Table 3: Quantities of exchangeable base cations.

Treatment	Ca	Mg	K	Na
	meq/100 g			
Sand	0.33	0.22	0.13	0.03
Sand + Peat	0.61	0.31	0.21	0.03
Sand + Porous Ceramic				
Sand + Zeolite	1.9	0.77	3.95	5.55

Table 4: Clipping mass and cation exchange capacity.

Treatment	Clipping mass	CEC
	mg	
Sand	89.7	0.59
Sand + Peat	94.3	1.16
Sand + Porous Ceramic		
Sand + Zeolite	297.3	11.17

Each treatment was replicated three times and packed into cylinders 12 inches deep and 4 inches in diameter above a layer of pea gravel. At this point, each cylinder received 3 lb K/M as K2SO4 and was then leached to provide differing base saturation ratios. After a day, starter fertilizer was incorporated into the top inch of soil in each treatment and seeded. Each cylinder was uniformly fertilized as needed. After tillering had occurred, all treatments were allowed to grow for an equal amount of time until enough clippings could be acquired for analysis.

The results of this experiment speak volumes. In looking at Table 1, we see that the base saturation ratios of each of the four treatments vary a great deal from those recommended by BSR theory. Table 2 shows plant tissue concentrations of base cations in each treatment. In comparing the two tables, it is obvious that there is wide range of percent saturation of cations in the soil and a narrow range of concentrations of the same cations in plant tissue. This indicates that there is no significant correlation between saturation ratios and plant nutrient uptake. Table 3 shows the quantities of exchangeable cations in the soil. Again, there is a wide range between each of the treatments, which would seem to point out that so long as there is enough nutrient available, the plant will take it up in concentrations in which it is needed. Table 4 compares clipping mass with total soil CEC. Notice that the clipping mass increases as CEC does. This is additional evidence that plant growth is not a function of base saturation in the soil, but the quantities present.

Conclusions

It seems evident from both of the studies presented here that BSR theory is not a necessary fertility practice in managing turfgrass. The results do not indicate that strict adherence to the practice is detrimental to turf, but rather that it is simply not an obligatory practice. There is no evidence that BSR theory practices produce a higher quality turf than traditional fertility regimes based on the amounts of exchangeable cations in soils. The true beneficiaries of the theory are not those who employ it, but those who sell it. Save your money and apply only as much K, Ca, and Mg as needed to bring their soil concentrations to the optimum ppm or lb/acre.

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Editor's Note: Sean Hearden and Brian Pyszka will graduate in December 2002 from the UW-Madison Turf and Grounds Management Program. Sean is currently interning at the Green Bay Country Club, and Brian at the Atlantic City Country Club. Both men are undergraduate advisees of Professor Wayne R. Kussow.

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A Long, Short Walk

By Monroe S. Miller, *Golf Course Superintendent, Blackhawk Country Club*

Like most golf course maintenance facilities, ours is a distance from the clubhouse. That is a good thing, generally. Noise, material and the general hub bub of activity we are immersed in are not always compatible with the most sedate and sophisticated activities reserved for the big house.

But at times it is a modest hassle. Meetings sometimes convene there; office staff dealing with our end of the golf business reside there. I even have to travel to the promontory to get my mail.

So, on an absolutely gorgeous day last month I decided to take the bit of extra time and walk there to get whatever correspondence waited for me.

It was the first bright, crisp sunny day we had had after a week of cool, wet, cloudy and generally dreary weather. Nothing is like a genuine early June day with low humidity and warm temperatures. And talk about green! We won't see color—green color—like this again this year. Someday I am going to do what I have thought about doing at least a thousand times—borrow a Munsell Color Book from Dr. Kussow and compare the greenest color chip with the dominant green on the golf course. I predict a match!

Walking is making a comeback these days. People are realizing it is good for your health, maybe better than jogging, and it offers some solitude that is hard to come by all too often. It is a revival of sorts—old Henry David Thoreau wrote a lengthy treatise on walking over 150 years ago. The thing I am unwilling to do in public is carry a walking stick with me in town. Somebody would surely think I had lost my senses. That implement has to be saved for walking the pastures and woodlands of Grant County, not over a private golf course in Madison.

Right or wrong, necessary or not, the hesitation to walk across the course is the insecurity of someone—anyone—thinking you are wasting time. "Exercise on your own time" are the words you fear a player will either say or think.

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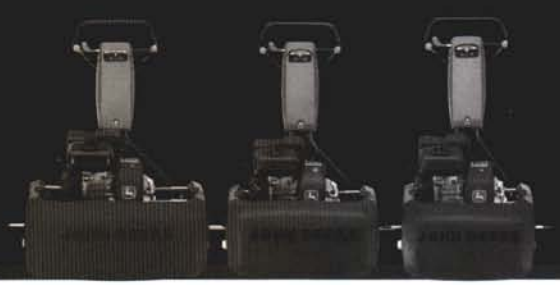

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I set all that aside, made sure I was clean and started hoofing down from the shop toward the course. Before I got to the soil shed one of my young employees stopped and asked, "want a ride?" I loved the courteous thought but told her I was walking to the clubhouse. It was easy to tell she was a little confused!

Before I had crossed the bike path that connects Middleton and Madison I stopped to visit with a neighbor who was walking the old greyhound he had rescued from the dog racetracks. That took five minutes—great conversation with a man I have known for over twenty years.

Looking left to check the blue tee for players, I hustled across the fairway. Guys were on the white box, motioned me over and offered some nice comments about the course. "Grass weather," I said, although I am always pleased for any positive comment even when I cannot honestly take the credit. Two were sitting in a golf car and two were waiting on a bench. I have decided you can have friendships with people you work for, and I value the relationships I had with these now retired players. Two MDs, an emeritus faculty member and a former bank president played almost everyday in the summer. They were enjoying the fruits of their productive working lives; golf was clearly what they enjoyed a lot. I sat down on the bench for a few minutes and we chatted about the fairways they thought were cut too short.

They hit and I got up and continued my short trip to the clubhouse. A strong wind during the storms of the past week had brought a lot of debris out of trees all over the course. The big stuff had been picked up and hauled to the chipper; I spent five minutes picking up smaller branches and twigs from the grove of trees backing up our eighth green, piling them at the base of the largest tree and out of the way of the rough mower. No big deal—it was time well spent.

I paused for a drink from the water cooler—it was cold and tasted really good, a reminder of why golf players get so worked up when one of the dozen coolers on the course is empty. I did notice the button you push to draw water was a little dirty; maybe too many crew members visit there. A little bleach will do the trick.

There, at the range, was L.J. Marks, hitting balls. Mr. Marks is 91. Talk about optimism! He wants to improve his game and lower his handicap. Seeing him is another of the endless examples why golf is such a great game.

Passing near the tees of the only three parr on our front nine, I knew, was going to slow me down. Two groups were waiting to hit—seven players—and they had time to talk. I shook hands all around and this was the first time I had talked to some this season. Bill Gardener wondered if I needed a ride somewhere; Jimmy Walker repeated this claim that the greens had slowed down over the past five years. "No, Mr. Walker, you are wrong," I replied. "It is documented that the opposite is true, evidence that the stimpmeter had real value." Hank Willis more or less backed me up with "greens everywhere have gotten too fast for some of us and less fun to play."

I stayed and chatted a little while longer, declining one offer to take a shot at the pin with one player's new golf clubs. It is difficult to beat conversation with people whose company you enjoy.

My short walk took me past our second tee ground, the general area where the buildings of the farm that occupied this ground at the turn of the century before it became the golf course it is today. I quietly watched the group putt on the first green. A couple of putts rolled in and the others ended past the hole, a good sign of quick greens this day. I waved and they all waved back.

My walk took me through the rough halfway up the first fairway and parallel to it. The fragrance from the blossoms of the flowers on the linden trees was intoxicating and certainly added to my walking experience. I was hoping the presence of Japanese beetles wouldn't damage them too much. Ralph Harris and Phil Ross were in the group hitting to the green. These men were veterans of the Second World War and were like so many of their generation, quiet and humble about their success and never a word about what they had done for the citizens of the world in Europe. Dr. Stephen Ambrose, the outstanding and prolific writer of history about WWII, spent a year as a Distinguished Visiting Professor here at the UW department of history. Dr. Ambrose was raised in Wisconsin and received a PhD from Wisconsin. These guys sat through one of his courses and had gotten to know him. The 50th anniversary of D-Day brought out the stories of heroism from veterans like them. My father's WWII experiences, the loss of my uncle at 18 in France in the war, and my own experiences in Vietnam forged a friendship with them.

2002 WTA Golf Outing
Benefiting the
Wisconsin Distinguished Graduate Fellowships in Turfgrass Research
Thursday, October 10, 2002
The Meadow Valleys Course at Blackwolf Run

Where: Blackwolf Run
1111 West Riverside Drive
Kohler, WI 53044

When: Thursday, October 10, 2002
9:00-10:00 Registration and Practice
10:30 Shotgun

What: Golf, Cart, Practice Range, and Lunch
Door Prizes for Every Entrant
Golf Recognition and Awards Ceremony after Golf

Event: 4-Person Best Ball

Cost: $125.00/person

The Meadow Valleys Course at Blackwolf Run

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- One of the few courses in the nation to achieve five stars in the Golf Digest "Places to Play" guidebook (3rd edition, 1998-99), Meadow Valleys also was ranked 34th in the United States on GOLF Magazine's list of the "Top 100 You Can Play" (May 1998). Its Valley "nine" comprised half of the routing for the record-setting 1998 U.S. Women's Open conducted by the USGA at Blackwolf Run. Hole #18 (played as the ninth hole of the U.S. Women's Open) was named one of the "500 Best Holes in the World" by GOLF Magazine (Jan. 2000).
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I was richer for that.

Ralph saw me. When Phil hit his shot, I motioned with my hands around an imaginary club—demonstrating what he'd done wrong. He waved out acknowledgement.

While waiting to cross the fairway and finish my trip to the top of the hill, I leaned against a substantial pin oak. "My gosh," I thought to myself, "I remember planting this tree with Vincent, probably 29 years ago."

Here I was, thirty years as the golf course superintendent, immersed in the middle of a town I had liked, on a course I loved and among players it was a pleasure to work for. Some I counted as friends.

It is one of the most interesting and longest short walks in the world, a walk on the golf course you are responsible for. With my eyes and my mind open, the experience was comparable to experiences of world travel. The changes over time had been huge; they were all improvements, actually. Bluebirds and Baltimore orioles were everywhere that day.

The deep green and healthy grass, the towering hickory and oak, the bright and deep blue Wisconsin sky, and the fresh clean air are all precious, at least to those among us who notice and appreciate and enjoy them. The golf course is beautiful any time of the day and any season, despite the habit of superintendents to see the warts and corners of neglect. There is an uncompromising sense of order here for me, a pattern that appeals to me. It looks good today in June, and it will look good in January with the snow piled high and white. And in October when the golden and maroon leaves are drifted deep in the rough ground, the beauty is beyond description.

This short walk reminded me of the heavy responsibilities of the past thirty years, which have gone so quickly. But how would it be to not make this walk? We all live in the present but cannot help living in the past, too. And now I think of the future. There will have to be a stopping place for me; nobody can keep going forever. How to stop? When to stop? How to leave off is the real question I have to answer in the not too distant future.

But not today. I have too much to do to have taken even this much time for a short walk to get my mail–a long, short walk in the summer on a golf course in Wisconsin.

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Fine Fescue Cultivar Selection for Fairways

By Dr. John Stier, *Department of Horticulture, University of Wisconsin-Madison*

A few months ago I wrote a summary of a round-table symposium held at the GCSAA conference in February on fine fescue use for golf course fairways (see "A Kingdom of Fairways" in the March/April issue). The article covered many thoughts on management of fine fescues but little on selection. As every turf manager knows, starting with the right grass can make all the difference in the world.

What are fine fescues? The term fine fescue is applied to several *Festuca* species that have extraordinarily narrow (fine) leaves. Often the leaves do not fully unfold, giving the leaf texture an even more narrow appearance. Five species are most commonly used for turf (Turgeon, 2002). Strong creeping red fescue (*Festuca rubra var. rubra*) produces long, abundant rhizomes and has 56 chromosomes. Slender creeping red fescue (*F. rubra var. littoralis* has shorter rhizomes and only 42 chromosomes. Chewings fescue (*F. rubra var. commutata*) has always been considered to be more tolerant of lower mowing heights than other fine fescues. It is a bunch type grass but produces more thatch than even the creeping red fescues. Sheeps fescue (*F. ovina*) has stiff leaves and is best adapted to dry, gravelly soils. It has a bluish green color and often grows in a swirl-type pattern. Hard fescue (*F. longifolia*) also has stiff leaves but is more tolerant of moist soils and has wider leaves than sheeps fescue. Both sheeps and hard fescue have bunch type growth habits.

No-mow mixtures are generally mixtures of several fine fescue species. Fine fescues mix quite well with Kentucky bluegrass and are often found in retail seed mixtures. Little work has been performed to determine their longevity and competitiveness in various mixtures, and their survival likely will depend a great deal on the environment and management inputs.

As a group the fine fescues are considered to be low maintenance because they require less water, fertility, and mowing than most other commonly used turfgrasses (Meyer and Funk, 1989). Although fairly tolerant of shade and acid soils, they do not perform well under high nitrogen (N) or in wet soils. Their traffic tolerance is generally poor and their recuperative ability minimal due to their slow growth rate. As a group fine fescues are notorious for turning brown in summer heat. Historically they generally do not tolerate mowing heights below one to two inches. Diseases such as net blotch (a type of leaf spot caused by *Drechslera dictyoides*), red thread, and dollar spot can be severe problems. In the past few years, however, numerous cultivars have been developed yet their newness has not allowed their characteristics to be fully explored. Some cultivars have had endophyte fungi incorporated into them for enhanced insect resistance.

Wisconsin cultivar trials. In 1998 the National Turfgrass Evaluation Program (NTEP) coordinated fine fescue cultivar trials in 26 states and one Canadian province. The trial had 78 fine fescue cultivars plus a novel species, tufted hairgrass. There were 27 Chewings cultivars, 25 hard, 22 strong creepers, 4 slender creepers, and 4 other (sheep, blue, blue x hard, and tufted hairgrass). Several states established more than one trial in order to evaluate performance

under two different management regimes in a similar environment (e.g., high and low input) or under two environments (e.g., sun and shade). At the University of Wisconsin-Madison we planted two trials to be maintained at fairway height, with traffic to be applied on one of the two trials. The trial will conclude next year. Results from all locations are compiled annually and published at www.ntep.org.

Materials and Methods

Plots (5 ft x 5 ft) were established on a silt loam soil (pH 6.8) in early September 1998. The site had a slope of approximately 2% which provided good surface drainage. Seeding rate was approximately 3 lb per 1000 ft^2. A randomized complete block design was used with each cultivar replicated three times. Trafficked and non-trafficked plots were established adjacent to one another with a 10 foot border between the trials. A golf cart traffic simulator was designed and constructed by the Biological Systems Engineering Department at UW-Madison. The traffic simulator consisted of two articulated steel frames each holding two 50 gal drums filled with water. Each frame had one 5 ft. axle with several golf car tires placed from one end of the axle to the other to provide uniform pressure and wheel slippage. The entire system was designed to equal the force (psi) of a single golf cart with two sets of clubs and two 175 lb individuals. Simulated golf cart traffic was applied three times weekly (one pass each time) to the trafficked plot beginning early May 1999 and ending in September of each year.

Plots have been mowed at 0.875 inches two to three times weekly using a reel mower with clippings returned. All turf was fertilized with 0.5 lb N per 1000 ft^2 each growing month and irrigated to prevent stress (approximately 2 to 3 times weekly). A three-way herbicide (2,4-D, dicamba, and MCPP) was applied in 1999 to reduce competition from broadleaf weeds which germinated during establishment. Plots were sprayed autumn 2000 with sethoxydim (Vantage) to control creeping bentgrass which had been spread from other sites by mowers.

Turf quality was rated monthly on a visual scale of one to nine, with one equal to dead turf/bare soil and nine equal to ideal turf. A rating of five was considered acceptable. Spring green up was rated on a similar scale each April, and turf color was rated during October. Percent living ground cover was estimated each October. Data were analyzed using Analysis of Variance to detect significant differences among treatments. Treatment means were separated using Fisher's LSD ($P \leq 0.05$).

Results and discussion

Data from 2001 showed surprisingly good results for all turf. We had expected many of the cultivars to virtually disappear under the dual threats of low mowing height and traffic but all cultivars survived. Eighteen cultivars provided acceptable-quality turf when trafficked (rating at least 5.0), while 76 cultivars provided acceptable turf quality when no traffic was applied. Cultivars separated into top, several middle, and one low-performing groups. In the trafficked plot, 31 of the 79 cultivars were classed as top performers (average rating 5.0). Of these, 42% were new or

Table 1. Summer patch (*Magnaporthe poae*) resistance[1] of representative fine fescue cultivars mowed at 0.875 inch height and subjected to simulated golf cart traffic, Verona, WI, 2000.

Top group[2]			Bottom group[3]		
Species	**Cultivar**	**Rating**	**Species**	**Cultivar**	**Rating**
Chewings	Longfellow II	9.0	Hard	Nordic	5.3
Chewings	SR 5100	8.3	Hard	Reliant II	5.0
Chewings	Sandpiper	8.3	Hard	Defiant	4.3
Strong creeper	Navigator	8.3	Hard	Osprey	4.0
Strong creeper	Jasper II	8.3	Hard	Scaldis	4.0
Strong creeper	SR 5210	8.3	Chewings	PST-4HM	4.0
LSD (0.05) 1.9					

[1] Disease resistance was rated visually on a 1 to 9 scale; 1 = 100% turf symptoms, 9 = no disease.

[2] 32 cultivars were in the top group, none were hard fescue.

[3] 14 cultivars were in the bottom group, 12 were hard, 1 blue, and 1 Chewings.