High yielding improved forages

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Key messages

- The integration of improved forages into smallholder crop-livestock systems aims to facilitate the intensification of mixed crop-livestock systems by providing livestock feed while mitigating climate change effects and reversing environmental degradation.
- High yielding improved forages produce 5 times more biomass than the natural grasses which can help alleviate persisting feed shortages in smallholder systems
- The intervention has proved that it is important not only to select forages based on empirical evidence of yield but also based on participatory farmer evaluations using the gender lens to ensure farmer preferences are considered in order to enhance adoption.

Objectives and approach

- The aim of the intervention package was to evaluate: (i) suitability and productivity of forages in different agro climates and farming systems and (ii) impacts of forages on water and nutrient fluxes through leaching and runoff to water ways.
- A total of 4 farms in 3 villages were selected to establish forage plots for experimental trials.
- A complete randomized trial design (CRT) with 6 treatments and 3 replicates was established on each farm.
- Participatory farmer evaluations were conducted at growing and harvest stages to determine farmer preferences.
- Leaching losses were estimated using tension lysimeters; local rainfall was measured with manual rain gauges; runoff losses was measured with non-recording overland flow detectors made of PVC tubing; erosion risk was deduced with a mini-disk infiltrometer and soil moisture measurements with a Diviner 2000 Probe

Key results

- At least one Napier grass (*Pennisetum purpereum*) accession was outstanding, in terms of dry matter yield or quality attributes, in each agro ecological zone which gives farmers options to choose from.
- In high attitude wet areas, accessions ILRI 16837, ILRI 16835, ILRI 4984, Kakamega (KK)1, and KK2 gave yields of 12.1, 9.3, 8.5, 6.4 and 4.9 t DM ha-1 respectively.
- In the mid altitude wet areas, accessions KK2, ILRI 16835, KK1 and ILRI 16803 gave yields of 7.0, 6.1, 4.9 and 4.3 t DM ha-1 respectively.
- In lower altitude drier area, accessions KK2, ILRI 16837 and KK1 gave yields of 4.9, 3.2 and 3.1 t DM ha-1 respectively.
- In terms of quality, KK2, ILRI 16837 and ILRI 16803 consistently higher quality averaging 9.7, 8.7 and 9.0 CP%. While KK2 and ILRI 16837 were the most digestible with 45 and 43% OMD.
- Farmers preferred accessions ILRI 16835, ILRI 16837 and KK2 in that order. These varieties were preferred due to high leaf: stem ratio (leafiness), ability to endure drought and rapid generation after cutting indicating that farmer preferences need to be accommodated.
- Runoff results indicated that the control had significantly higher runoff regimes (>60%) than the grass-legume combinations and the forage grasses and forage grass- legume interactions had a significant influence on water productivity. Clearly graphical trends depicted that some Napier grass accessions were superior, both with Lablab and as sole components, over the two year period.

Significance and scaling potential

- Scaling of improved forages has very huge potential across different agro ecological zones since we identified options suitable for each zone.
- Planting high yielding improved forages on different farm niches such as hedges, terraces and in the landscapes may have multiple beneficial effects of reducing feed scarcity, nutrient losses and water pollution.
- Improved high yielding forages have potential (i) to reduce costs of purchasing feed (ii) to shift practices towards more zero-grazing based systems and (iii) to increase milk production.

Figure1: Farmer practice:
Local forage yields (< 4 t DM/ha)

Figure 2: Intervention:
Improved forages - Yield 6-22 t DM/ha

Fodder Trees (*Leucaena leucocephala*) established on a demo plot

A farmer trainer collecting data on one of the plots

Farmer practice- Feeding forages on as is basis:	Intervention on farms - Forage choppers:
Feed wastage on farms 20-40%	Feed wastage reduced 5-10% Feed intake increased by 20%

Figure 3: Feed chopping improves feed intake by cattle

Figure 4: Participatory Variety Assessment

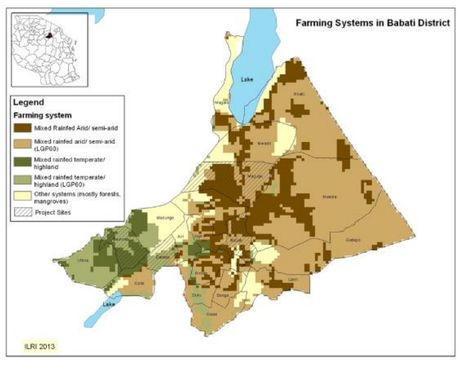

Figure 5: Farming systems in Babati district

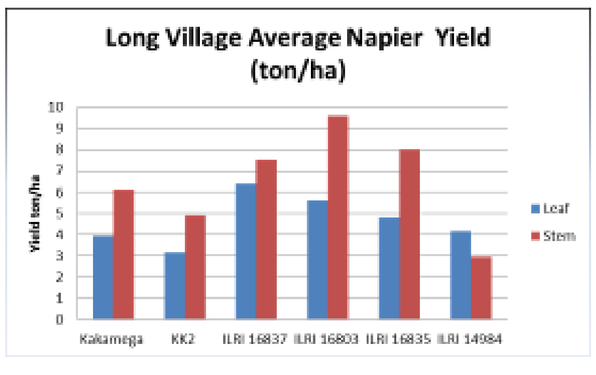

Figure 6: Performance of forages across different AEZ in Babati district

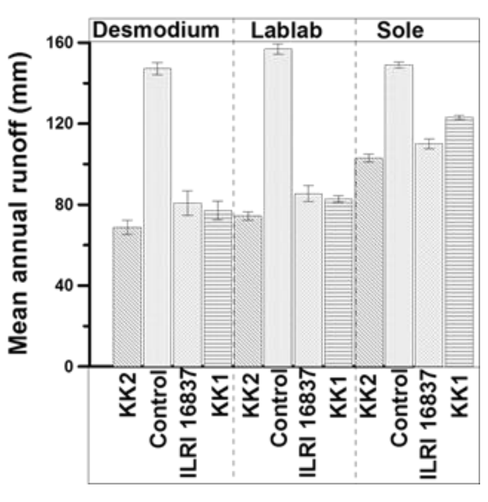

Figure 4: Runoff trends among forages and legume combinations over two years 2014 and 2015

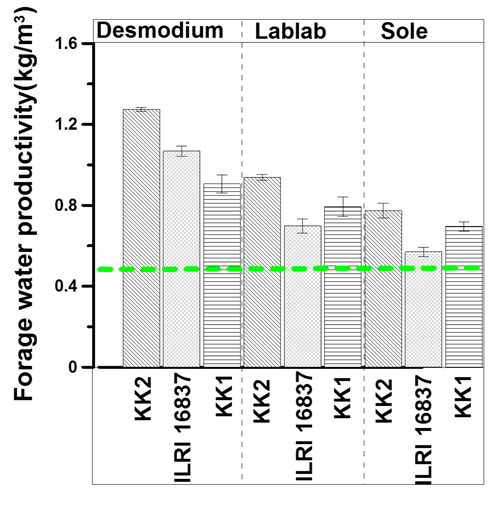

Figure 8: Mean water productivity trends among forage grass- forage legume combinations for 2014 and 2015.

We thank farmers and local partners in Africa RISING sites for their contributions to this research. We also acknowledge the support of all donors which globally support the work of the CGIAR centers and their partners through their contributions to the CGIAR system