COPING

By Roger Bell

Be careful what you pray for — you just might get it. That familiar old saying has never been more true than when it comes to the weather. After a **long** dry spell — we finally got rain. By the time you read this article, though, the situation could be radically different. About the only thing you can count on with weather is that it's not going to suit all the people all the time — or any of the people some of the time.

I have resolved to give up worrying about weather this year. I have a limited supply of irrigation water at my golf course. Last summer, I rationed it as best I could to minimize the damage but still, when the water came up short, there was nothing more I could do.

The same situation is true when a deluge of rain hits. There is nothing a superintendent can do with 5″ of sudden rainfall except wait for the flood waters to recede. Even the best designed and executed drainage system has its limits.

Perhaps the real job of a golf course superintendent is coping with whatever Mother Nature dishes up. Coping means managing the best we can with the tools at hand. As we would say in polite company, Mother Nature is fickle.

Have a good season — hope the weather suits you — and above all, pray carefully!

A FAIRWAY IN MY HANDS

By Monroe S. Miller

Seeds have become real important in my job the last year or so. I've probably used more seed in the recent months past than I have in my entire previous years as a golf course superintendent. One reason for such consumption was exciting — new construction! The other heavy use came in dealing with a tragedy — a Wisconsin winter that was more severe than usual. One seeding was frosting; the other was salvation.

Pat and I were getting ready to seed the new features of our golf course project last fall when I was running my hands through the bentgrass seed we were going to use. My first thought was to not spill any — "this seed is like gold". Then, in a more reflective moment, it occurred to me that with such small seeds I could almost literally hold a fairway in my hands. Not quite, but almost.

It's an old trick in our business — diluting bentgrass seed with Milorganite to provide more even and more accurate seeding rates. We were doing that and for the first time in years my memory retreated to the times in my youth when we inoculated alfalfa seed before sowing it in the springtime. Usually an abiding *Rhizobium sp.* bacterial community exists in the soil, even after crop rotations on southwestern Wisconsin slopes.

Those rhizobial organisms are the ones that form a symbiotic relationship with the alfalfa roots and this team of plant/bacteria carries out N_2-fixation, providing enough for the alfalfa's prosperity plus a little more. Rather than chance their absence, most farmers mixed the rhizobia with the alfalfa seed immediately before planting it simultaneously with the oat crop. Actually, most farmers had their kids do the mixing (in a bushel basket) right before it was needed in the grain drill. Mixing the bentgrass seed and Milorganite was a lot like that. From what I understand, the inoculation process is long a part of history and now farmers are able to purchase alfalfa seeds with an inoculant coating with a guaranteed shelf life. Progress is a great thing!

I had transferred the grass seed from the lined burlap bags into a bushel basket. We needed to remove the plastic liners so the seed could be soaked in the burlap. I plunged my arms into that clean and cool seed. As I looked closely at those mysterious little seeds, I had a vision of thousands of acres of grass covering golf courses all over the country, giving pleasure to untold numbers. Their roots held soil in place; their leaves gave communities fresh oxygen to breathe; their existence made our existence happier and healthier.

It may be an overstatement to call these visions religious experiences, but they were at least pleasant thoughts and lofty dreaming. That ecstasy was followed by doubt. Will it grow? Will the rains come after a summer of drought? Will the rains come too fast and too hard and ruin our good work? Will there be the clear and warm days that are needed also? Yet despite the questions and doubts, I imagined the grass growing and the mowers cutting and the golfers playing. It was a fantastic picture, worthy of all the prayers over the weeks following seeding.

Wisconsin has a strong seed history. Although that doesn't include grass seed production, it does include seed production for a lot of other agricultural crops. And it includes a history of some of the earliest seeding equipment (and some of the best) in the world. Most have heard of the famous Van Brunt seeders and grain drills made in Horicon. Daniel and George Van Brunt invented the broadcast seeder and the grain drill. They built their first seeders in Horicon in 1861 and continued to do so until 1911 when they sold out to John Deere. Deere still operates that factory today, building grass maintenance machinery instead of seeders and grain drills.

More familiar to modern day landscapers is the Brillion Company. Their grass seeding equipment is in a league all its own throughout the world. The company name is also the town where the machinery is made here in Wisconsin.

Students at agricultural colleges are exposed to many of the earliest experiments in plant science and soil science. Most are familiar with the names of Joseph Priestly, Jan Baptista van Helmont and Gregor Mendel and their experiments. Less known, but at least as interesting, is the work of one W.J. Beal. Professor Beal conducted some very interesting experiments with seeds.

Beal was on the faculty at the Michigan Agricultural College (called Michigan State University these days) during the last quarter of the last century. In August of last year, during a trip to a wedding in the Detroit area, I visited the MSU campus. I wanted to tour the Hancock Center (their turfgrass research facility) and I needed to visit the USGA Turfgrass Information Center and the Noer collection of books there. During my visit with Peter Cookingham, Director of the TGIC, I brought up the subject of Professor Beal. Peter promised to do some searching as his time permitted. When I saw him at the GCSAA Conference in Anaheim, Pete gave me an envelope of material about Beal and his work.

Beal's experiments were focused on seed dormancy — "vitality of seeds", as he called it. If the seed is the culmination of a plant's reproductive process that began with a flower, then a natural question that follows is "how long do seeds remain viable?"

In a paper read before the Society for the Promotion of Agricultural Sciences' 5th annual meeting in Philadelphia on September 1st and 2nd, 1884, Professor Beal described his experiment this way: "In the fall of 1879, five years ago, I began some experiments, hoping to add something to the information we now possess on this subject (of seed vitality). I selected 50 seeds of each of 23 different kinds of seeds of common plants. I prepared 20 lots of these seeds all alike. Each lot or "set" of seeds was well mixed in moderately moist sand, just as it was taken, from 3 feet below the surface, where the land had never been plowed. The seeds of each set were well mixed with the sand and placed in a pint bottle, the bottle being completely filled and left uncorked and placed with the mouth slanting downward. The bottles were buried about 20 inches be-

(Continued on page 5)

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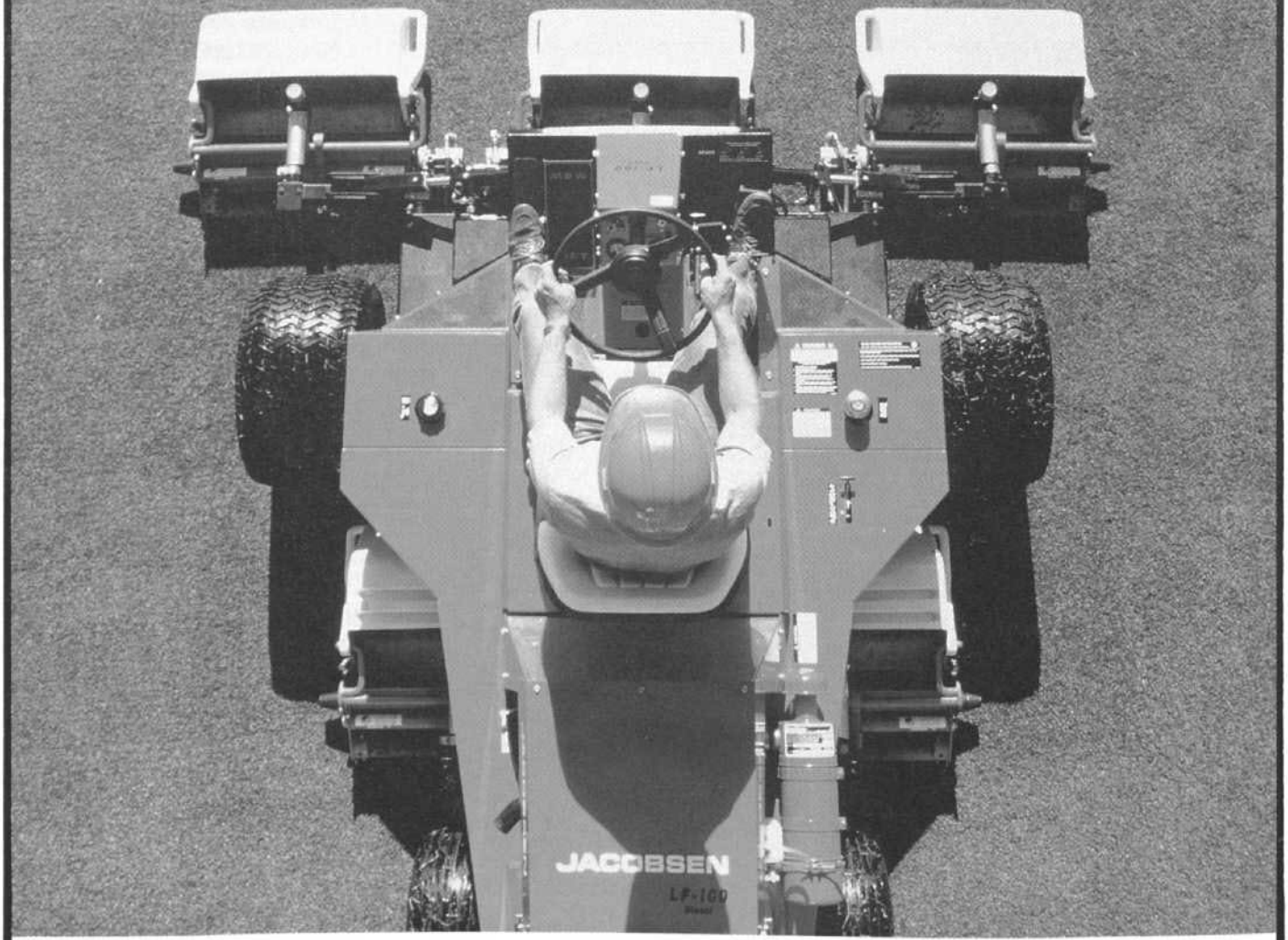

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(Continued from page 3)
low the surface of the ground on a sandy knoll."

For the first 40 years after 1879 one bottle was dug up every 5 years and the seeds were tested for viability. From the 40th year onward, Beal's successors have tested the seeds every 10th year. Below is data through the first 70 years:

	YEAR										
	5th	10th	15th	20th	25th	30th	35th	40th	50th	60th	70th
White Clover	0	0	0	0	0	0	0	0	0	0	0
Fireweed	0	0	0	0	0	0	0	0	0	0	0
Common mallow	+	0	0	+	0	0	0	0	0	0	0
Common mullein	+	?	+	+	0	0	+	0	0	0	0
Common chickweed	+	+	+	+	+	+	0	0	0	0	0
Shepherd's purse +	+	0	+	+	+	+	0	0	0	0	0
Rough pigweed	+	+	+	+	+	+	+	+	0	0	0
Peppergrass	+	+	+	+	+	+	+	+	0	0	0
Evening primrose	+	+	+	+	+	+	+	+	+	+	+
Yellow Dock	+	+	+	+	+	+	+	+	+	+	+

The longevity of seeds buried in soil. + indicates germination of one or more seeds; 0 indicates no germination.

In 1970 after 90 years of dormancy, seeds of only one species — *Verbascum blatteria* or moth mullein — were viable. Ten of the original seeds in the bottle buried by Beal in 1879 germinated.

An interesting historical sidelight: Peter wrote to me, "A colleague here in the MSU library (the Agricultural Librarian) says he knows 'the exact' location of the sandy knoll where Professor Beal buried the seeds for his experiment so if you stop by again perhaps we can arrange a 'field trip' (about 300 feet from us here)." I will make that trip again someday to see where this intriguing test of seeds took place.

The trend among golf course superintendents to pre-germinate seed probably has something to do with my renewed interest in seeds, too. It makes the subject of longevity especially fascinating. The oldest authentic case I've been able to read about were 2000 year old lotus *(Nelumbo nucifera)* seeds found in peat near Tokyo. They are enclosed in a hard shell nearly impervious to water. The seed coat almost has to be ruptured before the seed will germinate. Despite the passage of 20 centuries, plant life came from that seed. I wish I had similar confidence in a 4 year old bentgrass seed!

Other than agriculturalists and maybe gardeners, most Americans probably don't give seeds a passing thought. Until this past March, at least. Most of the nation's daily newspapers carried a 3-part AP expose entitled "SEEDS OF CONFLICT". Its subject was the seed reserves of our country and policies affecting them.

It was frightening to read. The conditions uncovered by AP reporters drove many like me into a rage. Underfunding, bungling, incompetence and neglect by, as usual, politicians and bureaucrats have imperilled the future of U.S. agriculture.

There is a golf course connection here, a personal one for those who attended the GCSAA Conference last February, that goes beyond our own obvious use and need of seeds. One of our speakers (and one of our friends), Rep. George E. Brown Jr., is mad as hell, too. As a member of the House Agricultural Committee, he plans on doing something about the terrible state of affairs of our seed reserves. He called the U.S. germplasm (seed) system "lousy, measured against the importance of the problem."

The California representative is chair of the subcommittee which oversees our germplasm reserves. He is upset over embargoes by the State Department which restrict free exchange of seed. He called them "an example of that age-old adage, 'There ain't no damn reason for it; it's just our policy.' "

This seems a disturbing note to leave a sentimental story on. Even seeds are politicized; they are more than a simplistic "fairway in my hands" or Dr. Beal's experiments on vitality. They are more than Johnny Appleseed or inoculated alfalfa.

But wait: we don't have to see them through the eyes of the politicians, the greedy or the power mongers. Read Muriel Stuart's words — she enjoyed the thought of a forest, a meadow, a garden in her hand:

Here in a quiet and dusty room
they lie,
Faded as crumbled stone or
shifting sand,
Forlorn as ashes, shrivelled,
scentless, dry —
Meadows and gardens running
through my hand.

Dead that shall quicken at the
call of Spring,
Sleepers to stir beneath June's
magic kiss,
Though birds pass over
unremembering,
And no bee seek here the
roses that were his.

In this brown husk a dale of
hawthorn dreams,
A cedar in this narrow cell is
thrust
That will drink deeply of a century's streams,
These lilies shall make summer
on my dust.

Here in their safe and simple
house of death,
Sealed in their shells a million
roses leap;
Here I can blow a garden with
my breath,
And in my hand a forest lies
asleep.

1988 DROUGHT TAKES TOLL ON BRIGGS & STRATTON CORP.

The drought of 1988 has hit Wisconsin's largest private industry employer. In early June Briggs & Stratton laid off an additional 300 production workers. They join 700 previously laid off employees. The layoffs are due to a lack of engine orders. That reduction in orders of small engines for lawn mowers and turf maintenance equipment is due to last year's drought. The drought cut into lawn mower sales and led to inventory buildups.

It is believed that for the first time ever, this major Wisconsin manufacturer will lose money for fiscal 1989 which ends this June 30.

However, improved sales prospects look good for this summer because retail and commercial sales have been doing well. Increased rainfall is primarily responsible for this improvement.

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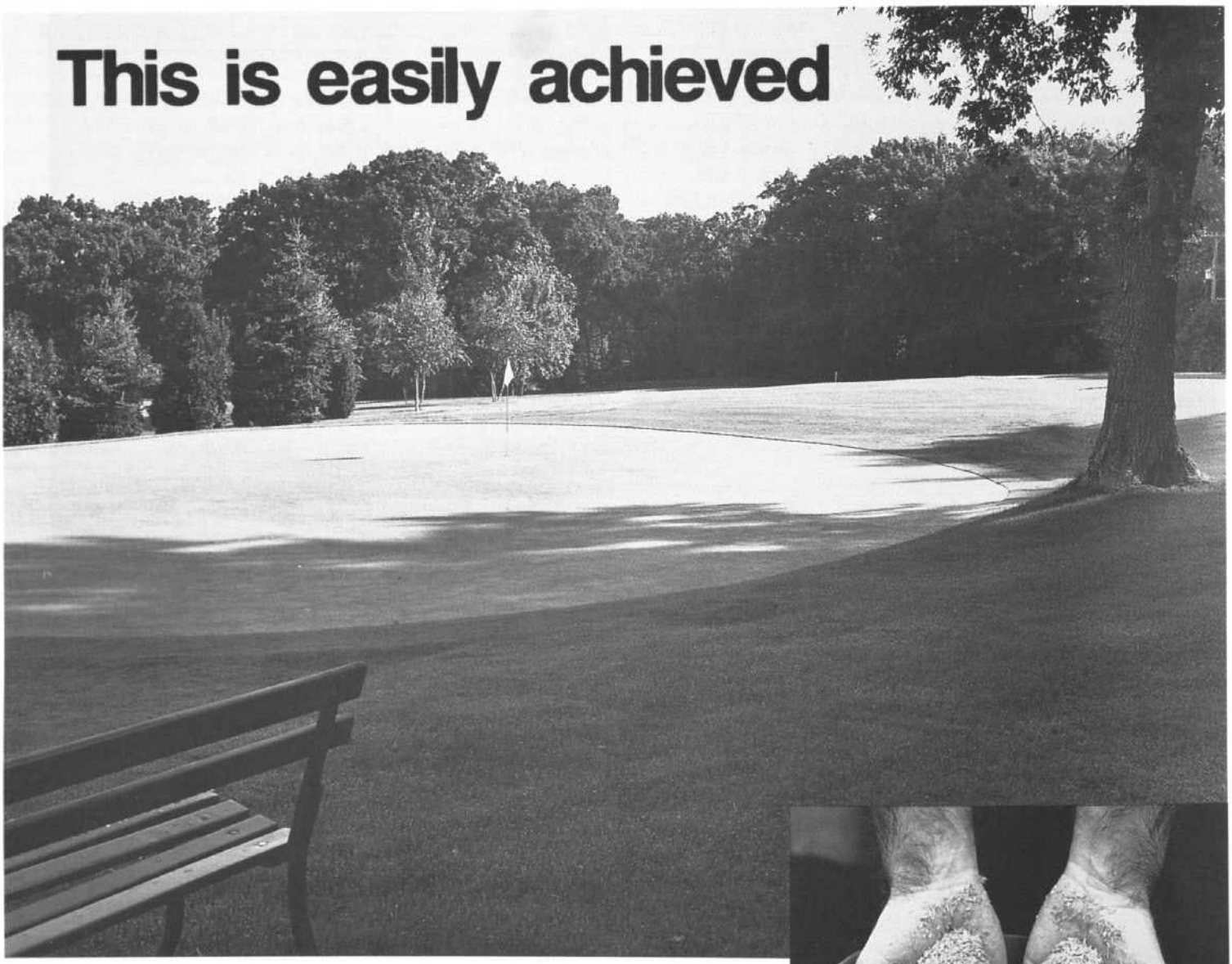

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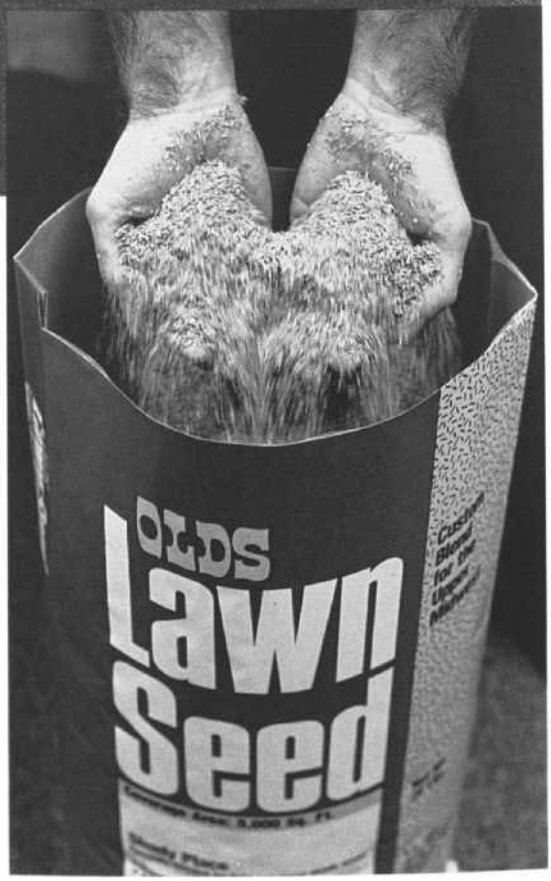

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Managing Greens for Putting Speed

By Wayne D. Otto

Editor's Note: This article, which first appeared in the March 1980 issue of the GRASS ROOTS, was the catalyst for the survey prepared, analyzed and presented by Bob Erdahl. It seems impossible that ten years have passed since its printing. Much of what Wayne said in 1980 is true today — some things never change.

We are reprinting Wayne's article for the benefit of newer members of the Wisconsin Golf Course Superintendents Association.

If you asked a golfer how he thought putting conditions could be better at his home course, he probably would comment some about the speed of the greens. Most low-handicap players prefer faster putting conditions than the higher-handicapped golfers are comfortable with. Extremely fast greens can be very difficult to putt especially if the surfaces are severely contoured.

A golfer should have ideal putting conditions whether he is at a daily fee golf course or at a private (members only) golf club. We are in the business of providing the best possible playing conditions for the golfer — and not how much clipping yield we can harvest per green. The ball should roll with ease on a green so a putt may be stroked smoothly — not having to be struck hard as a croquet ball is on the lawn. Some golf courses mow greens at high (conservative) heights of cut and use more nitrogen fertilizer than is necessary. These cultural practices do not produce ideal putting conditions and may develop an undesirable spongy and matted turf condition. It is the superintendent's responsibility to be aware of the playability of the golf course and not just growing green grass.

Top-notch putting greens have surfaces which are smooth, roll true, and are uniform in speed. These are conditions that do not exist on greens which have a build-up of mat and thatch. Foot printing which occurs on thatchy turf, affects the smoothness of putting surfaces. The vertical growth habit of turf will influence trueness and uniformity. Turf should be dense but be free of matting and grain which will destroy putting accuracy.

Putting green turf should have leaf blades that are fine in texture. Putting surfaces must be firm — yet resilient enough to accept a properly hit approach shot.

> What is Thatch? Dr. Jim Beard, says, "Thatch develops when the accumulation rate of dead organic matter from actively growing turf exceeds the rate of decomposition. Any cultural or environmental factor that stimulates excessive shoot growth or impairs the decomposition process will increase the accumulation rate."

For the establishment of a firm putting surface it is absolutely necessary to eliminate thatch accumulation which causes sponginess. Depending on the severity of the thatch problem, greens may have to be aerified several times before enough matter is physically removed to incorporate lime, topdressing, air and water into the composition to permit biological decomposition.

After several years of aerification, we decided that we need regular applications of topdressing. It was impossible to find the proper ingredients for a topdressing mixture. In 1974 we found a sand that some foundries were using which was perfect. It was medium-fine in texture with 97% passing a 0.42 mm screen and 96% was retained on the 0.15 mm screen. In 1975 we began using this material alone (without peat and soil) on four (4) greens at Ozaukee Country Club. After only one (1) year of results and with information from Dr. John Madison, University of California at Davis, we decided to apply sand for topdressing on all the greens.

Since 1976, sand has been applied at the rate of 2 cubic feet per M feet² about every 4 weeks. There is little interference with golf play as an application is now completed in 3 hours with: 2 men, a Lely spreader, a truckster, and a dump truck. The sand topdressing has been a preventive rather than a curative method for mat and thatch control. At the end of the 1979 season (4 years of sand use) the build-up of sand and organic matter measures ¾ inch. With no aerification we have no surface unevenness from leaf growth in aerifier holes which is particularly noticeable in the afternoon for quite a long time following aerifying.

Wetting agents were used before sand topdressing began and we still continue the program. Aqua-Gro is applied alone at the rate of 8 oz. per M feet² in May, June, July, and August. I prefer using the 8 oz. rate rather than mixing lighter rates with fungicide applications because of compatibility problems. There is less incidence of localized dry areas with the use of Aqua-Gro.

Supplemental irrigation is applied to greens at rates of 0.10-0.15 inch per day during the summer stress period. With frequent, light applications of water similar day-to-day playing conditions are maintained.

Mowing begins in the spring with a triplex greensmower, which is equipped with grooved rollers on both the front and rear of each cutting unit. The height of cut is bench-set at 9/64th inch which is lowered to 1/8 inch in May. We use thin bedknives with the underside ground off until there is 1/16 inch distance between the height adjustment bar and the bottom of the bedknife with the height set at 1/8 inch. The outer perimeter of the green is mowed only 4 times per week, with the triplex mower operating at the slowest possible speed to help prevent wheel tracking.

Nitrogen fertilizer use has much influence on putting speed. No more nitrogen should be used than is necessary for recuperation. High release of nitrogen during summer periods of high humidity and temperature produces a soft, lush, or succulent turf which will putt very slow. Lush turf is also more susceptible to disease injury and will tend to get fluffy and mower scaping will occur. Greens that have hardened-off or lean turf will have finer textured leaf blades than more stimulated turf.

For the past seven years (since 1973), I have been on low levels of nitrogen fertility. This has helped produce bet-

(Continued on page 9)

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Gator	5.9	Yorktown II	5.4
Prelude	5.8	Cowboy	5.4
Repell	5.8	Pennfine	5.3
Tara	5.8	Diplomat	5.3
Premier	5.7	Regal	5.3
Citation II	5.6	Barry	5.2
Manhattan II	5.6	Delray	5.2
Blazer	5.6	Omega	5.1
All Star	5.6	Elka	5.1
Ranger	5.6	Manhattan	5.1
Birdie II	5.5	Citation	5.0
Fiesta	5.5	Linn	3.4
Pennant	5.5		

It's no wonder courses like Bay Hill in Florida, Shinnecock in New York, PGA West in California and Sahara in Nevada are only a few of those that are demanding the excellent performance of Palmer.

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—Wayne Otto
Supt. of Ozaukee Country Club

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(Continued from page 7)
ter putting conditions and also prevents excessive shoot growth, which contributes to mat and thatch accumulation. The most actual nitrogen applied since 1973 was 3.4 pounds per M feet². The last three years (1977-1979) the average annual nitrogen applied was 2.5 lbs. The following fertilizer materials were applied in 1979 per M feet².

November	35 lbs. Milorganite
April	3 lbs. Potassium Sulf.
April-Oct. every 7-10 days	2 oz. ea. Fe. & Mg. Sulf.
August	6 oz. 33-0-16
September	6 oz. 33-0-16
per M feet 1/1979	
TOTAL	
Nitrogen	2.4 lbs.
Phosphorus	0.7 lbs.
Potash	1.6 lbs.

I have been using the dormant application of nitrogen since 1970. The past 6 years (1974-1979) 80% of the total annual nitrogen has been applied on dormant turf in late November or December, with the following results:

(1) early spring green-up
(2) a uniform and steady growth pattern
(3) an increased root response
(4) nitrogen lasts longer
(5) less total annual nitrogen is needed.

Nitrogen applications have been needed in late August for recuperation. The speed of the greens is another indicator that nitrogen is needed (ie. uphill putts start rolling back) especially on days with low humidity. A spray application of 33-0-16 water soluble fertilizer at 6 oz. per M feet² (1/8 lb. N) provides some immediate response and slightly decreases the putting speed. We do get a favorable response from foliar applications of iron and magnesium sulfate which are included at rates of 1-3 oz. each per M feet² with fungicide tank mixes.

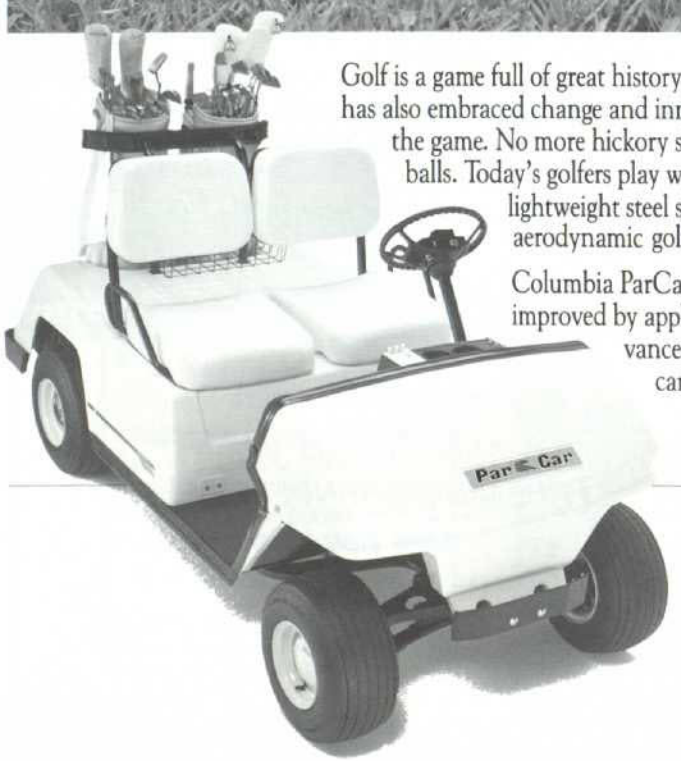
The low nitrogen program has been successful on the 58 year old silt clay greens at Ozaukee Country Club. Newer vintage greens which have a high sand content (less cation exchange capacity) will not respond the same. In September of 1974, we built a soil-less (90% sand and 10% peat) No. 9 tee, which was planted with Penncross bentgrass and is maintained at ¼ inch height of cut. The following annual nitrogen has been applied:

PER M FEET²	N
1974-1975	15.6 lbs.
1976	9.7 lbs.
1977	7.8 lbs.
1978	6.5 lbs.
1979	5.3 lbs.

In summary, my program of managing greens for putting speed includes: Close clipping with mowers equipped with grooved rollers; frequent, light applications of sand for topdressing; dormant application of nitrogen; no nitrogen during summer stress; and asking the grass when to fertilize. With this maintenance program we have firm putting surfaces with turf that is free of matting and grain. The putts roll smoothly, the ball does not deviate off line, and the greens are uniform in speed. Vertical mowing has not been needed because of frequent topdressings, the mowing program, and the low nitrogen fertilizer program.

It is most important that we provide a golf course with turf that is maintained at levels which will produce the best possible playing conditions for golfers.

New Ideas
For An Old Game



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