Sports Turf Manager

MARCH 1988 VOLUME IV NUMBER 1

Sports Turf Institute - 5th Annual Cal Poly University Pomona March 22, 1988

The 5th Annual Sports Turf Institute at Cal Poly University in Pomona, California will be held Tuesday, March 22, 1988 from 8:00 a.m. to 3:00 p.m. A line up of exciting and educational topics will be presented during the morning session. Topics include:

1. The Sports Turf Boom: Fact or Fiction
2. Grasses on the Horizon: Sports Turf
3. Proper Construction Saves $$ Later
4. Ways to Germinate Seed Faster
5. Irrigation for Sports Turf
6. The PAT System for Parks
7. Research Update: Sports Turf

The second activity of the day will be the on-site field demonstrations which are geared toward teaching the fundamentals of special athletic field techniques. The batting order will include:

1. Baseball Field Maintenance
   A) Skinned Infield Preparation
   B) Tips on Care of the Infield Grass, Home Plate Areas and the Pitching Mound
2. The Cambridge Drainage System
3. Coring and Sand Topdressing
4. Field Renovation Techniques
5. Backlapping Procedures for Reel Mowers

A trade show featuring 60 or more of the leading companies that market or sell equipment, products or supplies for athletic fields will be held from 12:00 noon to 3:00 p.m. Special door prizes and other gifts will be drawn at the conclusion on the day's activities.

For more information about the Institute, trade show, accommodations, etc., please call Mary Giles at the STMA office 714-981-9199.

STMA Educational Sessions — Houston

The educational sessions presented in Houston were of exceptional quality and the speakers included the leading sports turf educators, scientists and practitioners in the world. Attendance was disappointing but the knowledge and information that was expounded and disseminated would be helpful and useful to each and everyone who is a sports turf manager. The following is a brief synopsis of the educational presentations from the Houston conference:

1. A Synopsis of Sports Turf Related Organizations and What Makes Them Tick

   A. Dr. Peter Hayes, Director of the Sports Turf Research Institute, Bingley, England, discussed the historical aspects and the management of the STRI. He talked about the four functions, namely (1) advisory work, (2) consultancy work (3) research work, and (4) education. In summary, the Sports Turf Research Institute is the only body in the UK which is an independent research and extension organization. This is STRI's main strength - in that it is independent of trade bias and there is a two-way flow of information from extension agronomists in the field to research workers on the trial grounds.

   B. The Institute of Groundsmanship is headquartered in London, England and featured three prominent speakers:

      1. Christine Smith, who is a feature writer on their magazine, **The Groundsman**, and a member of the press and public relations team, discussed the aims of the IOG:
         a. to give opportunities for training

(continued on page 2)

Houston Education *(continued)*

b. to raise standards of sports ground maintenance
c. to bring groundsmen together
d. to improve the status of groundsmen and the profession

In addition, the IOG publishes **The Groundsman**, a monthly journal, sponsors the sports and leisure world trade exhibition at the Royal Windsor Race Course each September and offers an advisory service. Ms. Smith concluded her talk by "saluting the babes of STMA with the hope that the shared aims will forge even stronger links between the IOG and STMA."

2. Ray Johnston, the national chairman for the IOG, thanked the STMA for the opportunity to speak about their organization. He concluded by saying "we hope the links that already exist between the IOG and STMA and the personal friendships of our individual members will be further strengthened to the greater benefit of our profession."
3. Brian Robinson, a member of the national executive and vice chairman of the Education Committee spoke about membership, qualifications, educational enrichment and the awards bestowed upon the top professionals in the industry. He then introduced the Master Groundsman of the Year, Laurence Pithie and the Young Groundsman of the Year, Huw Morgan.

C. Dr. Eliot Roberts discussed the National Sports Turf Council - its goals, objectives and accomplishments. He provided a brief history, spoke about research and education and then discussed people-related problems, safety, field liability, economics, technical information, use of the field, technology-related problems, soil properties, irrigation, grass types, weeds and putting it all together.

D. Dr. Kent Kurtz, Executive Director of STMA, briefly discussed the missions and goals of STMA. He emphasized education of both established members and young members who will someday be the leaders in the field.

2. The remainder of the educational sessions dealt with the technical, scientific and practical field management information. Dr. Robert Shearman discussed wear tolerant management in sports turf; Dr. James Beard introduced and discusses the new Mesh-Element Root Zone Matrix Concept; Dr. Henry Indyk and Penn State University graduate student, John Rogers, spoke about athletic field conditions and field hardness studies related to injuries in high school football. The afternoon session heard Dr. Milton Engelke talk about the future in breeding turfgrasses for sports turf. He was followed by Jim Anglea, the sports turf manager at Texas-Arlington Baseball Stadium, who discussed the maintenance of baseball turf. Dr. Roy Goss emphasized that managing sports turf requires patience, knowledge and common sense. Dr. Peter Hayes, STRI, presented a talk on managing and maintaining soccer fields in the UK. Melvin Robey emphasized the ways to manage sports turf on a meager budget while Dr. Robert Carrow pointed out how soil compaction and water management are integral to proper management of sports turf. The sessions concluded with Jeff Graydon who pointed out the need for suggested recommendations and specifications for the care of athletic turf.

NOTE: If anyone would like to purchase a proceedings from the conference, contact Mary Giles at the STMA office (714-981-9199). Cost will be $10.00 each.

Kent Kurtz

Sports Turf Tour
Houston, Texas - Feb. 5, 1988

A small but courageous group of sports turf managers braved rain, cold and eventual snow on the sports turf tour in Houston, Texas. Earl Ericson, Park and Recreation Director for Pasadena, Texas Parks Department hosted the tour showing the group his parks' sports facilities. We were introduced to John Ray Harrison, Mayor of Pasadena, Texas who talked about his city and its sports fields. He was a baseball coach at San Jacinto Community College for many years, was a state legislator and judge before assuming his mayoral duties.

The Pasadena Unified School District sports facilities were next on the tour agenda. Harold Stevens, Assistant Athletic Director, talked about his facilities. The group visited a natural grass football field, a varsity baseball field and, finally, the artificial turf football stadium.

It was an international group - five members of the Institute of Groundsmanship, two guests from West Germany, three employees of O.M. Scott & Sons and many STMA members. The Institute of Groundsmanship gave Dr. Kurtz an engraved leaded crystal bowl for his continued friendship and cooperation with the IOG. They also presented Mark Hodnick, STMA President, with a beautiful hand-painted IOG crest for the STMA office in Upland.

The final leg of the tour to the O.M. Scott & Sons Field Research Station was eventful. The rain turned to sleet, the sleet to snow and by the time we arrived at the station in Cleveland, Texas over one inch of snow was on the ground. There was not much to see due to the snow, but we all appreciated the hours and hard work spend in our behalf by the O.M. Scott personnel. We met some wonderful people, made friendships, gained knowledge, shared problems and ideas, and, above all, met together in an effort to make sports turf better, safer and more enriching.

STMA members enjoy the sports tour.

Kent Kurtz

Doc's Dugout

Our profession of grounds maintenance is very old and its roots can be traced back to the 1830's when two significant inventions were introduced to make the job of groundskeeping easier and simpler. The first occurred in 1830 when the first lawnmower was patented and finally in 1832 when it was manufactured by Edwin Budding of Stroud, Gloucestershire, England. The second was the putting green cup cutter which was introduced around 1839 in Scotland. These two contributions assisted in bringing the profession out of the "cow pasture" stage and created a job in this line of work for many individuals. No longer were sheep and cattle depended upon to do the mowing or rabbits and rodents needed to provide holes in putting greens.

To our friends and colleagues from the United Kingdom we are indebted for the numerous contributions they have made to the field of sports turf management, both past and present. They have elevated the status and substance of our profession through their diligence, hard work, study and quality of performance. The work and education of the Institute of Groundsmanship is unsurpassed anywhere in the world. The fellowship and warm friendship the IOG and STMA experienced recently in Houston on the sports turf tour, at the educational sessions and in a social setting were extremely worthwhile and very genuine. STMA will be represented next September at Windsor to participate in the 50th anniversary of the IOG's educational exhibition and show.

Here in the United States the groundsperson has had to endure many years of second-class status. We live in an age where the headlines are occupied by politicians, financial experts and science-technology specialists. It took nearly 50 years for the greenskeeper to become a superintendent but even longer for the janitor or custodian to attain the title of sports turf manager. A movement is underway to elevate the status, integrity and professionalism of the sports turf manager but it will not come without considerable hard work and sacrifice. The pride and status which accompanies a title must be earned. No longer can we tolerate the criticisms, belittlement or degradation of us personally or the maintenance practices we perform by fellow "professionals" and especially through the media. No longer can we afford to tear down our peers in front of others so we look good or because we are jealous of someone else. The entire industry suffers from these types of endeavors. We may not agree with someone or the way a person approaches a particular job or task, or like a product or piece of equipment that individual is using but we need to remember and understand that there is more than one way to tackle a project or to accomplish a task.

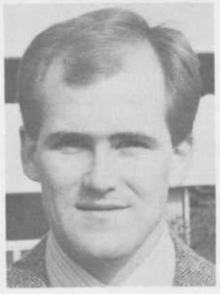
Remember every situation is different, every climatic zone is different, every individual is different and products may perform differently in different environments and under different use situations or conditions. Before we point an accusing finger at someone, it would be wise to look in the mirror and evaluate our own situation and make sure our own house is in order. Advice should be based upon research and fact and not just on personal opinion. The only way our young industry can survive, prosper and gain the respect and recognition we all desire is through cooperation and education and by sharing, understanding, praising and showing a little compassion and fellowship to our colleagues. Helping others is far more satisfying than tearing them down. Our industry can ill-afford to continually dwell solely upon the negative. It is the positive that we must emphasize and continually re-enforce. We must practice what we preach and not only look professional but be professional. Then the professionalism we all desire and deserve will be apparent because it will be earned and we can begin to call ourselves Sports Turf Managers.

Kent Kurtz

Future Sports Turf Managers Receive Awards

The Sports Turf Manager's Association's main goal and purpose is to educate its members and to develop the future of the industry by supporting the educational endeavors of its future leaders. In 1987 STMA established a scholarship program to assist students who are seriously pursuing a career in the field of sports turf management. The two awards that were established are named in the honor of two outstanding individuals who represent STMA and the industry. The Harry Gill Award honors the founder of STMA and its first president who currently is the Superintendent of Grounds at Milwaukee County Stadium. No other person has done as much as Harry to educate and train young people in the sports turf profession. The second award is named in honor of Jeff Wishard who sustained a serious injury several years ago in a football accident. Although Jeff is confined to a wheelchair, he is active in his community with responsibilities on the Village board, park commission and as a Boy Scout leader.

Eric Carl Hansen



J. Eric Chapman

The STMA presented two $500 scholarship awards to two students at their conference in Houston, Texas.

THE HARRY GILL AWARD

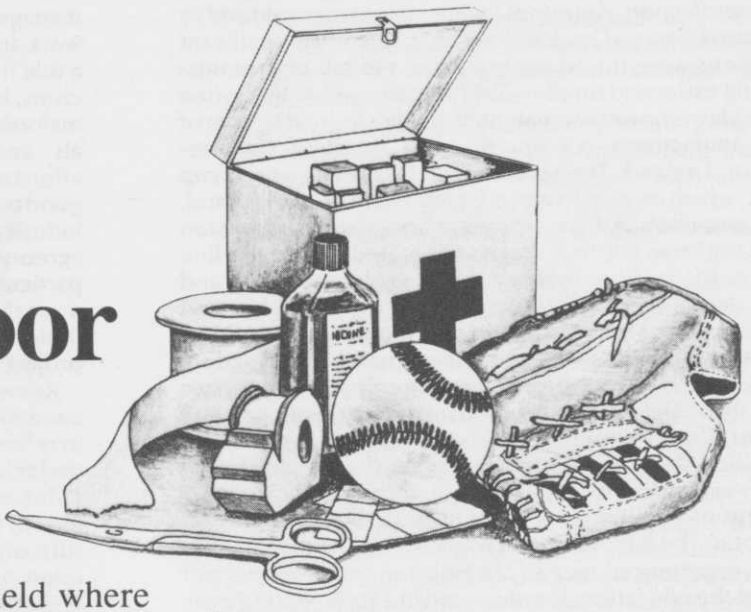
The recipient of the Harry Gill scholarship is **Eric Carl Hansen** who is working towards his degree in Turf Management at Texas A&M University in College Station, Texas. Eric received his first degree at the University of Alaska while serving in the Air Force. He currently serves as Head Baseball Coach at Leander High School where he also teaches science. He plans to resign this year to complete his education on a full time basis.

THE JEFF WISHARD AWARD

J. Eric Chapman is the recipient of the Jeff Wishard Award and is a junior studying Turfgrass Management at Washington State University in Pullman, Washington. Eric has worked with sports turf for quite some time as his father, James Chapman, has been involved in the industry for many years and his mother has been on the grounds crew of the Broadmoor Country Club in Seattle. Eric has worked for STMA member Gene Howe who owns and operates Sportsturf Northwest in Redmond, Washington. According to Howe, "my dues are well spent if any student of Eric's caliber receives our assistance." Eric most recently worked on the practice facility where the Seattle Seahawks train.

The Northwest Turfgrass Association provided funds to send Eric to Houston to receive the award. He was accompanied by the Seattle Seahawk's field supervisor, John Monson.

The Trophies of Outdoor Sports



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STMA Recognizes Groundsmen of The Year

A delegation of approximately 25 officers and members of the Institute of Groundsmanship came to the GCSAA and STMA meetings in Houton, Texas. The IOG is headquartered in London, England and is similar to STMA in its missions and goals of educating individuals employed in all phases of groundsmanship.

Each year through written examinations, practical applications and other evaluations, the IOG selects the top two groundsmen and the award for being the best is an all-expenses paid trip to the GCSAA conference in the United States. In recognition for their achievement and dedication to the sports turf profession, the STMA presented the two top groundsmen plaques for their accomplishments. STMA President, Mark Hodnick, the Executive Director, Dr. Kent Kurtz, presented the awards during the STMA educational session in Houston.

l to r: Laurence Pithie, Huw Morgan, Kent Kurtz, Mark Hodnick.

Young Groundsman of the Year Award

The Young Groundsman of the Year is 21 year old Huw Morgan who is the Head Greenskeeper at the Fairwood Park Golf Club near Swansea. Huw has been responsible for the maintenance of this 147 acre parkland course for the past two years. He is a member of the South Wales branch of the IOG and the British and International Golf Greenskeepers Association.

Master Groundsman of the Year

The Master Groundsman of the Year is an astute, bright, knowledgeable and very personable gentleman, Laurence Pithie. Laurence is the Golf Course Manager at the Minchinhampton Golf Club near Stroud. Since 1981 he has managed two golf courses — a new course built in the 1970's which he recently was responsible for reconstructing; the other, located on National Trust land, is a real challenge because modern sprays and chemicals are prohibited. Laurence is a member of the Gloucester branch of the IOG and the British and International Golf Greenskeeper Association.

Beam Clay Baseball Diamond Of The Year Awards

Out of a field of approximately 40 entries for the Beam Clay Baseball Diamond of the Year Awards, three baseball fields were selected by a judging committee chaired by James Long, Superintendent of Grounds for Holy Cross College. The awards were as follows:

Professional Category

Tom Burns, Field Superintendent, Charlotte County Stadium, Port Charlotte, Florida

Tom Burns, Bonnie Kelsey, Jim Kelsey

All three recipients were on hand in Houston, Texas at the STMA meeting to receive their awards from James Kelsey, President of the Beam Clay Company. The awards are sponsored annually by the Beam Clay Company, sportsTURF Magazine and the Sports Turf Manager's Association. The three recipients are all members of STMA. Congratulations, gentlemen, to a job well done. Keep up the good work!

College & University Category

Leo Goertz, Head Groundskeeper, Olsen Field, Texas A&M University, College Station, Texas

Leo Goertz, Bonnie Kelsey, Jim Kelsey

Municipal Category

Jeffrey Bowman, Park Superintendent, Orval Ricketts Park, Farmington, New Mexico

Jim Kelsey, Mark Hodnick, Jeffrey S. Bowman

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Rice Hull Compost is better suited for the hot and humid conditions of the Gulf Coast region. According to tests conducted by Agri-Systems of Texas, "...it is an extremely valuable additive anywhere in the Gulf Coast region, since rice hulls remain in the soil for many years after initial construction, and in fact improve in water retention as time passes."

Mixture	80% Lab Sand 20% Rice Hulls	80% Lab Sand 20% Lab Peat
Pore Space:		
Non-Capillary (Large)	20.67%	17.75%
Capillary (Small)	19.38%	23.9%
Total	40.05%	41.67%
Permeability: (Inches Per Hour)	49.63"	32.40"
Water Retention: (At Field Capacity, % By Wt.)	12.6%	14.5%
Bulk Density: (Grams Per cc)	1.36	1.44

Agri-Systems of Texas, Inc., Tomball, TX

The chart above shows a laboratory comparison of the similar characteristics of McMaster's Rice Hull Compost and peat. Call us at 1-800-622-4855 for your price and cost comparison.

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Waterwood; Huntsville, TX
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Pecan Grove Plantation; Richmond, TX
Fairway Farms Course; San Augustine, TX
Woodcreek; Wimberly, TX
Lago Vista; Austin, TX
Turtle Creek; San Antonio, TX
Country Place; Pearland, TX
Saluki National; Marion, IL
Columbus CC; Columbus, MS
Lost Creek; Golf, TN
The Falls; New Ulm, TX
Western Hills; Hopkinsville, KY
Pine Bluff CC; Pine Bluff, AK
Woodlands; Woodlands, TX
Blue Bonnett Country; Plantersville, TX
Raveneaux; Houston, TX
Ellington AFB; Houston, TX
Del Lago; Lake Conroe, TX
Cape Royale; Cold Springs, TX
Stephen F. Austin (State Park); San Felipe, TX
Cleveland CC; Cleveland, TX
Tanglewood on Texoma; Fink, TX
Lakeway, Austin, TX
Horseshoe Bay; Marble Falls, TX
Kingsville Naval Air Station; TX Corpus Christi, TX
River Plantation; Conroe, TX
Cooper Communities, AK
Old Stone Fort; Murfreesboro, TN
Colony Creek; Victoria, TX
Carter Golf, Inc.; Pell City, AL
Kingwood; Kingwood, TX
Quail Valley; Houston, TX
Hearthstone; Houston, TX
Atascocita; Lake Houston, TX
Willow Creek; Houston, TX
Roman Hills & Roman Forest; TX
Cottonwood Valley; Irving, TX
Galveston CC; Galveston, TX
Piney Woods; Nacogdoches, TX
The Shores; Rockwall, TX
Mill Creek; Salado, TX
Williamson Creek; Austin, TX
Riverside (City); San Antonio, TX
Padre Island CC; TX
Walden on Lake Houston, TX
Little Rock AFB, AK
Hot Springs Village; Hot Springs, AK
Winddance; Gulfport, MS
Pearl River Valley CC; Poplaville, MS
Walden on Lake Conroe, TX
Pine Forest; Houston, TX
Lockshire; Huffman, TX
Sharpstown (City); Houston, TX
South Shore Harbor; League City, TX
Pine Crest; Trinity, TX
Thorn Tree Golf; De Soto, TX
Crown Colony, Diboll, TX
Las Colinas; Irving, TX
Lost Creek; Fort Worth, TX
Rayburn Country; Sam Rayburn, TX
Woodlake; San Antonio, TX
Corpus Christi Naval Air Station;
Holly Tree; Tyler, TX
Vanderbilt University; Nashville, TN
Golf Course; Raleigh, NC
Falcon Point; Katy, TX
Rosewood CC; Pine Bluff, AK
Thompson Irrigation; Nashville, TN

School Districts, Football and Baseball Grounds:

Houston Oiler Practice Field, TX
Klein, TX
Spring, TX
Pasadena, TX
Fort Bend County, TX
New Caney, TX
Barber Hill, TX
North Forest, TX
Deer Park, TX
Humble, TX
Aldine, TX

The information given here is for information only and does not imply endorsement by the above customers or organizations. No discrimination is intended for customers or organizations not listed.

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President's Message

Mark Hodnick

The Sports Turf Manager's Association Conference held in Houston in February in conjunction with the Golf Course Superintendent's Association of America Conference and Show is now history. It was a good Conference and I met a lot of wonderful people, especially the people from the Institute of Groundsmanship in England with whom we have established an excellent working relationship and with whom we look forward to cooperating more in the future.

I am looking ahead to the 1988 year for the STMA with great enthusiasm. We are in a period of strong growth, adding 30 to 35 new members a month. We have settled into our new office and operations are flowing smoothly.

However, the Sports Turf Managers Association is only as good as the people who belong to it. The core of members who serve on your Board and plan your Conferences and other activities work very hard. It is disappointing that the attendance at Conferences is not higher. Our purpose is to disseminate knowledge and information to make you better sports turf managers. Our meetings are for YOU; it is to your advantage to be there. Please make every effort to attend in the future and become more active in your association.

My congratulations to the two STMA Scholarship winners. Because of the support from the membership, we were able this year to increase the two scholarships to $500 each from $250. With your continued support, we will be able to add programs in the future that will benefit the membership and the entire industry.

We are looking forward to the upcoming Conferences in Pomona in March and the College of Du Page in June. I hope to see all of you there.

I again thank everyone for the opportunity to serve as your President and for the confidence you have displayed in me. Your support is important in this, a critical year in our history. Together we can become a major force in turfgrass industry.

Does "Thirsty" Turf Make Noise?

Plants have been exposed to music in jest and in research Not too many years ago the University of Illinois exposed corn to sound for 18 hours per day without changing growth. Maybe it is time for man to listen to plants. Dr. E.L. Fiscus, USDA, has listened to noises made by drying plants. These sounds are in the 100 kilohertz range. Since the human ear hears in the 10 hertz to 20 kilohertz range, special equipment is needed to hear the sounds plants make as they become drier. The cells of the vascular system conducting water and nutrients from roots to leaves make minute, high-frequency noise when a deficiency of water causes fracturing in this pathway. Discoveries of this type stimulate many interesting questions for research and theoretical uses. Perhaps this could be used to activate a watering system at a precise time to the advantage of the preferred turfgrass species and to save water. Does this eliminate the need for an on-site agronomist? Scarcely! Things other than a shortage of available soil moisture can cause deficiency of water in the water conducting tissue. An agronomist would seem more important than ever to assume correct interpretation and treatments.

Marshall Receives The Gift of Life

In the last newsletter it was reported that Don Marshall was home quite ill awaiting a heart donor. Don received a heart in January and came through a successful heart transplant operation and is now home recuperating. Our prayers go out to Don for his courage and strength during a very stressful and difficult time in his life. We all wish him a speedy and successful period of recovery. For those who may want to drop him a note, his address is:

Don Marshall
11244 Warmington
Riverside, California 92503

Step-By-Step Baseball Field Construction

Charles Lindstrom, Charles Lindstrom & Associates, Lincoln, Illinois

With all of the expertise available today to turfgrass people, one is constantly amazed to find so little attention given to that critical area of an athletic field known as the skinned area. Although particularly common to a baseball field, the skinned area is many times a critical area on multi-use fields for the part of the year when football and baseball are played in the same area.

How many games are called off due to a wet infield when the turf areas are fine? How many bad bounces and bad throws are caused by wet infields? The answers are obvious - many - and the problems have existed since sports fields and arenas were developed.

There has always been sort of a trade-off in infield construction. The true bounce, the nice sliding surface and synonymous with a sand clay blend. But the problem with these surfaces has been poor drainage. Onto the market came the soil additives, soil substitutes and soil enhancers. Crushed or decomposed granite had some west coast baseball infielders wearing mouthpieces. Calcined clay and crushed brick even had John Madden commenting on how football players hated to get tackled on the skinned infield areas in the multi-use stadiums because they like sandpaper. And to take this one step further, there are the infields constructed with agricultural lime. One will always play and the hospital emergency rooms and uniform manufacturers will love the fact that agricultural lime is being used.

So what is the answer?

If one is player-oriented the grounds have to be tailored to the best playing condition for true bounces, sliding and playing the game as it was meant to be played. However, as previously mentioned, wetness takes a toll on the playing conditions. Therefore, the answer lies in controlling the wetness.

If one can locate the entire skinned area three to four inches from a drain then one has a good chance of controlling wetness. This can be done as follows:

1. Excavate the entire skinned area to a depth of 12 inches.
2. Insert three to four inch drain lines (pipe) with a sleeve or use special piping to handle sand without a sleeve and establish the proper drainage pattern.
3. Add eight inches of a uniform sand over the entire skinned area.
4. Cover with a geotextile material specially designed to allow water but not soil fines to move through material.
5. Add sand and clay to the top three to four inches over the geotextile material.

When the above steps are followed one might want to add a wetting agent, calcined clay or whatever to the surface of the infield. But is should be kept in mind that three to four inches down from the surface there is an eight inch subsurface layer comprised of good drainable sand which acts like a dry sponge. If these steps are followed it won't be long until the umpire calls out "Play ball."

Improving Stress Tolerance In Turfgrasses

William D. Middleton

Whether managing a putting green or bowling green, a football field or a racing course, maximizing the survival potential of the turfgrass stand is one of the highest priorities of every sporting turf professional. It has been demonstrated that SAND-AID ™ Granular Sea Plant Meal and PanaSea ™ Liquified Sea Plant Extract can improve stress tolerance in golf course turf. The question here is whether they offer similar stress tolerance benefits for professionals managing other types of sporting turf.

Three years ago at Michigan State University, Dr. Paul Rieke, a Professor of Soil Science specializing in Turfgrass Soils, began evaluating the long-term effects of various organic soil amendments on the stress tolerance of golf course greens. Michael T. McElroy, a research technician assisting Dr. Rieke in this study, made the following field observations during the summer of 1987, a summer characterized by intense heat stress:

"Overall, the quality of turf in the plots treated with SAND-AID was visibly superior...Quality was determined by the visual rating of color, density, texture and other commonly agreed-upon criteria...The differences between treated and untreated areas were even more striking under stress. The complex of symptoms that characterize stress... were far more visible in the untreated controls during periods of more intense stress."

"Improving Stress Tolerance" Michigan State University
Continuing Research Field Observations July 24 and August 24, 1987

Whereas SAND-AID improves stress tolerance by improving the soil's physical and chemical properties, PanaSea works directly on the turfgrass plant itself. At each stage of growth and development, from seedling through full maturity, PanaSea maximizes turfgrass' survival potential. In the early stages, it not only improves germination but enhances early establishment.

"An increase in germination percentages was obtained using PanaSea...An increase in the total root weight was seen...A dramatic visual response was observed in all seed varieties treated with PanaSea in regards to root formation. Treated seeds showed a distinctly more fibrous root system as compared to untreated seeds."

"The Influence of PanaSea of Germination and Growth
of Penncross Creeping Bentgrass, Perennial Ryegrass, and Festuca Rubra"
Thesis, 1982, David W. Gourlay, Texas A&M University

Applied as a foliar spray, PanaSea builds bigger, stronger root systems:

"PanaSea at the recommended rate showed 79% better root development than the control."

"Root Strengthening in Sod Production"
Virginia Polytechnic Institute, VPI Turfgrass Field Days, September 14-16, 1982

While it's clear that these materials offer benefits for professional turf managers trying to improve stress tolerance in golf course turf, there are some strong indications that they also benefit other types of sporting turf.

Internationally-recognized sporting turf professionals like Dr. Eric Lee, Tracks Manager of the Royal Hong Kong Jockey Club incorporate SAND-AID in the construction and maintenance of their sand-based racing tracks. Dr. Lee, who was a featured speaker at the GCSAA Conference in 1986, uses SAND-AID in much the same way and for much the same reasons golf course architects and superintendents do. That is, to minimize some of the problems associated with building and maintaining high sand content sporting turf surfaces.

Similarly, PanaSea is used on many major athletic fields in North America; again for some of the same reasons it's used on golf course turf. Nothing is more central to improving stress tolerance and thereby survival potential than maximizing root development. Therefore, PanaSea is finding its way into more and more fertility regimes as a supplement to stimulate root development and delay senescence.

Two of the most unique and valuable constituents in the sea plants we harvest and process are a group of naturally-occuring hormones called cytokinins and a natural carbohydrate-alginic acid. Cytokinins are key ingredients in PanaSea and alginic acid is the major component in SAND-AID, making up more than 26% of the dry weight analysis.

The cytokinin hormones is PanaSea play a vital role in boosting stress tolerance in turfgrass because they stimulate **both** division **and** elongation in the turfgrass root cells. The result: bigger, stronger root systems. There appears to be a synergistic interaction between the hormones and naturally chelated trace elements present in our extract because in university tests, PanaSea outperformed synthetic products with equal amounts of hormones.

"PanaSea at the recommended rate showed from 25-36% better root development than the synthetic product."

"Root Strengthening in Sod Production"
Virginia Polytechnic Institute, VPI Turfgrass Field Days, September 14-16, 1982

The cytokinins in PanaSea can also delay senescence. Premature senescence or rapid aging decline can be "triggered" by prolonged periods of heat stress.

PanaSea can raise the threshold at which stress-induced senescence occurs. Therefore, it's an ideal material in turfgrass stress management programs.

Similarly, because of its unique makeup, SAND-AID is an optimal material for stress management programs. Like PanaSea, it contains an extraordinary range of micronutrients and trace elements. However, SAND-AID's most important ingredient from a stress management point of view is alginic acid. This naturally-occurring carbohydrate emulsifies in sand and can dramatically reduce both nutrient leaching and water losses.

When SAND-AID is applied in conjunction with topdressing, aerifying and verticutting operations, it helps solve many of the problems associated with sand, like localized dry spots. Moreover, SAND-AID is the only natural organic constituent that can safely be incorporated into an all-sand regime with no risk of layering.

"In recent years, as the ancient cultural practice of sand topdressing has made a comeback, so has the use of seaweed materials for supplementing pure sand in topdressing programs...The reason is that sea plants have very little lignin and a relatively narrow C:N ration. Consequently they break down quickly.

"Organic Amendments to Soils"
Dr. Michael J. Hurdzan, ASGCA ***Golf Course Management*** *Magazine December, 1987*

Aliginic acid is a poly electrolyte; that is, it carries both positively and negatively charged particles. Thus, when SAND-AID is introducted into heavier soils with higher clay content, it stimulates a natural electrochemical attraction between the negatively-charged clay particles which help them to aggregate together into a more friable crumb structure. The end result over time is improved soil porosity. All in all, it's an ideal additive for topdressing, verticutting and aerifying programs.

SAND-AID is also used extensively as an organic additive for building, rebuilding or renovating golf course tees and greens.

Breeding For The Future Of Sports Turf

William A. Meyer, Ph.D., Turf-Seed, Inc.

Sport turf areas will continue to improve in the future as a result of turfgrass breeders' efforts to improve perennial ryegrass, tall fescue and Kentucky bluegrass. Our turf and wear trials in the Willamette Valley of Oregon have shown that the new improved varieties of these species, especially the perennial ryegrasses, have very good potential for athletic fields. The fine fescues have not shown good wear tolerance in our trials.

Perennial Ryegrasses

The new turf-type perennial ryegrasses such as Manhattan II, Omega II, Citation II, Prelude, Palmer, Tara and Repell have shown improvements in density, mowing qualities color and disease resistance. They have shown good wear tolerance and the ability to survive under compacted soil conditions bettern than Kentucky bluegrass and tall fescue. Perennial ryegrasses are well known for their excellent seedling establishment rate. They have been used successfully for the renovation of many worn athletic fields and for the southern overseeding of dormant bermudagrass. They are able to tolerate a cutting height of ¼" or less and do not form thatch. Perennial ryegrasses have the ability to grow actively in the fall later than Kentucky bluegrass and tall fescue.

Future breeding programs for perennial ryegrass will include improvements in overall disease resistance and winter hardiness in many northern areas of the U.S. On athletic fields the perennial ryegrasses should be used at a 30% level by weight in mixtures with improved Kentucky bluegrass.

Tall Fescues

In the last six years there have been many new turf-type tall fescues released that have shown improved turf quality and wear resistance compared to the old standard KY 31. Net Blotch caused by *Helminthosporium* is a serious disease. on tall fescues under wear and the varieties Apache, Bonanza, Cimarron, Mustang, Olympic, Jaguar, Trailblazer and Rebel II have shown improved resistance.

Tall fescues do not establish as rapidly as perennial ryegrass, but once they are established they form a stable turf with good lateral strength. Tall fescues are noted for their drought avoidance due to their deep root systems. They also are able to maintain density under lower fertility levels than perennial ryegrass. Tall fescues are not thatch prone like Kentucky bluegrass.

Improvements in tall fescue now being developed include a dwarfer growth habit, improved density, more vigor during establishment and improved brown patch resistance. The new tall fescues have given athletic field managers another viable choice, especially where 12½" cutting heights are acceptable and where available irrigation is less than that needed for perennial ryegrass and Kentucky bluegrass.

Kentucky bluegrass

Kentucky bluegrass has been a popular athletic field grass for many years because of its extensive rhizome system. These underground rhizomes give bluegrass good sod strength and regrowth potential to repair divots. The main disadvantage of Kentucky bluegrass is its slow seedling establishment rate. Where scheduling is tight on an athletic field, sodding is usually the only viable option to establish Kentucky bluegrass.

Kentucky bluegrasses do not recover as rapidly from severe defoliation and do not tolerate compaction as well as the improved perennial ryegrasses. There is also a need to control thatch by aeration or vertical mowing on Kentucky bluegrass.

In the 1980 National Kentucky trials after five years, the top 24 commercial varieties in this trial, with 84 entries, were as follows: Midnight, Enmundi, Bristol, Classic, Eclipse,

Aspen, Trenton, Glade, Majestic, Haga, Victa, Plush, Cheri, Rugby, Sydsport, Columbia, Adelphi, Baron, Merit, Banff, Ram I, Challenger, Bonnieblue and Gnome. The varieties A-34 and Touchdown have been used successfully in athletic fields mixtures because of their leafy aggressive growth habit. Usually three to five varieties of Kentucky bluegrasses are used in a blend to broaden the genetic base of a new planting. As stated earlier, combinations of perennial ryegrass and Kentucky bluegrass have worked well, especially where summer blight is a problem on pure bluegrass stands.

Future improvements in Kentucky bluegrass must include varieties with stronger rhizomes, better establishment rates and improved tolerance to close mowing. Improvements are also needed in summer patch disease resistance and consistent seed production.

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Sport Of Polo And The Management Of Its Facilities

James Mello, Nice 'N Green Plant Food Co.

Maintaining safe, quality polo fields increases the value as a sport surface for better play and spectator viewing. The maintenance should follow the procedures to insure safety first, polo playing quality second and turfgrass quality third. The sport of polo is growing and the demand for turfgrass maintained to withstand and recuperate from over-played fields is labor intensive and expensive. Poor maintenance decisions can be extremely costly, especially at installation. Playing wet fields even at high turf density can drastically set back the turf quality and repair should be immediate and effectively executed. Higher goal or faster playing polo also increases wear so the maintenance program must be designed to address the type and frequency of play and the expectations of quality required. It could be maintained for Sunday afternoon polo, or just a stick and ball practice field. Budgets for some polo clubs are limited, especially those where the land is owned and maintained by a public park district. Water availability and maintenance supplies and equipment are sometimes limited, making it more difficult for the turf manager.

Unfortunately the season for best turfgrass growth and the season for polo do not always overlap. Winter polo is preferred in the southern part of the United States where our warm season grasses are used. Fields of common and hybrid bermuda, bahiagrass, St. Augustine and kikuyugrass are growing at their slowest rate during the winter season. This reduces the amount of wear the grasses are able to recuperate from. Alternative weekly overseeding programs with perennial ryegrass at heavy rates will rapidly fill in worn areas. This is a practice which has been used extensively on bermudagrass greens, tees and fairways for better winter golf.

Pre-germinating seed and spraying with activated charcoal solution for increased heat absorption and germination speed are procedures which prove too costly for a large polo field - one which equals nine football fields in size. The high temperatures of summer make the warm season grasses so aggressive they will choke out all the perennial ryegrass which must be reseeded again late the following fall. This period of hot weather is a good chance for the recuperation of the warm season turf species. Players and ponies migrate north for their summer polo activities, reducing the amount of play. It is during this period that cultural practices such as vertical mowing and aeration can be done with time to recuperate before the next polo season.

Maintaining Cool Season Grasses

Once again the cooler weather of the Northern United States during the summer provides the best climate for polo but not cool season grasses. Fields of bluegrass, perennial ryegrass, fine fescue, tall fescue and various combinations are growing at their slowest rates in the middle of the summer. Their optimum growth periods are spring and fall. This slow growth reduces the amount of play the field can withstand and increases the level of maintenance required, such as watering, topdressing and overseeding problems. The deeper rooted plant can resist tearing better than a shallow rooted plant and the ability for these roots to obtain moisture increases the drought tolerance and summer field quality.

Bluegrass has been the preferred grass selection for polo as it grows by rhizomes which spread and form a dense sod turf. Disease coupled with poor drought tolerance can be a problem if required irrigation is not supplied. Bluegrass could become dormant resulting in a slick field, dangerous for play. The recuperation from wear ceases if under heat and drought stress. Alternative overseeding, topdressing and additional watering programs may be necessary. The best time for cultural practices such as aeration and vertical mowing is in the fall and early spring when cool weather promotes active growth. A rest and recuperative period is provided because players and ponies migrate south for winter polo, thus reducing play. Indoor arena polo has also been a growing sport and offers an opportunity for winter play in cool climates.

In recent years plant breeders have developed many cultivars of tall fescues that offer a great potential for polo field surfaces. Unlike bluegrass, tall fescue is a very drought tolerant species. It does not grow by lateral rhizomes, thus does not form as strong a sod. It grows as a bunch type which characteristically has a deep root system. Previously the only available tall fescue variety was K-31 which has a very wide leaf blade thus resulting in a coarse texture. Plant breeders have developed turf type tall fescue varieties with narrow leaf blades and texture almost as fine as Kentucky bluegrass. At heavier seeding rates the rapid establishment and density can provide turf quickly that has characteristics which can allow for reduced maintenance and water requirements in summer.

Tall fescue also has a greater high temperature survival than bluegrass and grows in areas too far south for bluegrass survival and too cold for effective use of warm season grasses. This transition zone has seen a tremendous use of turf type tall fescue on home lawns replacing the high maintenance of Kentucky bluegrass or having to look at a dormant bermudagrass lawn which would have to be overseeded or dyed for aesthetic quality. More fields will be seeded to tall fescues in both the transition area and Northern United States.

Polo Field Establishment

The area to be established for polo field use should be well inspected to insure the best location is selected. Preferably the field should lie north to south to avoid sun glare. If the present property is covered with perennial weeds the use of a nonselective herbicide like Round-Up should be applied prior to excavation to insure movement of the chemical into roots for total kill. This helps to eliminate perennial grasses, such as quackgrass, bentgrass or any unwanted perennials species which cannot be controlled easily after establishment. The soil should be tested to determine there is not a pH imbalance. If there is a pH problem it can be corrected by the incorporation of lime or sulphur while the ground is being prepared for seeding.

If the soil texture reveals a high percentage of clay or silt, you must realize that there is a potential for drainage problems with game delays and cancellations, which can present scheduling problems. The drainage problem can be addressed before establishment by the installation of a drainage system specifically designed for the best water movement for that particular site. Sand splitting for established fields with drainage problems has proven very successful on established soccer fields in Europe, and equipment has been imported to the United States recently to improve athletic surfaces here. The ideal classifications of soil texture are the sandy lawns which allow for good water movement through the field, minimizing the potential for compaction. The addition of soil amendments and installing better soil textured root zones can prove quite costly when considering the size of a regular size polo field.

(continued on page 20)

Sport of Polo *(continued)*

Turfgrass species selection will depend on the use imposed, geographical location and climatic conditions the site is exposed to. In seeding, the best long term protection against disease development involves the blending of 4-6 cultivars of the turfgrass species selected. Each individual cultivar or variety genetically varies in susceptibility and resistance to turfgrass diseases. A starter fertilizer high in phosphorous should be incorporated as the ground is being prepared for seeding. Seeding equipment which is designed for use with a drag helps to incorporate the seed with the soil and being designed for use with a drag helps to incorporate the seed with the soil and pulverizes the surface. With this done, rolling is not necessary, which could leave adversive compaction effects if the soil texture is a clay classification.

Irrigation

The ultimate success of trying to grow quality turf which can withstand a sports turf's frequent abuse lies in having total control over irrigation practices. The water requirement for a newly seeded field would be light and frequent to promote germination. After establishment, deep infrequent irrigations promote deeper rooting, thus better wear. The soil texture will determine how quickly water infiltrates and how long the soil retains it. Playing on dry hard surfaces is very dangerous because the field is slick and the surface has bad effects on horse leg injuries.

A drought tolerant tall fescue field may not be wilting but irrigation should be applied to soften the surface for better and safer footing. Sandy fields which do not compact allow for rapid infiltration of water and better, safer footing. The irrigation systems available include underground automatic travelling systems, portable pipelines and hose systems. Depending on the club's budget and staff, the irrigation system and effectiveness varies. Sometimes water is not always available. A polo field demands a lot of irrigation water and the success or failure of growing quality athletic turf will depend on it.

Mowing

Frequent mowing of turfgrass is the best cultural program because it reduces stress on turf. The smaller amount of leaf blade removed per mowing the better for turfgrass. Reel mowers with scissor action are preferred over rotary or flail mowers. The height of cut depends on the turfgrass variety. Warm season grasses, when actively growing would be the closest mowed. Cool season grasses would be mowed higher, Kentucky bluegrass 1" -1½", turf type tall fescue 1½"-2". The higher you can leave the height of cut, the more drought and wear tolerance will be observed. Professional players are concerned with ball roll speed and how the ball lies for better hitting. Divoted fields can seriously interfere with play. It is important that reels and bedknives be sharp and well adjusted. If kept properly adjusted and maintained, the sharpening life will be prolonged.

Fertilization and Renovation

Soil testing should be done to monitor phosphorous and potassium levels, but this can be performed every two or three years. The soil texture is important when designing a fertility program because heavy clay soils retain nutrients better than sandy soils. Turfgrass requires nitrogen (N), phosphorous (P) and potassium (K) in the greatest amounts of all nutrients. The ratio is roughly 4N - 1P - 2K. In maintaining sports turf, fertilizing is a very important tool to help recuperate from wear and injury. Quality nutrient sources, regardless of liquid or dry formulations, should be used. Supplementary NPK with iron and sulfur can improve turfgrass quality but minor elements such as zinc, boron, copper and others usually do not need to be added. This may not be true on a pure sand base field which does not have the ability to retain nutrients as they leach out of the root zone rapidly. Consulting with turfgrass specialists who know your area and soil types can save clubs money on nutrients not required or needed.

Overseeding sports fields is one of the best cultural practices to restore worn out or damaged turf. Making a mixture of seed, soil and sand to fill in divots after matches improves playability and establishes new plants to quickly fill in for future play. Seed is relatively cheap and although it may not be up by the time the field is played again, it is in place and will establish itself even if it is moved again by a turning hoof. A well overseeded field will recuperate quickly, especially when given a short rest which may be due to scheduling or prolonged bad weather. Waiting until the season is over to reseed usually delivers poor turf quality for season end play and drastic renovation procedures may be needed to insure quality turf for the next polo season.

Cool-Season Turf Diseases

By Dr. Joe Vargas, Michigan State University

A good deal of research in the area of turfgrass diseases has turned to biological management. Biological management of necrotic ring spot, summer patch and typhula blight has been demonstrated.

Another area of interest has been the re-occurance of resistance to fungicides by turfgrass pathogens, this time involving the pythium blight pathogen *Pythium aphanidermatum* and the anthracnose fungus *Colletotrichum graminicola*. These subjects and many more concerning the current status of turfgrass diseases are discussed in this article.

These diseases, the organisms that cause them, and their cultural, biological and chemical management tools are given in Table 1.

Biological management

Necrotic ring spot. It now appears that necrotic ring spot, caused by *Leptosphaeria korrae*, is the primary patch disease found on Kentucky bluegrass in the cooler regions of the cool-season turfgrass area. The symptoms can be observed throughout the growing season even though *L. korrae* appears to be most active during the cooler weather of the spring and fall.

The plants that were infected by *L. korrae* in the cooler weather are in a weakened condition and are very susceptible to summer heat stress or drought stress. Subjecting the necrotic ring spot plants to either of these stresses will lead to the death of the weakened plants and the recurrence of symptoms, even though the pathogen may not be active at this time. The symptoms during cool weather are patches six inches to two feet in diameter with straw- to red-colored blades intermingled in the patch.

Older patches may have green grass in their centers with the straw-to red-colored blades in the outer area of the patches. When the disease symptoms occur during the warm weather the red blades are often scarce and usually only straw-colored or wilted leaves are present.

Nitrogen is important for recovery of the patches caused by necrotic ring spot. Three to five pounds of actual nitrogen per 1,000 sq. ft. per season is necessary to promote recovery and to prevent new patches from developing.

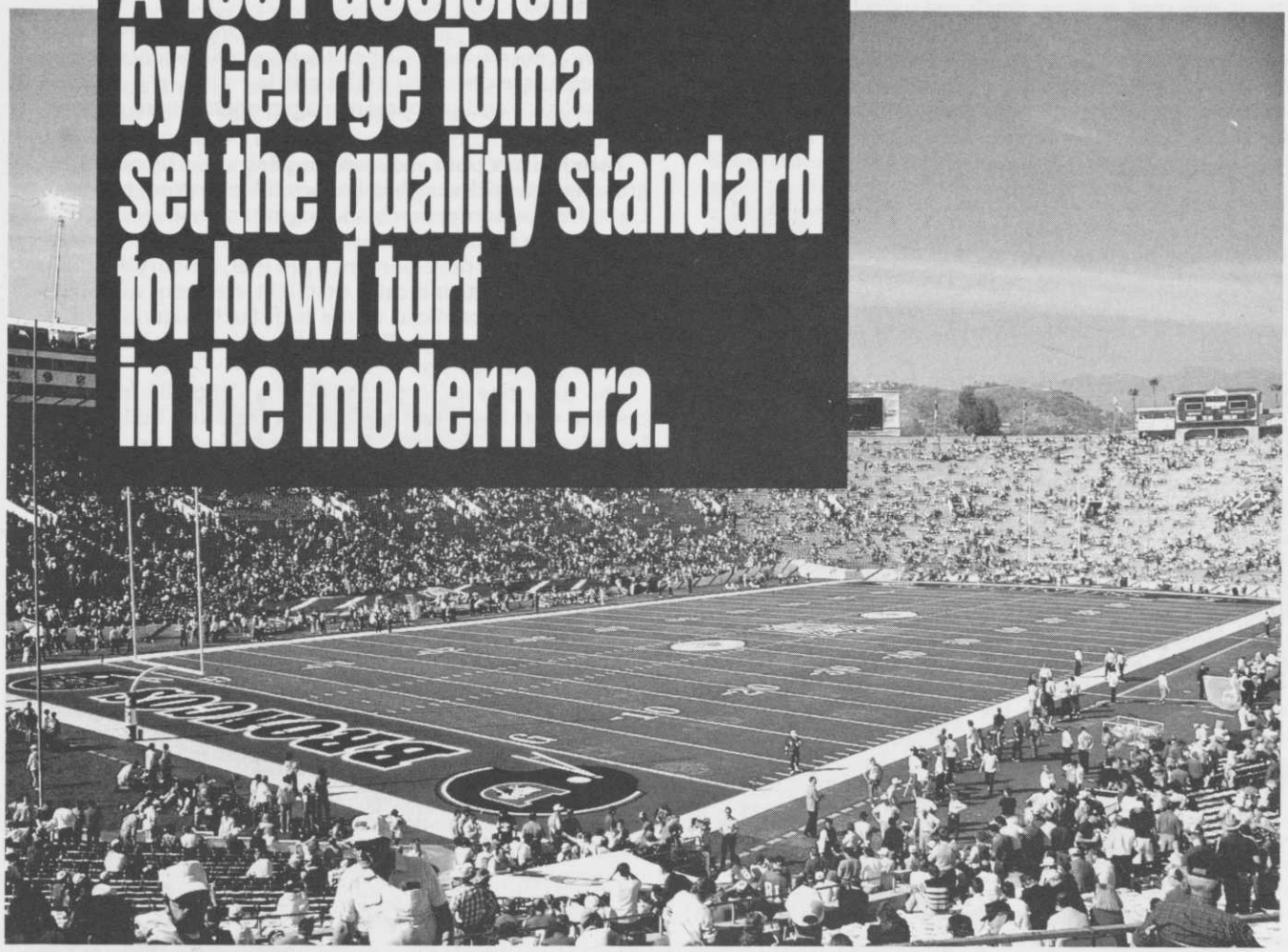
Proper cultural practices are also important in patch recovery and in the prevention of new patches. These include coring to relieve compaction and layers that result when sod of one soil type is laid on top of soil of another type, which is common practice during the establishment of home lawns and commercial lawn properties. This results more in short rooting during the warm weather (when the roots of the turfgrass plant are confined to the upper layer).

Coring and re-incorporating the soil back into the thatch will, over a period of years, alleviate the layering problem. It may also help manage any potential thatch problem, which is important in managing necrotic ring spot.

Thatch has a poor moisture-holding capacity and turfs growing in a thick thatch and susceptible to drought stress. Light, frequent irrigation is also important in managing this disease. The theory that deep, infrequent irrigation is more beneficial to turf development is just that, a theory. Preliminary research data indicates that light, frequent waterings may be more beneficial to the turf. Such waterings on a daily basis, around mid-day, have been shown to help manage necrotic ring spot.

The turf appears to be benefitting culturally from the cooling of the turf and biologically from the build-up of beneficial micro-organisms in the moist thatch that may be antagonistic to *L. korrae*. There are also some new products that help manage the disease biologically.

A 1981 decision by George Toma set the quality standard for bowl turf in the modern era.



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COOL-SEASON TURF DISEASES
TABLE 1
TURF DISEASE AND CONTROLS

Disease	Causal Agent	Hosts	Biologial and Cultural Control	Chemical Control
Anthracnose	*Colletotrichum graminicola*	Annual bluegrass Fine-leaf fescue Kentucky bluegrass Perennial ryegrass	Adequate nitrogen. Cool grass by syringing	Maneb plus zinc sulfate, chlorothalonil, benomyl, thiophanate-methyl, thiophanate, thiophanate-methyl + mancozeb, triadimefon
Brown patch	*Rhizoctonia solani*	All major turfgrass species	Reduce nitrogen. Remove "dew." Increase air movement	Mancozeb, maneb + zinc sulfate, chlorothalonil, anilazine, vinclozolon, benomyl, thiophanate-methyl, thiophanate, thiram, thiophanate-methyl + maneb, cadmium compounds, thiophanate + thiram, PCNB, iprodione
Dollar spot	*Lanzia spp.* *Moellerodiscus spp.*	Annual bluegrass Bahiagrass, Bermudagrass Centipedegrass, Colonial bentgrass, Fine-leaf fescues Kentucky bluegrass, Perennial ryegrass, St. Augustinegrass Zoysiagrass	Increase nitrogen Remove "dew."	Benomyl, thiophanate, thiophanate-methyl, chlorothalonil, anilazine, fenarimol, cadmium compounds, thiophanate + thiram, thiabendazole benomyl, iprodione, thiophanate-methyl + maneb, vinclozolin, triadimefon
Summer patch	*Phialophora graminicola*	Annual bluegrass Kentucky bluegrass	Light, daily watering during the sumer	Fenarimol, thiophanate-methyl, thiophanate, triadimefon, iprodione, benomyl
Helminthosporium Diseases	*Dreschlera*			
Brown blight	*D. siccans*	Ryegrass	Remove clippings.	Mancozeb, chlorothalonil, iprodione, anilazine, maneb, + zinc sulfate, PCNB, vinclozolin
Leaf blotch	*D. cynodontis*	Bermudagrass	Raise cutting height	
Melting-out, Net blotch	*D. poae*	Kentucky bluegrass	Plant resistant cultivars	
Read leaf spot	*D. dictyoides*	Fescue	Moderate spring nitrogen.	
Stem and crown necrosis	*D. erythrospila*	Creeping bentgrass	Daily irrigation.	
Zonate Eye spot	*D. specifera*	Bermudagrass		
Leaf spot	*D. gigantea* *Bipolaris sorokiniana*	Bermudagrass Bentgrass Fine-leaf fescue, Kentucky bluegrass		
Take-all patch	*Gaeumannomyces graminis*	Creeping bentgrass Kentucky bluegrass Velvet bentgrass	Reduce soil pH. Avoid liming, Use acidic fertilizers. Sulfur	Fenarimol
Pythium blight (cottony blight)	*Pythium spp.*	Perennial ryegrass Creeping bentgrass Annual bentgrass	Improve soil drainage. Increase air circulation	Chloroneb, ethazol, metalaxyl, propamocarb
Red thread	*Laetisaria fuciformis*	Creeping bentgrass Colonial bentgrass Bermudagrass Annual bluegrass Perennial ryegrass Fine-leaf fescue	Increase nitrogen	Anilazine, iprodione, triadiefon, vinclozolin, chlorothalonil
Pink patch	*Limonomyces roseipellis*	Perennial ryegrass Creeping bentgrass Fine leaf fescue	Increase nitrogen.	Try red thread fungicides
Snow molds Typhula blight Fusarium patch	*Typhyla spp.* *Fusarium nivale*	Annual bluegrass Colonial bentgrass Creeping bentgrass Fine-leaf fescues Kentucky bluegrass Perennial ryegrass Tall fescue, Velvet bentgrass	Avoid early fall nitrogen fertility that leads to lush growth.	Mercury compounds, PCNB products, chlorothalonil, chloroneb, These products may have to be used in combination for effective snow mold management. Benomyl, iprodione, or mancozeb will control Fusarium patch where it occurs alone.
Necrotic ring spot	*Leptosphaeria korrae*	Kentucky bluegrass	Nitrogen to promote recovery. Light daily irrigation. Lawn Restore Green Magic, Strengthen & Renew.	Iproione, fenarimol, benomyl, thiophanate, thiopanate-methyl
Stripe smut	*Ustilago striiformis*	Kentucky bluegrass Creeping bentgrass	Reduce nitrogen. Prevent summer dormancy	Fenarimol, triadimefon

Lawn Restore, produced by the Ringer Corporation, is a natural organic product that is a complete fertilizer containing all the major nutrients as well as some beneficial microorganisms that produce substances under laboratory conditions that are antagonistic to the pathogen *L. korrae*. It has also been shown to manage necrotic ring spot under field conditions. Lawn Restore has been effective in both promoting the recovery of existing necrotic ring spot patches and preventing the development of new ones.

Another group of products produced by the Agro-Chem Co. (Green Magic, Strengthen and Renew and Nutra Aid), when used in a systematic program, also have been shown to manage necrotic ring spot under field conditions. They appear to improve the environment and allow an increase in the natural population of beneficial organisms in the soil and thatch.

The key word is "management." These products are not a one-shot cure, but used systematically on a regular basis, they will manage the disease and provide a healthy turf.

Typhula blight. Typhula blight is caused by two species, *Typhula incarnata* and *T. ishikariensis*. *T. incarnata* is the primary species in the eastern U.S. and in southern and mid-regions of the Midwest and western United States. *T. ishikariensis* is most prevalent in the more northern snow mold regions, especially where prolonged periods of permanent snow (two or more months) exist in the midwestern and western U.S.

The two typhula species are easily distinguished from each other when observed soon after the snow melts. *T. incarnata* produces graying spots in the turf with scattered, fairly large brown sclerotia evident, where as *T. ishikariensis* spots have a reddish cast to them and contain numerous small, dark black sclerotia.

Typhula blight only occurs under snow cover. It does not occur in the cool, wet weather of fall and spring, except under leaf piles. Typhula blight has been, and still is, managed primarily by fungicides (Table 1).

Lee Burpee at the University of Guelph has isolates of a saprophytic typhula species, *Typhula phacorrhiza* that will biologically manage typhula blight caused by *T. ishikariensis*. This biological management of typhula blight was shown to be effective under field conditions in Ontario. Research is currently being conducted to find a way to make this biological management tool commercially available.

New fungicide resistance

Pythium blight. Metalaxyl resistance to pythium blight caused by *Pythium aphanidermatum* was reported back in 1983 by Dr. P.L. Sanders at Pennsylvania State University on a single golf course in Pennsylvania. This past season, she found resistance to matalaxyl in several additional locations in other states. We also found metalaxyl resistant strains of *P. aphanidermatum* at two locations in Kentucky on perennial ryegrass fairways.

We concurred with Dr. Sanders' previous findings that these new strains are far more aggressive than the older, wild type strains. They also appear to be pathogenic over a wider range of temperatures, occuring when temperatures were only in the high 70s.

The metalaxyl-resistant strain of *P. aphanidermatum* was not cross-resistant to chloroneb, ethazole, probamocarp or fosetyl A1. These fungicides can be used where these resistant metalaxyl strains occur. How widespread or how persistent these strains will become only time will tell, but a good rule of thumb is that if these strains are going to occur, they will begin to show up the second or third year, especially if multiple applications of metalaxyl are made during the first two seasons.

The fact that the perennial ryegrasses are super susceptible to pythium blight combined with the development of the highly aggressive metalaxyl resistant strains of *P. aphanidermatum*, raises serious questions about the use of the perennial ryegrasses in areas of the country where there is a high incidence of pythium blight.

Anthracnose. Resistance to the benzimidazole fungicides (benomyl, thiophanate, thiophanate-methyl) by *Colletotrichum graminicola*, the cause of anthracnose, took much longer to develop than with other fungi like *Erysiphi graminis* (powdery mildew) or *Sclerotinia homeoecarpa* (dollar spot).

Resistance to the benzimidazoles by *E. graminis* and *S. homeoecarpa* usually occured in the first three years and often in the second year. On the golf courses from which the benzimidazole-resistant strain of *C. graminicola* was isolated, the superintendent had used benzimidazole fungicide for 14 years. Resistant dollar spot had been observed on the course for over 12 years.

The question is, why did resistance to the dollar spot organism show up so quickly, whereas resistance to anthracnose took so long? I think the answer lies in the type of pathogen these two fungi are.

Sclerotinia homoeocarpa germinates and may grow for a short period of time and then infects the plant.

If fungicides like the benzimidazoles eliminate sensitive strains from the population, *S. homoeocarpa* is not capable of growing saprophytically after the fungicide has disappeared from the environment in order to re-establish itself throughout the turf area. This allows resistant strains, which are in low numbers in the population, to infect the turn and begin to build up their numbers quickly in the absence of competition from the benzimidazole-sensitive wild type strains. Under such conditions, the benzimidazole-resistant strains can build up rapidly in the turf.

Colletotrichum graminicola, on the other hand, spends much of its life living as a saphrophyte in the thatch and mat on dead organic matter when it is not a pathogen. So, when fungicides like the benzimidazoles eliminate sensitive strains from the population, the survivors can grow saprophytically and build up the population again.

With this type of competition, it would take benzimidazole-resistant strains many years to build up large enough numbers to become the dominant strain in the population. The message is that those of you who have been using the benzimidazoles for many years should be on the lookout for the emergence of benzimidazole-resistant strains of *Colletotrichum graminicola*. Don't be lulled into thinking that if resistance hasn't occurred by now, it won't occur.

Managing stripe smut

This disease, caused by *Ustilago striiformis*, is one of the most devasting diseases of turf. The patch diseases have certainly received all the notoriety in home lawn turf problems but more turf has been lost to stripe smut.

The reason strip smut doesn't receive all the notoriety is that, in most instances, it is a slower-acting disease that weakens infected plants which are then crowded out by weeds or die under stress randomly as individual plants rather than as large areas dying all at once. the remaining stripe smut infected plants are too week to fill in the voids and this allow weeds to enter in the turf. If the weeds are broad-leaf or annual grasses, like crabgrass, then selective herbicides can be used to remove them.

However, unlike healthy Kentucky bluegrass, the weakened stripe smut-infected plants cannot fill in the voids where the weeds were selectively removed and eventually the perennial weedy grasses like tall fescue and quackgrass fill in these voids. A total renovation of the existing turf is the only solution to a lawn infested with perennial weedy grasses since there are no selective herbicides.

What makes stripe smut such a devastating disease is that it is a systemic perennial disease. This means that once a plant is infected it will remain so for life. Any daughter plants arising from an infected mother plant via rhizomes or stolons will also be infected. So, unlike most other diseases, infection does not have to take place every year. All that's needed is environmental stress for this stripe smut weakened plant to die.

The foliar symptoms are most evident during the cool weather of spring and fall when the fungus grows throughout the veins of the plant, eventually producing spores which rupture the epidermis, causing the leaves to have a frail, torn appearance.

Though the symptoms are most evident in the cool weather of the spring and fall, most of the turf infected with stripe smut dies in the summer when the turf is allowed to go under drought stress. This may be due to the plant's inability to conserve moisture because of its torn epidermis or its general weakened condition.

When healthy Kentucky bluegrass is allowed to go under drought stress, it will go dormant and green up again with the occurrence of late summer or early fall rains. Kentucky bluegrass turf infected with stripe smut, however, will die if allowed to undergo drought stress.

The fact that the disease is systemic suggests that there is little resistance in the plant. Resistance is expressed as keeping the infection localized, that is, small spots on the leaves, as in the case of the rust diseases. Leaf rust and stem rust are considered minor diseases of turf because they tend to produce localized lesions whereas stripe rust is a major disease because it is systemic in the plant, indicating little resistance.

Until recently, a stripe smut-infected turf was subject to a slow but inevitable death, eventually being taken over by perennial weeds, which meant the turf had to be killed by a herbicide like Roundup and completely renovated. However, the development of triadimefon and fenarimol has changed all that. These two fungicides, used on a regular basis, will manage stripe smut.

The first application should occur in the spring just before the turf breaks dormancy, followed by a second application just prior to the summer heat stress period and a third application when the cool nighttime temperatures of the late summer or early fall return.

Other patch diseases

Summer patch. It has become increasingly evident over the past few years that summer patch, caused by *Phialophora graminicola*, is a primary disease of annual bluegrass during warm weather. It can also be found on Kentucky bluegrass and fine-leaf fescues, especially in the warmer areas of the cool-season grass region.

On annual bluegrass, the initial symptoms are a yellowing of the turf in patches, usually six inches to one foot in diameter, followed by a thinning of the turf, with the remaining turf turning bronze in color. If warm weather persists, all the turf in the patches may die.

Most of the creeping bentgrass cultivars are resistant and creeping bentgrass frequently can be seen recolonizing the centers of these patches. Preliminary data indicate that soil temperature and soil moisture may be important in the development of this disease.

Both excessive and limiting soil moisture during periods of hot weather may result in severe outbreaks of summer patch. Lighter and more frequent irrigations should help reduce the severity of summer patch.

Take-all patch. Take-all patch caused by *Gaeumannomyces graminis var. avenae* was formerly known as ophiobolus patch caused by *O. graminis*. This disease was originally thought to be confined to the Pacific Northwest. It has now been reported throughout the United States and Canada wherever creeping bentgrass is grown.

Effective chemicals

Fungicides for the management of the patch diseases and how to use them are discussed below:

Benomyl, thiophanate and *thiophanate-methyl*. These fungicides will manage all three diseases. They are all basically the same chemistry as far as mode of action is concerned. They are also systemically translocated upward and outward from where they enter the plant. For fungicides to be effective against these root pathogens, they need to be drenched into the soil where they can be taken up by the roots. If they are allowed to dry on the foliage, they will not manage the patch diseases.

For best results the area to be treated should be irrigated just prior to treatment.

Fenarimol. This fungicide will also manage all three patch diseases and does not need to be drenched in to be effective. For management of summer patch on annual bluegrass, treatments should be applied early in the season before the temperatures go into the 80 degrees Fahrenheit range on a permanent basis.

Iprodione. This fungicide is effective against necrotic ring spot and does not need to be drenched in to be effective.

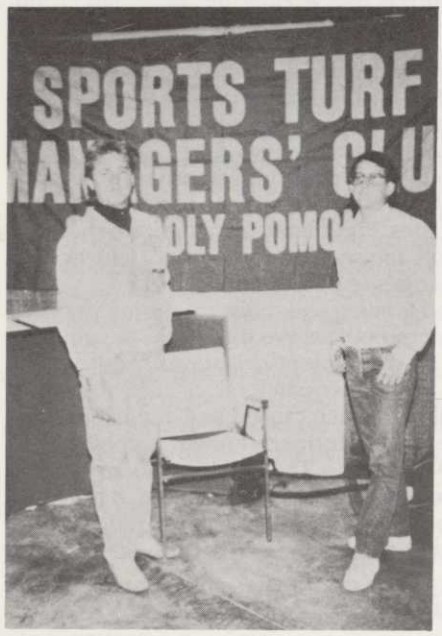
Triadimefon. This fungicide is effective against summer patch and does not need to be drenched in to be effective. There are some reports in the literature that suggest this product is only effective against summer patch when applied as a preventive treatment.

Landscape Management

GRAMS/GALLON TABLE

Gallons PPM	5	10	15	20	25	50	75	100	150	200	300	400
5	0.1	0.2	0.3	0.4	0.5	1.0	1.4	1.9	2.8	3.8	5.7	7.6
10	0.2	0.4	0.6	0.8	1.0	1.9	2.8	3.8	5.7	7.6	11.0	15.0
15	0.3	0.6	0.9	1.1	1.4	2.8	4.3	5.7	8.5	11.0	17.0	23.0
20	0.4	0.8	1.1	1.5	1.9	3.8	5.7	7.6	11.0	15.0	23.0	30.0
25	0.5	0.9	1.4	1.9	2.4	4.7	7.1	9.5	14.0	19.0	28.0	38.0
50	0.9	1.9	2.8	3.8	4.7	9.5	14.0	19.0	28.0	38.0	57.0	76.0
75	1.4	2.8	4.3	5.7	7.1	14.0	21.0	28.0	43.0	57.0	85.0	114.0
100	1.9	3.8	5.7	7.6	9.5	19.0	28.0	38.0	57.0	76.0	114.0	151.0
125	2.4	4.7	7.1	9.5	12.0	24.0	36.0	47.0	71.0	95.0	142.0	189.0
150	2.8	5.7	8.5	11.0	14.0	28.0	43.0	57.0	85.0	114.0	170.0	227.0
175	3.3	6.6	9.9	13.0	17.0	33.0	50.0	66.0	99.0	133.0	199.0	265.0
200	3.8	7.6	11.0	15.0	19.0	38.0	57.0	76.0	114.0	151.0	227.0	303.0
250	4.7	9.5	14.0	19.0	24.0	47.0	71.0	95.0	142.0	189.0	284.0	379.0
300	5.7	11.0	17.0	23.0	28.0	57.0	85.0	114.0	170.0	227.0	341.0	454.0
400	7.6	15.0	23.0	30.0	38.0	76.0	114.0	151.0	227.0	303.0	454.0	606.0

Memories From The Houston Meeting



Cal Poly Pomona students at the Sports Turf Manager's Club booth.

STMA President Mark Hodnick with students at the STMA booth.

Institute of Groundsmanship members with STMA President Mark Hodnick.

Sports Turf Managers Association Board of Directors

Sports Turf Manager is published in June, September, December and March by the Sports Turf Managers Association. Direct all editorial and advertising inquiries to the STMA Editorial Office at 210 Cartwright Boulevard, Massapequa Park, New York 11762, (516) 541-6902. Address all other inquiries to the Administrative Office at 400 N. Mountain Avenue, Suite 301, Upland, CA 91768 - (714) 981-9199.

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