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NORTHWEST TURFGRASS ASSOCIATION

1995 • 1996 Officers, Board of Directors and Staff

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EDITORIAL COMMENT:

During the last six months, a lot of changes have taken place with the Northwest Turfgrass Association. First, Roy Goss, Ph. D., was welcomed back as temporary Executive Director and now holds the title Executive Director Emeritus. I came on board as Executive Director in January and my wife, Linda, is an integral part of the NTA office.

I envision the NTA as being on the brink of a new era - starting it's second 50 years. Your Board of Directors has begun the process of joining together the different facets of professional turfgrass management in the Pacific Northwest to the betterment of all. They are working on regional funding for turfgrass research (see article, Common Cents by Larry Gilhuly, U. S. G. A., in this issue). Cooperative research projects with Washington State University and Oregon State University, matching funds from the United States Golf Association, cooperative ventures with the University of British Columbia, and matching funds from the Golf Course Superintendents of America Association are just some of the exciting possibilities.

We need to give more consideration to sports turf and general turf interests than we have in the recent past. Let me explain. Historically, the desire and demand for maximum quality turfgrass has been driven by golf. However, the lion's share of turfgrass management takes place in the non-golf area. The major producers of turf care products market approximately 75% of their goods to non-professional turf care and 25% to professional turf care. But, almost all research for turf care is driven by the smaller market segment, the professional turf care market. Golf turf has been in the leadership role regarding turfgrass research and the quality turf on major sports fields now seen on television were off-shoots from golf course fairway management developed in the 1980's.

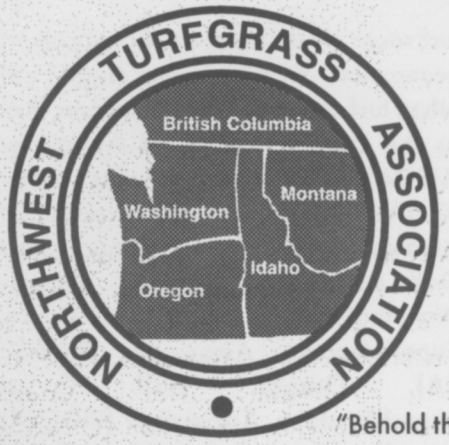
In the near future, we need to determine the economic impact of turfgrass management in the Pacific Northwest. Several states have determined that turf ranks close to the top in agricultural economics. Working more closely with other turf interested organizations such as the United States Golf Association (USGA), Oregon Golf Association (OGA), the Pacific Northwest Golf Association (PNGA), Washington State Golf Association (WSGA), Western Washington Golf Course Superintendents Association (WWGCSA), Oregon Golf Course Superintendents Association (OGCSA), Inland Empire Golf Course Superintendents Association (IEGCSA), Oregon State University (OSU), Washington State University (WSU), the University of British Columbia (UBC), Western Canada Turfgrass Association (WCTA), the Professional Golf Association (PGA), the Club Managers Association (CMA) and others on the T. U. R. F. (Turfgrass University Research Fund) advisory committee has greatly improved our efforts to support the turf industry.

Northwest Turfgrass Association's membership has hovered around 400 for a decade. Your Board of Directors has made great strides in laying a foundation for the future. There are many gifted professional people in the turf industry not counted in our membership. We need to make an attempt to welcome them to join our "grass roots" effort. I would like to challenge each of you to bring just one such individual to our membership.

Donald A. Clemans, CPAg

NORTHWEST TURFGRASS TOPICS

PRESIDENT'S MESSAGE



"Behold the Turtle, he makes progress only when he sticks his neck out."

James Byrant Conant

Like the turtle we are slowly, but surely, moving in a new direction at the Northwest Turfgrass Association. Fulfilling our mission statement, "Leadership in information, research and support of turf and grounds professionals" requires us to constantly review and evaluate all aspects of our association. Change becomes necessary, from time to time, because our industry continues to grow and diversify. Let me bring you up to date with some of the exciting news and developments at the NTA.

We were all very pleased to welcome aboard our new Executive Director, Mr. Donald Clemans, who began his duties with the new year. Most of you already know Don, either from his many years of experience working in many aspects of the turfgrass business or from his many years and countless hours of selfless, volunteer support of the industry. Don and his wife Linda, through their company, Turfgrass Connections, bring a new enthusiasm, a new understanding and a new management style to the N.T.A.

One of the obvious changes already initiated by Turfgrass Connections is the new and improved Turfgrass Topics. The new format of the Turfgrass Topics will, in addition to style changes, present information pertinent to the industry in a timely manner including: proceeding papers from our annual conference, industry news from throughout the region, updates on the progress of regional research projects of interest and the most current and complete calendar of Northwest turfgrass activities and events.

Please join the Board of Directors in thanking Dr. Roy Goss for his service as interim Executive Director during the transition process. Dr. Goss, longtime Executive Secretary of the NTA and a Director Emeritus has recently returned from Hawaii and brings to us once again the benefit of his experience, knowledge and wisdom. Welcome back, Roy and Marcie, and thank you.

Dr. Goss will help us kickoff our 50th annual conference in Victoria BC, as our keynote speaker. The theme for this year's educational conference is a celebration of the first fifty years of the Northwest Turfgrass Association. We will take some time in Victoria to reflect on and remember some of the rich history, the strong traditions, the important moments and, of course, some of the notable individuals who helped to begin and shape the NTA. We invite all of you to join us for our "golden anniversary" in Victoria this fall. Please contact Don Clemans if you have any historical artifacts, especially photographs, that you would like to share with us at the conference.

Our heartfelt condolences and deepest sympathies to NTA Board Director Kay Kinyon and his family who recently suffered the loss of their son in a traffic accident. Kay, our thoughts and prayers are with you.

Best Wishes for a speedy recovery to Bob Wick, Executive Director of the Western Canada Turfgrass Association, from his recent heart attack. The assistance of Bob and his wife Charlotte, has been invaluable to us in planning our Victoria Conference. Get well soon, Bob.

We all owe a big thank you to USGA Western Director, Larry Gilhuly, for his ongoing support of the Turfgrass Universities Research Fund (T.U.R.F.) program. The written purpose or mission statement of the T.U.R.F program is to: maintain effective funding in developing consistent, quality research projects and educational opportunities which benefit the golfing community. Articles written by Larry about the T.U.R.F. program were recently published in the both the USGA Green Section Record and USGA Golf Journal. Larry has been pushing the message of the T.U. R.F. program at various golf association, superintendent and management meetings all over the Northwest. His support of the program has been instrumental in gaining the solid support of the Washington State Golf Association. The WSGA now contributes $.50 per golfing member (ghin handicap) from dues. This amounts to over $45,000, per year. Now, there is also the possibility of the USGA matching funding on qualifying research projects. Turfgrass research in the Northwest is not dead and gone but alive and well thanks to the contributions of people like Larry Gilhuly.

The NTA sponsored a regional "summit" meeting in April. These meetings are designed to bring together the leadership of various areas of the industry to discuss mutual concerns and exchange ideas. The meeting this year was held at Waverley Country Club in Portland, Oregon, and was well attended. Communication between various industry interests and an exchange of dialogue has proven beneficial in the past and will be no less so in the future.

Speaking of summit meetings, the Northwest Turfgrass Association was asked to participate in the first bi-annual golf associations retreat held in April at Canterwood Country Club. Represented at this event were the Northwest PGA, the Pacific Northwest Golf Association(PNGA), The Oregon Golf Association (OGA), The Washington State Golf Association(WSGA) and the United States Golf Association (USGA). Each

group had the opportunity to present information about their association and to describe how they related to the groups represented. This is the first time, to my knowledge, that the NTA has been asked to participate in such an event. Interaction with the associations attending this meeting may provide benefits to us in the future.

The Columbia Cup will once again be held at Indian Summer Country Club near Olympia, Washington. The Toro Company and Western Equipment Distributors will sponsor the event with all proceeds going to turfgrass research. Last year $5,000 was raised for this purpose. The winner of the Columbia Cup will be the four man team from the Pacific Northwest with the lowest team gross best ball score. We will also identify the best golf course superintendent player in the Northwest by individual low gross score. Greg Hall from Fairwood Country Club in Renton, WA, is the defending champion. All NTA members are invited to participate and sign-up will be limited to the first 120 players. Last year was a lot of fun and host superintendent and committee chairman, Tom McCarthy, again has a tremendous event planned. We hope to see all of you at the Columbia Cup in July.

The Northwest Turfgrass Association is preparing for the future. Thanks to all of our staff, our volunteer Committee and Board Directors, our friends at the Universities and the USGA, our industry sponsors and our friends at the various golf associations, we approach the year 2000 stronger than ever. We hope that you and your fellow turf managers will be a part of our future. If you know of someone who isn't a member but should be, give them our office phone number (1-800-738-1617) so they can be a part of the best regiona1 turfgrass association in America.

Thomas A, Christy, CGCS
Inglewood Country Club
Kenmore, WA

USING COMMON CENTS!

Larry Gilhuly, Western Director, USGA Green Section

Have you ever watched a block of ice melt? It takes a long time and requires great patience, yet eventually the end product is usable. Much the same can be said about turfgrass research. It also requires patience; however, without fundamental research during the past several decades, nearly all of the current grasses, most of the cultural programs and the control of pests would not have been possible. In a nutshell, turfgrass research is vital and must continue!

While the USGA Green Section continues to fund projects throughout the United States, every portion of the country has different geographical problems. This has been a concern with turfgrass research funding as most projects are given the highest priority if they have a national impact. Regional research is generally addressed with money raised by local turf associations, superintendent groups and the turf industry. Generally, the amount of money raised is not adequate to conduct large scale research for the local golf community. The question remains, where can larger sources of funding be found for regional research? In the Pacific Northwest, the beginning of an answer has been started. During the past several decades, turfgrass research in the Pacific Northwest has been allocated through grants from the Northwest Turfgrass Association and other organizations. Occasional USGA grants have also been received; however, completing meaningful regional research with limited funding has been difficult. With this in mind, a new approach was taken and has proven successful with the recent announcement of $ .50/player/year allocation for turfgrass research by the WSGA Board of Directors. This will amount to an annual contribution of nearly $43,000.00 beginning in 1996. How and why this was accomplished is a good lesson in organization, timing and hard work.

THE PLAN

During the past several decades, golf associations in the Pacific Northwest had been approached to provide funding for turfgrass research. For various reasons, all efforts had been unsuccessful. Using this as a platform, rather than a plank, Mr. Tom Christy, CGCS, Riverside Golf and Country Club, in Oregon devised the T . U. R. F. (Turfgrass University Research Fund) program with other turf professionals in the Pacific Northwest. The plan was to spend at least two years educating regions' Golf Association Board members and club representatives about the need for regional turfgrass research and programs at Washington State University and Oregon State University.

THE APPROACH

Rather than approaching the golf associations with a gun to their heads and an extended hand, representatives from WSU, OSU, USGA, local golf course superintendent associations and the industry began educating golf associations about funding problems within the turf industry. As several Board of Directors for the Washington State Golf Association mentioned, "It just makes common sense! Golfers funding turfgrass research that will provide direct benefits back to the game can see results with their small dues increase ".

EDUCAT ION

During 1994 and 1995, education of the general golf community was also necessary. This was accomplished through presentations at the annual meetings of both golf associations. These presentations discussed in great detail the environmental concerns that our industry faces as well as regional research that could be funded. As with the Board of Directors for the golf associations, the response was over-

whelmingly positive with most in attendance also claiming, ""It just makes good sense!"

In addition to these formal presentations, a professional brochure was developed that describes the intent of the program and the organizations involved.

FOLLOW-UP

Once the presentations were completed, communication was continued between the Northwest Turfgrass Association and various golf organizations. Yearly meetings are held with representatives of each golf organization that determine where the funds will be spent and on which projects. This aspect of the organization was extremely important as there are representatives on the T. U. R. F. program from Washington State Golf Association, Oregon State Golf Association, CMA, PGA, the three local chapters of the GCSAA, USGA Green Section, Washington State University, Oregon State University and the golf industry. By pooling the interests and talents from every aspect of golf, the whole will be greater than the individual parts.

SUMMARY

Can this same idea work in your area of the country? Absolutely, if you have individuals that are willing to put in their time to educate the public on local concerns. It also requires local golf association executives that are willing to listen and understand the needs of our industry. For this, a large debt of gratitude is given to Mr. John Bodenhamer, Executive Director, Washington State Golf Association, and Mr. Jim Gibbons, Executive Director, Oregon State Golf Association. Without these understanding gentlemen, turfgrass research in the Pacific Northwest would not be proceeding forward with a bright future. In Washington and Oregon, the funding of turfgrass research will now be completed with "Common Cents!"

THE GOLFER' S GOLF COURSE EXPECTATIONS AND CONCERNS

The following "Top 10" list was compiled based on the comments of a cross section of members of the PNGA and WSGA Boards Of Directors, volunteers, and other association members and included men and women of varying ages and playing abilities. The question to which they responded was:
"What expectations do you have regarding the playing conditions, maintenance, and overall atmosphere of a golf course (home or away) when you play?"

THE GOLFER'S "TOP 10"

1. SMOOTH GREENS
2. NOTICE OF AERIFICATION
3. OPEN MINDED SUPERINTENDENT
4. TEES ALIGNED PROPERLY/HOLE LOCATIONS NOT SET UNFAIR
5. BUNKERS MAINTAINED (REGULARLY RAKED/EDGED)
6. FIRM (DRY) CONDITIONS
7. PROTECT THE ENVIRONMENT
8. LEVEL TEES
9. GREEN GRASS
10. VARIETY IN COURSE SETUP

MAINTENANCE PRACTICES AND HOW THEY EFFECT THE COURSE RATING

1. CHANGE IN EFFECTIVE PLAYING LENGTH

A change of 22(18) yards in the playing length of the golf course will change the USGA Course Rating 0.1 strokes. A change of 93(85) yards will change the Slope Rating 1point.

a. Tee placement - The most obvious way to increase or decrease the effective playing length of the golf course is to move all the tee markers behind or ahead of the permanent yardage markers on each hole. EXAMPLE: Placing the tee markers yards ahead of the permanent markers on each of the 18 holes decreases the overall length of the course 180 yards, which results in the Course Rating being 0.8(1.0) strokes too high and the Slope Rating being 2 points too high.

b. Dogleg or forced layup - Adding obstacles or moving tees that cause the Scratch Golfer to layup short of their normal 250(210) yard landing area or the Bogey Golfer to layup short of their normal 200(150) yard landing area increases their ,respective Course Ratings. Removing any obstacle or lengthening the distance to a dogleg

OBSTACLE/EFF.LENGTH F ACTOR CHANGED	CHANGE IN USGA C/R	CHANGE IN SLOPE RATING
FAIRWAY	+ or - 0.3	+ or-1
ROUGH HEIGHT	+ or - 0.7	+or-5
GREEN TARGET	+ or - 0.2	+or-l
GREEN SURFACE	+ or - 0.2	+or-l
TEE PLACEMENT	+ or - 0.8	+or-2
ROLL	+ or - 0.5	+or-l
TOTAL CHANGE	+ or - 2.7	+or-11

that has caused a forced layup will result in the Course Rating actually decreasing.

c. Roll - Softening fairways increases the effective playing length while hardening them decreases the effective playing length. If over-night watering results in the condition of the fairways changing from average to soft, the USGA Course Rating will be increased 0.2(0.3)strokes. To a greater extent, if the increased watering results in the condition of the fairways changing from firm to average, the USGA Course Rating will increase 0.5(0.6) strokes and the Slope Rating will increase 1 point.

2. CHANGES IN OBSTACLES

In general, changes in obstacles has less effect on USGA Course and Slope Ratings than changing the effective playing length. Increasing or an obstacle rating by only 1 point will result in the USGA Course Rating being adjusted on 11 one-thousandths of a stroke. In order for the USGA Course Rating to change 0.l strokes you must have a change of 9 points in the obstacle ratings.

Listed below are obstacles that are directly affected by maintenance practices and how they con change the USGA Course and Slope Ratings.

a. Fairway - Changing the mowing pattern on all par 4 and par 5 holes on the course by 10 yards per hole will adjust the USGA Course Rating 0.3 strokes and the Slope Rating 1 l/2 points.

b. Rough and Recoverability - Changing the rough height by 1 inch on all 18 holes adjusts the USGA Course Rating 0.7 strokes and the Slope Rating 5 points.

c. Green Target - Changing the holding properties of the greens because of over/under watering from "soft" to "medium" or "medium" to "hard" will adjust the USGA Course Rating 0.2 strokes and the Slope Rating 1 point.

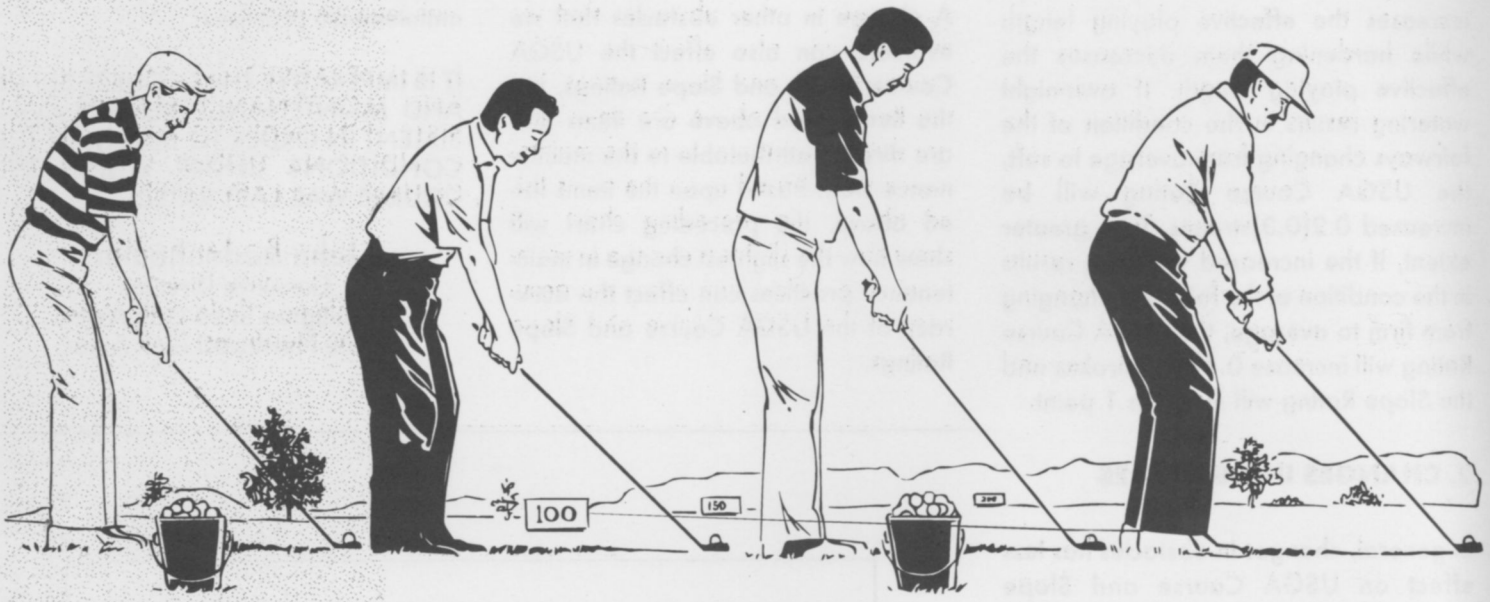
d. Green Surface - A change of 1 to 1 1/2 feet in the Stimpmeter speed on all 18 greens will adjust the USGA Course Rating 0.2 strokes and the Slope Rating 1 point.

A change in other obstacles that we evaluate can also effect the USGA Course Rating and Slope Ratings, but the items listed above are items that are directly attributable to the maintenance staff. Based upon the items listed above, the preceding chart will show how the slightest change in maintenance practices can effect the accuracy of the USGA Course and Slope Ratings.

As can be seen by the chart preceding, it would be possible that inaccuracies of 5 strokes or more in the USGA Course Rating and 20 points or more in the Slope Rating can result from inconsistent maintenance practices.

IT IS IMPERATIVE THAT COURSE SET-UP AND MAINTENANCE REMAIN CONSISTENT IN ORDER TO MAINTAIN THE CONDITIONS UNDER WHICH THE COURSE WAS LAST RATED

John Bodenhamer
Executive Director
Washington State Golf Assoc.
Pacific Northwest Golf Assoc.



TOPDRESSING WITH CRUMB RUBBER FROM USED TIRES ON ATHLETIC FIELDS AND OTHER HIGH TRAFFIC TURF AREAS.

Dr. J.N. Rogers, III, and J.T. Vanini Department of Crop and Soil Sciences Michigan State University

INTRODUCTION

Over the last few years the focus on athletic field maintenance has intensified. Primary reasons for this occurring include an increase in recreational sport activity, the gradual shift from artificial turf to natural grass, and an increase in concern for player safety and liability. Most of this maintenance responsibility falls on the shoulders of athletic department administrators and turf managers who desperately need more information specific to their turf problems. The athletic field research program at Michigan State University has feverishly attempted to keep up with these shift in attitudes through various turfgrass studies. Most of the studies have been aimed toward increasing turfgrass wear tolerance through variety testing or physically protecting the soil from compaction and the plant from damage.

In 1991, 234 million tires were discarded in the United States, many of them in landfills. However, 25 out of 47 states have prohibited these tires from landfills, and 46 out of the 47 have legislated government funding to recycle the tires (1). This usually means the tire must be broken down into very small pieces and subsequent uses for these parts sought out. While the metal/steel in the tire are easily sold, finding a market for crumb rubber particles (1/4" and less) has been more challenging. One idea researched at Michigan State University since 1990, is the use of crumb rubber as a soil amendment in different turfgrass situations. The theory is that the crumb rubber particles introduced to the turf/soil system will increase turfgrass wear tolerance, reduce soil compaction, and subsequently reduce turf system. inputs.

Original studies of incorporating crumb rubber into the soil profile have proven it to be an ideal soil amendment for high trafficked areas. However, it required taking an area out of play . for three or four months, an often impractical task for an athletic field manager. Thus, the objective of this research was to provide an incorporation method which is less disruptive and easier than tilling crumb rubber into the soil profile. One method investigated was topdressing the crumb rubber into the turf/soil surface.Topdressing plays many roles in enhancing the turfgrass environment. Among these benefits include thatch modification, a smooth playing surface, modification of the soil surface, and winter protection (2). Putting greens and sportsfields profit from this maintenance practice, primarily because they are intense traffic areas with high quality standards, and the games played rely on the importance of a smooth and uniform surface. Specifically, soccer and football fields are subject to more abrasive action due to the nature of the games played on them. In most cases, a sand/organic matter mix or 100% sand is used to promote the aforementioned qualities. However, the most intensively worn out areas, usually by .mid-season, are past the point of repair in terms of turfgrass cover, and topdressing will not alleviate the problem. This can be detrimental for the playing field due to the intense traffic areas on the field becoming the most sparse areas or the least dense turf stand (Soccer and football fields are most vulnerable to wear in between the hashmarks and the goal mouth and mid-field portions, respectively).This effect is magnified on low to medium maintenance sports fields. With the absence of turf, the aesthetics and playing field quality are dramatically reduced which can ultimately lead to player injuries. Additionally, sand has more abrasive edges, leading to scarification of the crown tissue area particularly those areas under stress and poor environmental conditions for recovery. The abrasive action of the sand can also be detrimental to any high traffic turf area as well as those under reduced light, (e.g. shade) growing, and recuperative conditions (ie. cooler weather). The crown tissue area of the turfgrass plant is the source of regeneration of leaves, stems, and roots. While the importance of keeping it alive is obvious, just as important is to provide a favorable environment for this regeneration to take place. Once this area is thrashed and mangled, either by the sand particles or the play on the field, the plant could very easily die thus resulting in bare soil. Consequently, aesthetics and the playability are dramatically reduced, and the potential of surface-related injuries increases exponentially.Thus the hypothesis was that topdressing crumb rubber, applied in the same manner as any other. topdressing, can dramatically reduce the abrasive action caused by the nature of the athletic activity. With an increase in surface area and rounder edges, (in comparison to sand), the crumb rubber is able to cushion the crown tissue area while still providing a smooth and uniform surface, improve overall turf quality and reduce compaction. Inevitably, this improves the playability and aesthetics of the playing surface. Further, if areas that are reseeded or established on an annual or frequent basis are not worn substantially because of topdressing with crumb rubber, one can logically assume a reduction in inputs for turfgrass management and subsequent dollar savings.

Materials and Methods A trial plot was established on an 80% sand . 20 % peat mix (Table 1) at the Hancock Turfgrass Research Center (HTRC) at Michigan State University, East Lansing, Michigan on 29 July 1993 to determine optimum topdressing rates for high trafficked areas, specifically targeting high school and collegiate athletic fields and playgrounds. To determine optimal particle sizes and application rates, crumb rubber

was topdressed in a 2x5 randomized complete block design with three replications. There were two sizes of crumb rubber (10/20 mesh and l/4" size) and five treatment amounts (0.0, 0.05, 0.10, 0.125, and 0.25 inch) added to the surface in equal applications on 29 July, 11 September, and 5 October 1993, and reached final levels at 0.0, 0.15, 0.30, 0.38, and 0.75 inch. Crumb rubber was not applied in 1994.Treatment areas were l0ft x 12ft. Crumb rubber was topdressed with a rotary spreader and then dragged in for as even distribution as possible on a perennial ryegrass (Lolium perenne var. Dandy, Target, and Delray) and Kentucky bluegrass (Poa pratensis var. Argyle, Rugby, and Midnight) turfgrass stand.(Because of the relatively small plot sizes, the rotary spreader was a suitable means for application. On larger areas, a belt-type topdresser works excellent.). On 16 May 1994 trafficked lanes were slit-seeded with Lolium perenne var. Dandy at 1.1 lbs./l000 sq ft. The rubber particles eventually settle down to the soil surface. However, crumb rubber will not transgress through the soil profile because of being lighter or having a lower particle density. (rubber's particle density is 1.2 g/cc versus soil particle density . at 2.65 g/cc).During the study, measurements were made as to the crumb rubber's effectiveness in reducing impact absorption (surface hardness measured with the Clegg Impact Tester) (3), reducing compaction (thereby providing a favorable environment for growth and recovery), improving turfgrass color, and sustaining turfgrass density.

Table 1. Crumb Rubber Sieve Analysis for the Crumb Rubber Topdressing Study at the Hancock Turfgrass Research Center, 1993.

Category(Size range)	Sand(%)[1]	1/4" size(%)	10/20 mesh(%)
Gravel(> 2mm)	0.9	93.3	16.6
Very Coarse(1-2mm)	8.8	3.7	39.4
Coarse(1-.50mm)	44.3	1.5	17.5
Medium(.50-.25mm)	39.6	1.3	22.4
Fine(.25-.10mm)	5.8	0.2	3.8
Very Fine(.10-.05mm)	0.6	0.0	0.3
Total Percentage	100	100	100

Note All particle size figures are averaged over three samples.

[1] The sieve analysis of the sand used for the modified rootzone for the Crumb Rubber Topdressing Study at the Hancock Turfgrass Research Center.

In 1994, impact absorption was collected by the Clegg Impact Soil Tester (2.25kg hammer). Impact absorption values were recorded with the Brüel and Kjaer 2515 Vibration Analyzer, rep1acing the read-out box. This analyzer allowed for further evaluation of surface hardness characteristics as described by Rogers and Waddington at The Pennsylvania State University (4). The values recorded was an average of four measurements. Shear resistance was measured with the Eijkelkamp Shearvane (5). The value recorded was an average of three measurements. Surface temperature was read by the Barnant 115 ThermocouplerThermometer. Soil moisture recordings were provided by the gravimetric method (6).Three soil samples (7.6 cm) per treatment were used for this method. Density and color ratings were observed on 27 October and 4 December.

In 1993, wear treatments were initiated on 26 August and ended 14 November and in 1994, wear treatments were initiated on 6 September and ended 15 November, for a total of 48 games simulated each year. Wear treatments were applied by the Brinkman Traffic Simulator (BTS) (7). Two passes by . the BTS is equivalent to the traffic experienced in one football game between the hashmarks between the forty. yardlines (8). The field tests conducted were to originally assess athletic field conditions. However, we quickly realized the results observed translated to a wide range of highly trafficked and compacted areas commonly seen on campuses, from intramural fields, game and practice fields to areas where a Saturday afternoon tailgate party takes place.

RESULTS AND DISCUSSION

While our data were collected throughout the 1993 and 1994 seasons, due to spatial constraints, our purpose is to only highlight the trends we observed in 1994, and results from one data collection date will be presented. Whenever a test regarding turfgrass wear and soil compaction is conducted, chief among the components to be evaluated following the wear is turfgrass density and color. These are important to the field manager as they are often indicators of good playing conditions. Turf grass color and density . ratings provided substantial evidence that turfgrass conditions have been maintained despite intense traffic (Table 2). These findings are consistent throughout the 1994 season and were attributed to the crumb rubber particles protecting the crown tissue area of the plant (Values shown are after 40 games simulated with the BTS). During the 1993 season the density ratings were dependent upon the amount of rubber used as well as the size of the rubber (data not included). We had higher turfgrass densities where we used the smaller rubber size (10/20 mesh) and high rates. We believe this was because the smaller particles were able to work to the surface faster, in 1993 during the fall, thus protecting the plant. When this relationship was not evident in 1994 it was logical to conclude the larger particles had also worked to the surface during the winter and were also now providing the protection to the turfgrass

plant. This is significant because the smaller particle sizes are more expensive, an important factor in all decision making processes.While there were no turfgrass color responses in 1994 regardless of crumb rubber size or rate, we saw a increase in color immediately after putting the rubber down in 1993. This response was positively correlated to crumb rubber rate. We still do not have the exact reason for this response as we saw no increases in color in 1994.The amount of crumb rubber used as a topdressing played an important role in affecting surface characteristics. Impact absorption values (Gmax) were significantly lower at high crumb rubber rates in 1993.While this phenomenon did not continue in 1994, the surface characteristics, duration of impact (Tt), time to peak (Tp), and rebound ratio (rr%) showed the effectiveness of crumb rubber (0.75") in providing a softer, more resilient surface (Table 3). Tp, Tt, and rr% values increased at the high rates of crumb rub-

Table 2. Effects of crumb rubber size and topdressing rates on color and density ratings on a Kentucky bluegrass\perennial ryegrass stand under trafficked conditions at the Hancock Turfgrass Research Center, East Lansing, MI. 1994.

	Color Ratings		Density Ratings	
Crumb Rubber Particle Size	27 Oct	4 Dec	27 Oct	4 Dec
1/4"	5.9	4.6	67.7	60.0
10/20 mesh	5.9	4.4	72.1	64.0
Significance+	-NS-	-NS-	-NS-	-NS-
Crumb Rubber Topdressing Depth				
0.00"	5.7	4.7	53.3	41.7
0.15"	6.0	4.7	61.7	50.8
0.30"	5.9	4.6	71.7	63.3
0.38"	5.7	4.6	73.3	65.8
0.75"	6.2	4.1	89.5	88.3
Lsd (0.05)	-NS-	-NS-	11.0	14.3

Note Scale for Color Ratings: 1-9; 1-Brown, 9-Best, 6-Acceptable

+ indicates a significant difference at the 0.05 level.

Table 3. Effects of crumb rubber size and topdressing rates on a variety of field measurement values measured on a Kentucky bluegrass/perennial ryegrass stand after 46 football games simulated Hancock Turfgrass Research Center, Michigan State University, East Lansing, MI, on 10 November 1994.

Crumb Rubber Particle Size	Impact absorpt. (G_{max})	time of duration (Tt)	time to peak (Tp)	Rebound Ratio	Shear resist. (Nm)	Soil Moisture(%)	Surface Temp. (°F)
1/4"	60	10.3	5.7	0.216	14.2	16.3	47.5
10/20 mesh	62	10.2	5.8	0.236	14.7	16.6	47.8
Significance+	-NS-	-NS-	-NS-	-NS-	-NS-	-NS-	-NS-
Crumb Rubber Topdressing Depth							
0.00"	58	10.1	5.6	0.168	11.9	16.2	47.6
0.15"	60	9.7	6.1	0.181	15.3	16.5	47.6
0.30"	62	9.9	5.5	0.210	13.7	16.3	47.6
0.38"	61	10.5	5.7	0.257	16.0	16.8	47.7
0.75"	62	11.1	5.8	0.314	15.4	16.4	47.8
Lsd (0.05)	-NS-	1.0	0.4	0.03	2.1	-NS-	-NS-

ber. These characteristics are important parameters as they further define critical elements of surface hardness, such as, duration and severity of impact as described by Rogers and Waddington at the Pennsylvania State University (3). When an object is in contact with a surface the longer the time of impact the more resilient that surface and more likely the surface will resist compaction. Crumb rubber particle size was not significant in regards to these surface hardness characteristics.In 1993, shear values decreased significantly as crumb rubber levels increased. In 1994, as crumb rubber levels increased, shear values increased significantly and stabilized. However, differences between particle sizes were not significant. To help explain this scenario, crumb rubber was topdressed in 1993 but not 1994. In 1993, the crumb rubber had not settled down to the crown tissue area, when the shear vane apparatus was applied to take a measurement, the teeth or fins could not grip the surface as well. One possible correlation to this is when a player digs his/her cleat into the surface, and it slips out from underneath. However in 1994, after a growing season and the crumb rubber settled to the soil surface and stabilized, shear values increased significantly as crumb rubber levels increased. This settling process, in part, also explains the lack of significant differences in impact absorption values in 1994 as compared to 1993.In 1993, surface temperatures were significantly higher as crumb rubber levels increased. Although data was not significant on 10 November, the effect of crumb rubber on surface temperatures was significant due to the relationship between turfgrass growth and soil temperatures. As surface temperatures drop below 50°F the growth and recovery of turfgrass slows. Keeping temperatures higher can lead to increased playing quality conditions. This also holds true in the spring time as well, a factor very important to golf courses in the northern United States. For instance, on 7 April (data unpublished), there was a 7.5°F from the check treatment to the highest crumb rubber treatment. The exposure of crumb rubber at the surface heats the turf surface and revitalizes dormant turfgrass. This translates to a quicker spring green-up, an important factor for any field used in early spring. One concern we had was the effect of the crumb rubber on turfgrass during the summer. As the density of the turf stand increases during the growing season, the effect of crumb rubber on surface temperatures moderates due to the shading effect of the turfgrass, an effect measured and confirmed during 1993 and 1994.Although crumb rubber is an excellent tool, it is not a "cure-all". Therefore the use of crumb rubber cannot be an exclusive means for maintaining turf in any high traffic turfgrass area, and must be used as a tool integrated into the management program. It should also be noted that we recommend the field manager must have a 100% turfgrass stand, or as close to this as possible, before making any crumb rubber applications. Therefore, our research does conclude topdressing between 0.375 and 0.75 inch (not more than 0.25 inch at any given application) would be a good level to achieve for high traffic areas.Thus, the 'Take Home Message" is that crumb rubber will not resurrect the turfgrass, but it will protect the crown tissue area of the plant which becomes vital in improving the longevity and quality of a high traffic turfgrass stand. This is shown in the mag-

nified photographs of sand and crumb rubber particles (Figures 1-4). The sand particles have sharp edges and will tear turfgrass tissue. Crumb rubber has more rounded edges and subsequently there is less abrasive action to the turf plant While the research to date has been extremely promising, we have not covered every scenario in the turfgrass industry. First, we do have confidence that the crumb rubber topdressed at 0.50 to 0.75 inch levels (1200 to 1800 lbs/1000 sq ft) will increase turf grass wear tolerance and prevent soil compaction in turfgrass maintained above 0.63 inch. We have done little testing at cutting heights below 0.63 inch, and while we remain optimistic that crumb rubber would provide similar findings, obviously there will be some limits. Second, except for early in 1993, we have seen little differences in response from different crumb rubber sizes in our studies. However, we have noted the smaller sizes are easier to work with in terms of working into the turf area.. It comes as no surprise this is a more expensive product, and we also caution against using a too finely granulated product as this could cause a detrimental effect in the soil profile relationship. A cost breakdown of 1000 sq ft for re-establishing an area versus topdressing crumb rubber can provide an idea of the necessary steps involved to continually re-establish an area. This is only an estimation of the costs however it does provide an idea of the dollar savings that can be attained over an extended period of time..Another point not researched to date is the effect of crumb rubber on warm season grasses. We have no reservations about it protecting the turf plant but there is some question as to overseeding cool season grasses in the fall. There is a need for research in this area. The final area is the question of contamination from crumb rubber particles in terms of soil and water quality. We have had crumb rubber tilled in the ground at MSU since 1990 and monitor soil samples annually. The major constituents of rubber are iron, sulfur, and zinc. While iron and zinc levels have increased in our tests, none have approached levels of concern nor do these elements pose concerns to the water qualit., At no time have we seen any toxicity to the turfgrass plant during our studies.

We are confident, we have found another use for a difficult to reuse product that poses environmental hazards and takes up landfill space. When topdressed, crumb rubber can extend turfgrass wear tolerance and reduce soil compaction in high traffic areas. These high traffic areas exist on every athletic field as well as walk paths, golf courses, and main event venues on campus. The more this product
is researched and tested the more uses will be found. Michigan State University has a patent pending on this use of crumb rubber and has sold the use rights to Jai-Tire Industries, Denver, CO (800-795-TIRE). Royalties paid to Michigan State University will go toward turfgrass research. A deep appreciation to the Michigan Turfgrass Foundation goes out for funding the assistantship to research this project.

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8 Cockerham, Stephen T. 1989, Cleated-shoe traffic concentrated on a football field. Califomia Turfgrass Culture. 39:(3&4) p.11-12. Slides for Crumb Rubber Article A. Example of place to use crumb rubber at ends of cart paths.B, Example of place to use crumb rubber at tee entrance.
C. Example of place to use crumb rubber at limited access points on golf course.
D. Topdressing crumb rubber on field to be moved into Pontiac Silverdome, June 1994.
E. Sand magnified 9400x - Note sharp edges.
F. Crumb rubber magnified 9400x - Note rounded edges.
G. Crumb rubber study at Hancock Turfgrass Research Center, November 1993 after 75 passes with BTS,

Table 4. Estimated costs to re-establish a 1000ft² area annually per year versus topdressing with crumb rubber at 0.75 in. for a five year period.

Items	Re-establishing	Topdressing Crumb Rubber
Seed, Fertilizer, Labor, Aeration, Watering, and Seedbed prep. for one year.	$400	$400
Topdressing crumb rubber at 0.75" (1800lb. x $.0.15/lb.)	$0	$270
Re-establishing annually for four more years at $400/year.	$1600	$0
Miscellaneous costs	$200	$200
Total	$2200*	$870*

* Prices are an estimation of costs and do not include equipment or inflation.

Maintenance Standards For Soil Base Soccer Fields

by Tom Cook, Oregon State University Horticulture Dept.

Good quality soccer fields are rare based on my observations of fields in Oregon. Ironically, the poor condition of many of the fields isn't from lack of maintenance inputs. The real problems include lapses in maintenance at critical times of the year and often heroic but misguided attempts at major cultural practices. By performing desirable maintenance practices at appropriate times, maintenance personnel can get the most out of the resources at their disposal. What follows are guidelines for maintenance of fields at levels ranging from professional quality fields to unirrigated youth soccer league fields. I've titled the different levels of maintenance as follows: Professional Quality, Good Quality, Budget Irrigated, and Non-Irrigated. For this paper I have used the Willamette Valley in Oregon as the climatic site for recommended maintenance practices. With that in mind the guide will be most useful throughout Western Oregon, Western Washington, and perhaps lower Western British Columbia.

A thought to ponder is that if you asked several "experts" for their opinions on how to best maintain fields you would probably get several different answers. The key is to discern between matters of style and matters of substance. Style issues involve choices of fertilizers, grass cultivars, and which machine does the best job of coring or dethatching. The important point is that people who know what they are trying to accomplish will get good results with whatever machine they use, or whatever fertilizer they apply. When I look at other peoples recommendations, I try to determine if what they advise will work, not whether they advise doing exactly what I would do. Maybe the point is simply that there is no one way to do anything. Decide what needs to be done and then figure out how to achieve your goals using the resources you have at your disposal. I cringe when maintenance people tell me they knew what to do but they didn't do anything because they didn't have just the right machine.

Matters of substance are more important to worry about. Over the years I've concluded that soil fields are by nature "mudholes" and will be generally wet and mushy during the winter season. When I see recommendations to install subsurface drains on these fields to improve drainage I get angry because I know it won't work. Likewise when I see recommendations for miracle penetrants and soil enhancers I get frustrated because they promise to do things they just can't do. The old adage that, "If it seems to be too good to be true it probably is," is appropriate here. With soil fields it is important to accept their limitations and work to get as much mileage out of them as possible. With that in mind please read on!

PROFESSIONAL QUALITY FIELDS

Most of us probably dream about the mythical perfect soccer field that is smooth, flat, dense, and green. With a perfect profile and grass mowed short it plays fast, gives perfect bounces, and is easy on the players feet. Well, you can forget about perfection because we are starting with a native soil profile and soil fields will never be perfect. What follows are my recommendations for cultural practices that can give the best possible soil base field. To be honest, I doubt that even most pro's get to do all of the things I will list. The real purpose is to create a model against which you can judge your current maintenance practices.

1. MOWING

Mow 2 times per week April through October Mow weekly February through March and November Mow as needed during December through January Total projected mowings per year = 70

2. CLIPPING REMOVAL

Sweep, vacuum, or otherwise remove clippings from the turf after each mowing from April through October. Projected clipping collections per year = 56

3. FERTILIZATION

Fertilize with an N-P-K approximating ratio 5-1-4. Use products containing mixtures of soluble and controlled release nitrogen. Slow release sources such as Nutralene, IBDU, Polyon, Poly-S, ESN, etc., are products of choice. Avoid straight soluble sources to avoid flush growth and peak and valley growth. Time applications for mid-spring, early June, mid to late July, mid September, mid October, and early December, depending on turf vigor and appearance. With a consistent application schedule, rates of 1lb N / 1000 sq. ft per application, should be adequate to produce acceptable turf. Turf under low fertility may require up to 2 1bs N/1000 sq. ft to achieve acceptable turf quality. Actual application rates and frequencies will vary for every field and can only be determined by observing turf performance. If you fertilized a field that is 75 yds. by 110 yds. at a rate of 1 lb. N/1000 sq. ft. you would need approximately 170 lbs. N. Using a 25% N fertilizer, you would need 680 lbs. of fertilizer for each application. Six applications per year with a 25% N product would require 4080 lbs. of fertilizer.

4. OVERSEEDING WITH PERENNIAL RYEGRASS

Plan on one to three overseedings per year. Overseed the entire field at least one time per year. Target seedings on areas such as goal mouths, and field

centers are acceptable if the rest of the field is in good shape. In years when play destroys significant areas, reseeding should follow tilling and regrading.

Overseeding rates:

General overseeding, modest wear = 5 lbs seed/l000 sq ft
(5 lbs seed/l000 sq ft) X (170,000 sq ft/field) =
850 lbs seed/field/overseeding

Target overseeding heavy wear areas = 10 lbs seed/l000 sq ft

Timing for overseeding:

– General or target overseeding after the fall season is over.
Do this even as late as mid to late November.
– General or target overseeding in early spring. Do this around spring break on school fields, or early April on non-school fields.
– General or target overseeding in late spring. Do this in June as soon as school is out or when the spring season is over.

5. CORING

Coring soil fields frequently is important for minimizing surface compaction and improving infiltration of irrigation water. Core fields 3 to 4 times per year with conventional 0.75" hollow tines. Sweep up cores, drag and mow cores, or use a core pulverizing machine to break up cores.

Time coring for late March to mid April, once school is out in June, mid August before fall sports begin, and at the end of the fall season if the field is firm enough to drive on. Avoid coring during the playing season to avoid objectionable debris on the field during play.

On fields with a history of poor drainage consider vertidraining rather than coring during the June and/or August periods. Set vertidrain solid tines to a depth of 8" to 12" or as deep as possible up to those depths.

6. TOPDRESSING

Topdress fields 4 to 5 times per year using golf green quality sand. Apply sand with machinery designed for that purpose avoiding large vehicles such as dump trucks. Rutting caused by dump trucks does more damage than good. Time topdressings during spring through fall when the fields are drier and less likely to be rutted by equipment. Topdress before irrigating, not after.

As used here topdressing serves to firm and smooth the field and helps provide top quality surfaces. Topdressing does not improve drainage.

Each topdressing should total approximately 0.25" per application. A sequence of 5 topdressings per year will put a maximum of 1.25" of sand on a field. A realistic target is about l" of sand per year for two to three years followed by 0.5" to 0.75" annually after that.

Total volume of sand required per year for a 75 yd by 110 yd. field:
assuming 5 applications per year at 0.25"each for a total of l.25" comes to 656 cu yd/ field/ year. For a single application on a regulation soccer field, plan on approximately 130 cu. yd. of sand.

7. THATCH REMOVAL

Once per year in conjunction with overseeding and coring use a flail or solid blade dethatcher to remove organic debris that has accumulated at the surface. This debris is often composed of fresh grass parts that have been ground into the surface via players cleats. In that regard it is different than thatch we might see in an undisturbed lawn. Its important to remove as much of this material as possible to prevent development of an organic bog that becomes anaerobic and causes the surface to become impervious to water.

Dethatching is best timed in June when the soil is firm and relatively dry. A typical sequence of activities might include coring, dethatching, debris removal, overseeding, topdressing, and finally fertilization.

GOOD QUALITY FIELDS

Good quality fields are typical of the good fields we occasionally see in parks or at some schools. They are green, dense, and relatively smooth. They always stand out in the summer and early fall periods. Once late fall and the rainy season arrive they fall apart but are generally better than most other soil fields in the area. They aren't as well as groomed professional quality fields but most of us would be happy if they were our fields. As you'll see, the numbers will change but general care is quite similar to professional quality fields.

1. MOWING

Mow weekly March through October
Mow as needed November through February

Total projected mowings per year range from 40 to 45.

2. CLIPPING REMOVAL

Sweep, vacuum, or otherwise remove clippings from turf after each mowing from April through October.

Projected clipping collections per year = 28

3. FERTILIZATION

Fertilize with an N-P-K ratio approximating 5-1-4. Use products containing mixtures of soluble and controlled release nitrogen. Slow release sources such as

Nutralene, IBDU, Polyon, Poly-S, ESN, or similar products are products of choice Straight soluble sources should be avoided during the main growing season but may be useful during late fall to enhance winter growth. Time applications for mid-spring, early June, mid September, late October, and mid to late December, depending on turf vigor and appearance. On healthy turf, rates of 1 1b N/l000 sq ft per application, should be adequate to maintain functional turf. Turf that is weak may require up to 2 lb N/l000 sq. ft. to achieve acceptable turf quality. Actual application rates and timing will vary for every field and should be based on observation and your judgment.

Using a 25% N fertilizer applied 5 times per year at 1 lb. N /1000 sq ft on a full-sized soccer field you can plan for 3400 1bs. fertilizer / year.

4. OVERSEEDING

Plan on using enough seed to overseed the entire field at least once. Most of the time overseeding will take the form of target seeding heavy wear areas such as goal mouths and field centers. In years when use destroys turf completely and grades are ruined by wet weather play, plan on tilling and grading affected areas and reseeding rather than simply overseeding.

Overseeding rates:

General overseeding = 5 lbs seed/l000 sq ft
Plan on 850 lbs seed/full size field

Core fields 2 to 3 times per year with conventional 0.75" hollow tines. Sweep up cores, drag and mow cores, or use a core pulverizing machine to break up cores.

Time coring for late March to mid April, once school is out in June, in mid-August before fall sports begin, and at the end of the season if the field is firm enough to drive on.

On fields with a history of poor drainage, consider substituting vertidraining during the June period. Set vertidrain solid tines to a depth of 8'' to 12" or as deep as possible up to those depths.

6. TOPDRESSING

Even on good fields it is generally not feasible to topdress consistently. Topdressing is a labor intensive activity that few schools can even consider. What I generally see is sporadic heavy topdressing that does more harm than good. The few departments I know that have attempted topdressing, have rarely been able to sustain the effort more than 2 to 3 years. Results are generally promising if you can sustain a program at least 3 years, Otherwise it's not of much value.

A single field topdressed 5 times at 0.25" per topdressing requires approximately 650 cu yd. of sand. Plan on 130 cu yd. for a single topdressing.

To get the most mileage out of a topdressing program concentrate applications in the dry months from April through August. Shoot for monthly applications of no more than 0.25" each. The goal is to buildup a fairly uniform layer of sand prior to the wet season.

7. THATCH REMOVAL

Once per year in conjunction with overseeding and coring, use a flail or solid blade dethatcher to remove organic debris that has accumulated at the surface. Removing thatch helps prevent development of an organic bog that plugs the surface and often contributes to the anaerobic stench common on sports fields.

Dethatching is best timed in June when soil is firm and relatively dry. A typical sequence of activities might include coring, dethatching, debris removal, overseeding, topdressing, and finally fertilization.

BUDGET IRRIGATED FIELDS

These are typically poorly maintained fields, with permanent bare areas in goals and field centers. Often grass is not watered in summer until a few weeks before play begins. In some cases the water is turned on in spring and not turned off until late fall. As a rule these fields are not routinely overseeded, are rarely fertilized, are occasionally buried under heavy sand topdressings, and provide poor quality surfaces to play on. They are among the first fields to lose grass and mush up in fall. In short they are the most typical fields I see.

As I see it these are the fields that will benefit most from a well thought out and creatively planned maintenance program. Every shot counts in maintaining these so they provide functional playing surfaces. The following will vary significantly from the professional and good quality field guides.

1. MOWING
If you can't do anything else, try to keep these fields mowed at least weekly.

This is most important during the summer months. Summer mowing will insure that you have the best turf possible in fall.

Mow weekly March through October
Mow 2 times per month in November and February
Mow at least monthly in December and January
Total projected mowings add up to 38.

2. CLIPPING REMOVAL
Don't worry about removing clippings on these fields.

3. FERTILIZATION
Do what you can to get these fields fertilized. Concentrate on fertilizing spring through summer to get fields back in shape by fall. Use primarily soluble or

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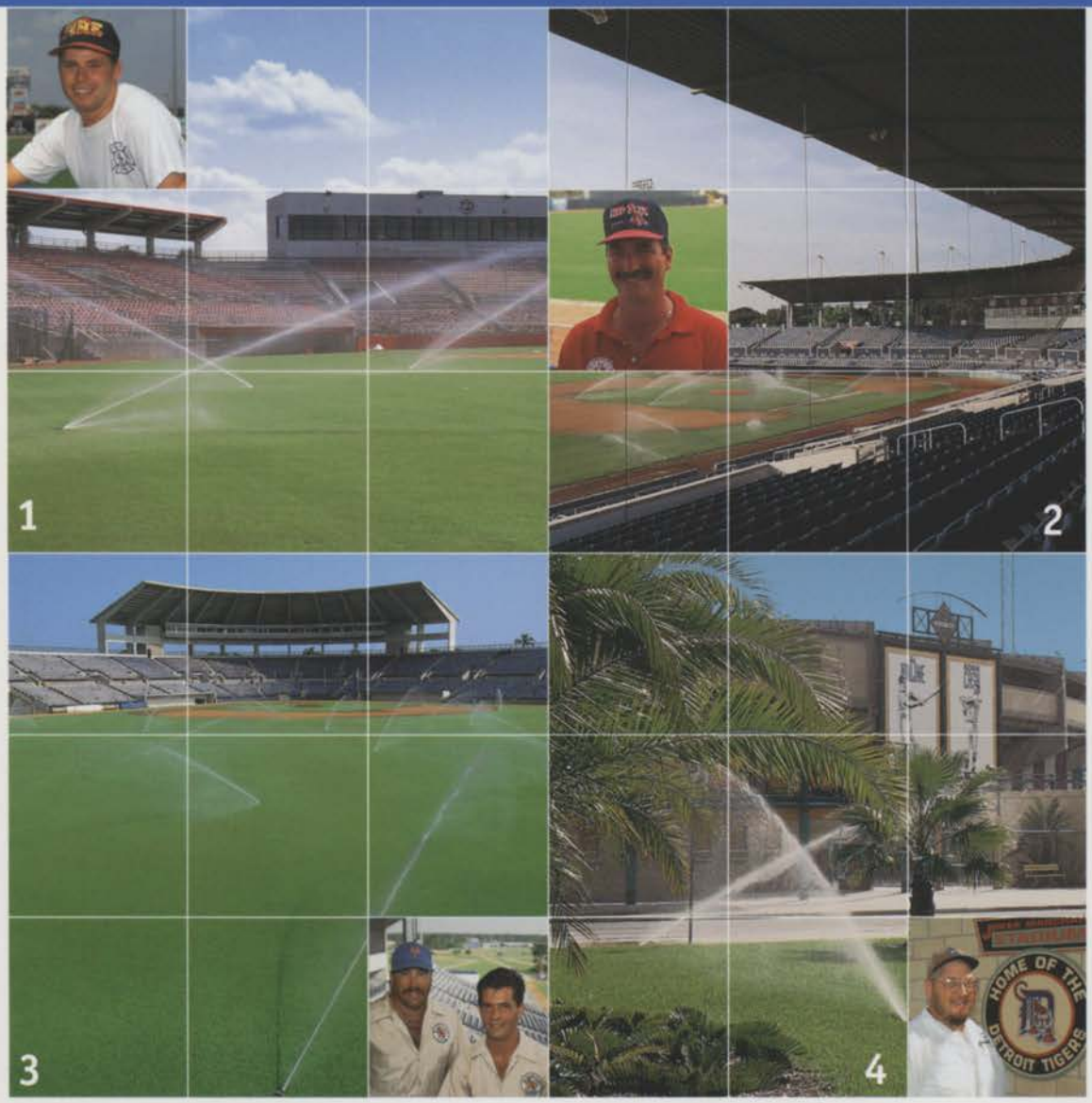

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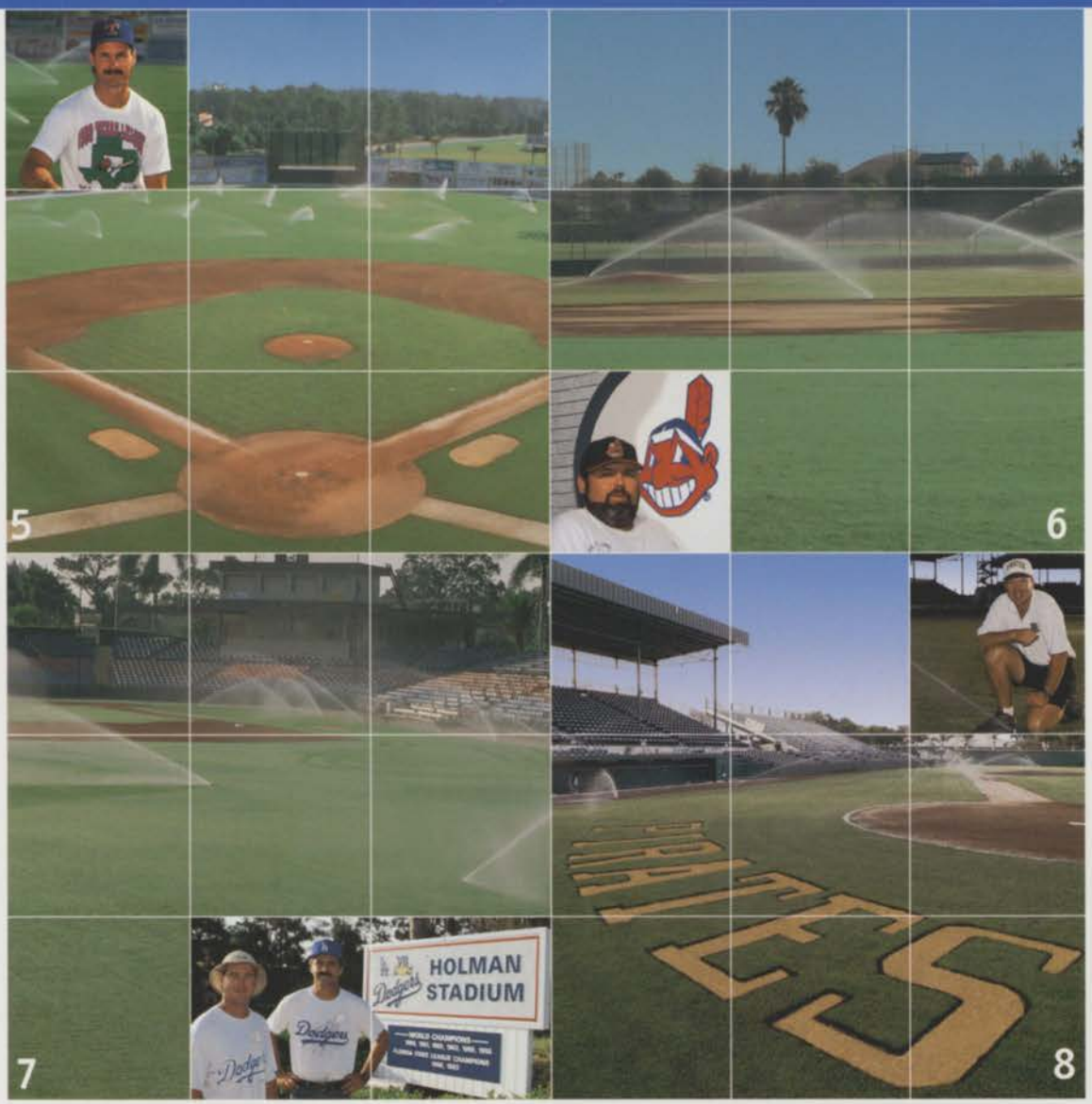

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For The
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NORTHWEST TURFGRASS CONFERENCE

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The Board of Directors of the Northwest Turfgrass Association (NTA) extends a cordial invitation to members of the association, their colleagues, employees, companions, friends and others interested in the Turfgrass industry in the Pacific Northwest to attend and participate in the 50th annual **Northwest Turfgrass Conference**.

Research and development information provided by national and international Turfgrass and ornamental experts; the annual golf tournament for research; a turf and grounds tour; and an outstanding program for companions are some of the major components of the conference. Others include the annual business meeting of the members; and a number of social activities designed for everyone.

The Empress Hotel and Victoria Conference Centre in Victoria, British Columbia (Canada) will be hosting the hundreds of golf course superintendents; parks, cemetery, school and other grounds maintenance personnel; professional consultants; landscape and lawn care personnel; equipment and product suppliers; research and extension staff; and others involved in the Turfgrass industry from throughout the Pacific Northwest who will assemble for the premiere professional development conference.

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mixed soluble - slow release products. Products based on SCU (sulfur coated urea) offer good initial and fair residual response at relatively low cost. Look for products approaching 5-1-4 ratios for N-P-K. Co-op's and other fertilizer suppliers can often custom blend to your specifications.

Timing: Mid to late April apply 1.5 lbs N/1000 sq ft
Early June apply 1 to 1.5 lbs N/ 1000 sq ft
Early September apply 1 to 1.5 lbs N/1000 sq ft

Total fertilizer required assuming 4 lbs N/ 1000 sq ft/year using a 25% N product =
2727 lbs fertilizer.

Note: Don't get into the habit of routinely applying 15-15-15. While it works okay, it is a waste of Phosphorus and may be more expensive per pound of Nitrogen.

4. OVERSEEDING

All overseeding on these fields should be targeted at wear areas. Use perennial ryegrass for overseeding. There are at least 90 good cultivars so there is no need to get confused about which is the best. Just remember to avoid "LINN" and unnamed common types.

Target overseed wear areas at the end of the fall season if the field is not too torn up. If you simply broadcast the seed, there is a good chance it will germinate and fill in before spring sports start. It is always worth a try because if it works you are way ahead in spring. When worn areas are not overseeded they eventually become dominated by annual bluegrass which on these sites often behaves as a winter annual. It actually looks good in late winter but then dies in late spring, leaving you with bare ground again in summer.

If the wear areas are too torn up to simply overseed, wait until late spring and till and regrade the areas before seeding. If you have to import soil to get the surface back to its original grade, use soil similar to what is already there. Tilling in or layering two or three inches of sand on soil doesn't accomplish anything and may make it more difficult to get new seed to germinate. Tilling and regrading is more effective than burying dead grass with a heavy topdressing and trying to seed over that. If you take the approach of tilling and grading you will probably find it is something you will do once every few years because you generally will have better turf year around. Healthy turf will hold up better than weak turf.

If you overseed in fall and don't get a catch, come in during spring or early summer and slice seed the area with a tractor mounted machine. The main point is to make regular overseeding an important part of your maintenance program. It will go a long way towards improving year around turf quality.

Overseed at rates of 5 to 10 lbs seed / 1000 sq ft, using the heavy rates in fall or when you have a short time frame to get turf ready for play. At the 5 lb rate plan on using 850 lbs seed / 1000 sq ft to overseed a full size soccer field.

5. CORING

Core as many times as you can manage each year. Realistically that will probably be 3 times a year if you are really dedicated. Use conventional 0.75" hollow tines, and drag or mow the cores to break them up. Time coring for spring break, again when school is out, and one more time in late summer before fall sports begin. Don't core if it is too wet to safely drive your tractor across the field. Under real wet conditions you do more damage to the field than good. Every other year, contract to have the field cored with a vertidrain to get deep penetration. You'll be surprised at the improvement in turf performance.

6. TOPDRESSING

Topdressing has limited value on budget fields because it needs to be done on a light and relatively frequent basis. Use your time, money, and people for basic maintenance practices instead. Poorly conceived topdressing efforts are one of the most common screw ups I see on school fields. Usually what happens is you make a heroic effort to round up the dump trucks and some reject concrete sand and bury the turf throughout the field. Dragging usually moves the sand into the tire ruts and leaves you with 2-4 " of sand in some areas and none in others. Now that you have smothered the turf a lot of it dies so field density is reduced. You increase irrigation to speed recovery and find the sand dries out quickly while the original soil becomes wet and mushy. Recovery is slow, field quality declines, and by fall the fields are not ready to play. In short, you wasted a great deal of time and effort and accomplished nothing.

Instead of topdressing, concentrate on good old fashioned turf culture!

7. THATCH REMOVAL

Once a year find a flail mower and set it down low so you can effectively dethatch and do some minor surface grading. Follow dethatching with slice seeding and fertilizer then water thoroughly. June, about the time school is out, makes for good timing, provided you keep the field moist enough to get good germination of the perennial ryegrass. This is much more effective than topdressing as described above and is probably less expensive.

BUDGET NON-IRRIGATED FIELDS

Sadly, there are a lot of non-irrigated fields that are being used for kids soccer. Ironically, when I am approached by people about installing irrigation on these fields, I usually tell them not to! The reason is not that I don't like kids. The reason is that these fields are generally maintained by volunteer groups and

lack the resources needed to maintain irrigated fields. In fact, they can barely maintain unirrigated fields. My point is that as soon as fields are irrigated they need to be mowed all summer long and ultimately
need a lot more inputs. I try to emphasize that before they start irrigating they need to get geared up to do the maintenance that will be required. At that point the conversation ends with them being disheartened and me feeling like a villain.

So what can be done with non-irrigated fields? I think they can be a lot better than most are, if you do the right maintenance practices at the right times. Remember that even though these fields will never be great they can be functional and have a complete cover of grass.

1. MOWING
Find a way to get these fields mowed regularly. Don't depend on already strapped school district maintenance personnel to go out of their way to help you out.

Mow weekly from September through November.
Mow 1 to 2 times per month as needed during December through February
Mow weekly March through June
Mow every two weeks July through August Total projected mowings add up to about 36.

2. FERTILIZATION
Fertilizer is an important tool on unirrigated fields. Summer drought stress will always leave fields weak as fall soccer begin. By the end of fall most of these fields will be very thin and torn up. Fertilizer applied at the onset of fall rains will stimulate grass during the season. Another application in early December or just after the season ends will maximize growth through winter and provide dense turf for the spring season. Fertilizer applied in early spring will help turf handle wear in the spring season. If June is wet, you can even fertilize then to develop dense turf prior to the summer stress period.

Fertilize with an NPK ratio approximating 5-1-4. Fertilize with soluble or mixed soluble-slow release fertilizers. Keep in mind that on these fields you generally want to stimulate growth to aid recovery from drought or wear. The early and end of season applications should each be about 2 lbs. N / 1000 sq ft. The early and optional late spring application can be at lower rates if turf is in good shape. Plan on 1 to 1.5 1bs N/l000 sq ft at these times. The late spring application should only be applied if there is adequate rain to dissolve it and wash it into the soil where turf can use it.

With a 25% N fertilizer applied 3-4 times per year, plan on 5-6 1bs of N per year. This adds up to about 3400 to 4000 lbs of fertilizer per year for a full size field. If this is more than you can afford, drop the late spring application. The fall and late fall are the most important so don't miss them.

3. OVERSEEDING
Every summer, drought will cause severe thinning of turf on unirrigated fields. What is left may be further destroyed during fall play. Overseeding is important if you hope to maintain turf density at an acceptable level. Without irrigation you have to rely on natural rainfall for germination but temperatures are often too low for good growth during the rainy season. It seems like an impossible task. Fortunately, we have perennial ryegrass which germinates and grows fairly well even in cool weather. Established in late fall, it can often survive the drought the following summer. That implies that regular overseeding every fall can actually increase turf cover over time. In all but the driest years, that is exactly what happens.

The key in overseeding non-irrigated fields is to be realistic about what you can achieve. It will always be two steps forward and one step back!

Target or general overseed each year at the end of the fall use period. If the field is firm enough to drive on, overseeding via a tractor mounted slice seeder is a great way to go. If that's not possible, broadcast on the surface and take your chances. The key areas are always the heavy wear sites but overseeding the entire field is a good idea.

General overseed at 5 lbs / 1000 sq ft and raise it to l0 lbs /1000 sq ft for target areas such as goals. One scenario involves slice seeding the entire field followed by broadcast seeding the heavy wear areas.

Timing is pretty simple. Late fall works best because it gives the perennial ryegrass the most time to establish before summer drought hits it. Spring seedings often come up just fine but mortality is high when drought comes in summer.

FINAL NOTES

The preceding discussion focused on active maintenance practices useful for a variety of different types of fields. A final strategy useful for soccer fields needs to be addressed in this paper because it can have a profound impact on all fields regardless of how they are maintained. I saved it for the end because it seems to be controversial and I didn't want readers to get mad and quit reading too soon. This revolutionary strategy is called many names but I'll call it FIELD ROTATION in this paper. Field rotation involves moving goal posts several times per season so games are always played on live green grass. To do this effectively, goals need to be designed so they can be moved by two people in a reasonable amount of time. In addition, field maintenance people need to be geared to stripe fields quickly and accurately so the new lines are easy to see. The best way to do this is to use paint for stripes instead of killing out permanent stripes at the beginning of each season. My suggestion is to design fields more or less square and larger than needed so goals

can be moved at least one goal width to the left and one goal width to the right of center and 5 yd. forward or back. If all these positions were used in one season, there would be 9 different field configurations possible. This would increase the time period in the fall when games are actually played on green grass. It would also reduce the tendency of goalies to dig large craters at the goal mouths which require major repairs at the end of the season. Even if fields were moved only three times per season the impact on field quality would probably be significant.

I see this simple strategy as the cheapest and most effective way to extend the functional life of turf on most soccer fields. Unfortunately, when I mention it to soccer clubs they reject it almost out of hand. It seems the prospect of building safe moveable goals is too much for most groups to even attempt. I believe there are enough engineers in the world that someone can come up with a simple but effective goal that will withstand kids climbing on it without collapsing and injuring the climbers. Likewise there are lots of different machines that are reasonably priced and capable of striping fields fast.

The hardest part of moving goals and restriping fields is getting organized to do it. In my opinion, there is more than enough organization to implement this strategy in nearly every soccer group I have ever talked to. If the goal is to provide the best possible playing conditions for the kids, this is clearly the most cost effective way to do it. When you consider your options for improving your fields, start with basic maintenance and incorporate the simple concept of moving goals. I think you will be surprised at how effectively this combination will improve the quality of your fields.

WHAT'S GOING ON HERE?!?!

June 13, 1996
WWGCSA SUPER PRO-AM
BATTLE CREEK GC
MARYSVILLE, WA

June 18, 1996 WSU TURFGRASS
FIELD DAY
PUYALLUP, WA

July 18, 1996
UBC TURFGRASS FIELD DAY
VANCOUVER, B.C.

July 22, 1996 COLUMBIA CUP
INDIAN SUMMER G & CC -
OLYMPIA, WA

September 20, 1996 WESTERN
WASHINGTON GCSA
GCSAA SEMINAR

September 30-October 3, 1996 NTA
50TH CONFERENCE
VICTORA, B.C.

SPIKELESS GOLF SHOES GAINING MOMENTUM

By Greg Crawford, Media Director, Northwest Turfgrass Association

Why is that scratch golfer playing in tennis shoes? Why is the 15 handicapper playing in alternative spikes? Those are questions being asked more and more on golf courses these days as players leave their metal spikes in favor of walking shoes or alternative spikes. Why are players refusing to play in metal spikes?

In 1994, according the United States Golf association, metal spikes did $40,000,000 worth of damage to golf courses in the United States. That damage includes course maintenance repair, equipment damage and clubhouse damage.

For the golfer who switches to alternative spikes, the reasons for the decision are many and varied. Howard Mayo plays most of his golf at Portland Golf Club. "For me, it was strictly a matter of comfort. I had heard a lot of talk about alternative spikes so I decided to give soft spikes a try. From time to time, I have some back problems and I thought soft spikes might help. I am really pleased I made the choice to switch as it has been much easier on my back and my feet," said Mayo.

Joe Keating plays at least twice a week in Spokane, when the weather permits. As an eight handicapper, Keating has made the switch from metal spikes to walking shoes. "I have no problem with the way golf courses are maintained, but I do have problems with so many spike marks," Keating said. "I switched to walking shoes because I wanted to do my small part to help eliminate spike marks. Sometimes my playing partners laugh at me but I am never going back to metal spikes. Greens are the most important part of any golf course and I want them as perfect as possible. Not everyone is going to agree with my stand, but I want to play golf and score well and my not using metal spikes, hopefully, will send a message to other players."

Not everyone feels like Keating. Don Franklin plays a minimum of four times a week in Seattle and hates alternative spikes. "I gave them a try and I will never use them again," said Franklin. "I was not comfortable in alternative spikes and I could't see any difference in spike marks. I would quit the game rather than give up my metal spikes."

Over eighty courses in the United State would not be the place for Franklin to play. That is how many course have total bans on metal spikes. Widgi Creek Golf Club in Bend, Oregon, was the first course in Oregon to ban metal spikes. "We strive everyday to have the finest putting greens in golf," said Walter Mattison, CGCS, superintendent at Widgi Creek. "Since our ban took effect on May 1, 1996, I have noticed a difference for the better in our putting surfaces. I have always been a proponent of alternative spikes and I am not convinced more than ever alternative spikes are the way to go."

Richard White has been the superintendent at Willamette Valley Country Club in Canby, Oregon, since 1982. "We are doing some things at our club to promote alternative spikes and educate our members about their use," said White. "I think the most important thing is we are not forcing any of our golfers to switch, but as we educate them more about the advantages of alternative spikes, the move comes naturally."

Change in golfing equipment does not come easy in any area and, as all golfers know, change on a large scale only happens when professional golfers endorse or have success with the product. Most pros scoff at the idea of giving up their metal spikes but, usually in the same sentence, endorse the concept of alternative spikes on the amateur level. "Amateurs should definitely give alternative spikes a try and see for themselves," said Greg Norman, the world's number one golfer. "On the professional level, the change will take a long period of trial and error, but on the amateur side, I can see a real surge of players switching because of both comfort and course conditioning."

The issue of alternative spikes will continue to heat up on the discussion side, but one thing is certain: If you have ever played in a spike free tournament or played a golf course which bans metal spikes, you have more than likely played on some of the smoothest and spike mark free putting surfaces you will ever see. The battle on this issue will continue.

SUMMER STRESS ON TURFGRASS!

By Henery T. Wilkinson, Professor
Department of Natural Resources and
Environmental Sciences University of Illinois, Urbana - Champaign

Turfgrass stress is not limited to summer conditions, but without question, this is when it is the most severe. Stressed turf is generally recognized by poor growth (leaf growth or turf color), but the causes of turf stress are much more complicated. But instead of identifying the causes of stress, focus on the how the turfgrass plants respond to the many stresses that they are exposed to. The grass plant is the "control center" in terms of determining the quality of a turf. Every year your turf will be exposed to numerous stresses and at certain times the combined effect of multiple stresses could result in turf destruction. More often turf plants respond to stresses in a way to minimize the damage, thus preventing destruction. As a turf manager, your goal should be to predict and understand the various stresses that your turf is exposed to and use proper methods to minimize their impact. To help you achieve this, I will first consider the natural behavior turf exposed to the summer climatic conditions and then look briefly at the various pests and cultural practices and how they could affect your turf.

Cool season turfgrasses respond to the change in seasons much as trees do. In the spring, the roots are active and the leaves are extending at rapid rates. Mid-spring brings on the drive to flower and produce seed. When a turf is trying to flower and produce seed, root growth and leaf extension will naturally slow down. These various processes are controlled by hormones produced by the plant. The stress of flowering, causes the plant to slow leaf and root growth. One possible means of reducing this natural stress is to supplement the turf with fertilizers, especially nitrogen and potassium. As the turf completes the flower-seed forming stage of growth, the soil and air temperatures have warmed considerably. Generally, it is June by this time, and the turf will resume root and leaf growth. During this time, the turf generally shows very little symptoms of stress. When grass is growing strong, the amount of stress required to significantly weaken the turf is high, consequently, you often do not see poor quality turf in June. Even damage from diseases and insects, which are active during this time of the year, is not often reported for this time of year.

REMEMBER: TURF THAT IS GROWING STRONG CAN TOLERATE A LOT OF STRESS BEFORE IT WILL DECLINE!

In late June (this can vary depending on where your turf is located in the cool season turf growing region) the soil and air temperatures continue to climb to near or above 80 F (25 C) and the amount of natural precipitation declines. In addition the length of daylight hours is changing. Of the three climatic conditions (temperature, moisture and daylight) temperature is the most influential. When the cool season grasses are heated up, they want to slow down their growth. Generally, roots and leaf growth is dramatically reduced, while rhizomes or stolons continue to grow. This is the time that other stresses are going to be much more damaging to the turf. There are three reasons for this: i) disease and pest activities will be at their highest during this time; ii) the turf can not produce new tissues as fast at they can be destroyed, and iii) use of turf is intense.

Diseases of turf destroy grass tissues. If the rate of destruction is greater than the rate of plant growth, you will see the symptoms of the disease. This is the case in the summer. The turf simply can not recover from loses due to disease. Likewise, insects chew on the roots and crowns of turf during the summer months, When the rate of insect injury exceeds the rate of turf growth, the plants will suffer and show it. This too occurs during the summer months. Finally, the use of turf increases in the summer. Foot traffic, wear, compaction, and general damage from various sports

activities all add to the pressure on the turf If the plant can not respond, which is difficult and slow at best in the summer, the turf will show the symptoms of stress: thinning, blue-green color, brown leaves, stunting and death, The challenge for the turf manager is how to both revive the grass and reduce the severity of the various stresses.

A practice that most turf managers attempt is to try and force the turf to grow, even during the summer months, when the grass is trying to go dormant. Yes, in the summer, cool seasons will go partially dormant. This is a natural response to heat and drought. The plant will shut down the leaf growth and put its limited reserves into growing rhizomes, stolons and crowns. The reason is simple: these are survival structures and will prevent the turf plants from dying should the heat and drought of summer persist for months. For example, during hot summers without rain, grass needs only about 1/4 inch of water per month to remain viable. It will look dead, but in fact, it' s rhizomes or stolons are alive and waiting for cooler temperatures and moisture. Mangers that continue to supply turf with water and nutrients during the summer will force the grass to grow, but the activities of diseases, pests and humans also increase. As most managers know, staying ahead of problems during the summer is a challenge.

Here are a few suggestions to consider for preventing and managing your turf in the summer and reducing the effects of stress:

1. In the spring and early summer encourage the grass to grow. This can be achieved in part by maintaining moist soil around the roots and keeping an adequate supply of nutrients in the root zone soil. In addition practices that reduce compaction, increase aeration and drainage will improve the health of the turf.

REMEMBER: TURF THAT HAS GROWN STRONG IN THE SPRING WILL TOLERATE STRESSES OF SUMMER!

2. In the summer months, water the root zone, i.e., that depth of soil in which the roots are found.

3. Spoon feed your fertilizer: apply a balance (N:P:K) fertilizer and/or other nutrients as
needed, but do not over supply them.

4. Do not make dramatic cultural changes during the summer. For example, do not change the height of cut much, but continue to mow the grass as needed.

5. Use of preventative pesticide programs for those areas with a history of disease or insect problems.

6. Distribute use patterns on the turf as much as possible to reduce compaction and wear.

7. If you have the opportunity to renovate or reestablish turf, select those cultivars that have good summer quality ratings for your area.

Summer stress on turf is brought about by a combination of the natural growth patterns of cool season grasses, climatic extremes of heat and drought, your cultural practices, the use of the turf and pest pressures. A strong turf with plenty of roots, rhizomes or stolons and crowns will resist stress the best, To manage stress, you must try and establish balance in your turf, thus avoiding dramatic changes which could exceed the ability of your turf from tolerating stress.

POTASSIUM CARBONATE CONTROLS FAIRY RINGS AND OTHER DISEASES

by Bill Walmsley, Sports Turf Agronomist
New Zealand Sports Turf Institute Christchurch

Fairy rings are a widespread problem for which traditional treatments have had limited success. Bill Walmsley reports on one treatment that shows potential.

Fairy rings caused by various basidiomycete species are a significant problem in Leptinella sp bowling greens. In the past they have been treated using fungicides such as triforine (Saprol) and benodanil (Calirus). These fungicides gave reasonable results if they were drenched into the soil at high rates using large volumes of water. However, the results were inconsistent.

In recent years the fertiliser potassium carbonate has been used as a treatment for eliminating fairy rings and is giving more consistent results. As a bonus it is also a much cheaper treatment than fungicides. Potassium carbonate has also been used successfully to treat thatch collapse in golf greens caused by basidiomycete fungal activity, and on summer spotting disease in Leptinella bowling greens, thought to be caused by a slow-growing Rhizoctonia species affecting the roots.

Potassium carbonate has recently become popular for hardening the foliage on Leptinella bowling greens to prevent bruising and disease. On golf greens it is being used to stiffen the foliage to help improve putting speeds for a few days.

FAIR RING CONTROL

Potassium carbonate is the product of choice for eliminating fairy rings from Leptinella bowling greens. It could equally be used on fairy rings in golf greens, golf course fairways or lawns. Potassium carbonate is used at 0.9kg/100m2 for two applications spaced one week apart. On a 1340m2 bowling green this equates to 12.5kg per application. There is room to experiment with the application rate. It is currently based on applying one 25kg bag of potassium carbonate as two applications (12.5kg per bowling green per application) a week apart.

Potassium carbonate seems to work best when applied in spring or early summer when fair rings first appear, but it has been reported to work at most times of the year. Double rates of application (i.e. two 25kg applications) are sometimes used in winter. There doesn't seem to be any need for the higher rate given the reliability of the standard rate on most fairy rings. The few that fail to be adequately suppressed with the standard rate could be treated with additional applications.

A key point with fairy ring treatment is to make certain the potassium carbonate is watered well into the soil immediately after application to prevent a foliar burn. Potassium carbonate is very prone to burning foliage due to its high salt index. Treating a green on a cool day when it is damp from overnight irrigation is suggested. Potassium carbonate should be dissolved in cold water and applied in solution through a hose-end venturi proportioner (ejector) or boom sprayer to help minimise the risk of foliar burn.

BASIDIOMYCETE THATCH COLLAPSE

A similar rate of potassium carbonate has been used on a basidiomycete thatch collapse condition in a golf green. The treatment appeared to be successful, suppressing activity for several months. The results have been promising, but more work is required to refine a reliable treatment programme.

SUMMER SPOTTING/GOLDEN BRACELET DISEASE

Summer Spotting and golden bracelet are troublesome diseases which damage Leptinella bowling greens. Both diseases develop slowly from November to April, causing gradually expanding circular patches containing numerous dead spots. commonly used fungicides appear to be relatively ineffective unless drenched into the soil at high rates.

A single application of potassium carbonate at 12.5kg/1340m2 (0.9kg/100m2) has given approximately two months control of these diseases. There appears to be no benefit from two applications, according to Mark Beeby (Linwood Bowling Club). According to his experience, 10kg/1340m2 seems to be the minimum effective rate on summer spotting disease.

There is great potential to experiment with different application rates, methods and frequencies. For example, does improving the downward movement of potassium carbonate by applying it after Hydrojecting or spiked rolling have any effect? Would more, lighter applications have the same effect? Is a single application all that is needed? How does it interact with wetting agent or other fertilisers?

FOLIAR HARDENING

Light rates of potassium carbonate have been used to help stiffen the foliage on both Leptinella bowling greens and on golf greens. The effect of potassium carbonate appears to be much greater than similar quantities of other potassium fer-

tilisers or iron sulphate.

The use of a "Liquid potash" product containing 1.6kg/l. of potassium carbonate has been popular. This product has been used by Ken Prebble (Burnside Bowling Club) at 1.5l/1340m2, equivalent to 2.4kg/1340m2 of the solid product).

On the West Coast, Bob Cochrane (Coben Bowling Club) has used potassium carbonate powder in solution at 5kg/1340m2 (0.37kg/100m2).

In both above cases excellent results were reported at hardening the foliage. The foliage became stiffer and harder that with other potassium sources. The effect began within 1-2 days of application and appeared to last for three weeks in both cases.

CHARACTERISTICS OF POTASSIUM CARBONATE

Potassium carbonate, K_2CO_3, is a powder typically containing 57% Potassium (0-0-57). It is alkaline and caustic, so care should be taken to prevent any powder or liquid being splashed onto skin or eyes. It releases heat when dissolved in water so the powder would be added to a generous volume of cold water/ Do not use hot water or add water to powder. Water will boil violently! It is readily soluble, and easily applied through a boom sprayer or hose-end venturi ejector.

MECHANISM OF ACTIVITY

It is interesting to speculate on the mechanisms for potassium carbonate's effectiveness.

In the case of both fair rings and summer spotting disease the fungal filaments are located well below the soil surface. Fairy ring fungal structures live within the soil. In contrast, it is believed that summer spotting and golden bracelet are caused by a slow-growing Rhizoctonia fungus living on the root or stolon surface. The exact causal agent is unknown at this time.

Presumably the soluble potassium carbonate readily washes to depth in soil, causing rapid changes in the soil environment which kills certain fungi. The changes would include a rapid increase in soil osmotic pressure and salt concentration, a brief fluctuation in soil pH (probably well buffered by the soil), a fluctuation in potassium concentration and soil chemical changes from ionic reactions.

The rapid change in osmotic pressure is a reasonable explanation, since heavy fertiliser applications and sea water treatments have also been know to control fairy rings. So too have rapid changes in pH caused by heavy liming.

The rapid uptake of potassium by the plant improving its osmotic potential and the effect on lignifying cell walls is a likely explanation for potassium carbonate stiffening the foliage.

SUMMARY

Potassium carbonate is a fertiliser that appears to have plant therapeutic properties. There is a great potential to discover more plant health benefits of this material and to improve the treatments already being used.

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ATHLETIC FIELDS NEED YEAR AROUND PLANNING

by Greg Crawford, Media Director, Northwest Turfgrass Association

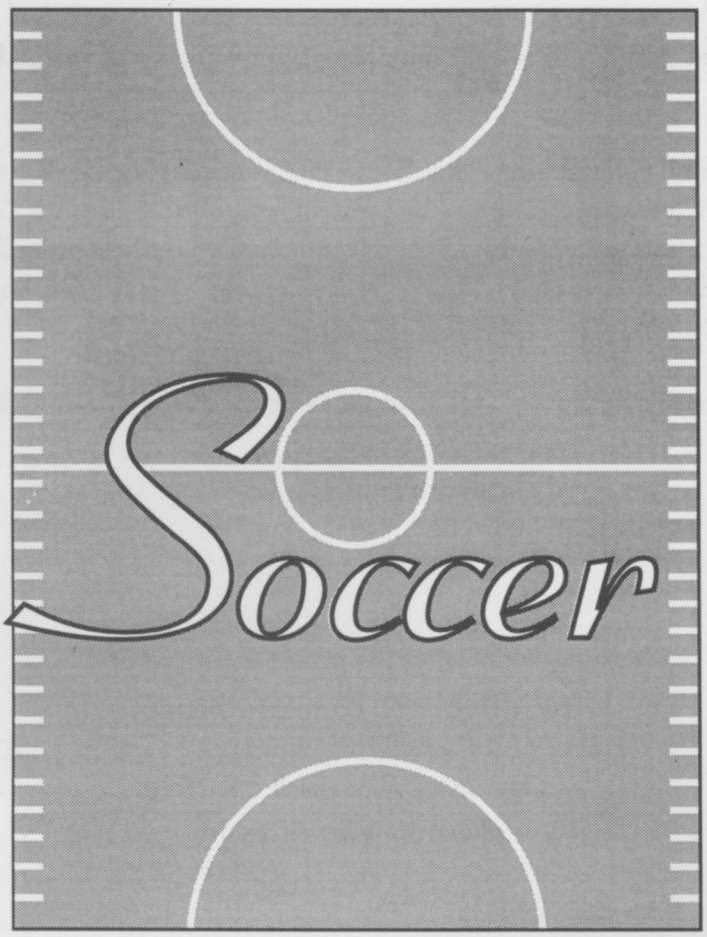
Mike Hebrard has been designing and consulting about proper maintenance on athletic fields for the past ten years. Needless to say, he is not short on opinions about the subject.

Hebrard owns his own company called "Athletic Field Design", based in Clackamas, Oregon. He is more than familiar with the changing weather conditions in the northwest and what it takes to prepare a field for optimum playing conditions.

"Sure we have some touchy weather to deal with in the northwest and it definitely impairs our maintenance practices, but we still can do some practices to make fields into top condition," says Hebrard.

The majority of participation on athletic fields in the northwest comes from soccer, football, baseball and softball. All of these sports and seasons create their own set of maintenance problems.

According to Hebrard, the toughest fields to maintain are soccer fields because the sport, for the most part, is played year around. "Every field needs some sort of down-time, but this is tough to do in soccer because of its increasing popularity," says Mike. "I do recommend that people who maintain soccer fields slice-seed the goal mouths at least once per month." He adds that because soccer is such a "new" sport, it is important to educate not only the maintenance people but the budget decision makers as much as possible to achieve the highest level of expertise and funding.



With the spring rains ending and much warmer weather coming, many contests will be played on all-dirt infields during the summer. Like turfgrass, dirt needs proper maintenance on nearly a constant basis during the dry season. Mike suggests two important things when dealing with dirt are 1) not to let the soil get compacted and 2) to use more water on your soil than turfgrass. He uses a product called "Turface" which helps breakdown the soil and also uses a special nail drag on a constant basis to prevent compacting. When there is a grass infield involved with dirt, Hebrard recommends that it be edged properly and often, AND it should be mowed at a height of 3/4" to 1" by a walk-behind mower at least twice per week. If possible, he also suggests aerating at least three times per year.

Where there is an infield, there usually is an outfield. Mowing should take place at least once every five days at a height of 1" to 1-1/2". It is also important, when there is a choice, to keep the outfield more wet than dry to prevent injuries.

It is never too early to start thinking about that fall football field. Mike says to start in June by laying out a budget and keeping your field well watered. Once again it is always better to have a softer turf. Mowing height should be at 2" to 2-1/2" and cut at least once per week. It is nice to get the turfgrass looking great, but Hebrard also encourages everyone to work hard on making your lines and yardline markers as straight as possible.

Hebrard, who consulted for over 100 athletic fields in the northwest, offers some parting advice. 1) Always attempt to budget enough money for proper care and spend that money in the right places. 2) Do your mowing on a schedule and stick to the schedule as much as possible and 3) Time your fertilization efforts to coincide with the weather.

"Do not be afraid to seek other professional advice and attend as many educational seminars as possible. Never resign yourself to knowing everything and be sure not to close your mind," says Hebrard.

THE COLUMBIA CUP TOURNAMENT

Monday, July 22, 1996

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CART?	YES NO

ABOUT YOUR PARTICIPATION

It is increasingly important for the turfgrass industry in the Pacific Northwest to come together for the common good. With this in mind, the Northwest Turfgrass Association has been actively involved in turfgrass research, education, and scholarship for the last 50 years.

In 1994, we instituted a T. U. R. F. (Turfgrass University Research Fund) and Advisory Council sponsored and/or endorsed by representatives of the following:

IEGCSA (Inland Empire Golf Course Superintendents Association)

UBC (University of British Columbia)

USGA (United States Golf Association) Green Section

USGA- Sectional Affairs

WCTA (Western Canada Turfgrass Association)

WSGA (Washington State Golf Association)

WSU (Washington State University)

PNGA (Pacific Northwest Golf Association)

NTA(Northwest Turfgrass Association)

OGA (Oregon Golf Association)

OGCSA (Oregon Golf Course Superintendents Association)

OSU (Oregon State University)

PGA (Tour)

WWGCS (Western Washington Golf Course Superintendents Association)

The Washington State Golf Association has committed to $.50/member/year, which , in 1996, will amount to approximately $45,000 (the largest single contribution in NTA history.) The NTA is considering joint-effort research projects between Oregon, Washington, and British Columbia to consolidate our interests regionally.

Your membership in the Northwest Turfgrass Association is important and appreciated. Remember: The choices we make affect other people, whether or not we know about it or care. Your participation is important to YOUR industry.

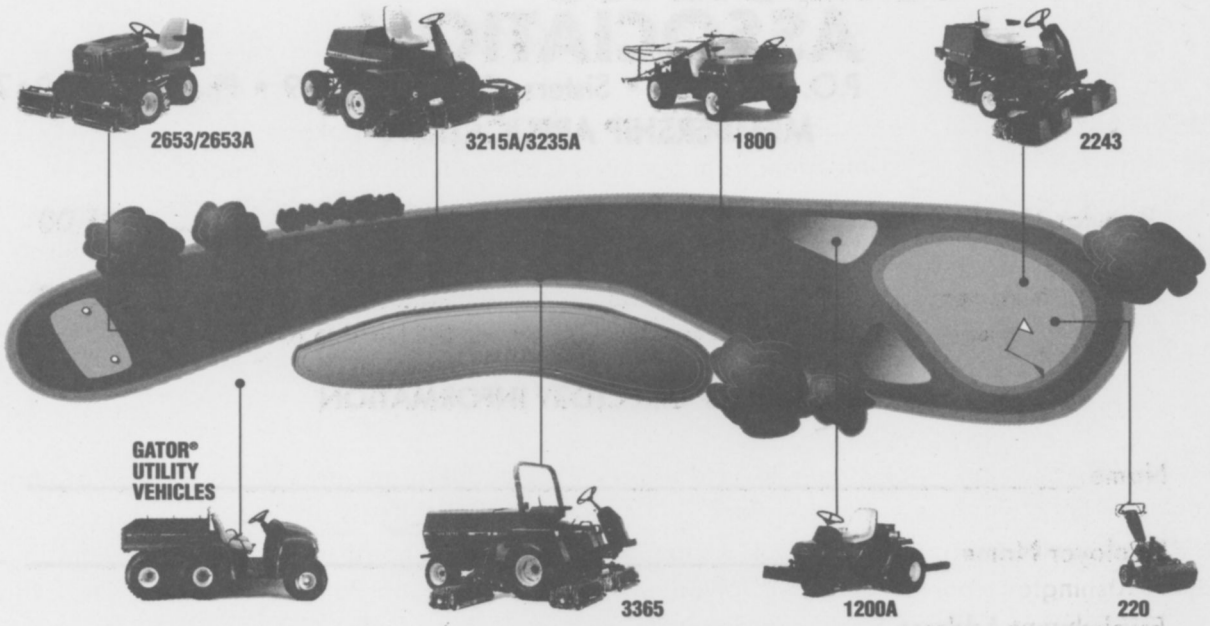
FOR INFORMATION REGARDING MEMBERSHIP, CALL:
1-800-738-1617

IN MEMORIUM

NORRIS BEARDSLEY, 76, died April 12, 1996. A lifetime resident of Spokane, Washington, Mr. Beardsley was retired as golf course superintendent from Spokane Country Club, after 54 years of service. He was a member of St. Thomas More Catholic Church, served in the Army during World War II and was active in the Northwest Turfgrass Association for many years. Norris was a cross-hand golfer. His wife, Shirley, died in 1995. He is survived by one son, Dale Beardsley of Spokane; three daughters, Bridget Hoke of Spokane, Helen Hill of Kalama, Washington, and Collen Foleen of Copperas Cove, Texas; eight grandchildren, one step grand-child and three step great-grandchildren.

KEN PUTNAM, 90, died April 20, 1996. He spent all but about three years of his life in Washington. His golf life started as a caddie at Jefferson Park Golf Course in 1918. Ken's professional experience included caddie, golf pro, club manager, golf course superintendent, course construction superintendent and course designer. Washington courses he was involved with include Jefferson Park, Seattle Golf Club, Inglewood Country Club, Olympic Golf Club, Yakima Country Club and Sunland Golf & Country Club. He was president of the Northwest Golf Course Superintendents Association three times, starting in 1959, and was the president of the NTA in 1964. Ken remained active in golf until 1990, was a Rotarian and Shriner. His wife of 40 years, Pauline, died a few months before Ken in 1996. Mr. Putnam is survived by his son, Charles "Pepper" Putnam.

RICHARD W. "DICK" MALPASS, 79, died May 26, 1996. A long time resident of Oregon and Washington, his golf career started in 1961 while assisting with the construction of Shadow Hills Country Club and he then became that club's golf course superintendent. Dick was active in the professional organizations of Northwest Superintendents Association, Evergreen Chapter of GCSAA, Oregon Turf Management Association, Oregon Golf Course Superintendents Association, Northwest Turfgrass Association, and the Golf Course Superintendents Association of America. He edited newsletters for at least 30 years, served on Boards of Directors and was president of the OGCSA from 1966-69, president of GCSAA in 1976, president of the NTA in 1966 and again in 1982. Riverside Country Club, in Portland, Oregon, attracted Dick's attention in 1970, where he became superintendent until his retirement in 1984. From 1985 to May, 1996, Dick served admirably as Executive Director of OGCSA and, on May 5, 1996, was named Executive Director Emeritus of OGCSA. He is survived by his wife of 57 years, Frances; one son, Richard W. Malpass, Jr.; four daughters: Alice Stroda of Harrisburg, Oregon; Sharon Malpass of Salerno, Italy; Harriet Purkey of Salem, Oregon; and Shelley Underwood of Oregon City, Oregon; eleven grandchildren and four great-grandchildren; brothers Robert of Springfield, Hugh and David of Harrisburg and Bruce of LaPine.



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MEMBERSHIP APPLICATION

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MEMBERSHIP DIRECTORY INFORMATION

Name _____

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Employment Address _____

City _____ State _____ Zip + 4 _____

Business Phone _____ FAX _____

MEMBER POSITION DESCRIPTION

1. The **ONE** category that **BEST** describes my professional responsibilities is: **(Check One)**

___President	___Superintendent	___Contractor	___Instructor
___Owner	___Greenkeeper	___Sales Rep	___Researcher
___Partner	___Ground Keeper	___Forester	___Horticulturist
___General Mgr.	___Forman	___Consultant	___Certified Specialist
___Publisher	___Supervisor	___Agronomist	___Other
___Vice President/	___Editor	___Distributor/Dealer	_____
/Director/	___Arborist	___Extension Agent	
Coordinator	___Architect/Engineer		

2. The **ONE** segment of the industry checked below **BEST** describes the segment with which I am most involved: **(Check One)**

___Airports	___Garden Center	___Parks	___Single/Multi
___Cemeteries	___Golf Facility	___Roadsides	Family Dwellings
___Churches	___Institutions	___Schools	___Sod Producers
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