Bentgrass Establishment & Management Guide

BARENBRUG®

T-1™ & L-93 XD™ Blend
The Oaks Golf Club
London, Ontario

Each and every golf course is unique. We developed the following guidelines to serve as a starting point in the management of this remarkable cultivar.

These guidelines cover the basics as well as some advanced topics of cultivar management. Do not assume you need to incorporate every one of these recommendations, as most bentgrasses can accommodate a range of management styles. Sound agronomic judgments will always produce the best performing turf.

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Information in this guide is provided as a general guideline. It is intended as a starting point in developing a sound management program. If you have additional question, please contact a Barenbrug representative.

Timing of Seeding

Bentgrass seed germinates most readily when soil temperatures are warm (above 60°F/15°C). If seeded in very warm conditions (above 80°F / 27°C air temp), bentgrass will germinate quickly but may need protection from damping-off fungi.

- Seed can be coated with fungicide to provide protection before emergence.
- In most cases an over-the-top application of fungicide after emergence will be sufficient.
- Warm soil temperatures offer the best time to plant if Poa annua seed is present in the soil. Poa annua rarely germinates above 80°F / 27°C, hence giving the competitive edge toward bent establishment

T-1™ at Loch Lloyd Country Club
Loch Lloyd, MO

Bentgrass can be sown in the cooler months of the year but seed may require 30 days or more to emerge in cold weather. During this interval the surface is vulnerable to erosion.

- Example: Seed planted in early August might produce a putting green that's ready for play by June of the next year. However, a green not planted until late September (in Northern areas) may require a full year until it's ready to open for play.

In semi-tropical areas, spring plantings may be problematic in trying to nurse immature seedlings through the summer. This feat can be accomplished but requires skill in irrigation and fungicides. Spring planting may also prolong the time until the grass is ready to play.

Seeding Rate

Optimal rate: 0.75 to 1.5 lbs. of seed per 1000 ft^2 (3.7-7.5 g/m^2).

Applying more than 1.5 lbs. seed per 1000 ft:

- Does not make up for seeding errors
- Nor does it allow for the green to open sooner for play. In fact, it may delay opening day because the overly dense plants are immature. Excessive seeding rates produce turf that is less stress tolerant and more susceptible to damping off.

Establishment Fertility

Corrective (basic) Fertilizer

- Do a lab soil test before seeding so that results are in hand prior to establishment day.
- Correct deficiencies in phosphorus (P), potassium (K), magnesium (Mg), and pH via fertilizer amendments as noted on the lab report.
- Do not try to correct nitrogen (N), or calcium (Ca) in most cases, or pH's above 8.5.

Starter Fertilizer

- Apply a balanced starter with a 1-1-1 ratio of N, P2O5, and K2O (example: 10-10-10 or 16-16-16. Apply just before, at, or within 1 week after seeding.
- Apply at 0.75 to 1.5 lbs. of actual nitrogen (N) per 1000 ft^2 (3.8 to 7.5 g N/m^2). With a 16-16-16 product, this would equate to a rate of 200 to 400 lbs. of fertilizer product per acre. If a farm-grade fertilizer is used, apply only the lower rates to avoid burn.
- Another alternative, if potassium levels are adequate, is to apply a 4-5-1 ratio starter. A product based on mono-ammonium phosphate offers fast nutrient availability with less salt effect.
- Some superintendents prefer a starter with some slow-release N component. Try to avoid using a superphosphate-based P-source, as superphosphate dispenses phosphate slower than seedlings require.
- Generally do not use liquid fertilizer as a starter treatment unless you have had success with this method in the past.

Establishment Fertility (cont.)

Fertilization from Emergence to 4-6 Weeks

- Apply a 1-1-1 ratio fast-release fertilizer on an every-five-day cycle at 0.3 to 0.5 lbs. N/1000 ft^2 (1.5-2.5 g N/m^2). Water immediately after applying.
- Other acceptable alternatives:
  - 6-1-6 ratio fertilizer, with some slow-release N.
  - Fertigation (i.e., soluble fertilizer delivered through the irrigation system) applied at 0.3 to 0.5 lbs. N/1000 ft^2 (1.5-2.5 g N/m^2) every 1 to 2 weeks.
  - Ammonium sulfate can be substituted during the cooler months as a nitrogen source. Ammonium sulfate also benefits disease control.
- Seedlings grown on a sand-medium will usually require a foliar micronutrient application by 2 or 3 weeks after emergence.

Maintenance Fertilizer

- Maintenance fertilization varies depending on whether the growing medium is straight sand, USGA mix, or native soil. Sandier soils will require lighter and more frequent fertilizations and slightly heavier yearly rates.
- Switch from a grow-in to a maintenance fertilizer regime at 4 to 6 weeks after emergence, or when the grass has reached nearly 100% ground coverage. It is important with to decrease the N fertility input as the stand completely covers the ground.
- Rate:
  - Apply fertilizer as the grass requires it, not on a calendar schedule (see Maintenance section below).
  - It is not unusual to end up applying 8-10 lbs. N/1000 ft^2 (40-50 g N /m^2) over the course of the first growing season. That amount should drop by half in the second year and be even lower in the third.
- Fertilizer choices:
  - Polyomer coated fertilizer or similar slow-release fertilizer with N-P-K ratios including equal N and K, with lower P.
  - Apply 1-1-1 ratio soluble fertilizer at 0.1 to 0.3 lbs. N/1000 ft^2 (1.5-2.5 g N/m^2) as needed during the season for quick greening, especially if the stand seems sluggish or there are not enough clippings caught in the buckets.
  - Liquid fertilizer sources can be sprayed on the turf or fertigated at label rates.

Mulch

- A light application of wood fiber, clean straw, pellet or other organic mulch can be applied to the surface to:
  - Aid retention of moisture around the seedlings
  - Minimize washing of seed during storms
- Some courses remove the straw at 3-4 weeks (raking) while others allow it to decompose.
- The mulch can be omitted if an auto-irrigation system is used and timings of water are tightly controlled (see below).
- Some people have had success with a geotextile blanket in lieu of an organic mulch. If you have used these successfully before, you can use them. Otherwise, we'd recommend sticking with organics.

Mowing

- The first mow should occur as soon as the surface is physically capable of supporting the weight of a mower, without damage. Never let the stand grow to 1 inch (25 mm) tall before mowing.
- First mowing should be done when there is uniform turf coverage and the plants reach:
  - 0.25 to 0.38 inch (6 to 10 mm) for greens
  - 0.38 to 0.5 inch (10 to 12 mm) for tees
  - 0.6 to 0.75 inch (16 to 19 mm) for fairways
- It's a good idea to run a walk-behind mower across the green with the reels off, once before mowing for the first time, to help solidify the surface.
- Collect the clippings during the first mow and then alternate catching and not catching the clippings until surface coverage reaches 80%. This small amount of added biomass improves wear and reduces ball marking when the course first opens. Use a fiberglass whip as needed to prevent clippings from shading and damaging the surface.
- Never use a riding or triplex mower for the first 4-6 weeks after establishment, until the greens are solid enough to support the weight without tearing. Many superintendents prefer to use only walk-behind mowing the first growing season on greens.
- Lower the mowing height in small increments, every other mow. Ideally, you should reach the desired mowing height by 6 to 8 weeks after first mowing if not sooner.
- The greens should be mowed the first season with smooth front rollers. Grooved rollers should not be used the first year, especially on the clean-up pass.
- Special care should be given depending on the sand particle shape: Round sands tend to shift during establishment causing holes and bare spots. Angular sands pack tighter but can be more abrasive to young plants until a sod layer builds.

Topdressing

- Light weekly topdressing should be used to help cover the clippings and smooth any surface irregularities.
- Washed masonry sand with particles from 0.25 to 0.5 mm can be used in place of a sand-organic topdressing during the establishment year, if desired.

Irrigation

- The irrigation system should be checked thoroughly before seeding day. It's a good idea to water the day before seeding to help firm the sand surface and bring the green to field capacity.
- A green will normally require more irrigation the first week after seeding than thereafter.
- During germination, it is best to irrigate on multiple 5 to 10 minute cycles, spaced out across the daylight hours. The time of run should be watched every day so that NO puddling or washing of seed occurs. If the system is flexible enough, 2 revolutions of the sprinklers every hour is ideal.
- Early irrigating practices are key to success or failure of bentgrass establishment. The critical time for seedling viability is when seedlings are first emerging from the soil. At that point they are at their lowest energy state and even one missed day of irrigation (or rainfall) can mean a spotty stand.
- At around 2 weeks after emergence, gradually switch from very frequent watering to once or twice daily watering.
- By 4-6 weeks after emergence, the green should be on a normal maintenance irrigation schedule (see below).

Core Aerification and Vertical Mowing During the Establishment Year

- Core aerification is generally unnecessary during the establishment year. In fact, it can cause surface damage if handled roughly, until the sand surface stabilizes.
- Vertical mowing (grooming) is desirable during the establishment year if you notice:
  - A lot of plants with larger-than-desired leaf widths, and/or
  - Stolons creeping across the surface into thinner areas.

How to Tell When a Green is Ready for Opening

- A rule of thumb is to cut a square of turf from the green and:
  - Examine it to see whether a mat (cushion) layer has adequately developed.
  - Try pulling the square apart. It should be fairly resistant to tearing.

T-1™ on The Floating Green, Coeur d'Alene Resort, ID

Section 2: Management

Fertilizer

- Yearly fertility applications should total 1 to 4 pounds N (5-20 g/m^2), 2 to 3 pounds P (10-15 g/m^2), and 6 to 10 pounds K (30-50 g/m^2) per 1000ft^2. Higher rates in each range are used with more golf rounds and sandier soils. Likewise, courses with smaller-than-average greens may need to fertilize to compensate for more concentrated wear.
- Micronutrients should be checked via tissue tests during the summer.
- A soil test should be done annually, each year in the same month.

Mowing

- Common mowing heights:
  - 0.100 to 0.150 inch (2.5 to 4 mm) for greens
  - 0.150 to 0.400 inch (4 to 10 mm) for tees
  - 0.250 to 0.500 inch (6 to 12 mm) for fairways
- A consistent mowing schedule always provides a higher quality turf. Infrequent mowing results in the removal of excessive amounts of leaf tissue and puts the grass under stress. Removal of more than one third of the leaf tissue at a single mowing can result in stunted growth and a stemmy surface.
- For greens, mowing 6-7 times weekly is recommended. Mowing less often can be done if reductions in surface quality are acceptable.
- For fairways or tees, mowing 2 to 3 times weekly during the growing season is best.
- Changing mowing patterns each day helps eliminate grain and reduce wear and compaction. When triplex greens mowers are used, the final "clean-up" cut around the perimeter of the green should be mowed on alternate days. Some superintendents make this perimeter cut with a walking greens mower to reduce wear and compaction.
- If fast greens are desired for tournament play, mowing heights can be lowered for a short period. However, other practices such as brushing and verticutting are recommended instead to increase speed of greens. Research has shown that the primary factors influencing putting green speed are mowing and rolling, where some superintendents double either or both practices with caution.

Vertical Mowing, Grooming, Brushing

- Groomers may reduce the need to verticut as often. Groomers may be used 1-4 times per week depending on growth and maturity.
- Some superintendents use a deep verticut (Graden) in the spring to remove thatch and dead material. Another option for thatch control is core aerification and/or topdressing.
- Brushing is another useful maintenance tool. Brushing early in the spring and once a month depending on weather and growth, will increase plant density. Brushes on mowers will do an acceptable job but are not as thorough as a heavier brushing or brooming.

Aerification, Topdressing

- Most golf courses aerate two to three times a year – once in the spring, early summer, and fall. If multiple aerification events are not ideal or allowed on your course, focus on fall aerification and time with fall seeding to repair or transition greens to new bentgrass cultivars.
- A range of tine sizes can be used from the 1/4" solid to 5/8" hollow core. Solid tine, star tines, and Hydro-jet injection also work.
- Topdressing styles vary from golf course to golf course. Topdressing is important to smooth the greens from foot traffic and ball marks. Most varieties will accommodate light weekly applications or heavier monthly applications.
- The main purpose of topdressing is to dilute thatch. An even blending of topdressing and thatch is the fastest way to stem thatch buildup.
- If thatch thickness is increasing, your options for remedy are:
  - Apply less nitrogen per year
  - Apply topdressing more frequently
  - Aerify more often
- It is important to incorporate the topdressing into the plant canopy. Topdressing can be worked into the stand by dragging or brushing, or with the application of water. Remaining small stones and large sand particles should be brushed off the green.
- For new bentgrasses with high shoot density it is important to open up the stand before topdressing by use of groomers, verticutting, grooving, slicing, aerification, or spiking. It may also be helpful to specify topdressing sand with fewer large particles (>0.5 mm).

Irrigation

- Weather conditions and greens construction have major influences on watering. Watering rates vary from 0.05 to 0.3 inches (1.3-7.6 mm) per day depending on temperature, wind, humidity and sunlight. During cooler months, rates are less than 0.1 inch (2.5 mm) of water per day and weekly irrigation may be adequate.
- It is best to irrigate "as needed" rather than on a tightly fixed schedule.
- Watering every other day or every second day is preferable over daily irrigation. Research from Texas A&M has shown that watering greens every-other day or twice weekly produced a higher quality surface than turf watered daily (weekly water rates being equal).

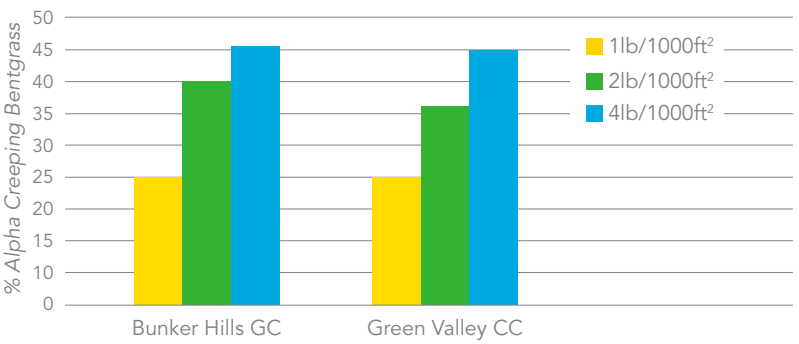
Plant Growth Regulators (PGR's)

- PGR options include Primo MAXX (trinexapac-ethyl), Proxy (ethephon), and Trimmit (paclobutrazol).
- Recovery rate from ball-mark damage can be enhanced by the application of PGR. Studies at Penn State University have shown that growth regulators and bio-stimulants can accelerate ball mark recovery without the need to increase nitrogen fertility, which can reduce green speed.

Interseeding into an Existing Turf

- Interseeding is the introduction of a new grass into existing turf. One of the most challenging surfaces for interseeding is an existing putting green during play. The following is a brief description of two techniques for incorporating bentgrass seed into existing turf:
- Seed 1 to 3 times annually, each time in a different direction
  - Use 2-4 lbs. seed per 1000ft^2 (10-20 g/m^2) per application. Research at Jacklin Seed has shown that establishment rate effectively doubles when seeding rates increase from 1 to 2 lbs. to 2 to 4 lbs. (see figure below)
  - Bentgrass interseeds best during months when soil temperatures are warmer.
  - Vertical mow, aerify, or slit seed to open the stand and allow the seed to reach the soil. Then broadcast seed, topdress, and drag or rake.
- An alternative method is to interseed at low rates every 2 weeks throughout the growing season, whenever the stand is groomed, spiked, or topdressed.
  - This technique regularly introduces bentgrass seed to the green and is useful for countering the Poa annua "seed bank" in turf soils.
  - Superintendent observation: Mark Kuhns at Baltusrol Golf Club uses this technique. He applies 0.1 to 0.25 lbs. of seed per 1,000ft^2 (0.5-1.2 g/m^2) every 2 weeks via a Scotts drop spreader with the spreader gate closed (the spreader leaks bent seed at the proper rate when closed!)
  - A Gandy tip-spiker can also be used to seed. The hopper can be throttled down to low seed application rates.

Graph: Comparison of seeding rates treatments, 1, 2, and 4lbs/1000ft^2 (5, 10, or 20g/m^2), 1-year after interseeding 'Alpha' creeping bentgrass at Bunker Hills golf course in Coon Rapids, MN and Green Valley Country Club in Lafayette Hills, PA.



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