

*Dr. Payne*

APRIL 1984



# A PATCH of GREEN

Official Publication of the  
Michigan & Border Cities Golf Course Superintendents Association



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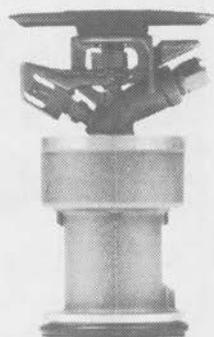
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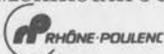


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# Sulfur Acts As Important Nutrient

Dr. Roy L. Goss  
Washington State University

Until recent years sulfur research for turfgrass has received little attention. There is little documented evidence in scientific literature with respect to the action of sulfur on turfgrass. Without question, sulfur is a most important nutritional element and in the author's view ranks even more important than phosphate which we all know is most essential.

Sulfur nutrition in turfgrasses is assuming more importance due to the declining amounts of indirect sources of sulfur available to turfgrasses. Restrictions on the burning of high sulfur coal and other fossil fuels and high degree of refinement of fertilizers have practically eliminated S as a contaminant and thereby reduced its availability to plants.

Sulfur is necessary for many cell activities including the formation of certain amino acids which are building blocks for proteins. Sulfur alone has received considerable attention in the past as an effective fungicide for certain plant diseases. In well-nourished turfgrasses leaf tissue levels of S usually equal or exceed the level of phosphorus; hence, it should be treated as a major plant food element in any turfgrass program.

Research and Results of Sulfur Nutritional Studies at Washington State University.

Our research for the past 15 years has been conducted on colonial type bentgrass putting green turf treated with 6, 12 and 20 lbs. of nitrogen, 0 and 3 lbs. of  $P_2O_5$  phosphorus, and uniform applications of 8 lbs.  $K_2O$  potassium per

1000 ft. per season was combined with all N,P and K treatments. Sulfur was applied to these N-P-K treatments in three equal applications in the spring of each year to avoid excessive sulfur from single applications.

The following represents a summary of our findings of sulfur at this time:

1. Effects of S on color, density and vigor: Sulfur increased the yield of clippings in all plots regardless of N,P and K. This may not be highly desirable, but it is an index of vigor. Color and density were significantly better, and likewise the texture of the turf was improved. Sulfur when applied as elemental wettable sulfur through its enhancement of color may possibly replace some of the plant's need for nitrogen.

2. Effects of S on turfgrass diseases: *Ophiobolus graminis* var. *Avenae* and *Fusarium patch* disease caused by *Fusarium nivale* are the two major turfgrass diseases in a large part of the Pacific Northwest. Sulfur has eliminated all *Ophiobolus patch* disease regardless of N,P and K treatments, while there are no known fungicidal controls for this problem. *Fusarium patch* disease has been significantly reduced in all of our trials especially at the higher levels of sulfur. It is possible that sulfur may be effective on other turfgrass diseases as well.

3. Effects of S on bluegreen algae: Algal scums frequently form on turfgrasses, especially where infiltration rates of water are slow and surfaces tend to remain excessively wet. Algal

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# Research Objectives

There is a continued interest in the development of new products or the redevelopment of old products that have had some success as controls for **Poa annua**. We have two years of test data using many compounds on a **Poa annua** bent fairway at Highland C. C., Indianapolis, Indiana. We have looked at growth regulators as well as various pre- and post-emergent controls on **Poa annua**.

One concept that continues to be of interest in the growth regulator control of **Poa annua** is a combination of two regulators, EL500 and Embark. We made two applications in 1982 and one in 83. Rates have ranged from 0.25 to 1.0 lbs. of EL 500 plus 0.12 to 0.25 lbs. ai/A Embark. We have found that a range of rates of 0.25 to 0.5 EL 500 plus 0.25 Embark gave a gradual change in population from that of predominantly **Poa annua** to predominant bent in one and one-half years.



Dr. Bill Daniel, Purdue

Preemergent herbicides that we have looked at include Prograss, Ronstar, Balan, Dacthal, Devrinol, Machete, PreSan and Prowl. Though all have shown some moderate successes, none have met our objectives.

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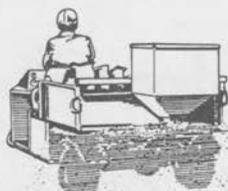


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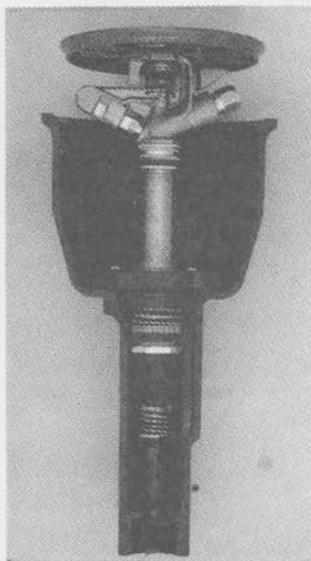


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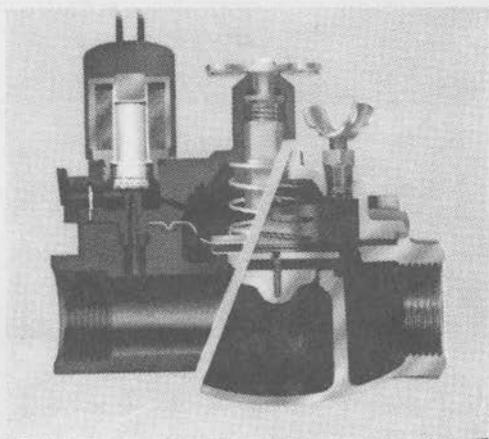
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## PRUSA PROMOTED TO ASSOCIATE EXECUTIVE DIRECTOR

John M. Schilling, Executive Director of the Golf Course Superintendents Association of America, recently announced the promotion and appointment of James G. Prusa, CGCS, to the position of Associate Executive Director of the Association.

In announcing the appointment Schilling explained, "The Executive Committee approved, at my request; Mr. Prusa's promotion at their fall meeting. He is now charged with his new responsibilities and, in addition, will retain those of Director of Education.

"Jim is a team player who places tremendous demands on himself and those around him. He and I have worked well as part of a team and we'll continue to do so as we perform the executive management functions of the Association. He'll now play an increased role in the management of our staff and will fill a long-standing need in the Association



for a definite second executive in command. His responsibilities will include direct participation in the financial management of the Association as well as all operational decisions."

CONTINUED PAGE 21



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## PROTECT TREES FROM WINTER INJURY NOW

The fact that winters are tough on trees and shrubs is an understatement. James A. Fizzell, University of Illinois Horticulturist in Cook County says, this summer we saw the effects of the winter as plants expired from delayed reaction to damage. Plants girdled by rodents, or with roots injured by excess water or low temperatures, can live quite a while before the stored foods are used up. Then when least expected, they die.

You can avoid many of the winter problems by preparing now. To reduce damage from mice, remove all grass and weeds around the trunks of the trees and shrubs. Use hand clippers on vegetation you can't cut with a lawn mower. Be sure not to nick the bark. Unmowed vegetation provides cover for field mice which eat the inner bark of trunks and roots, frequently killing fruit trees.

Rabbits eat the bark off the trunk and any branches within reach, particularly on young fruit trees. However, Fizzell

notes, they do not bother older trees which have developed heavy outer bark. Either chemical repellants or mechanical barriers are recommended for protection from rabbits. Spray repellant on the trunk and lower branches as recommended on the label. Chemicals are more effective in protecting shrubs than mechanical barriers. For trees, use chicken wire or hardware cloth to form a cylinder around the trunk. The cylinder should be at least two inches from the trunk and high enough to provide protection in the event of heavy snow cover. Or, wrap the trunk with newspapers, waterproof paper, or tree wrap.

Wrapping the trunk will also help protect the trees from winter sun scald, says Fizzell, and will benefit even older trees not subject to rabbit damage.

Trunk wrapping does not keep the trunk warmer, but provides shade from the winter sun which could elevate the temperatures of the inner bark to the

CONTINUED PAGE 17

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Tank mixing brings other advantages, too. With TERSAN 1991 in your tank, you get systemic action for protection from within the turf plant. Disease control is longer-lasting and is less affected by rainfall or frequent irrigation. Tank mixing fungicides with different modes of action also reduces chances of benzimidazole resistance. You help insure the long-term effectiveness of TERSAN 1991 in your disease control program.

This year, plan on using TERSAN 1991 in combination with Daconil 2787. It's the tank mix turf diseases can't match.

*With any chemical, follow labeling instructions and warnings carefully.*



## Research Objectives, cont.

An old product, recently redeveloped, that looks very good is the TurfCal, tricalcium arsenate, in a flowable form. This has been quite successful in selectively eliminating **Poa annua** in our test plots. We have TurfCal on a pitching green, on bentgrass, at low cut maintenance at Highland C.C., on our Purdue experimental green, and the Elks C. C., Lafayette, IN, on bluegrass fairways and at several other sites in the Midwest. We have been able to eliminate the **Poa annua** from the bent without damage to the bentgrass. Fairway work with the TurfCal in Indianapolis and Lafayette has been most successful in the elimination of **Poa annua**. It is anticipated that this product will be available beginning in the fall of 1983. The Lafayette test site also includes the application of sulfur for **Poa annua** control as well as sulfur in combination with the TurfCal. The sulfur treatments were first applied in spring of 1982. We will continue to add sulfur to observe **Poa annua** responses.

Rubigan continues to be of interest as a selective control of **Poa annua**. We have observed treatments with this product at Highland C. C. for two years. Continued treatment, a 0.4 oz. of formulation/1,000 sq.ft. at 14 day intervals in 1982 has reduced **Poa annua** populations on the bentgrass green test site. Treatments at this rate are continuing in 1983.

Fertilizer application studies include the evaluation of late fall, spring and summer, summer and fall treatments. This program was initiated in the fall of 1982 and is expected to continue for some years. The test is in cooperation with six other Midwest universities who are using the same grasses and fertilizers. Our intent is to evaluate the density and turf performance.

The evaluation of new liquid sources of nitrogen as opposed to granular was begun in 1981. There are several liquid ureaformaldehydes potential that look promising. Among these are Nitro 26, an experimental with a 21-0-0-analysis, Fluf, Fluf plus urea, Formolene, a Georgia Pacific ureaformaldehyde, 30-0-0, Powder Blue plus urea, and flowable aldehyde nitrogen, 20-0-0.

Several other new experimental sources

of nitrogen with potential for slow release are included in another test. We are also evaluating the potential for nitrification inhibition in turf. Several nitrification inhibitors look encouraging.

There is an extensive series of pre-emergent crabgrass controls including the old standards as well as new experimental compounds that have some potential. The future may bring other flowable or liquid forms of pre-emergent herbicides to supplement those already on the market.

We are evaluating bentgrass response to applications of oxidiazon, ronstar, a pre-emergent control of annual grass to observe responses to this herbicide under putting green conditions.

Another series of tests that appears promising is that of pre-and post-emergent application for control of crabgrass. Tandem from Dow, and experimentals from Union Carbide and American Hoechst are good postemergents. The American Hoechst product has also given excellent control of goosegrass. We anticipate seeing this on the market soon for your use.

A good part of our effort is in the evaluation of growth regulators to reduce maintenance time costs. A new growth regulator from Monsanto was first made available in 1980. Since it is not restricted to foliar uptake, and has soil activity, it allows a broader time frame in which to make applications. It is also a good inhibitor of seedhead development. Currently evaluation of this growth regulator is extensive throughout the United States.

Other growth regulators that we are continuing to evaluate either alone or in combination include Embark, EL 500 (Cutless) from Elanco, PP333 from ICI, Eptam, three experimental products from 3M, Glean, and ethrel. Combinations of Embark with either EL 500 or PP333 have some potential. Both EL 500 and PP333 are excellent growth regulators but neither has potential for seedhead inhibition, whereas the combination with low rates of Embark has given us good seedhead inhibition.

The fungicide program with Don Scott continues on our Penncross nursery here at Purdue. The test site has a good infestation of dollarspot so it

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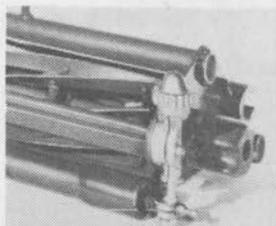
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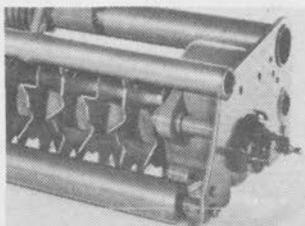
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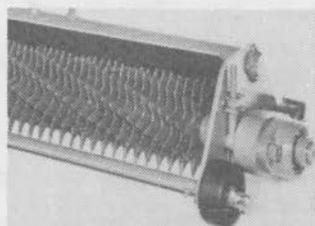
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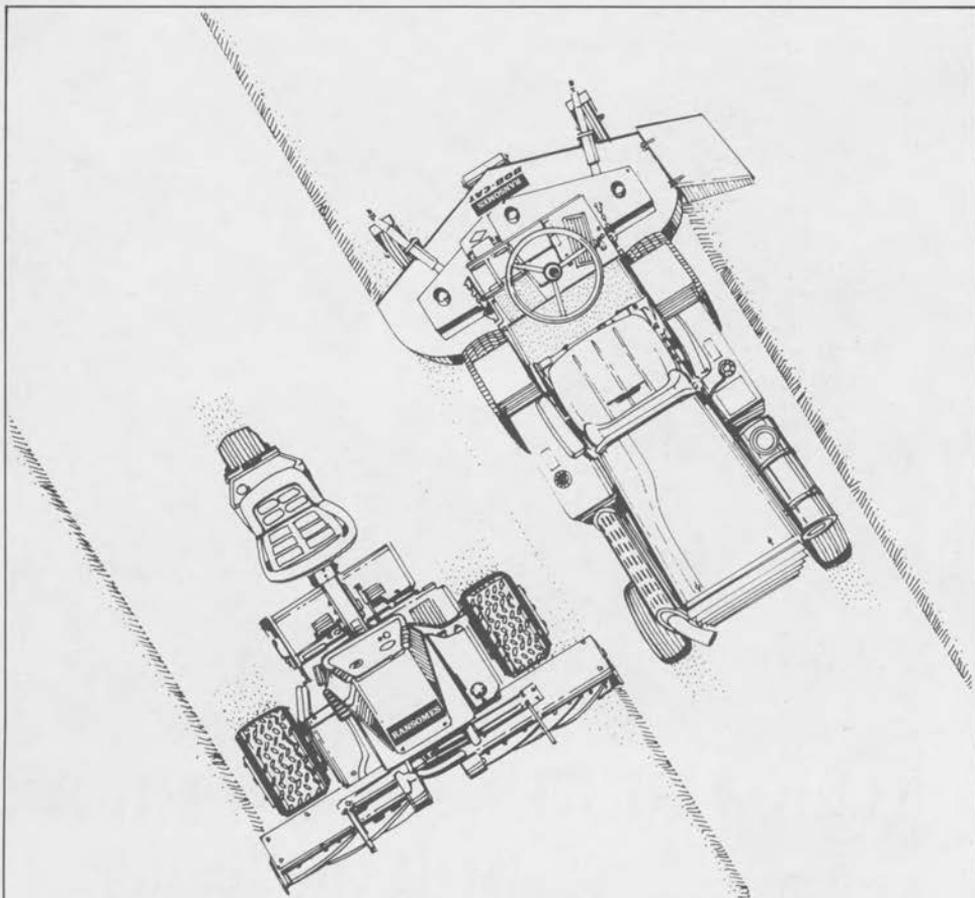
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## GCSAA Elections



EUGENE D. BASTON, CGCS  
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### Timmerman Elected President

James W. Timmerman, CGCS, is GCSAA's new President after being unanimously elected by the membership in attendance at the 1984 Annual Membership Meeting held in Las Vegas. Eugene D. Baston, CGCS, was elected Vice President.

Two new directors were also elected during the annual meeting: John E. Laake, CGCS, Columbus Country Club, Columbus, Ohio, and James M. Taylor, Sr., CGCS, Kanawha County Parks & Recreation, Charleston West Virginia. Both will serve two terms as director. Riley L. Stottern, CGCS, was re-elected as a director and President Timmerman appointed him to serve as Secretary/Treasurer.

Continuing their terms as directors are John P. Hayden, CGCS, Richard V. Slivinski, CGCS, and Donald E. Hearn, CGCS. Robert W. Osterman, CGCS, will remain on the Executive Committee as immediate Past President.



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point where it begins growing even in mid-winter. When the sun sets, temperatures rapidly drop to freezing or lower; this causes ice crystals to form in the inner bark, killing it. Such injury usually occurs on the south or southwest side of the trunk, the area most likely to be warmed by winter sunlight, and may not become apparent until the next summer. Maples and other thin bark varieties are very susceptible to this kind of injury. Some nurseries are investigating white paint on trunks as protection from winter sun damage.

Remove tree wraps when growth starts in the spring as they provide cover for insects which may injure the trunk during the growing season.

Of major concern in winter survival is damage, says Fizzell. Fill in low areas

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—Dick Emmons

so water will not stand around the stems and roots during the winter months. Divert down spouts so runoff doesn't collect in shrub beds or around shade trees. Wet conditions are ideal for development of disease organisms which attack the plants at the soil line and kill them. Roots in standing water can suffocate and rot away.

It is equally important that evergreens and newly planted trees and shrubs go into winter adequately watered. Plants standing in water drown, but those in parched, dry soils won't survive either. Roots continue to grow as long as soils remain unfrozen. Evergreens lose water from their leaves on bright winter days.

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Three different 35 mm. slide sets, one each on insects, diseases and weeds of turfgrass, are not available from the N.Y. State Turfgrass Association. These slide sets are a useful tool in the identification and diagnosis of turfgrass problems, and are of value to turfgrass superintendents of golf courses, athletic fields, parks, schools and universities, cemeteries, institutional and commercial grounds and residential complexes; landscape gardeners; lawn care firms; and those in the educational fields.

The 66-slide set on turfgrass disease, compiled by Dr. Richard Smiley of Cornell University, pictures the characteristics and effects of snow mold, leaf spot, dollar spot, rust, red thread, slime mold, striped smut, mildew, fairy rings, brown patch, melting out, fusarium and pythium. The 76-slide set on insects of turfgrass in the northeast, compiled by Dr. Haruo Tashiro of the NY State Agricultural Experiment

Station, pictures a variety of chafers, beetles, weevils, sod webworms and chinch bugs and the damage they do to turf. The 80-slide set on weeds, compiled by Dr. Arthur Bing and Robert O'Knefski of Cornell University, features line drawings and identifying photos of 16 common weeds including annual bluegrass, crabgrass, goosegrass, tall fescue, nutsedge, wild onion and garlic, woodsorrel, clover, dandelion, ground ivy, plantain, chickweed, knotweed and black medic.

Each slide set is \$30 for NYSTA members and \$35 for NYSTA non-members, and includes a written key, handling and third class postage. Add \$1.50 per set for first class postage. If membership in NYSTA is desired with the slide set order, send an additional \$25 and pay the member price for the slides. Send your check made payable to NYSTA to the N.Y. State Turfgrass Association, 210 Cartwright Blvd., Massapequa Park, NY 11762.

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### Sulfur as Nutrient, cont.

scums can cause surface sealing, thinning and almost complete elimination of putting green turf if not corrected. Applications of elemental wettable sulfur at 50 lbs. per acre and high have completely eliminated this problem in all of our test areas. There has been evidence reported that the use of Fore fungicide (a Dithiocarbamate) applied several times per year will eliminate algae. This fungicide contains a high percentage of sulfur which apparently is the active agent on algae control. An important factor in algae control also is to improve drainage.

4. Effect of S on earthworms: Only limited activity of worms was observed in plots receiving 1.5 lbs. S per 1000 ft. per year, and no activity as observed in areas receiving 3.45 lbs. per 1000 ft. while control plots receiving no sulfur maintained high worm activity.

5. Effects of S on *Poa annua*: A) 1.15 lbs. S per 1000 ft. per year increased the vigor of all turf including *Poa annua* at all N, P and K levels, while 3.45 lbs. per 1000 ft. significantly reduced *Poa annua* at all fertility levels. B) Additions of P with all N and K levels and 3.45 lbs. S per 1000 ft. increased *Poa annua* significantly over those not receiving P. Although the highest sulfur level significantly decrease *Poa annua* without respect to P applications, the addition of P resulted in an increase in *Poa annua* over plots not receiving P. Plots receiving 6 lbs. N, 8 lbs. KO and 3.45 lbs. S without P were 99% free of *Poa annua*. The same treatment which in addition received 4 lbs. PO phosphorus was approximately 15% *Poa annua*. Plots receiving 6 lbs. N, 4 lbs. P<sub>2</sub>O<sub>5</sub>, 8 lbs. K<sub>2</sub>O potassium and 1.15 lbs. sulfur contained up to 85% *Poa annua*. It is obvious that S exerts the most influence on *Poa annua* control with phosphorus and nitrogen rating second and third, respectively.

Some precautions should be observed in using elemental wettable sulfur. With increasing soil temperatures it can strongly acidify the surface rootzone and can result in significant burns if the rates are too high. Sulfur should be applied during the cooler portion of spring. Avoid the hotter part of the year for these applications. Saline soils

will respond entirely different from the acidic soils of the Pacific Northwest coast and application rates will have to be adjusted to suit these specific needs. Our general recommendation for acidic soil areas is not to apply more than one lb. or wettable sulfur per 1000 ft. per application and these applications can be made until the season total is applied.

There is no question that different grasses will respond differently to sulfur and we do not have this experience from our research program. Ammonium

CONTINUED NEXT PAGE

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### Sulfur as Nutrient, cont.

sulfate is a good source of sulphate sulfur provided that a significant amount of nitrogen from total annual applications is derived from this product. The effect of sulfur on poa annua is a longterm program and differences may not appear for three years or more after the initiation of the program. It is conceivable that levels considerably higher than 3½ lbs. per 1000 ft. per year can be used throughout the southwestern U.S. Recommendations regarding suggested rates may be available from your own turfgrass research and extension programs.

### Unknown Modes of Action of Sulfur On Poa annua

We have concluded from our research program that sulfur through its acidifying action may be tying up phosphates which are most essential for Poa annua seedhead production and its continued survival. We have also alluded to the fact that there may be other factors of which we have no knowledge. Westhafer and others at the University of Rhode Island in reasonable short-term tests on sand-grown turf in greenhouses concluded there was no significant effect of sulfur on Poa Annua under conditions in their trials. This possibly introduces the unknown factor which has stimulated our investigations into aluminum. Other researchers have demonstrated that high aluminum concentrations may be selectively toxic to Poa annua while having little affect upon bentgrasses.

In conclusion, we must stress that balanced nutritional programs are important in helping to control diseases and weeds in turfgrasses. Previous WSU research has indicated an N-P-K ratio of 3-1-2 was on optimum ratio for putting greens and general turfgrass needs where clippings are removed. More recent research indicates that P can be reduced still further to perhaps ½ the value indicated in the ratio above and produce good turf with fewer problems and no phosphate deficiency. Sulfur should receive as much or more attention as phosphorus, particularly on specialized areas such as sand-based putting greens and athletic fields.

NOTE: From Proceedings 1981 Arizona Turfgrass Conference. Reprinted from *Turf Culture*, Texas Agricultural Extension Service.

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Until his recent promotion, Prusa has been employed as the Director of Education for the GCSAA. Two years ago, after a six month, nationwide search, Prusa was approached by the Association and asked to consider the education job.

"When GCSAA asked me to consider the Director of Education position a few years ago, having not applied for the job, it took me by surprise," Prusa suggests. "I was in love with the course I was managing, Pasatiempo, and very much enjoyed my job and location. I had worked hard to become a professional golf course superintendent and it remains my profession. It was a sense of duty to the profession, the game and the substantial challenges of the position that swayed Karen and me in my decision to accept the offer.

"As a profession, we have tremendously unsatisfied needs in the areas of self-promotion and quality assurance - and an insatiable hunger for information to help us in the field. Like any human institution, the Association will only produce in proportion to the amount of demand placed upon it by its constituent membership. This is supported by some basic laws of economics. I am totally aware of a sense of urgency my member colleagues have for greater productivity and performance from their Association. They turn to us because the industry, the game and their employers have placed greater management demands on them. For us to achieve success as an association, our members' needs must be met and they must ultimately hold their Association accountable to that end. This is my hope for our future, and my objective is to facilitate and accomplish it."

As a member of the GCAA in the '70s, Prusa was one of its most outspoken - and often critical - participants. Prior to coming on board as an employee, he had immersed himself in the affairs and changing direction of the Association through serving on both the Governmental Relations and Education Committees. His activism had involved him in many state and local public hearings defending the turfgrass industry's use of the controversial herbicide 2,4-D

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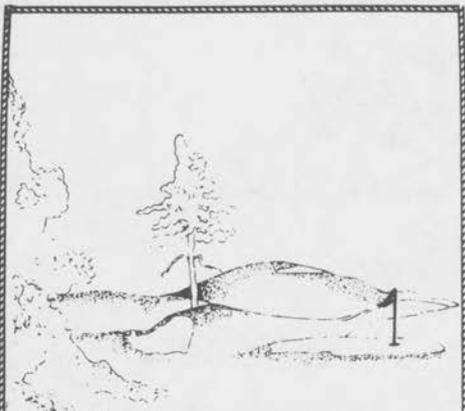
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**PRUSA, cont.**

and saw him contribute to the redirection of GCSAA's continuing education efforts. He has very strong convictions about improving professionalism and business expertise within the golf industry, yet welcomes - even insists upon - a diversity of views. Prusa is a decorated Vietnam veteran who has four years of active military service to his credit. He holds a Liberal Arts degree and earned his Bachelor of Science degree in Horticulture from Cal Poly University at Pomona. His graduate work was in Organizational Management and marketing at the University of Santa Clara Graduate School of Business.

Prusa was raised in the golf and turfgrass industry. His father is a long-standing member of GCSAA, and his brother is an executive for a consumer lawn care company. Prior to joining the GCSAA staff in 1981, Prusa held the golf course management position at Pasatiempo Golf Club in Santa Cruz, Calif.

President Robert W. Osterman, CGCS, "Jim has served as the architect of our future continuing education and professional certification planning. He admirably contributed to the overwhelming success of our 1983 Atlanta Conference and Show. His new position will place tremendously increased demands and challenge on him. However, Jim's diverse educational background, vision and management track record have tailor-fit him to our needs. We face great current needs in implementing plans and have great expectations for the future."

Prusa and his wife Karen, a network telemarketing consultant with AT&T, reside in Kansas City with their six month old daughter Natasha Clare.

**Research Objectives, cont.**

serves an excellent site to evaluate fungicides to control both Helminthosporium and Fusarium blight on bluegrasses in fairways on the Purdue South Course.

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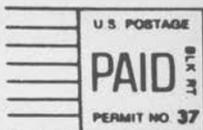
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