

**THE SUPERINTENDENT'S GUIDE TO**  
**BETTER CREEPING**  
**BENTGRASS GREENS**

**PRESENTED BY**  
**SEED RESEARCH OF OREGON**



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# **THE SUPERINTENDENT'S GUIDE TO BETTER CREEPING BENTGRASS GREENS SEED RESEARCH OF OREGON**

IT IS OUR SINCERE HOPE THAT THE ESTABLISHMENT AND MANAGEMENT CONCEPTS DESCRIBED IN THIS BROCHURE ARE EASILY UNDERSTOOD. THE EXPERIENCES OF THE INDIVIDUAL AUTHORS ARE ANECDOTAL AND ARE NOT NECESSARILY WRITTEN TO BE USED AS A "HOW TO-" MANUAL FOR GROWING OUR BENTGRASSES. IT SHOULD ALSO BE NOTED THAT THE CLIMATES AND SOIL TYPES OF THE COURSES IN THIS BROCHURE MAY BE RADICALLY DIFFERENT FROM THOSE FOUND ON YOUR SITE. WE LOOK FORWARD TO PUBLISHING YOUR SUCCESS STORY, TOO.

## **INTRODUCING PROVIDENCE CREEPING BENTGRASS**

In the Americas, golfers have traditionally preferred bentgrass putting surfaces. Golfers lucky enough to have played the beautiful, old courses of the New England states brought with them stories of extremely smooth and fast velvet bentgrass greens.

A healthy velvet bentgrass putting green provides an extremely upright, and fine textured surface that is exceptionally disease resistant. It has an incredibly low nitrogen fertility requirement, and requires very little mechanical management (i.e. verticutting, core aeration).

However, velvet bentgrass lacked the climatic adaptability and traffic tolerance of creeping bentgrass. In view of these limitations, plant breeders, seed companies, golf course superintendents, and golfers learned to accept the creepers. So from New England to the Desert Southwest, to the Pacific Northwest to the Transition Zone, creeping bentgrass has been planted with great success.

The first improved varieties began to appear on the U.S. market in the mid 1950's. These grasses tended to be coarser in texture, and had a more lateral growth habit. Because of their wide climatic adaptability, many superintendents and turf students were taught the basics of managing only these types of creeping bentgrasses. This education included the frequent use of vertical mowing and core aerifying, reduced nitrogen fertility to limit thatch production, and the preventative use of fungicides.

Over the last 40 odd years, bentgrass breeding has sought to change the character of creeping bentgrass. From imported, South German bentgrasses and indigenous germplasm, the creepers have begun to take on a more velvet bentgrass appearance. Providence is undoubtedly the most successful of these "new" varieties of creeping bentgrass.

Providence provides fast, smooth greens due to its upright growth and fine texture. Disease resistance has been greatly improved through careful germplasm evaluation and selection. *Poa annua* invasion has been minimized due to greater stand density, and the need for mechanical management has been greatly reduced.

## **ADVISE FOR ESTABLISHING PROVIDENCE BENTGRASS GREENS ON HIGH SAND MIXES**

(by Gordon Witteveen – Board of Trade Country Club – Toronto)

The following is based on 40 years of greenkeeping successes and mistakes, and most recently, two successful new greens redesigned by Arthur Hills, built by Evans Construction and seeded to Providence Bentgrass.

**WATERING:** Immediately after seeding, drive over the green with a Toro sand trap rake, with the rake in the "up" position. The characteristic, knobby tire marks of the Sand Pro should be imprinted on the entire

green and surrounds. When one turns the water on, the higher edges of the depressions will erode and cover the seed at the bottom. To avoid run off, most of the watering should be monitored from the controller site. To keep the green moist during the initial stages, water at least 3-5 times per day. After the seed has germinated, watering becomes even more critical. It may be necessary to water greens as often as every hour, starting at 10:00 a.m. and continuing until 6:00 p.m., or later.

Now is not the time for the superintendent to take Sunday afternoon off and go to the beach. During grow-in, greenkeeping truly is a seven day a week job.

**FERTILIZING:** All that irrigation water washes the fertilizer through the sand profile! You will be amazed how quickly after germination the tiny grass plants turn yellow from lack of nitrogen. Feed them with your favorite potion, whatever it may be, but feed them often or the new green will wither and be retarded. It is always a revelation how much more fertilizer new greens need compared to old, established putting surfaces. Availability of nutrients is radically different than the amount applied.

**MOWING:** The first cut is made with a walking mower equipped with a solid roller, set between 3/8" and 1/2". Don't wait too long, or the leaf blades will flatten out under the mower. It is sometimes a good idea to lightly roll the green the day before cutting. That gets rid of the lug marks from the trap rake and the foot prints you left from periodic inspection. As subsequent cuts are made at lower heights, care should be taken so as not to remove too much of the leaf tissue. Lower the mower between 1/16th and 1/32nd per week. This gives the plants time to get accustomed to the last cut.

**TOPDRESSING:** To obtain a smooth surface it is essential to topdress. Leave adequate time between topdressings, so that the grass plants do not get buried. Instead of using a steel mat, which can severely damage young grass plants because of its abrasiveness, use a "levellawn" to incorporate the topdressing. It takes a little longer, but it is much gentler. If there are some small open spaces in the stand that are unlikely to fill in naturally, additional seeding can be done in conjunction with the topdressing.

**WHEN TO OPEN FOR PLAY?** This is where judgement based on experience comes into the equation. Too many greens are opened much too early or at the wrong time of the year. We all know of horror stories when new greens were put into play on the hottest day of the summer. It is probably best to open a new green in the fall, when the number of players diminishes and natural stress levels are also in decline. It is not always possible to wait for the opportune time, but one thing is certain: if the green in question was a problem green you rebuilt; the longer you wait to allow play, the better your chances of success.

## **ESTABLISHMENT OF PROVIDENCE**

(by Kevin Pryseski, CGCS – Cattail Creek C.C. – Glenwood, MD)

We built our greens in strict accordance with the United States Golf Association's greens specifications. Our root zone is 85% sand to 15% peat mix. All of the root zone material was blended off-site, and delivered when needed. Sphagnum peat was the organic material source.

Seeding on the back nine greens was completed by September 19, 1992. We used a rate of 1.5 lbs./1000 ft<sup>2</sup> applied in two perpendicular directions and wire leaf rakes were used to drag the seed into the mix. The same process was employed on the front nine but was not completed until October 4th due to irrigation delays.

Watering during the first two weeks should be a manual operation regardless of your confidence in the system. Assign three members of the staff six greens apiece and water at least three cycles of 5-7 minutes per head per day. Visual inspections must be made to assure that the heads are performing correctly, and avoid damage to the putting surface when sprinkler heads stick in one position. This is an

opportune way to see the development of seedlings and make subtle corrections in the watering and fertility schedules without delay.

The weather in the fall of 1992 was colder than normal with several early autumn frosts. Even so, germination occurred in seven days. No mowing took place until March 1993. However, two weeks after germination the greens were rolled using Toro GR 1000 walking mowers with reels disengaged once a week until greens were covered the third week of November. This procedure helped in firming the root zone quicker.

The two week period between the seeding of the back and front nines, proved to be quite dramatic in terms of establishment. The two week delay in seeding the front nine, and the subsequent poor growing weather, seriously retarded the establishment rate of those greens. The difference was so evident that the projected May 30th opening date was postponed until July to allow the front nine greens the opportunity to catch up.

The initial grow-in fertilization program was as follows. No pre-plant fertilizer was applied. Week one is exactly one week after planting.

### **Grow-in Fertility Program**

<b>WEEK</b>	<b>N - P<sub>2</sub>O<sub>5</sub> - K<sub>2</sub>O RATIO</b>	<b>ACTUAL APPLIED</b>
WEEK #1	1-1-4 (minors)	1.00 lbs. K <sub>2</sub> O/1000 ft <sup>2</sup>
WEEK #2	4-5-1	0.68 lbs. N/1000 ft <sup>2</sup> 0.94 lbs. P <sub>2</sub> O <sub>5</sub> /1000 ft <sup>2</sup>
WEEK #3	4-5-1	0.68 lbs. N/1000 ft <sup>2</sup> 0.94 lbs. P <sub>2</sub> O <sub>5</sub> /1000 ft <sup>2</sup>
WEEK #4	1-3-4	0.10 lbs. K <sub>2</sub> O/1000 ft <sup>2</sup>
WEEK #5	4-5-1	0.68 lbs. N/1000 ft <sup>2</sup> 0.94 lbs. P <sub>2</sub> O <sub>5</sub> /1000 ft <sup>2</sup>
WEEK #6	2-0-2	0.90 lbs. N/1000 ft <sup>2</sup> 0.80 lbs. K <sub>2</sub> O/1000 ft <sup>2</sup> 9 lbs. Fe/acre
WEEK #7	Sustane 5-2-4	1.00 lbs. N/1000 ft <sup>2</sup> 0.40 lbs. P <sub>2</sub> O <sub>5</sub> /1000 ft <sup>2</sup> 0.80 lbs. K <sub>2</sub> O/1000 ft <sup>2</sup>
WEEK #8	4-5-1	0.68 lbs. N/1000 ft <sup>2</sup> 0.94 lbs. P <sub>2</sub> O <sub>5</sub> /1000 ft <sup>2</sup>
WEEK #9	1-0-2	0.50 lbs. N/1000 ft <sup>2</sup> 1.00 lbs. K <sub>2</sub> O/1000 ft <sup>2</sup>
WEEK #10	—	9 lbs. Fe/acre

The third week of November, the greens were covered with Tyvek (a geotextile). A wetting agent was applied on the covers at a rate of 32 oz./100 gallons of water to keep water from puddling and aid in infiltration. Before covers were installed, an application of Bayleton 1G was applied to the greens at 1.5 lbs/1000 ft<sup>2</sup> for snow mold control (*Microdochium nivale*). Covers were removed three more times before the end of March for additional applications of Bayleton 1G at 1.5 lbs./1000 ft<sup>2</sup>.

After the covers were removed in the spring, we mowed the greens at a height of 0.25". They were double-cut four times a week for the first two weeks. Mowing height was then lowered to 0.188" and mowed five times weekly until May 30. At this point, we began mowing at a height of 0.156", six days a week, and continued throughout the first summer.

Topdressing, beginning as soon as growth begins in spring, is the most important program to follow for successful Providence greens. The greens were lightly topdressed every Monday until mid-July when weather was too hot and dry. Topdressing during this time of the year was damaging the turf by abrading the leaf tissue. Topdressers were walked over the greens at a setting of #1 and later reduced to 1/2 setting. The greens mix and topdressing sand are the same with the topdressing @ 85-15 sand-peat mix. After applications the greens are dragged by hand with tennis court brushes.

## MANAGEMENT OF PROVIDENCE

(by Kevin Pryseski, CGCS – Cattail Creek C.C.)

Our fertilization program emphasizes the use of high potassium levels (to strengthen the plant's cell walls) and spoon feeding the nitrogen (to discourage the plant from producing too much succulence). It is our goal to grow a plant strong enough to withstand foot traffic, but active enough to recover from ball marks and disease pressure. The season after "grow-in", our fertilizer totals were:

9.86 lbs. N/1000 ft<sup>2</sup> - 2.25 lbs. P<sub>2</sub>O<sub>5</sub>/1000 ft<sup>2</sup> - 9.80 lbs. K<sub>2</sub>O/1000 ft<sup>2</sup>.

Through soil samples, observation and overall performance the second year (our first full year) totals were: 8.54 lbs. N/1000 ft<sup>2</sup> - 4.29 lbs P<sub>2</sub>O<sub>5</sub>/1000 ft<sup>2</sup> - 11.20 lbs. K<sub>2</sub>O/1000 ft<sup>2</sup>.

Spoon feeding with an 18-3-9 liquid plus Humate (12% humic acid) proved to be a tremendous asset through the summer. A liquid calcium product was also applied three times during the summer along with five applications of Iron Chelate with minors (12-0-0) supplying 1/7 lb. N/1000 ft<sup>2</sup> per application. We were able to tank mix both products with our fungicide treatments. Other changes made the second season were to use potassium nitrate in a 13-0-44 and Scotts coated potassium in 0-0-45.

The STEP product was replaced with Scotts Fluid Minors when we noticed a "speckling" pattern from the granular product. Soil Technologies Bio-Pro (seaweed extracts plant growth hormones and micro-nutrients package) applied once every four weeks during the growing season at 1 lb./acre rate also proved to be very effective. Our soil tests indicated that we should also apply gypsum twice a year at 20 lbs./1000 ft<sup>2</sup> (spring/fall). With soil pH's in 4.6 -5.3 range pelletized limestone (mini-prill) is applied spring and fall at a rate of 30 lbs./1000 ft<sup>2</sup>. These products are also good sources of calcium and magnesium which can be very low in new sand greens.

The first season no vertical mowing was employed. With Providence's upright growth habit we were able to keep the putting surface rolling "true" and build an appropriate thatch layer for protection against traffic wear. The thatch layer has accumulated to what we feel is a proper 1/4" to 1/2" to withstand wear. I think developing a reasonable layer was an important factor in the success of the greens the second year.

Very light (!) vertical mowing was begun in May (2nd season) on an every three week basis. A Toro GM 3100 triplex with verticut reels is used in two directions adjusted to just "knick" the plant above the soil surface. This is followed by our regular topdressing procedure which incorporates the mix below the leaf blade. This procedure along with 1/2" core aeration beginning in the spring should maintain the thatch at a manageable level. We core aerate twice yearly for the purpose of alleviating some "localized dry

spots” which began to occur this fall (1994). The use of the Hydroject was also employed every three weeks from June - August this year (1994) with good results. Dropping of N rates and the utilization of slower nutrient release sources will also keep thatch levels manageable.

### 1994 Second Season Fertilization Program

DATE	FERTILIZER RATIO	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O
3/24	Milorganite 6-2-0	.5 lbs.	.16	0.0
4/06	2-0-2	.9	0.0	.7
4/18	1-2-2	.57	1.0	.9
5/02	liquid minors elements pkg.			
5/09	1-2-2	.34	.62	.51
5/11	Gypsum 20 lbs./1000 ft <sup>2</sup>			
5/18	2-1-2	.38	.19	.38
6/08	1-0-2	.25	0.0	.47
6/09	liquid minor elements pkg.			
6/21	Perform plus Humate 18-3-9	.14	0.0	.07
6/23	Perform plus Calcium			
6/28	1-0-2 with minor elements	.25	0.0	.47
7/11	1-0-2 with minor elements	.25	0.0	.47
7/26	1-0-3	.39	0.0	1.1
8/02	2-0-1	.14	0.0	.07
8/08	1-0-2 with minor elements	.25	0.0	.47
8/11	liquid minor elements pkg.			
8/16	Milorganite 6-2-0	.4	.1	0.0
8/27	2-0-1	.14	0.0	.07
9/02	4-5-1	.34	.47	0.0
9/15	liquid minor elements pkg.			
9/16	4-5-1	.68	.94	0.0
9/29	1-2-2	.34	.62	.51
10/03	Perform plus Calcium			
10/12	2-1-2	.38	.19	.38
10/23	2-0-2	.9	0.0	.7
10/25	High Ca + Mg - 30 lbs./1000 ft <sup>2</sup>			
10/31	1-0-2	.5	0.0	.93
11/07	0-0-45	0.0	0.0	2.0
11/14	1-0-2	.5	0.0	1.0
11/30	Gypsum 20 lbs./1000 ft <sup>2</sup>			
		<b>N</b>	<b>P<sub>2</sub>O<sub>5</sub></b>	<b>K<sub>2</sub>O</b>
	<b>TOTAL</b>	8.54	4.29	11.20

Green speed is a major issue at our club. I have actually been asked by some members to slow the greens down. Again, Providence’s upright habit contributes to speeds in excess of 10' on the stimpmeter. Our mowing heights range from 0.125" - 0.141" depending on weather. This year we were at 0.141" in July/August. Frequency of cut is six times weekly with Monday set aside for topdressing.

The use of a roller has not been a routine practice. It has been employed for special events, primarily for smoothing the putting surfaces (not necessarily to increase speed). However, we will be outfitting

the GR1000 mowing units with groomers next season that will allow us to bring the height up slightly and still maintain our desired speed.

Watering on sand greens must be done by observation. The use of hand watering is a daily routine from June - August with three staff members given six greens each. They are kept on the same six every day to develop a familiarity with the green's hot spots.

Our spray program is on a preventative basis for disease with a close eye on the changes in weather. As of now, no disease has shown up on any green with a very basic contact/systematic rotation being employed. Cutworms and sod webworm have been the only pest problems encountered, but they are easily controlled.

The success of Cattail Creek's greens is due in large part to:

- 1) Weekly, light topdressing
- 2) High potassium fertility
- 3) Spoon-feeding of nitrogen
- 4) Attention to the quality of the mower's cut
- 5) Limited irrigation, and diligent hand-watering
- 6) Constant observation

## **INTRODUCING SR 1020 CREEPING BENTGRASS**

Few is the number of golf course superintendents that can grow bermudagrass greens with the same putting quality of bentgrass. Fewer still are the number of superintendents growing bermuda greens that enjoy the biennial transition periods.

Over the last 25 years, with the improvements in maintenance equipment and irrigation delivery, bentgrasses have begun to find their way further and further south. Initially, the same bentgrasses that were being used in the cooler, northern climates were being planted in the hotter regions. Sometimes with less than pleasing success. It was obvious to many that if bentgrasses were to survive in the south, heat tolerance would need to be specifically bred into future varieties.

In response, plant breeders throughout the southern tier of the U.S. began, in the late 1960's, to develop creeping bentgrass varieties, especially suited for the hotter growing seasons. To date, the best of the hot climate bentgrasses is SR 1020.

Year after year, SR 1020's fine texture, upright growth, and traffic and heat tolerance have extended the climatic range of creeping bentgrass beyond what was once considered unthinkable. From Arizona to Texas to Georgia, SR 1020 has been consistently the best hot weather variety available.

## **ESTABLISHMENT OF SR 1020**

(Diamante C.C. Hot Springs, AR – by Mandel Brockinton, CGCS, formerly at Diamante)

Prior to the seeding of the SR 1020, an application of 10-18-22 starter fertilizer, equal to 1 lb. N/1000 ft<sup>2</sup>, was incorporated into the upper 2" of the seed bed. The seeding rate of 2 lbs./1000 ft<sup>2</sup> that was used on the back nine seemed to be light considering the lateness of the season. I felt that by seeding the front nine that late in the fall, I should use a 4 lb. rate in the event that the colder weather hampered germination. (This is an excessive rate, and in retrospect, I would never recommend that anyone seed that heavily.) We walked the seed into the putting surface with a Toro Sand Pro; the tires pushing the seed into the seed bed worked very well and created an even pattern of grass on the greens.

During the pre-germination stage, great care was taken to water the greens as needed to prevent desiccation. I tried to consider the location, and exposure to sunlight and wind when scheduling the water. I did not want to allow the seed bed to become dry before water was reapplied, or overwater the seed. Hands on inspection of the green is needed during this stage of development.

The weather turned out to be perfect, and we got a good stand of grass up in 4 days. Although the

seeding rate specification for SR 1020 is significantly lower, 0.5-1.5 lbs./1000 ft<sup>2</sup>, the higher rate did not seem to have any adverse effects, and the greens really began to take shape in a short period of time. We first mowed the greens two weeks after germination at a height of 1/4".

The grow-in fertilization of the greens began at this time using a 1/2 lb. N/1000 ft<sup>2</sup> every week. Through the remainder of the grow-in, I used alternating applications of a quick release nitrogen source one week, and a starter fertilizer the next week. An 18 week program would be as follows:

### **Sample Grow-in Fertility Program For SR 1020**

<b>PREPLANT -</b>	1-2-2 slow release 1 lb. N/1000 ft <sup>2</sup>
	1.5-1.5-1.5 Ag grade 1 lb. N/1000 ft <sup>2</sup>
<b>GROW-IN -</b>	
week 1	1.5-0-2.5 slow release 1 lb. N/1000 ft <sup>2</sup>
week 2	2-0-1.5 slow release .5 lb. N/1000 ft <sup>2</sup>
week 3	1-0-1 Sustane 1 lb. N/1000 ft <sup>2</sup>
week 4	1.5-0-2.5 slow release 1 lb. N/1000 ft <sup>2</sup>
week 6	1-1.5-2 slow release 1 lb. N/1000 ft <sup>2</sup>
week 7	2-0-1.5 slow release .5 lb. N/1000 ft <sup>2</sup>
week 8	1.5-1.5-1.5 Ag grade 1 lb. N/1000 ft <sup>2</sup>
week 10	1-0-1 Sustane 1 lb. N/1000 ft <sup>2</sup>
week 11	3-1-2 (liquid feed) .5 lb. N/1000 ft <sup>2</sup>
week 12	2-0-0 slow release 1 lb. N/1000 ft <sup>2</sup>
week 13	3-1-2 (liquid feed) .25 lb. N/1000 ft <sup>2</sup>
week 14	2-0-1.5 slow release .5 lb. N/1000 ft <sup>2</sup>
week 16	1-0-1 Sustane 1 lb. N/1000 ft <sup>2</sup>
week 18	1.5-0-2.5 .5 lb. N/1000 ft <sup>2</sup>

As soon as the surface was firm enough, topdressing was applied to promote lateral growth and to smooth out the putting surface. The greens were mowed 3-4 times each week and watering of the greens went to a more normal schedule. As soon as the weather and plant development would allow, the mowing height was lowered and fertilization cut back. I normally apply 4-6 lbs. N/1000 ft<sup>2</sup> to my greens per year. However, grow-in will require the use of 8-12 lbs. N/1000 ft<sup>2</sup> for the new greens in the first year.

### **MAINTENANCE OF SR 1020**

(Diamante C.C. Hot Springs, AR – by Mandel Brockinton, CGCS, formerly at Diamante)

I try to keep the nitrogen levels in the 4-6 lb./1000 ft<sup>2</sup> range per year and potassium in the 7-8 lb. range. The potassium will remain this high unless soil tests tell me to cut back. With the high rates of potassium, I have found that the hardiness of the grass is improved in the summer months and root length is carried longer into the summer months. The first nitrogen application of the year is applied a week prior to the first aeration to help the healing process.

Spoon feeding the nitrogen to the greens in the summer has been a very successful practice for me. Normally, I apply 1.5 lbs. N/1000 ft<sup>2</sup> in the spring and another 1.5 lbs. in the fall. The other 1 pound of N is applied in the summer months, in 1/4 - 1/8 lb. increments.

Before any nitrogen is applied, I look to see if an iron application would be a better substitute. I like to apply iron first, especially if my nitrogen levels are high. I prefer to use iron for color and nitrogen for growth. Too much nitrogen has too many bad side effects on mature greens. I also take a look

at my micronutrients and apply them whenever spraying applications are made throughout the year.

The use of the water injection aerification has helped me during the summer months. It allows air to get to the roots, adding to root length. The machine is used every other week, starting in May and ending the middle of September. Localized dry spots are treated only as needed with great results. However, the machine is no substitution to the regular aerification practices.

In the first part of March, we use our regular aerifier to pull the plugs with a 1/2" hollow tine. In mid-April, before the *Poa annua* seedheads are set, I follow up with the deep tine aerification machine using 1/2" solid tines. Topdressing is applied before the deep aerification to mitigate the weight of the machine being used. The last aerification comes at the end of September, when we again use the 1/2" hollow tines.

A heavy verticutting is also done before the March aerification. Any other verticutting is done lightly, as needed to thin the stand, throughout the milder weather. No verticutting is done in July or August due to heat and drought stress.

I feel the most important practice to bentgrass is the use of the Vicon to lightly topdress the green anytime during the year. My normal program is to lightly apply topdressing three times each month, from March to November. When plugs are pulled, I try to split my topdressing application a week apart. I have found that this seems to allow the greens to recover quicker. I take great care to get all the sand out in the morning and rolled in using the rollers of a triplex mower or watered in to get the sand into the thatch/soil surface. In my experience this is the best control of the greens getting too much grain. With SR 1020's upright growth pattern and the use of the Vicon, I am able to maintain great green speed with almost no grain throughout the summer months.

Disease control is on a preventive basis. When looking at label rates, we try to use the lowest rates and the longest time between applications. I like to rotate the chemicals we use every time we spray, and contact fungicide is used every third spraying. The best disease control I have found is daily inspection of the putting surface for any disease development. The use of fungicides can be abused if sprayed every time the weather changes or a spot shows up on a green. I have a few greens that, due to their location, will show disease problems before other greens, so great care is taken to watch the susceptible greens with a more careful eye. Most of the time we will only spray the affected greens.

The irrigation system is used in the early morning hours around 5:00 a.m. to 6:00 a.m. I like to vary the watering strategy daily, from deep watering (to promote good root development) to light irrigation (to knock the dew off of the greens). I have found that varying the water amounts develops a better root system and better turf quality. During the spring, fall and winter, I water as little as possible and even then I infrequently water heavy.

The syringing (or water cooling) of the grass begins when signs of wilt or dry spots appear. I have found that this can only be done by hand watering. I train my crew to watch for the wilt and water only those spots that show signs of stress. The greens are never cooled all over until the last time my crew checks them that day. Only then is the green cooled and stress spots heavily watered. The light application of water is only enough to last a short period of time; I want the greens dry going into the late evenings. The dry spots and wilt areas are then watered the next morning, and only then with the use of a hose and nozzle. When wilt or dry spots occur they are flooded with enough water to cool the area and force the water into the root zone. I don't mind seeing a green wilt a little because I know I can increase the irrigation that next day knowing I am not applying too much water.

With the SR 1020 bentgrass the overall thinning in the summer does not occur as in the other varieties of bentgrass I have used. The grass will still dry out, and burning will occur but the summer thinning has not been a problem in the Texas heat so far. The color of the grass is not effected by heat and remains a good, dark green color in the high temperatures. It retains an upright growth habit that allows me a higher cutting height. Even at 0.157", the SR 1020 has great speed and smoothness. It is not unusual to have my membership ask me to slow the green speed!

Mowing should be done only with walking greens mowers. In my opinion, riding mowers should only be used if budgets will not allow the man-hour and equipment expense of walkers. The light weight of the walking mowers and the better cut you get with them is all the evidence any superintendent needs. We are able to make a cleanup pass well into the late summer using the walkers. When the heat stress gets to be too great, we still mow a cleanup pass 4 days a week. Before the decision is made to convert to bentgrass, the use of walking greens mowers should be considered.

We used SR 1020 at Ridgewood Country Club in Waco, Texas as an experiment. To our thinking, it would not last the summer, and the bermudagrass would be planted the next summer. Once the members saw what bentgrass was and got over the fear of losing the grass in the hot temperature, the decision was quickly made to convert all the greens to SR 1020 creeping bentgrass as soon as possible. In my opinion, no transition and a great year round putting surface is reason enough to have bentgrass. The use of SR 1020 has been a great help. Its heat tolerance has cut down on my headaches in those dog days of summer. The most important reason for growing SR 1020 at Ridgewood Country Club is the pride that the membership has in the putting surface it creates.

## **INTRODUCING DOMINANT CREEPING BENTGRASS BLEND**

It is not always that the whole is greater than the sum of its parts. Let us introduce you to one such occasion: Dominant creeping bentgrass blend. By blending the proven disease resistance of Providence with the unsurpassed heat tolerance of SR 1020, we have developed a blend of bentgrasses that performs uniquely beyond the some of its parts.

For years, golf course superintendents have blended seeds together to attain better “genetic diversity”. Unfortunately, the plant materials were often quite different in color, growth habit and texture. This led to segregated putting surfaces that were as unattractive as they were hard to maintain.

Dominant creeping bentgrass blend combines the 5 clones of Providence with the 5 clones of SR 1020 to create a durable, single textured blend. As favor for bentgrass greens moves further south through the transition zone, more and more superintendents are finding that the Dominant blend provides tremendous heat resistance, exceptional disease resistance and recovery in a superb putting surface.

## **ESTABLISHMENT OF DOMINANT**

(by Pat Finlen, CGCS – Lake Quivira C.C. – Lake Quivira, KS)

The fertility program I followed is one that I learned from listening to many superintendents that have built numerous greens and from making many mistakes myself on new greens in the past. Twenty-one bags of Milorganite was incorporated into the mix at the sand plant. This equates to three bags per 1000 square feet of finished green. A starter fertilizer was mixed into the top two inches at the time of seeding. From the date of seeding until mid October we followed what we call a four to five day week. Every fourth or fifth day we applied a different product. The green was watered with individual head control very lightly five to six times a day for the first month. The discharge pipe for the entire green drainage system was monitored daily. For almost one month the pipe has at least a trickle flowing through it.

### **Fertility Program—Day 1=Day of Seeding Sept. 2nd**

(expressed in lbs./1000 ft<sup>2</sup>)

		<b>N</b>	<b>P</b>	<b>K</b>
Day 1	Starter Fertilizer	0.50	1.00	0.25
Day 5	Trace Element Package	0.25	0.00	0.25
Day 6	Pythium Control (Subdue)			
Day 9	High Potassium	1.00	0.00	2.00

Day 14	Starter Fertilizer	0.50	1.00	0.25
Day 19	High Nitrogen with minors	1.00	0.12	0.50
Day 24	Trace Element	0.25	0.00	0.25
Day 28	Starter Fertilizer	0.50	1.00	0.25
Day 29	Broad Spectrum Fungicide			
Day 34	High Potassium with minors	1.00	0.00	2.00
Day 41	Starter Fertilizer	0.50	1.00	0.25
Day 46	High Potassium	<u>1.00</u>	<u>0.00</u>	<u>2.00</u>
	<b>Total</b>	<b>6.50</b>	<b>4.12</b>	<b>8.00</b>

With the onset of winter the fertility program will be scaled back with a final application made around Thanksgiving. Germination of the Dominant was in three and a half days. On the 11th, 12th and 13th day we rolled the green. On the 14th day we mowed the green at 7/32". The green was mowed every third day and on the 23rd day the green was mowed at 5/32". There was almost 95% plus coverage by the third week. By the first week of October the green looked as if it had been there for months.

Our number one goal with our fertility program is to achieve a 1/2" mat by winter so that when the green is opened in early spring it can withstand the heavy spring play. Without that mat we are guaranteed to have a long summer with a thin putting surface.

## **MANAGEMENT OF DOMINANT**

(by Steve Nash, CGCS)

The most obvious advantage that I have found in using such a fine textured bentgrass is that I can keep the mowing heights somewhat higher and maintain very fast greens. During the summer, I mow my greens at 3/16" and still maintain a stimpmeter reading of 8-9 feet. For special occasions, rolling can be used to get the green speeds of 10', while still keeping the cutting heights up. To my thinking, the higher I can keep my greens and still keep the golfers happy, the healthier my greens will be in the long run.

Culturally, Dominant's upright growth habit reduces the need to verticut. International Town & Country Club in Fairfax, VA has gone from a regular routine of verticutting, to very rarely needing our verticut units. Topdressing to keep the green surface smooth tends to be the most frequently used cultural practice. Aerification is done only on an as needed basis.

As can be predicted, the biggest concern with a Dominant/USGA green is keeping enough fertilizer in the root zone area. The high sand content of the root zone mix tends to allow nutrients to leach through quite rapidly. During grow in it is not unusual to apply a starter fertilizer at a rate of 1/2 lb. N/week, until the mowing height is down below 1/4".

Usually, if you can see the grass turning off color, then you have waited too long before making your next application. The sand based greens will need the total package of fertilizer nutrients in larger than normal amounts throughout the growing season. It is quite possible that the green will end up with a fertilizer schedule that has me applying 1/2 - 1 lb. N every 10-14 days during growing season. The importance of biweekly applications of micronutrients can not be over stressed. As with all turf areas, soil and tissue testing regularly will help to keep you in touch with your green's nutrient requirements.

## **ESTABLISHING BENTGRASS GREENS FROM SOD**

(by Steve Nash, CGCS)

One of the biggest questions we asked ourselves during the renovations at International Town was whether to seed or sod our new greens. Both methods have their advantages and disadvantages. Before you decide, you must analyze which method will work best for your club based on the amount of time out

of play, cost per square foot, and labor dedicated to installation and grow-in management.

Seeding is inexpensive (usually less than 1 cent per square foot), but slower to establish. Sodding can be expensive (usually around \$1 per square foot), but can be significantly faster to establish. We knew that seeded greens could take as long as nine months, and sodded greens could be playable in as short as two months. We felt that, for these reasons, we should sod our greens. We could afford sod. We could not afford to have our greens out of play for an extended period of time.

Our greatest concern with the sod was the production. It is vitally important that the bentgrass sod be grown on an identical medium to that in your renovated greens. There are too many establishment and management problems associated with dissimilar growing mediums, not the least of which is the layering of different soils in the profile. There are two ways to assure yourself that your sod will be a perfect match. The first approach is to contract the sod production at least a year in advance. This will allow you the opportunity to have the sod grower supplied with the exact mix that is going into your greens. The other possible approach would be to use washed sod. This allows your sod the opportunity to root directly into the mix.

For all of the advantages of sodding, the most difficult thing that a superintendent faces is impatience. Golfers see the green grass on the putting greens and get anxious to play. Sod must be given enough time to root and mature before play may resume. There are no hard and fast rules for the opening of sodded greens, so the superintendent must judge for himself when sufficient root establishment, smoothness and the maturity is present on each green.

## **SR1020/DOMINANT CREEPING BENTGRASS MANAGEMENT STRATEGIES**

(by Ed Miller, Director of Golf Course Operations – Carefree Resorts – Phoenix, AZ)

Because of the increased shoot density and upright growth characteristics of the new bentgrasses, they need to be managed somewhat differently than the older more lateral types. This is true of the Seed Research grasses as well. Because of the increased density, the greater the potential for improved putting surface quality. At the same time, this increased density creates a very tight turf canopy and with it some potential challenges with management variables. If asked to highlight some of the strategies we consider critical to the successful propagation of healthy and high quality putting surfaces, I would separate the areas of focus into three key categories. These categories consist of:

### **I. Soil and Fertility Management**

Manage the organic matter content of the growing medium. The less OM in the mix or soil, the less biology, nutrient holding, water holding and buffering capacity the mix has. With present day mixes it's hard to find a mix that has OM in excess of 1.5 percent. That's kind of funny considering all of the soil science texts I've read over the years say that the most productive soils have OM in the 4 to 5 percent range. We have seen that if you get below 1 percent humus, thatch production is prolific, growth, unless you spoon feed is a roller coaster ride and the tenure of the superintendent at these courses is about three years. Use some organic fertilizer products and add peat to the top dressing mix. Although not as effective as building a mix with a decent OM content, it will help.

Get the soil balanced. A proper calcium to magnesium ratio (4 or 5 to 1) does wonders for how the soil takes water and breathes. It is also imperative to keep the percentage of potash in base saturation in excess of sodium. This way when the plant is going into stress it draws on potash instead of sodium.

Consider applying 10 to 12 pounds of actual K per year as long as K doesn't increase in excess of 10 percent of base saturation. This isn't likely to happen as most soilless greens construction won't hold anything

well enough to see this accumulation of a very lightly held mineral. You have to think more about solution management than soil management. Remember that in the summer you're putting on a lot of water and this does leach potassium. Speaking of which, it's important to know what else your putting on from the water.

Watch your nitrogen. With the exception of grow-in conditions, we eliminate nitrogen from our fertility plan from June 15 to September 15. We have found that we receive enough atmospheric nitrogen through monsoon storms to keep growth sufficient during this period. These new bents, with increased shoot density, can get really puffy with excess nitrogen and this is an 8-ball that's best not to get behind. Replace N with iron applications and potash. If your phosphorous levels are low, a little N from mono-ammonium phosphate is better than being deficient in phosphorous. It's best to get the P levels up in the spring. Know if you're applying any nitrogen from other sources. Reclaimed water can deliver up to 4 pounds of N per year in a very active form. The N-phuric water treatment materials also have a nitrogen component, N from both of these sources can really add up in the big irrigation months.

Use some ammonium sulfate in the spring and fall for soil temperature control.

## **II. Water Management**

In addition to supplying the plants with water, effective irrigation management also provides the plants with plenty of air. This is why we prefer infrequent irrigation. As the soil dries down, the pore space that was filled with water, becomes filled with air. This helps the whole system to breathe. If a perched water table concept is used in construction, aeration can be improved by flushing type irrigations that fill the pore space, break the water tension and then create a flushing vacuum action as this water moves through the bottom of the profile pulling air behind it. Deep and infrequent irrigation is not a water conservation effort, it's an irrigation philosophy that gives the plant what it needs to drink and breathe.

The management of salt buildup is really important in the desert southwest. Bicarbonates, sodium and chloride are present in moderate to high amounts in almost all of the water sources in Arizona. It's important to know what the levels are and how much salt you're applying to the soil. Flushing type irrigations are typically required on at least a monthly basis in the summer months. It's also important to remember that although this quality of water would be fine for bermudagrass in the summer or ryegrass in the winter, it can be tough on bentgrass in the summer.

Sprinkler performance can many times be suspect when it comes to proverbial isolated dry spots. It is well worth the time and effort to place rain gauges or collection cups to ensure that all areas of the putting greens are receiving the amount of water the computer tells you they are. Low heads or bad nozzles also often go unnoticed. When I think of irrigation management, I believe that it takes place in the field and not in front of the computer screen.

## **III. Cultural Efforts**

With increased shoot density many things get really important. When you consider how tight and compressed the canopy of a bentgrass stand can get, there is unquestionably less tolerance. This canopy can create in itself a micro-climate that holds gasses and humidity. When we have a canopy that can create this effect, it's important to really keep the system breathing and to manage the aeration.

Aeration can be provided in many forms. The old standby of core cultivation is still hard to beat. The amount or frequency is dependent upon the mix, size of greens and traffic received. Some mixes, even

sand, benefit greatly by deep tine aeration. Spiking or small tine or Hydroject aeration can all play an effective part. With summer being the most challenging period, an aggressive late spring or early summer aeration is critical to keeping the surface breathing. It is the time of year the creeping bentgrass can really benefit, and you don't have to fear any germination of the grassy weed *Poa annua*.

Good cultural practices can also be considered summer survival strategies. If there were one general philosophy worth mentioning it would be that the success or failure of bentgrass summer is not a result of summer efforts, but of the preparations made for summer during the rest of the year and particularly the spring. There are no cures and no recuperation in July and August.

## **Some Special Considerations**

Expect creeping bentgrass to get puffy in the summer, most pronounced during the monsoon season. When humidity increases so will the density and height of the canopy. When anticipating this, it's important to do two things: go into this period with a low mowing height so that when it happens you can fall back on cutting height and not have to putt on Velcro. Also, the higher the cutting height, the taller the canopy and more intense the micro climate becomes. The other is, that you want to be really aggressive with top dressing prior to the onset of the puffy period..

Vertical mowing or grooming is also beneficial prior to the monsoon but we get extremely cautious once it's upon us and prefer to battle the increased mat with top dressing.

Wetting agents also help, especially the good ones, in keeping water moving and helping to keep oxygen in the root zone.

Use fungicides as a last resort and when you do, stick to contacts if possible. Sterol inhibitors, on a cool season plant already in heat stress, can sometimes be the last straw. I've seen combinations of these fungicides that have done far more damage than the disease ever would have.

In closing, just like anything else, it's best to keep things simple. When you keep inputs controlled, it is a lot easier to see and understand the cause and effect of both the good and bad things that happen. It's also really important to understand how important such a small amount of area as the putting greens are to your golf product. In light of this, know who you can trust to make decisions and inputs to this important area.

All of the information presented herein is intended to be in guideline form. Although I believe it will apply to the majority of courses growing the new bentgrasses, there will always be exceptions. When this is the case, you just have to fall back on your powers of observation and determine what is best for your individual situation.

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