



JOHNSTON SEED COMPANY  
ENID, OKLAHOMA USA

# ESTABLISHING RIVIERA BERMUDAGRASS



## INTRODUCTION

*Congratulations on your purchase of Riviera, the new cold-tolerant turf-type seeded bermudagrass produced and marketed by Johnston Seed Company, Enid, Oklahoma. Riviera is a revolutionary new product developed by the Oklahoma State University Turfgrass Development Team, with financial support from the United States Golf Association. Riviera is the result of many years of selection for improved turf quality, cold tolerance, seed production, and disease resistance in the transition zone. The transition zone offers a unique weather pattern with periods of extreme cold, extreme heat, and drought. Bermudagrasses produced in the Southwestern United States typically suffer from severe winter injury and cool-season grasses produced in the Northwestern United States struggle with the summer's heat, drought, and disease pressure. Riviera was developed for the turf manager who wants to manage grass and not constantly replant his grass.*

*Seed of Riviera is grown in Northwestern Oklahoma, not a place that first comes to mind when you think bermudagrass, at least not yet. Approximately 98% of the world's production of bermudagrass is grown in Southern California and Arizona. A region where temperatures typically range from 115°F to 40°F, humidity is low, and irrigation is readily available. In contrast, Oklahoma is the land of extremes. Temperatures range from 110°F with high humidity in the summer and reach below 0°F during the winter with extreme drought conditions. What does this mean to a turf manager? Everything, unless he lives in a glasshouse. A lot of other varieties make claims but Riviera has the history and data that ensures the turf manager his grass will perform year after year. Thank you.*

Gene McVey, President  
Johnston Seed Company

## Site Preparation and Requirements

- **Adaptation Range:** Research has shown Riviera to be adapted to most regions south of the 39<sup>th</sup> Parallel North in the United States (a line extended from Kansas City, MO east and west) and areas with similar climatic conditions around the world.
- **Sunlight:** Bermudagrass does best in areas receiving full sunlight, but will grow in areas shaded 25% or less. More than 25% shade results in weak stands and increased susceptibility to winter injury.
- **Soil Type:** Bermudagrass does well on most types of soil. Compacted heavy soils may need to be improved prior to planting. The incorporation of sand or topsoil in the top 4 to 6 inches will increase soil aeration and drainage.
- **Drainage:** Good drainage is necessary to maintain a healthy root system. Bermudagrass can withstand occasional periods of standing water, but prolonged periods of soil moisture saturation will weaken and eventually kill the stand. Areas of poor drainage should be corrected prior to planting.
- **Soil pH:** Bermudagrass will tolerate a wide range in soil pH but optimum performance is between 6.0 and 7.0. Soil pH is best corrected prior to seeding by incorporating lime into the soil before or during seedbed preparation. The soil should be tested prior to seeding to determine if amendments are required. Your local cooperative extension office or fertilizer dealer can provide information on soil testing and make recommendations to correct any problem areas.
- **Soil Fertility:** A soil test can also provide you with information on the fertility level of your site. The basic soil test will provide you nitrogen, phosphorous, and potassium levels as well as the pH. The phosphorous level should be maintained at a minimum of 65 lbs/acre. Potassium levels should be at a minimum of 200

lbs./acre. These two macronutrients are necessary for proper root and shoot development in the young seedlings. An application of nitrogen should only be used if the soil test level is less than 45 lbs/acre. Do not apply more than 1 lb/1000 sq ft of actual nitrogen prior to planting. Excessive nitrogen in the soil promotes annual weed growth leaving the bermudagrass seedlings at a competitive disadvantage. As the bermudagrass seedlings develop, light applications of nitrogen can be applied to assist in establishment. If the site is suspected to have any micronutrient deficiencies an extensive soil test may be warranted. These deficiencies will also need to be corrected prior to planting.

- **Site History:** One aspect that is frequently overlooked when preparing a site for a new seeding is the prior application of a pre-emergent type herbicide in the last 12 to 18 months. If pre-emergent herbicides were frequently used in the past, you will need to identify the herbicide used and consult the label to determine the residual period of the particular herbicide. Pre-emergent herbicides are designed to inhibit the germination of weeds but they also inhibit the germination of the bermudagrass. Pre-emergent herbicides such as Barricade® (Syngenta) are extremely effective for crabgrass control in established turf but the long residual effect can result in severe stand reductions if new plantings are attempted prematurely on these areas. In addition, certain postemergent herbicides, such as Fusilade® (Syngenta) may also have short term residual effects on germination and development. Your herbicide representative or local extension service can assist in helping you make this determination.
- **Planting Date:** Bermudagrass seed should only be planted during the spring and summer months once the soil temperature has reached 65°F and is on the rise. It can be very tempting to begin seeding too early, especially in the northern areas of the transition zone when a brief warming period temporarily elevates soil temperatures to above 65°F. If the soil cools down the seed will lay in a moist cool soil thus leaving the seed more susceptible to seedling diseases. It is important to monitor the soil and determine that the temperature is trending upward over a 2 to 3 week period. The “cutoff” date for planting depends upon your geographic location. A simple rule to follow is not to plant within 75 days of the average first frost date for your location. This period may need to be extended to 90 days if the site is located in the very northern part of the adaptation range. The newly established plants must have time to develop adequate roots prior to the first frost.

## Seed Information and Rates

- **Seed Characteristics:** Riviera bermudagrass is a mixture of hulled/unhulled seed. The basis for the mixture is to ensure that if the earlier germinating hulled seed experiences a late frost condition or desiccation the later germinating unhulled seed will offer an insurance policy. Hulled seed typically germinates in 6 to 8 days while unhulled seed germinates in 10 to 14 days assuming moisture and temperature is sufficient. The seed is coated with a hygroscopic (water absorbing) clay-based material to improve moisture extraction from the soil. The coating is also used as a carrier for fungicides, which protect against seedling diseases. In addition, coating makes the seed unit larger and easier to distribute when seeding.
- **Seed Count:** There are approximately 1.6 million seeds in one pound of unhulled bermudagrass seed. One pound of hulled seed contains approximately 2.1 million seeds. The hulled/unhulled mixture is typically the average of these two numbers, about 1.8 million seeds per pound. Coated seed will contain one-half this number of seeds or 900,000 seeds per pound.
- **Recommended Seeding Rates:**

Application	Recommended Seeding Rate*	Equivalent No. of Seed		
		per sq. ft.	per sq. cm.	
Lawns	1 - 3 lbs./1000 sq. ft.	0.5 - 1.5 kg/100 sq. m.	900 - 2700	2.5 - 7.5
Tee Boxes	2 – 3 lbs./1000 sq. ft	1.0 - 1.5 kg/100 sq. m.	1800 - 2700	5.0 - 7.5
Fairways	45 – 135 lbs./acre	50 - 150 kg/hectare	900 - 2700	2.5 - 7.5
Soil stabilization	90 – 135 lbs./acre	100 - 150 kg/hectare	1800 - 2700	5.0 - 7.5
Parks	45 – 90 lbs. acre	50 – 100 kb/hectare	900 - 1800	2.5 – 5.0

\*Recommended rates can be adjusted to compensate for soil type, seedbed preparation, and establishment time.

\*\*An approximation based on seed count on individual lot and even distribution of seed during seeding.

## Choosing a Strategy for Seedbed Preparation

- **Tilled Seedbed:** A tilled seedbed is most commonly used on new installations. Compaction problems, drainage problems, and other soil related problems are easiest remedied when the ground is free of sod

and other plant debris. Cultivate the upper 7 to 10 inches of the soil with a disc or cultivator. Caution should be used around existing irrigation lines, underground power boxes, trees, etc. during deep cultivation. Deep cultivation is necessary to alleviate areas of soil compaction especially in tight soils. The addition of any required soil amendments and fertilizers can be blended throughout the rooting zone during the deep cultivation operation to insure proper rooting of your newly seeded Riviera. Proposed drainage tile and irrigation installations should be completed after deep cultivation and prior to final seedbed preparation. Once sufficient grading and smoothing of the surface has been completed, the seedbed should be firmed using rakes or in the case of large installations, larger drag harrows may be used. The firmness of the soil is critical in insuring proper seed depth placement and seed-to-soil contact. The final seedbed should be firm enough to walk on with your foot leaving an imprint no deeper than ½ inch. This top ½ inch of soil should be loose, but moist, at the time of seeding. If additional firming is needed, water or roll the area. The seeding of small areas can be accomplished by broadcasting the seed by hand or with the aid of a ground driven spreader. To insure proper distribution of seed it is recommended to apply ½ the seed in one direction then apply the other ½ of seed in the direction perpendicular to the first. After seeding, cover the seed with soil to a depth of 1/8 inch by raking. Firm the area with a weighted roller. On larger installations a Brillion type seeder is recommended. Seeders like the Brillion have a large roller in front to firm and reduce soil particle size. A seed hopper drops the seed, and then a smaller roller firms the seed in at the right depth. No additional raking or rolling is required. Water the seeded areas frequently to keep the top inch of the soil moist. Maintain this moisture layer to ensure good germination and development. Avoid runoff and standing water. As the seedlings develop reduce the frequency of watering but increase the amount.

➤ **Perennial ryegrass and other cool-season grass renovation:** Many turf managers are exhausted both physically and financially from the struggle to maintain cool-season species in the Transition Zone. Drought and disease issues have managers searching for new, less costly alternatives. The interseeding of Riviera seeded bermudagrass is one alternative with proven results. The agronomics of converting a perennial ryegrass turf or other cool-season species into Riviera bermudagrass are not difficult but a few key points should be taken into consideration before beginning renovation:

1. Bermudagrass can be successfully interseeded into existing cool-season sod, but the best results were achieved when a nonselective herbicide was used to kill the existing species. Attempts have been made to interseed directly into a healthy sod with very limited results and it is not recommended at this time.
2. There will **not** be a smooth color transition from ryegrass to bermudagrass. The herbicide effects appear quicker than the germination and development of any bermudagrass. Turf quality will be reduced for 4 to 6 weeks.
3. Play on the area will be lost for a brief period during the grow-in phase to prevent damage to the developing bermudagrass seedlings.

There are essentially two methods of interseeding with proven results. The difference in the two methods rests on the density of the existing stand of grass.

- A. **Thin Stand:** The thinning stand of ryegrass can be planted using a commercial slit seeder. Mow the area to within 5/8 inch of the soil surface and remove clippings. Apply 4 lb. glyphosate such as Roundup Pro® (Monsanto) at the rate of 1.5 oz./1000ft<sup>2</sup> (2 lbs. a.i./acre) to the actively growing ryegrass. It is recommended to wait at least 4 days after the application to begin slit seeding. Water frequently to maintain moisture in the top inch of the soil. As seedlings develop water less frequently but increase the amount. Restrict traffic until seedlings are firmly rooted.
- B. **Dense Stand:** Dense stands of ryegrass are more of a challenge. Mow the area to be seeded to within 5/8 inch of the soil surface and remove clippings. Apply 4 lb. glyphosate such as Roundup Pro® (Monsanto) at the rate of 1.5 oz./1000ft<sup>2</sup> (2 lbs./acre) to the actively growing ryegrass. It is recommended to wait 4 days then core aerify and verticut in two directions to reduce the density of the ryegrass and expose more soil. Drag the area with a mat to level and break up cores. Broadcast the seed, then drag the area again with a mat to incorporate the seed and roll to firm the soil around the seed. Water frequently to maintain moisture in the top inch of the soil. As the seedlings develop water less frequently but increase the amount. Restrict traffic until firmly rooted.

➤ **Interseeding into damaged or thinned area of bermudagrass:** Although bermudagrass is known for its excellent wear tolerance and stress resistance, stand thinning and damage can still occur under extreme conditions. Some widely used varieties such as the “common” type bermudagrasses and certain sod types lack sufficient cold tolerance and wear tolerance to survive very harsh conditions. In many cases these areas are seeded or sodded every spring to the same varieties to make the area playable. Managers now have a more permanent alternative to these short-term solutions. Riviera’s exceptional cold tolerance and wear resistance make it a perfect choice for these areas. Seeding can be done relatively easily and it is inexpensive as compared to the repetitive replanting performed every spring. The first step is to identify

the cause of stand loss. If a heavily compacted area, it is necessary to first perform deep aeration to alleviate the compaction to achieve sufficient root growth. Destroy any unwanted vegetation on the area to be seeded. The area can then be seeded and dragged following aeration. If winterkill is the issue and the area is not heavily compacted, a slit seeder may be used to quickly seed the area of damage. Following the seeding operation, keep the top inch of the soil moist. As seedlings develop reduce the frequency and increase the amount of application. Restrict traffic until firmly rooted.

## Weed Control in the New Stand of Riviera

Weed control in newly seeded stands of bermudagrass has always been one of the greatest challenges in the past. Many managers have chosen to sprig or sod to avoid the weed issues experienced with seeded bermudagrasses. When seeded varieties were planted, most managers would prefer to mow frequently to keep the weeds from shading out the bermudagrass stand. They would live with the results until the stand was mature enough to apply one of the arsenicals such as MSMA. Typically the crabgrass and other weeds would be very mature and more difficult to control. The improvements in seeded bermudagrasses have increased the research in weed control for establishment. Studies at the University of Arkansas and North Carolina State University suggest there is an acceptable margin of safety in the early stages of growth with many postemergent type products. Although some injury was observed, the Riviera seedlings quickly grew out of it and established quickly. In the University of Arkansas study, MSMA (1.5 to 2.0 lb. a.i./acre) showed very little injury with an application 2 weeks after emergence. Riviera also showed acceptable safety to low rates of Trimec® Classic (pbi/Gordon), Confront® (DowElanco), Monument™ (Syngenta), Drive® (BASF), Revolver™ (Bayer), Lontrel™ (DowAgrosciences), and Manor® (Riverdale). Many of these were used in combination with MSMA. Products which showed unacceptable injury were Sencor® (Bayer) + MSMA, Aatrex® (Syngenta), and higher rates of Confront®, Trimec® Classic. Before application of any of these products, the data should be reviewed to determine which herbicide strategy is most applicable to the particular situation. One should also consult the label of the specific product and adhere to the directions of the manufacturer.

## Fertilizing the New Stand of Riviera

During the grow-in phase, it is recommended to apply 0.5 lbs. nitrogen/1000ft<sup>2</sup> every 2 weeks with the first application made 2 weeks after emergence. Continue this schedule for 60 to 90 days then apply 0.75 to 1.5 nitrogen/1000ft<sup>2</sup> each month of the growing season. The management intensity level will determine the amount of nitrogen required monthly. Sports turf installations should use the higher rate while residential lawns may prefer to use the lower rate. It should also be noted in the fall, when the Riviera is preparing for dormancy, it is recommended to apply additional amounts of phosphorous and potassium while nitrogen rates should be significantly reduced.

## Mowing Your New Stand of Riviera

Begin mowing the new stand approximately 3 to 4 weeks after emergence depending on the conditions at the time of establishment. The recommended minimum mowing height during establishment is 1 inch. Once the sod matures, the mowing height can be gradually reduced to a minimum of 3/8 of an inch. As the mowing height is decreased, the required management level will be increased.

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