



Kenya Climate Smart
Agriculture Project

Brachiaria (*Urochloa Cultivars*) Grass Seed Production Manual



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Preface

Brachiaria grass has shown great potential in improving livestock productivity in Kenya. However, reduced access to seed limits growing of the fodder. Development of alternative fodder seed distribution system is key in upscaling the production of the forage among dairy farmers. This manual provides information on how to strengthen Producer Organizations (POs) and other farmer groups to produce clean planting material for sale and utilization of Brachiaria to improve livestock production. A number of Brachiaria varieties have been screened and promoted by KALRO which include Piata, Murandu, MG4, Torendo (Xaraes) and Basilisk. Mulato I and II varieties are more vulnerable to red spider mite infestation, lowering their productivity. The price for a split ranges from Kes. 5 to 8 and can increase or reduce depending on demand and supply dynamics, location and cost of production among other factors.

Most of the Brachiaria varieties do not produce viable seeds especially in the highlands where dairy is mainly practiced. However, trials by KALRO have proved that root splits can be used as an alternative planting material for production of the forage.





BRACHIARIA GRASS. Var. Toledo (Xaraes), Basilisk, MG4 and Piata

1.0 Introduction

Brachiaria is an animal feed rich in protein and energy when compared with other grasses like Napier, Guatemala, Seteria, Rhodes grass among others.

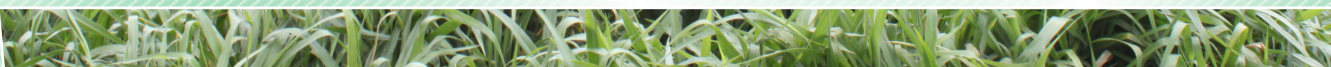
Improved varieties of Brachiaria have been introduced in Kenya and their adaptability is very good in many parts of the country especially in highlands, medium altitude and coastal lowlands. Brachiaria grasses are good alternative to Napier grass. It can withstand dry seasons of 3-6 months.

Brachiaria grasses have good adaptation to drought, low fertility soils and are environmentally friendly. The potential of Brachiaria grass in Kenya to address the challenge of livestock feed shortage has been hindered by scarcity and high cost of seed. However, trials by KALRO have proved that root splits can be used as an alternative planting material for production of the forage. The nutritive value of Brachiaria forage is Crude Protein 13.5%, EE 3.4%, NDF 64.2%, Ash 15.8%, Calcium 0.31% and Phosphorus 0.37%.





There is a growing interest in production of Brachiaria using splits. The average price of a split is Kes 5. At a spacing of 60 x 60cm, 16,000 splits per acre or 40,000 splits per Ha. (16,000 splits per acre) is recommended.

1.1 General Agro-ecological requirements for Brachiaria grass production

- Minimum rainfall: 800mm
- Altitude: 8 - >2,000 m ASL
- Soil pH: 4-8



1.2 Varieties/ Cultivar of Brachiaria grass and Attributes

 <p>cv. Basilisk</p>	<ul style="list-style-type: none"> • Adapted to infertile soil and withstands heavy grazing and trampling • The grass can tolerate shading and is suitable for soil erosion control • Yield of 5-8 t/Ha. (2 - 3.2 t/acre) dry matter per year • Required splits per acre is 16,000 with a spacing of 60x60cm
 <p>cv. Piata</p>	<ul style="list-style-type: none"> • Highly productive up to 2,000 m above sea level with annual rainfall of 700 mm and above. • Drought tolerant but in cold temperature growth is reduced. • Tolerates moderate trampling at grazing • Suited to soils of average fertility and may be cultivated in sandy soils
 <p>cv. Toledo (Xaraes)</p>	<ul style="list-style-type: none"> • Grows in soil with medium fertility • Annual rainfall of over 800 mm • Grows up to 2,300 m above sea level • It holds the soil firmly and can be used for erosion control in hilly areas
 <p>cv. MG-4</p>	<ul style="list-style-type: none"> • It has semi erect growth habit and plant height ranges between 50 –110 cm • Adapted to less fertile soils • Annual rainfall above 800 mm • Good for hay making • Easy to harvest, dries rapidly thus maintains high nutritive quality

The above Brachiaria varieties are good for cut and carry, grazing and silage making

2.0 FIELD ESTABLISHMENT

2.1 Land preparation

Land preparation requires primary ploughing followed by first and second harrowing to make a seedbed with a fine tilth.



Primary and secondary land preparation

2.2 Fertilizer and manure application

Thoroughly mix soil with well cured manure at a rate of 2 to 4 tonnes per acre. Where the soils are low in phosphorous, apply 100 kg Triple Super Phosphate (TSP) fertilizer per acre. Compound fertilizer (NPK) can be used at rate of 100 kgs per acre. To maximize re-growth, apply organic manure or nitrogenous inorganic fertilizer at 50 kgs per acre after every harvest.

2.3 Propagation

Brachiaria grass can be propagated from seeds, root splits or stem cuttings. Propagation by stem cuttings is not common in the country. Vegetative propagation can be done on a small scale but may not apply to large scale planting due to the quantity of planting material required.

Propagation of Brachiaria grass from seed or splits



Brachiaria seeds

- Planting using seeds is convenient for large scale production
- Seed rate of 5 to 7 kg hectare or 2 to 3 kg per acre. Higher seed rate is required if planting is carried out by broadcasting
- Alternatively, seeds can be sown in the nursery bed and then transplanted into the main field when seedlings are 8 to 10 weeks old



Brachiaria splits

- The use of rooted tillers (root splits) is the best option to establish Brachiaria grass, especially when seeds are unavailable
- Root splits can be obtained from an old stand of Brachiaria grass pastures
- An actively growing rooted split with about 2 to 3 tillers is recommended for planting per hole
- 11,500 splits per acre or 28,750 splits per Ha. is recommended at a spacing of 60 x 60cm

2.4 Brachiaria splits inoculation

Inoculation can be done by uprooting Brachiaria grass root stumps, separating the individual splits and incubate in a nursery seedbed with a rooting hormone (HB101® or root doctor ®) to accelerate root formation.

Inoculated splits are placed in a nursery that is covered with a net to prevent direct sunlight. Polythene sheet is placed at a soil depth of 30cm to prevent root penetration deep in the soil. Fill up the gap of 30cm with soil mixed with manure. The sheet also assists in preservation of soil moisture for the benefit of the sprouting seedlings.

For establishing pure stand from seeds, seeds are sown in rows with spacing of 50 cm apart and drilled by hand or mechanized planter. Planting depth of 0.5 – 1 cm for seed is appropriate. Roots tillers should be spaced 60 cm between and within the rows. Planting the grass in rows facilitates good weed control and other intercultural operations.



Spacing and depth for seed sowing

2.5 Weed management

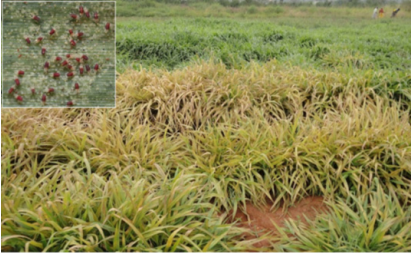


Weeding is essential at the early stages of growth. It can be done manually or by use of selective herbicides. Manual weeding is practical for all types of weeds.



3.0 PESTS AND DISEASES




3.1 Pests

The common pests affecting Brachiaria are red spider mites, shoot fly and mole rats.

<p>Red spider mites</p> 	<ul style="list-style-type: none">• Serious threat to Brachiaria grass production and it is widespread in Kenya• It is characterized by presence of mites underneath the leaves, with isolated chlorotic (yellowish) patches on the upper surface of leaves• These mites feed by sucking grass leaf tissue leading to plant withering and eventual drying• Mite infestation is severe when there is moisture stress• Effect can be reduced by irrigation, harvesting grass at the beginning of dry season, and growing the Brachiaria cultivars that are resistant to mite attack like Basilisk and MG-4.
 <p>Shoot fly</p>	<ul style="list-style-type: none">• Attack is observed at early stages of seedling and young tillers• The larvae eat through the leaf sheath, cut the growing point of Brachiaria seedlings which results in shoot wilting, yellowing and drying of the seedlings or tillers of older stand• Can be controlled by planting treated seeds and spraying systemic insecticides and good agricultural practices
 <p>Mole rats</p>	<ul style="list-style-type: none">• Mole rats burrow through the soil and feed on the roots and leaves• Signs of their damage and presence include; small mounds of freshly dug soil, dry Brachiaria plants, stems and leaves being pulled down into the soil holes• For effective control of the moles, farmers should combine forces to collectively manage the moles through physical trapping and chemical poisoning e.g. Fuko-kil®

3.2 Diseases

The most common diseases of Brachiaria grass reported in Kenya includes leaf rust, leaf spot, leaf blight, honeydew or ergot and smuts. Among them leaf rust, leaf spot and leaf blight are widespread in Kenya. A recent study has shown difference among the Brachiaria cultivars against leaf rust, leaf spot and leaf blight diseases. The prevalence of ergot and smut diseases in the country is low.

 <p>Leaf Rust</p>	<p>The disease is caused by a fungus and the symptoms are brown spots and stripes on leaves</p> <p>Control Measures</p> <ul style="list-style-type: none"> • Good agronomic practices (clean planting material, weeding, fertilization and harvesting at the right time) • Use of tolerant varieties e.g. Basilisk and MG4
 <p>Leaf spot</p>	<ul style="list-style-type: none"> • Leaf spots is caused by bacteria • Brown spots and streaks on leaf blades or sheath are the observed symptoms • Managed through good agronomic practices (clean planting material, weeding, fertilization and harvesting at the right time)
 <p>Leaf blight</p>	<ul style="list-style-type: none"> • Leaf blight is caused by bacteria • The observed symptom is brown spots and streaks on leaf blades <p>Control measure</p> <ul style="list-style-type: none"> • Controlled through good agronomic practices (clean planting material, weeding, fertilization and harvesting at the right time)





**Smut disease and Honeydew/
Ergot**

Honeydew/Ergot diseases are caused by fungus

Symptoms

- Sticky honeydew oozes from infected florets for Ergot disease
- Florets have black powder for smut disease

The two diseases are controlled through good agronomic practices (clean planting material, weeding, fertilization and harvesting at the right time)

4.0 Harvesting

The average forage dry matter yield ranges from 10 to 40 tons per hectare (4-10 tons per acre) depending on soils, rainfall and management. The first harvest for splits can be one month after harvesting the forage. The grass splits are harvested manually using small farm tool (jembe or Pangas) at small scale.

4.1 Seed business analysis

Brachiaria is sold mainly as rooted and sprouted splits. The current price for a split ranges from Ksh. 5 to 8 and can even go higher depending on demand and supply dynamics, location and cost of production among other factors.

From the worked example below, the cost of producing one acre of rooted Brachiaria splits indicates a gross profit margin of 65.8% .

The cost of producing one acre of Brachiaria with an expected yield of 120,000 splits is Kes 205,100. This also translates to a cost per unit split to Kes. 1.71.

Gross Margin analysis for Brachiaria splits (Basic costs/Estimated returns)

BRACHIARIA SPLITS				
Brachiaria splits (1 Acre)	Units	No. of units	Cost of units	Totals
Land Hire	Acre	1	10,000	10,000
Ploughing (Tractor hire)	Acre	1	4,000	4,000
Heavy harrowing (Tractor hire)	Acre	1	3,000	3,000
Light Harrowing Tractor hire	Acre	1	1,500	1,500
NPK fertilizer	bags	3	6,000	18,000
CAN fertilizers	bags	3	4,000	12,000
Brachiaria splits	splits	16,000	5	80,000
Insecticide	lts	4	2,000	8,000
Planting labour	m/days	50	400	15,000
1st weeding	m/days	40	400	12,000
2nd weeding	m/days	50	400	15,000
Chemical application labour	m/days	10	400	3,000
Split making labour	m/days	80	400	24,000
Rooting hormone	pcs	20	80	1,600
Packaging material	pkts	50	100	5,000
Top dressing labour	m/days	10	400	3,000
Sub total				205,100



Gross margin analysis for 1 acre of Brachiaria splits

	Splits	Cost	Total
Expected output	120,000	5	600,000
Cost of production (TC)			205,100
Gross Profit (GP=TR-TC)			394,900
Gross profit margin % (GPM = GP/TR*100)			65.8%

Other costs such as salaries, levies, insurance, marketing and promotion are not factored. It further assumes that harvesting is done twice per year, all rooted splits are sold and establishment is done as per the production recommendations. All other risk factors such as vagaries of weather, theft, crop destruction, pests and diseases are held constant.

4.2 Marketing and promotion of Brachiaria planting material

For successful marketing of Brachiaria splits, farmers and farmer groups need to focus on some basic marketing principles which include Product, price, place and promotion. These principles help farmers decide on the product and its characteristics, set the price, and decide how to distribute and promote it.

The marketing model adopted targets to empower farmer groups to bulk, clean and sell to other farmers. This is based on the following marketing principles;

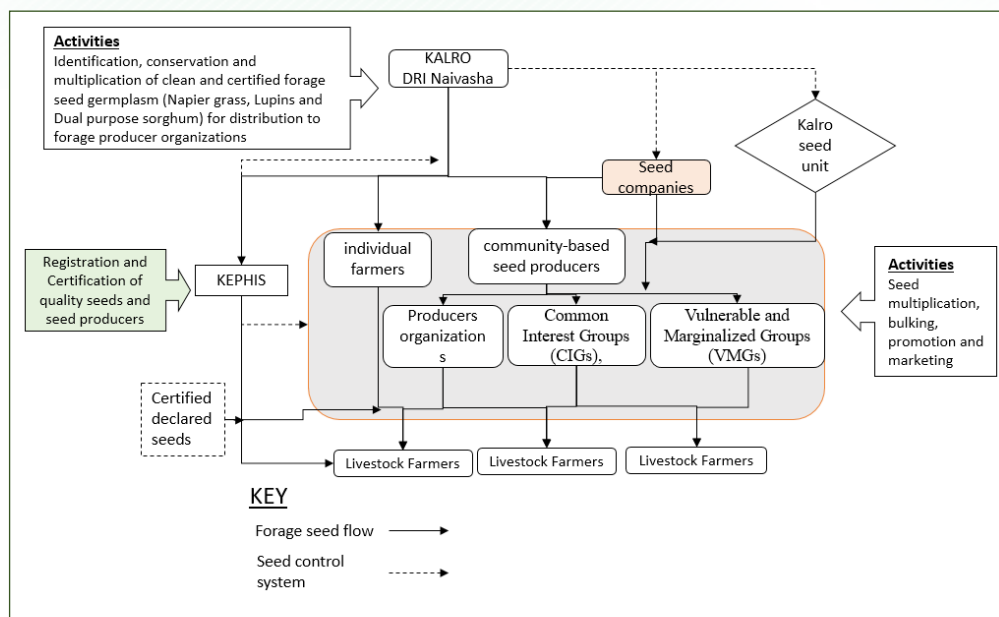
Product: What to produce? - The most preferred planting material is Brachiaria planting material

Price: at what price to sell?- Kes 5 - 8 This is determined mainly by the cost of production and demand.

Place: where to sell it? - Farmers can sell the rooted splits amongst themselves, other CIGs, VMGs, POs and other institutions.

Promotion: how to promote the product? This can be achieved using avenues such as farmer to farmer interactions, churches, schools, shows, milk collection centres and use of printed materials.

4.3 Business model



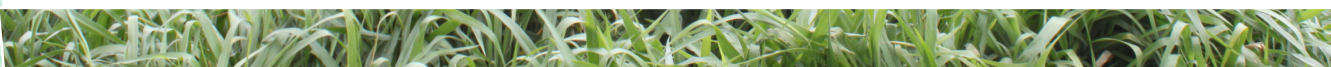
5.0 FURTHER READING

1. Donald M. G. Njarui¹, Elias M. Gichangi¹, Mwangi Gatheru¹, Mupenzi Mutimura² and Sita R. Ghimire³ **Urochloa (syn. Brachiaria) grass production manual**

¹Kenya Agricultural & Livestock Research Organization (KALRO), Kenya ²Rwanda Agriculture and Animal Resources Development Board (RAB), Rwanda ³International Livestock Research Institute (ILRI), Kenya

2. Ben Lukuyu, Julius Githinji and Margaret Lukuyu **How to grow Brachiaria grass** (International Livestock Research Institute) April 2018
3. **Smallholder dairy farmer training manual No. 24** (International Livestock Research Institute)







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