Participatory evaluation of farmer preferences and productivity of selected Napier grass (*Pennisetum purpureum)* accessions in northern Tanzania.

Gregory N Sikumba[1], Walter Mangesho[2], Ben Lukuyu[1], Festo Ngulu[3] and Mateete Bekunda[3]
[1]International Livestock Research Institute, (ILRI), Nairobi, Kenya
[2]Tanzania Livestock Research Institute, (TALIRI), Tanga, Tanzania
[3]International Institute of Tropical Agriculture, (IITA), Arusha, Tanzania
Corresponding author: gsikumba@cgiar.org

Abstract

A total of six Napier grass accessions (KK2, KK1, ILRI 16837, ILRI 16835, ILRI 16803 and ILRI 14984) were grown and harvested at 1 meter on three field trials replicated three times per plot. Participatory variety assessment involving 77 farmers was conducted on the field trials managed by farmers using a rating and voting exercise. Farmers identified and ranked their preferred characteristics. The number of leaves and shoots, tolerance to drought, rapid regeneration and, after harvest, length of stem were the main characteristics identified. Farmer's ranked (pairwise ranking) Kakamega (KK) 2, ILRI 16835, ILRI 16837 and KK1 as first, second, third and fourth best accessions, respectively. However, ILRI 16835 produced the highest yield (mean = 1.77 t ha^{-1} (DM); sd = 0.93). Irrespective of the dry matter (DM) yield showing no significant difference between the accessions (mean = 1.40 t ha^{-1} (DM); sd = 0.97), the number of tillers showed a significant ($P<0.001$) positive relationship with dry matter yield for all the 6 accessions.

Background

In Tanzania, livestock feed availability is one of the major problems hindering livestock productivity. Findings from the feed assessment (FEAST) conducted in Babati district indicate that problems are caused by large fluctuations in the quality and quantity of forage due to seasonality, limited available pasture land and degraded soils. Therefore, farmers have inadequate feed resources to meet the optimum feeding requirements of their cattle. In mixed crop-livestock production systems, integration of improved forages for livestock feed is often neglected relative to food crops, yet livestock can make a positive contribution to whole farm productivity. More specifically, sustainable integration of forages such as Napier grass (*Pennisetum purpureum*) and legumes can increase feed availability and quality, hence cattle productivity, and improve soil fertility through biological nitrogen fixation and soil erosion control (Pengelly 2004).

Objective of Study

i. To quantify dry matter yield of Napier grass accessions across different villages
ii. Identify the selection criteria used by farmers to select Napier grass accessions in Northern Tanzania.

Experimental Design

- ❑ One farmer per village was selected for establishment of experimental trials on farm.
- ❑ A complete randomized design (CRD) with 6 treatments and 3 replicates was adopted.
- ❑ Plots sizes were 5 m x 5 m with 1 m between plots and 1.5 m between replications allowed as guard rows.
- ❑ Cuttings of the Napier grass accessions were planted at a spacing of 1 m between and within rows.
- ❑ Pairwise ranking was used to get framers to rank the accessions and selection criteria
- ❑ Collected data was subjected to ANOVA and means were separated according to Duncan's multiple-range test for multiple comparisons.

Measurements

- ❑ The number of tillers per stool
- ❑ Participatory farmer evaluation
- ❑ Yield (t ha^{-1})

Preliminary Results

- ❑ Farmers ranked number of leaves and shoots , tolerance to drought , rapid regeneration after harvest and length of stem as first second third and fourth respectively ass the most important characteristic of interest in selecting Napier grass accessions.

Figure 1: Participatory Variety Assessment

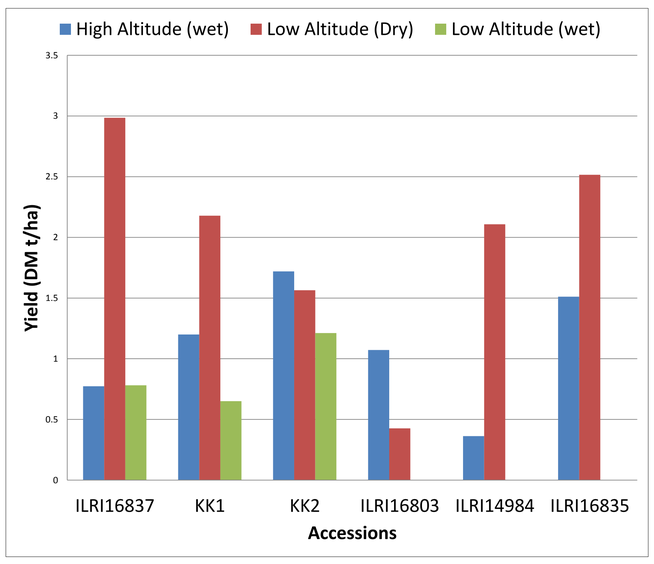

Figure 2. Napier yield (DM t/ha) of different accessions across the Agro ecological zones (AEZ's)

Table 1. Farmer ranked Napier grass accessions based on their preferred selection criteria.

Accession	Mean # Tillers	Mean Rank	Rank
KK2	11	1	1st
ILRI 16835	15	2.9	2nd
ILRI 16837	11	3	3rd
KK1	10	3.13	4th
ILRI 14984	10	5	5th
ILRI 16803	16	6	6th

Table 2. Effect of Genotype and Environment on Dry matter Yield of Napier grass

Source of Variation	Df	Sum Sq	Mean Sq	F-value	Pr (>F)
Accession	5	4.916	0.983	1.772	0.142779
AEZ	2	11.746	5.873	10.584	0.000232 ***
Accession: AEZ	7	10.19	1.456	2.623	0.026369 *
Residuals	37	20.531	0.555		

*Significant. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1*

Table 3. Multiple Comparisons of means (Duncan's multiple range test) results

Accession: AEZ	Means Yield (t ha^{-1})	Grouping[a]	AEZ's[B]	Means	Grouping[a]
ILRI16835	1.94	a	Low Altitude (Dry)	1.96	a
KK2	1.50	ab	High Altitude (Wet)	1.09	b
ILRI16837	1.33	ab	Low Altitude (Wet)	0.88	b
KK1	1.31	ab			
ILRI14984	1.24	ab			
ILRI16803	0.75	b			

[a]Means margins sharing a letter in the group label are not significantly different at the 5% level.
[B]Low Altitude (Dry)= Sabilo, Low Altitude (wet) = Seloto and High Altitude (wet)= Long.

Key Findings

- ❑ Preliminary results show that farmer's preferred KK2 using their selection criteria; identified.
- ❑ Dry matter yield results identified ILRI 16835 as the most productive accession
- ❑ Based on both PVA and yield data the other three promising accessions identified as "best bet" for the 3 areas include KK1, ILRI 16835 and ILRI 16837
- ❑ Yields for all genotypes was statistically similar
- ❑ Forages in Low dry altitude performed significantly different from the other two villages.
- ❑ The interaction between villages and the accessions was also statistically significant.
- ❑ The interaction between Accessions and AEZ showed that ILRI16835 was statistically significant from ILRI16803
- ❑ There is a strong positive correlation (0.5158) between number of tiller and dry matter yield. Therefore accessions with high number of tiller have higher yield

Conclusion

It is important to screen forage varieties using empirical evidence and participatory assessment and selection techniques to insure that not only yield is considered but also considering their preferred traits for easy adoption. This was seen were KK2 was preferred even if it was not the most productive variety empirically in terms of dry mater yield.

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