## Cultivation of Bermuda Grass in Iran By Hamid Kheyrodin

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Dr. Hamid Kheyrodin http:// <u>www.jbcr.in</u> jbiolchemres@gmail.com info@jbcr.in

**REVIEW ARTICLE** 

## Received: 06/07/2013 Revised: 02/02/2014 Accepted: 02/02/2014 Cultivation of Bermuda Grass in Iran

## Hamid Kheyrodin

Faculty of Desert Science, Semnan University, Iran

## ABSTRACT

Bermuda grass is growing in medium to fine textured soil is a warm season turf grass that spreads by rhizomes and stolons. It has excellent heat, drought, and salt tolerance but does not do well in shade. Bermuda grass is the most widely used species on athletic fields and golf course fairways/tee boxes due to its high wear tolerance and rapid recovery. Developments in the grassing industry have produced many improved Bermuda grass Seed varieties that are very popular in sports fields, golf courses as well as commercial and home lawns. The newer Bermuda grass Seed varieties are now being used extensively for fairways and tee boxes removing the need to plant the more expensive vegetative Bermuda grass varieties.

It has many characteristics that make it a desirable forage base for cattle – •it responds well to fertilizer, thrives in a variety of soil conditions, tolerates heavy grazing pressure and persists through adverse environmental conditions. There are many strategies to consider in fertilizing Bermuda grass. The goal of the producer is paramount. If he desires to run the maximum number of cattle on his operation, the Noble Foundation helps accomplish this goal with an aggressive and targeted fertilization program on Bermuda grass. If he wants to produce fewer cattle with limited inputs, the Foundation manipulates fertilizer rates to accomplish this goal. Bermuda grass is an excellent species to use to manage cattle numbers by varying fertilizer rates.

Key words: Cultivation, Bermuda Grass, Environmental conditions, Soil and Fertilization.

## INTRODUCTION

Bermuda grass can be confused with nimble will. However, nimble will has a membranous ligule, which can be distinguished from the hairy ligule of Bermuda grass. Bermuda grass is also often confused with zoysiagrass, but zoysiagrass has hairs standing upright on the leaf blade, whereas Bermuda grass does not. Zoysiagrass is also stiff to the touch and offers more resistance to your hand than Bermuda grass. Zoysiagrass leaf vernation is rolled whereas Bermuda grass leaf vernation is folded. There are many different hybrids of Bermuda grass that range from fine to course in leaf texture. As a weed, Bermuda grass is sometimes referred to as wiregrass. Where ever a node touches the ground, forming a dense mat. It also reproduces from roots under the ground.

It has a deep root system, and in drought situations the root system can grow 47 to 59 inches (120-150 cm) deep. Most of the root mass lies 24 inches (60 cm) under the surface. Its blades are a gray-green color and are short, usually 1 to 4 inches (3-10 cm) long with rough edges. The erect stems can grow 0.3 to 1.3 feet (0.1-0.4 m) tall. The stems are slightly flattened, and an inflorescent purple in color.Bermuda grass reproduces through seeds and through runners and rhizomes. The seed heads are on 1-3 inch (3-7 cm) spikes and are themselves about 2 inches long. Bermuda grass will put out seeds about 3 months after planting. The seeds germinate at temperatures above 68° F (20° C), and begin to grow within 2 weeks. One plant can cover an area of 3 square yards (2.5 sqm.) in just 150 days after germinating. Bermuda grass can grow in poor soil. During droughts the upper parts die off, but the grass will keep growing from its rhizomes. It prefers moist and warm climates, and where there is more than 16 inches (410 mm) of rainfall a year. Bermuda grass is an early succession grass, and is first to grow back after grass fires, which burn quite often on the African savanna.





## Fig 1. Show bermudagrass in Iran Fig 2. Show Bermuda grass that planted in middel of october.

To the Hindu in India, Bermuda grass was a sacred grass because it fed their sacred cows. In ancient Roman days they squeezed the juice from the stems and used it as a diuretic and astringent to stop bleeding.

Bermuda grass is considered a very invasive and competitive weed. Few herbicides are effective against it. Before mechanized farm machinery, Bermuda grass was the farmer's worst weed. However, back then it saved thousands of acres of farm soil from erosion. It was the most widely grown pasture and turf grass in the South. Bermuda grass is highly nutritional for cattle and can be fed to sheep. 2002

#### Soil Testing

Noble Foundation fertilization recommendations begin with the use of soil testing. A good soil test allows producers to determine whether or not to lime and how much phosphorus (P) and potassium (K) to use. Soil testing can also determine if enough residual nitrogen (N) is in the soil to reduce N fertilizer recommendations. Soil testing can further determine if toxic levels of some substances, such as salt, are present in the soil. A good soil testing program is dependent upon taking a good sample.

The Foundation recommends testing every field of introduced forages at least once every three years. A sampling depth of 0 to 6 inches is recommended. Cores should be collected from a minimum of 12 places within the field and thoroughly mixed to make up one sample. An additional 6- to 12-inch sampling depth is recommended if there is interest in determining whether residual nitrogen exists. Problem areas should be sampled separately. The Noble Foundation has a video, "Unless You Test It's Just a Guess," that examines the need for soil testing and demonstrates correct sampling procedures

#### Liming

The Noble Foundation recommends liming forage legumes and alfalfa when the soil pH drops below 6.0. The Foundation recommends liming Bermuda grass when the soil pH drops below 5.0, and all other species when the soil pH drops below 5.5. Some believe that the Foundation's critical pH for Bermuda grass is too low. However, research (Table 1) in both Texas and Louisiana (Hillard, et al., Haby, and Eichhorn, et al.) shows that Bermuda grass is very acid tolerant. The Foundation feels that inputs are better spent on fertilizer than lime until the soil pH drops below 5.0 on Bermuda grass.

Location	Researcher	Finding
Arkansas	Phillips, et al.	No response to lime on bermudagrass at pH 5.9
Texas	Hillard, et al.	No response to lime on bermudagrass at pH 4.7
Texas Haby No response bermudagras but ryegrass i lime at		No response to lime on bermudagrass at pH 4.3, but ryegrass responded to lime at pH 5.3
Louisiana	Eichhorn	No response to lime on bermudagrass at pH 4.9

Much of the Bermuda grass acreage in our area is also managed for annual ryegrass, and the Foundation recommends liming this production system when the pH drops below 5.5 for optimum production of the ryegrass.

## Nitrogen Rate

Usually, the most limiting nutrient in Bermuda grass production is nitrogen. Nitrogen is vital to plants for optimum growth. Deficiencies of nitrogen appear as pale green color in the plants, very poor growth and yield and low protein. The optimum nitrogen rate for a particular situation is dependent upon a producer's goals. Cattle carrying capacity can be manipulated by varying the amount of nitrogen used on Bermuda grass. There have been many research studies on the response of Bermuda grass to varying rates of nitrogen. Most of this research shows ranges in Bermuda grass response to nitrogen from 20 to 40 lbs. of dry matter production per pound of nitrogen above that produced with no nitrogen. The Foundation uses an average figure of 30 lbs. of Bermuda grass dry matter produced per pound of nitrogen above the amount of grass produced with no nitrogen when determining stocking rates. As can be seen in the following tables (Tables 2 through 4), the nitrogen use efficiency of Bermuda grass production declines as the amount used increases.

Table 3. Bermudagrass Response to N in NE Texas. Haby, et al, Texas A&M Overton, TX (1984-86)			
N Rate (lbs/A)	Yield (tons/A)	Lbs. DM Produced Above Check per Pound of N	
0	5200		
160	12200	44	
320	15200	31	
480	16000	23	

Table 4. Effect of N Rate on Bermudagrass Yield and Crude Protein Content in North Central Louisiana, Eichhorn, et al, LSU Homer, LA (1972-82)			
N Rate (Ibs./A)	Forage Yield (lbs./A)	Crude Protein (%)	Lbs. DM Produced Above Check per Pound of N
0	2077	8.6	( e <u>ne</u> r
100	5807	9.9	37
200	9244	10.8	36
300	11319	11.5	31
400	13562	12.7	29

Also, it can be noted that N use efficiency increases in relationship with the amount of rainfall received. Evidence of this is that Overton, Texas, and Homer, La., are both areas higher in rainfall than Ardmore, Okla., and both had better nitrogen use efficiencies.

The Foundation's recommendations for nitrogen on Bermuda grass vary according to the productivity of the soil and the producer's goals. In general, a flat, deep soil with good water holding capability can efficiently use a

#### Nitrogen Source

The best nitrogen source for fertilizing summer pastures is often debated. Urea can suffer volatilization losses if applied to the soil surface in hot weather and no rain occurs within three days. Losses can be as high as 30% of the total N applied. Urea-ammonium nitrate (UAN) solutions contain one-half urea and the urea portion is subject to the volatilization loss. Most of the research conducted around the region shows little urea volatilization loss when urea is applied in April. Losses increase as urea is applied later in the summer. When losses occurred in these research tests, they were seldom more than 15 to 20 percent. Tables 5 and 6 show N source comparisons. In general, urea can be used with little or no loss if the ground will be tilled within two to three days after application, if a rainfall event of more than 0.25 inches occurs within two to three days, or if the temperature is below 75 degrees. Ammonium nitrate may be a better choice for summer fertilization.

Nitrogen Timing: The optimum time for

Table 5. Effect of N Source on BG Yield. Westerman, et al, OSU Haskell, OK (1978-80)		
N Source	Yield (tons/A)	
Anhydrous Ammonia	4.07	
UAN Solution	4.56	
Urea	4.25	
Ammonium Sulfate	4.61	

Table 6. Effect of N Source and Timing. Altom, et al, Noble Foundation Burneyville, OK (1985-89)			
N Source	150 lbs. N All April	150 lbs. N Split	
Urea	6618	7143	
Ammonium Nitrate	6579	7622	

applying fertilizer to Bermuda grass has been researched in several locations, with particular attention paid to whether it is better to apply the entire N in the spring, or to split the amount into two or more applications. Most of the research (Tables 7 and 8) suggests that split applications are preferable when the total N rate exceeds 100 lbs. per acre.

If the total nitrogen application is recommended to be more than 100 lbs. N per acre, the Foundation usually recommends that 100 lbs. N per acre be applied in late April or early May to take advantage of the more predictable spring rains. The balance can be applied during the summer. Even considering the additional application expense, the advantages of splitting applications of more than 100 lbs. actual nitrogen usually outweigh the cost.

The Foundation sometimes recommends applying 40 to 50 lbs. N in August to grow fall Bermuda grass. The purpose of this is to stockpile the forage for the fall/early winter season and decrease the amount of hay that needs to be fed.

#### **Phosphorus and Potassium Fertilization**

The Foundation recommends fertilizing with phosphorus (P) and potassium (K) based on soil test results. These recommendations are based on field research studies for a particular location and are superior to general fertilizer recommendations. Using soil testing as a basis for determining the need for these nutrients is cost-effective and prudent. Bermuda grass removes relatively large amounts of phosphate (P2O5) and potash (K2O) when harvested for hay.

Eichhorn, et al, LSU Homer, LA (1972-74)			
N Rate (lbs/A)	Single Application	4 Way Split	
180	6140	8344	
360	10052	12800	
540	16152	16152	

Table 8. Effect of N Timing on Bermudagrass Yield Altom, et al, Noble Foundation Burneyville, OK (1985-89)			
N Rate (lbs./A)	Single Application	1/2 April, 1/2 June	
150	6579	7622	



Fig 3. Show Bermuda grass in USA.

#### **Phosphorus Fertilization**

Most of the soils in our service area are very deficient in phosphorus (P). Phosphorus is vital in plants for developing a healthy root system and reaching optimum yield. Nitrogen fertilizer is not used efficiently in plants that are deficient in P.

Data on P fertilization of Bermuda grass are limited. The existing data show that when soil test P is low or very low, a good response to P fertilizer is obtained. Most data show a yield increase of about 1 ton of forage per acre when soil test P is low and P is applied at the recommended rate. Most sites show little to no increase to P fertilizer when soil test P levels are medium or higher, although some sites show inconsistent increases even when soil test P is high.

#### Potassium Fertilization

Potassium is essential in plants to fight off diseases. It also aids in water translocation in plants and makes Bermuda grass less susceptible to winter kill. Deficiencies of potassium (K) can cause both yield losses and stand losses. Research has shown that stands of Bermuda grass are about half as good where potassium is deficient as compared to where it is sufficient. There was also an increase of about 2 tons in forage yield per acre where K was applied at recommended levels on a soil testing very low in K. If high rates of potash (more than 120 lbs. K<sub>2</sub>O per acre) are called for by soil tests, it is better to split the application than to apply it all at once. The reason is that Bermuda grass will take in more potassium than it needs if an abundant supply is present. This is called luxury consumption. It is not harmful to the grass, but it is an inefficient way to use potassium.

Table 9. Effect of K <sub>2</sub> O on Bermudagrass Yield and Stand on a Very Low Soil Test K Site* Eichhorn, et al, LSU Homer, LA (1974-80)			
K <sub>2</sub> O Rate (lbs./A)	Yield (lbs/A)	BG Stand Yr 1 (%)	BG Stand Yr 6 (%)
0	8919	57	29
100	12399	47	84
200	13583	45	89
400	14341	41	88

\* 400 pounds N/acre were applied to all plots

#### Medium Quality Bermuda Grass

*The three-way Bermuda grass seed blend, "Bermuda Triangle Blend" and the two way Bermuda Grass Seed blend "La Prima"* are used extensively on golf course fairways, athletic fields, home and commercial lawns -- anywhere a good quality Bermuda grass that requires 'medium' inputs is desired or needed.

**Bermuda Triangle Seed Blend** is one of the better Bermuda grass seed blend choices for medium input home lawns, fairways and sports fields. Seed land sells more Bermuda Triangle than any other improved variety because of its proven versatility.

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La Prima Bermuda Grass Seed Blend is also a popular choice for all types of lawns, known for its fast germination and rapid establishment. La Prima Bermuda Grass Seed Blend contains the Bermuda grass varieties <u>SR-9554</u> and the premium variety <u>La Paloma</u> which are used for home and commercial lawns, sports fields and golf fairways.

<u>SR-9554</u> is one of the better quality medium Bermuda grass varieties and in many applications performs similar to the other medium quality varieties -- this variety can be found in our <u>La Prima Bermuda Grass Seed Blend</u>.

**Blackjack Bermuda Grass Seed** is also an improved medium quality variety used throughout the Southern states and with its cold tolerance, a bit further north. This Turf-Type Bermuda Grass is generally planted for lawns or athletic fields. Characteristics of Blackjack Bermuda grass are -- a deep green color, carpet like density, extra cold tolerance, super fine texture, superior seedling vigor, and good shade, drought, and traffic tolerance.

#### SUMMARY

The goal of the Noble Foundation is to help cattle producers meet their production goals. Bermuda grass responds well to fertilizer, and applications can be targeted to meet producer's needs for hay production or cattle carrying capacity. Recommendations are based on Noble Foundation and land grant university research with overall farm productivity and producer goals in mind.

When grown as a turf grass, mow regularly to a height of 3/4" to 1.5" tall, fertilize during the growing season (May to August) and use soil barriers to prevent spread into adjacent areas. Sometimes over seeded with rye, Bermuda grass has winter hardiness problems in the Midwest Transition Area, however, and is not recommended as a turf grass for St. Louis. Some winter kill is to be expected when winter temperatures dip below 10 degrees F. 'Sun devil' is a seeded variety which is considered even less winter hardy than the species needs regular dethatching.

## ACKNOWLEDGMENTS

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**Corresponding author: Dr. Hamid Kheyrodin**, Faculty of Desert Science, Semnan University, Iran.

Email: hkhyrodin@yahoo.com

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