should be advised, however, that Kentucky bluegrasses perform best at pH values near 7.0.

It is extremely difficult to find in the literature and in textbooks anyone brave enough to spell out soil values and tissue values for micronutrients in turfgrasses. These factors have been fairly well identified in many of our economic agricultural crop plants, but rarely does any refer to the turfgrass plant.

The author has searched the literature carefully and has come up with what he considers the best range of micronutrients for turfgrass management, both soil levels and tissue levels. Some of these values have been taken from soil testing laboratory handbooks, but the most important factor is that these micronutrients have been "road tested" for a number of years in the Pacific Northwest and we feel very comfortable with these values to prevent micronutrient deficiencies. The following table shows these values which can be used as a guide, from my point of view, anywhere in the United States.

CONTINUED PAGE 15

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TABLE 1. MICRONUTRIENT SOIL AND TISSUE ADEQUACY LEVELS.

NUTRIENT	SOIL LEVEL	TISSUE LEVEL
Boron	1.3-2.0 ppm	9.0 ppm
Copper	1.6-3.0 ppm	17.0 ppm
Molybdenum	0.2-0.4 ppm	5.0 ppm
Manganese	30.5-50.0 ppm	41.0 ppm
Zinc	5.1-8.0 ppm	20-40 ppm
Iron	25.0-50.0 ppm	280 ppm
Chlorine	Unknown	Unknown

Now that we have covered the academics of the subject of micronutrient adequacy for turfgrasses, let's be practical. How does the average golf superintendent or other turfgrass managers determine micronutrient deficiency? Visual symptoms are quite often extremely misleading. We have already mentioned the fact that sulfur deficiency very closely resembles nitrogen deficiency. Possibly phosphate deficiency can sometimes be confused with sulfur deficiency or deficiency of other nutrients. In general, phosphate deficiency is a purpling of the grass tissue and is quite easy to diagnose. But other times it can be somewhat misleading and possibly results in slow growth rate. Deficiencies symptoms of magnesium very close resemble those of calcium and can be confused. Now, let's consider a very practical aspect. What happens when a nutrient availability is such that a deficiency symptom is not distinct, but the growth rate and density of the turf has diminished? In this event, the only practical way to determine the micronutrient deficiency is either by tissue or soil test. The above table will be of value in helping to determine these deficiencies. In taking tissue tests, however, the operator must be extremely careful to collect a good representative sample of the tissue, it must be clean with no soil particles, and the container (basket) in which the clippings are caught must be very clean with no fertilizers apparent and they must be properly handled all the way to the laboratory. Likewise, the same advice is applicable for soil tests. The soil test will also be a good means of determining micronutrient deficiency provided you take into account the soil reaction — whether the soil is acidic or alkaline.

There is no question that on sand profiles micronutrients will be limiting if not supplied. For this reason, we have tried to develop a formulated fertilizer that supplies extremely small amounts of micronutrients with each application and can essentially be used every time a putting green or sand-based sports field is fertilized. This fertilizer formulation has proved very successful for practitioners in the Pacific Northwest for approximately 5 years at this point and we feel it is doing a good job on sand root zones with no deficiencies ever having been observed under this program.

In conclusion, we must keep reminding ourselves that there are 16 nutrients that are required for plant growth, three of these being available from air and

CONTINUED PAGE 24

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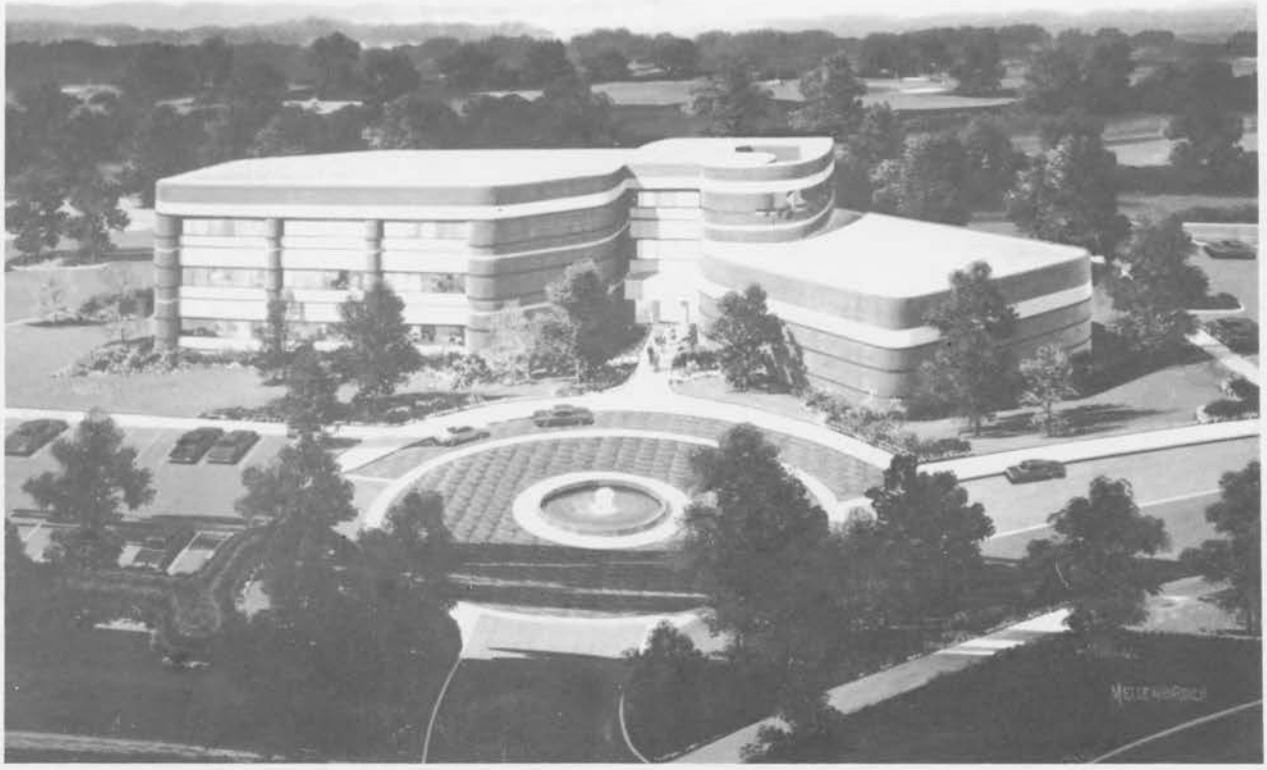
GCSAA NEWS

GCSAA BREAKS GROUND ON BUILDING



The Golf Course Superintendents Association of America (GCSAA) broke ground January 12 for the construction of their new $4 million headquarters complex. GCSAA President Dennis D. Lyon, CGCS, said that the groundbreaking ceremony was an important step for the future of GCSAA.

"We're excited to see the building becoming a reality," Lyon said. "This new facility will allow us to keep meeting the needs of our growing membership for many years to come."

Joining Lyon in the ceremonial "first shovel," were GCSAA Vice President Gerald L. Faubel, CGCS; GCSAA Secretary/Treasurer Stephen G. Cadenelli, CGCS; GCSAA Executive Director John M. Schilling and Mayor of Lawrence Robert Schumm.

Part of the building's planned 40,000 square feet will be a state-of-the-art educational facility. An extensive periodical library and advanced audio/-visual equipment will aid the GCSAA education staff in the growth and development of their programs and seminars. "It will allow us to bring GCSAA members here to Lawrence to attend educational activities in a facility that is custom-designed to meet our instructional needs," said Colleen Smalter Pederson, GCSAA Director of Education.

An eye-catching feature of the new headquarters will be the surrounding landscape. In addition to being situated on a championship golf course, the building will be highlighted by fountains and a wide variety of shrubs and flowers — approximately $300,000 worth of professionally designed landscaping.

The landscape will tie in closely with the look of the neighboring golf course. "We wanted the landscape to reflect the professional quality that our members maintain on their golf courses," noted Schilling.

The building design was completed by PKG Design Group, P.A., a Lawrence architectural firm. At the ceremony, Schilling announced that R.D. Anderson, Topeka, had been selected as general contractor for the project. Construction of the building is set to start by the end of the month. Schilling said plans call for the building to be ready to occupy in about 13 months.

The new site is one mile west of the current GCSAA building, which has been located on the Alvamar Golf & Country Club since the association moved to Lawrence in 1973. Despite the relocation, the new headquarters will still overlook an Alvamar course: a new 18-hole championship layout being designed by architect Ken Kavanaugh and developed by Alvamar owner Robert Billings. The new course is also expected to open in 1991.

So, allow me to spend a few minutes giving you some "tips" on working with the DNR and some advice on overcoming your potential problems. First, I want to outline the commitments the DNR has made to provide information which will assist golf course developers and managers in avoiding environmental problems.

The DNR promised to produce a permit application guide for use by golf course developers. We have provided this guide to MSU for publishing in the Conference proceedings. Chuck Wolverton will be discussing this guide in his talk. The guide will provide information needed to complete applications for construction of a golf course. By August we have committed to providing information on dealing with water quality issues and guidelines for the use of chemicals.

What is needed in addition to these efforts is a compilation of currently available research and turf management information to develop a **Best Management Practices Manual** for golf courses. We believe the golf course owners and developers would be well served to collectively invest in the development of such a manual and the Department is prepared to assist in technical review.

Some tips for working with the Department:

First, Wetlands: While the information in the permit manual will be very useful to avoid development permit problems, the very best advice that I can give you is to **avoid** wetlands completely. The law provides that wetlands can only be filled, dredged, or drained when **no** prudent and feasible alternative exists and where unacceptable impacts to aquatic resources **will not** occur. In very few cases will you be able to meet these tests. If you do meet the test, you will be required to "mitigate" or replace the lost wetlands. The cost of replacing the lost wetlands, in many cases, will be more expensive than avoiding them in the first place. There are many excellent examples where wetlands have been integrated into golf course designs adding character to the course thereby eliminating the need for permits.

If your development project requires State permits, then the DNR, by law, must insure that certain standards are met — including that the project will cause no pollution, impairment, or destruction of air, land, water, or related natural resources.

So, the first and most important rule is to avoid construction in regulated areas like wetlands.

Second, construct adequate buffers around lakes and streams. Avoid creating runoff directly into a river and stream. Design fairways so they drain into fairway depressions or into a wetland for treatment.

CONTINUED NEXT COLUMN

Now, let me turn for a second to what I think you can do to address the perceptual problem that golf courses are contributing to pollution.

While it is apparent that golf courses, at least in several areas of the State, have organized to promote and market their facilities, there has been no corresponding effort to create an organization which can disseminate information on the standards for environmental management and inform the industry on emerging environmental and other regulatory issues. I believe is is imperative that golf course owners organize themselves to do several things:

1. Develop guidelines for best management practices for use of chemicals. Move the industry toward using chemicals when the conditions warrant not because it is "The first Monday of the month." Tailor nutrient applications that meet the needs of turfgrasses and do not exceed the retention capacity of the soils. Choose chemicals that meet the control levels needed for pest management, that do **not** leave residues that are persistent and biomagnify.

2. Begin to build the necessary documentaion as an industry that your chemical and fertilizer use is not polluting either ground or surface waters. We think the research has been done to demonstrate that golf courses can be managed without creating problems — it needs to be organized and disseminated.

3. Move toward the application rates and types of chemicals which are non-mobile and quickly biodegradeable. Make these chemicals the standard for the industry and minimize their use through integrated pest management programs.

4. Begin to educate your users to expect and accept different conditions. Roughs do not have to be kept green and lush. The course does not have to be maintained so that balls are never lost.

5. Anticipate that water use, both surface and groundwater, is going to be an emerging issue that needs to be addressed. The golf course industry should expect that your use of water will be of lower priority when measured against other existing traditional uses of water. Reduce your course's dependence on water by moving toward drought-resistant grasses, and by designing your course to take advantage of the moisture holding capacity of the soils.

6. In areas of the State heavily dependent on golf tourism, begin regular dialogue with the community. The committee, like the one created in northeast lower Michigan, will help to reduce conflicts and concerns. Begin this dialogue before the controversy arises.

Golf courses are almost always constructed at sites that were previously undeveloped. Whether in urban or rural areas, there will always be those people who oppose a golf course development because it will change historical land use patterns in their area. The

CONTINUED PAGE 23

increase plant uptake of micronutrients.

One of the most biologically active synthetic cytokinins is an adenine derivative known as benzylaminopurine, referred to as BA. We have obtained enhanced turfgrass growth with BA applications less than one ounce per acre.

In our studies, BA was more effective as an anti-aging material than an agent for promoting turfgrass growth.

Possibly by delaying chlorophyll degradation, the increased efficiency of photosynthesis caused when enhancement of growth was associated with BA.

TRIAZOLE FUNGICIDES

In our work, too, systemic triazole fungicides, propicanazole and triadimefon, applied at 4 to 20 ounces of active ingredient per acre, have produced turfgrass growth responses similar to turfgrass treated with natural or synthetic cytokinins.

Therefore, we refer to these fungicides as cytokinin-like materials. However, these triazole fungicides have been reported to act as inhibitors; that is, they affect plants as plant growth regulators do.

At low concentrations, the mode of action of the systemic triazole fungicides is the production of a precursor to the biosynthisis of cytokinins.

Possibly the lower concentrations of cytokinins interact favorably with plant metabolism and stimulate rooting.

Our research was initially designed to enhance the root development of transplanted sod. Sod that could grow roots rapidly into the underlying soil would be less affected my moisture stress.

Under conditions of root stimulation, the sod would be less dependent upon irrigation and better supplied with nutrient uptake.

Also, areas sodded with biostimulant-treated turf could be used sooner than areas sodded with turf not biostimulant-treated.

PRACTICAL APPLICATIONS

The use of biostimulant-treated sod would be pragmatic in situations where the turf was destroyed because of activities such as rock concerts, home shows or motor crosses and had to be sodded for an athletic event on short notice.

Results from our studies have shown over 500 percent enhancement of rooting from seedling grasses foliarly-treated with cytokinins or cytokinin-like materials under greenhouse conditions.

In the field, rooting enhancements of 200 percent have been obtained with transplanted sod, foliarly-treated with biostimulants.

Because of the sod enhancement obtained with applications of biostimulant, additional studies were designed to ascertain if sod strength enhancement could also be achieved with biostimulant treatment to enable early sod maturing.

Our studies showed root mass difference between biostimulant-treated turf and non-treated sod, but not until four to six weeks after treatment.

An additonal four weeks was necessary to obtain an

CONTINUED PAGE 24

DNR SPEECH, CONT.

environmental concerns often become the hook for State or even Federal involvement in what otherwise would be a local land use decision. Protection of wetlands, ground and surface water, flood plains, and habitat for threatened and endangered species are issues that must be addressed in any development — the sooner they are satisfactorily addressed in the planning process, the less likely they are to become the hook for those who are really opposed to the change in land use.

Finally, there are no guarantees that if you follow all the right steps the Department will issue a permit — the permits we issue are not like local building permits, electrical codes, etc. It is not just a matter of conforming to standards — it requires, particularly in the case of wetlands, that a demonstration be made that the project has met **all** the criteria for an exception to a State and Federal law that **protects** this valuable natural resource from filling, dredging, or draining. Again, my best advice for dealing with wetlands in golf course construction is to avoid them if at all possible.

Golf courses provide valuable open space in urban settings and outdoor recreation opportunities. In rural and northern Michigan, they provide an essential element of our tourist industry with a low intensity land use that can complement other natural resource values.

On a final note, the best defense is often an offense. In the case of golf course design, and operation there are actions that can be taken to enhance the quality of life and add permanent environmental protection.

Too often golf courses have been designed and managed as rather sterile environments consisting of well manicured, exotic grasses that require intensive chemical treatment to control diseases, and animal pests. The water hazards, sand traps, trees, shrubs and roughs often have an artificial look that is obviously the result of efforts to either make the playing of the game easier in some cases or by adding barriers to increase the difficulty.

Wildlife management is thought by too many golf course operations only in terms of eliminating pests such as moles, skunks, gophers, ground squirrels, mice, and even Canada geese. Designing and operating a golf course to also control pests eliminates the habitat and food supply for more desirable wildlife.

Conversely, you can design and operate golf courses that enhance the habitat for certain wildlife species which enrich the out-of-doors, recreation experience most golfers are seeking. Even in urban settings, habitat for a broad range of birds and mammals can be provided that are not only attractive and interesting to your consumers, but also help control unwant-

CONTINUED PAGE 25

increase in the sod strength.

RESPONSES DIFFER

Turf species responded differently to different biostimulants. The biostimulants we worked with increased root and shoot weight, number of leaves per plant, total number of buds initiated and photosynthetic rate of Kentucky bluegrass and creeping bentgrass.

Materials that most consistently enhanced growth and development of Kentucky bluegrass and creeping bentgrass were the cold water extract from **Ascophyllum nodosum** seaweed and the triazole fungicide, propicanazole.

Propicanazole was the most effective biostimulant that we have applied to tall fescue.

The cold water seaweed extract appears to be the best biostimulant to enhance morphological and physiological development of warm season grasses.

Seaweed extract negated some of the effects of cold temperatures on bermudagrass.

Zoysiagrass was best able to tolerate dessication when treated with seaweed extract.

OUTLOOK POSITIVE

Our most recent studies show that all of the biostimulators tested were effective in enhancing Kentucky bluegrass foliage and root development under low soil moisture. Research is continuing in this area.

We are encouraged that our preliminary results indicate that the use of biostimulants could favorably influence the plant-soil moisture relationship and enhance the quality of turf grown under droughty conditions.

In addition, studies are being initiated to determine if biostimulants can be used to reduce the amount of fertilizer needed, especially nitrogen, for turf culture. It has been reported that less fertilization was required to maintain production of several crops other than when biostimulants were applied.

However, the use of biostimulants should not be considered a remedy for mismanagement or improper turf culture practices.

Improper use of biostimulants or anticipation of unrealistic results will likely cause dissatisfaction to the turfgrass manager.

From **THE GATEWAY GREEN**,
Mississippi Valley GCSA Newsletter

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water, N, P and K from fertilizers, calcium and magnesium are available from liming materials and sulfur is available from any number of sources including elemental sulfur materials. The other 7 considered to be micronutrients must be supplied in very small amounts where required and on a frequency that the plant does not become deficient.

From **HOLE NOTES**
Minnesota Golf Course Superintendents Association

ed pests by competing for food and space or by directly preying upon them.

A few well designed and properly located nest boxes can attract blue birds almost anywhere in lower Michigan. Song birds of many varieties uncommon in adjacent subdivisions, may find golf courses in urban areas particularly attractive. If you are fortunate enough to attract an owl, or hawk, to your golf course the need to artificially control rodent pests may be reduced substantially. While it may be difficult to attract certain desirable mammals in truly urban courses, suburban courses and those in rural and northern Michigan have the opportunity to create habitat for both game and non-game species. The northern Michigan tourist golfer is often just as excited about the white-tailed deer, bobcat or elk they observed in the rough along the fairway of the seventh hole as they are the birdie they scored on the 18th.

Water hazards are often created on golf courses when none exist naturally. Rather than designing them with no natural buffer and manicured turf to the edges resulting in over-enriched, blue-green algae ponds, they can be natural settings that provide nesting, feeding, and resting areas for migrating waterfowl including ducks, geese, and shorebirds.

Where practical and compatible, golf courses can provide added recreational benefits particularly during the non-golfing seasons of late fall, winter and early spring for hunters, trappers, birdwatchers, hikers and cross country skiers. Encouraging use by non-golfers may well expand the community support for a golf course.

The Department of Natural Resources cannot require the creation or maintenance of wildlife habitat except in rare instances where it is in mitigation for the destruction of a protected resource like wetlands. However, I believe it is in both the short term and long term interest of golf course owners and managers to design and operate with an integrated wildlife management plan, as well as an integrated pest management plan. By doing so the golf course industry may turn its critics into its champions.

In summary, avoid disturbing wetlands in the design and construction of your courses, take the initiative to develop a manual for best management practices, and finally, go on the offense by creating wildlife habitat that will benefit your operation and visibly demonstrate to the public the positive contribution golf courses can make in preserving and enhancing environmental values.

NEWS CLIPS FROM

UNIVERSITY of GUELPH

PUBLIC RELATIONS AND INFORMATION

TURFGRASS CAMPAIGN OFF TO A FLYING START

The $1.5 million fundraising campaign for the Guelph Turfgrass Institute, announced at a new conference in Toronto today (Jan. 24, 1990), is off to a flying start. George M. (Mac) Frost and his wife Beth, who have owned and operated golf courses in the Toronto area since 1946, have donated $500,000 to the campaign.

"Such money that is raised by the campaign will provide the institute with a research and information centre that will serve as a focal point for the Canadian turf industry and the public," said Ron Craig, president of the Ontario Turfgrass Research Foundation. "The new centre will provide services to alleviate some of the pressures caused in recent years by the housing boom, increased demand for open park space and more outdoor leisure activities," he said.

Frost said that the donation "is a result of a long-term involvement in turf and greens maintenance and an appreciation of the importance of ecologically sound turf research and practices." Over the years, with the help of partners and his wife, Beth, Frost developed Brookwood Golf Course, Parview Golf Club and Spring Lakes Golf Course, which was recently sold.

Established in 1947, the Guelph Turfgrass Institute conducts research and extension acitivites, and supplies information on turfgrass production and management to all sectors of the industry. The centre will house world-class facilities for research and education, policy development, conferences and for public access to publications and computer-reference material. A computer will link the facility with turfgrass centres around the world.

"Most people take healthy lawns, sports greens and city parks for granted," says Chris Ball, director of the Institute. "But environmental concerns about lawn-care chemicals, frequent watering restrictions and increased use of public playground areas demonstrate the need for continued research into new varieties of turfgrass, as well as new production and management techniques."

The Institute is a joint project of the Ontario Turfgrass Research Foundation, the Ontario Ministry of Agriculture and Food and the University of Guelph. Noting Guelph's expertise in the natural sciences and agricultural research, university president Brian Segal expresses satisfaction in "working co-operatively to enhance the turfgrass industry that is so important to our province and our country."

Bill Ingratta, OMAF's program manager for horticulture, says his ministry is pleased with the Institute. "We believe we are building a centre of excellence in Canadian turfgrass education and extension."

Recent research carried out by the Institute focuses on turfgrass management and renovation, weed control and growth regulation, pesticide residues, soil and nutrition and turfgrass seed production.

For more information contact Ron Craig at 416-836-0988 or Andrea Mudry Fawcett in media realtions at Ext. 3839 at the University of Guelph, 519-824-4120.

Franklin D. Roosevelt started his career as a lawyer in New York. One of the first cases he was retained to represent was a particularly difficult civil suit. The opposing lawyer, a notable orator, did well in his pleadings before the jury. However, he made one big mistake: he talked on and on for hours. Roosevelt, noticing the inattention of the jury, decided his strategy. When his turn came to sum up his client's side of the case, he merely said, "Gentlemen, you have heard the evidence. You have also listened to my distinguished colleague, a brilliant orator. If you believe him, and disbelieve the evidence, you will have to decide in his favor. That's all I have to say."

Within five minutes the jury returned. It had ruled in favor of Roosevelt's client.

From **Bits & Pieces**, November, 1984

Don Benham (Benham Chemicals), receives award for excellence in sales and service of Lebanon fertilizers from Randy Rogers, mid-west manager for Lebanon Country Club.

MSU ACCEPTS DONATION — Century Rain Aid president Ernie Hodas (left) presents a check on behalf of Century Rain Aid to Dr. Jack Kelly (second from right), chairperson of the Department of Horticulture at Michigan State University. The $100,000 check encompasses pledges, Rain Bird irrigation supplies for the MSU Horticultural Demonstration Gardens, and pumps donated for the Hancock Turfgrass Research Facility. Also shown are Hodas' wife Shirley, daughter Barbara Dingus holding granddaughter Lauren and professor Will Carlson of the Department of Horticulture.

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AUBURN HILLS, MICHIGAN — The Toro Company announced that it has become the founding sponsor in the development of the Shrine Gardens, located on the grounds of the Professional Golfers' Association World Hall of Fame in Pinehurst, North Carolina. The Garden was created to recognize golf course superintendents service and contributions to the game of golf.

APOLOGY FOR THE PRINTER

The inaugural issue of the **"A Patch of Green"** magazine was printed in February, 1971; I don't know under whoose inspiration the magazine was started, but over 20 years later an idea come to fruition has become a stalwart publication for members of the MBCGCSA. A publication in which these members can look to as the bond that brings them together and cements them into a truly professional organization. It is the voice of the membership — a forum for the ways and means, the hows and whys and the do's and don'ts that each participating superintendent (and staff) feels is necessary for the successful operation of a golf course. In short, the idea that became the **"A Patch of Green"** is adding permanence to the thoughts and ideas of the organization for which it is the official publication.

Printed matter and its dissemination is an enduring form of communication that transcends an otherwise world of temporary and erasable information. Tapes can be recorded over or played and replayed until unusable. Computer discs can be cleared of thousands of bytes of information in the flash of an electric shock.

The paper that the **"A Patch of Green"** is printed on is not wholly acid-free, but is a fine paper stock that will just about guarantee that the life of this article will outlive the writer and its readers. (Newsprint is one of the highest acid-content papers and therefore, supposedly, one of the least enduring, but, recent garbage dump research has found **readable** newsprint from decades ago — rock solid credence to the long-lasting ability of printing) And, no matter how many times this magazine is read; and by no matter how many eyes, you're not going to destroy it by "reading it out."

In the period leading up to the American Revolutionary War; before the "shot heard 'round the world"; revolutionary fervor "was in the minds and hearts of the people" protesting various **proclamations** issued by George III and his parliament led by Prime Minister George Grenville: October 7, 1763 a **proclamation** limiting the land which the colonists could expand into; the Navigations Acts **proclamations** of 1763; 1764, the Sugar, or Revenue Act, taxing molasses brought into the colonies from outside crown properties; the Quartering Act of 1765; and the most hated **proclamation**, the Stamp Act of 1766. This final act subjected the colonists to being forced to buy stamps and place them on most **printed matter**, including, among others, playing cards and diplomas. The act gave rise to the now famous cry: "Taxation without representation is Tyranny." The Stamp Act was repealed, but too late as the events of the coming years took place.

Now, if some periwigged Britisher had stood on the docks of Boston Harbor and just yelled out these proclamations people would have definitely gotton angry. But when they **read** these proclamations, **printed** with the permanence that lithography has, they forged a nation free and of the people whose lasting legacy lives on today in the writings of Thomas Paine, Thomas Jefferson, Patrick Henry and Benjamin Franklin. These men and others led the call for freedom through pamphlets and newspaper articles distributed throughout the "membership" that was the thirteen colonies.

Sure, the new American States were won with the rifle and generalship, but it was the **printed word** that not only enduced the revolution but gave it its togetherness and much needed cohesive nature. How else could the patriot in Georgia **know** that the colonists in Philadelphia were united with him in the struggle for independence unless he could **read** the names of those who **thought** as he did?

The invention in 1440 of metal moveable type in his shop and the legacy of the **printed word** that grew from Johannes Gutenberg's Bible **reads** through every word that goes into the **"A Patch of Green."** Whether announcing an upcoming seminar or ads in the classified section, **"A Patch of Green"** is an anchor in a sea, er desk, of drifting information. The articles in its pages are for you, the reader, and it is for you that they were written. It is, therefore, your magazine. The editors and authors are sharing ideas and thoughts so as to bring them, lighter than air, imprinted onto paper heavy with ink.

Heavy, which brings us to the real purpose of this "Par-ring Shot" — Advertising rates are to increase with the next (March/April, 1990) issue of the **"A Patch of Green."** This is the first increase since the **"A Patch of Green"** went to its current 8½ X 11 format, May, 1985. The new rates will be: Full page, $185.00; Half page, 115.00; Quarter page, 75.00; Eighth page, 55.00; Sixteenth page, 40.00; and classifieds to 15.00 per column inch.

To those non-advertising readers of the **"A Patch of Green"** we remind them that now more than ever, is the time to **Patronize Your Advertisors.** Remember, they foot most of the bill for the costs that go into publishing **"A Patch of Green."**

Blakeman Printing Company Incorporated wishes to thank the MBCGCSA for its continued patronage.

Inspiration for preceding article from **"An Apology For Printers,"** The Pennsylvania Gazette, for the week of June 3 to June 10, 1731, by Benjamin Franklin.

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