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Short Communication

Overcoming fodder scarcity during the dry seasons at Butana Area

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ABSTRACT

The present study was conducted in Butana area which is frequently faced with rangeland deterioration. The objective was to mitigate fodder scarcity during summer. Two sites were selected, one at Sobagh enclosure established by IFAD, the other site was at EL-Adid ELtuwal village (~70 km south of Sobagh). At the two sites 3 types of range species (*Clitoria ternatea*, *Cyamopsis tetragonoloba* and *Phaseolus trilobus*) together *Moringa oleifera seeds* were planted. Plants measurements were done for successive 2 years during the rainy season, the measurements included: dry yield (ton/ha), Milk yield production was compared between groups of goats fed range species herbaceous and Moringa grown as fodder. Dry matter yield (ton/ha) for the dry seasons at the two sites showed that, *Clitoria ternatea* and *Cyamopsis tetragonoloba* had the highest (<0.001) yields (0.71 ton/ha) while *Phaseolus trilobus* had the least yield (0.28 ton/ha). Also *Moringa oelifera* showed significant increase (P <0.001) compared to *Phaseolus trilobus*. Milk yields increased significantly (P <0.001) with feeding *Moringa oleifera* (0.56 liter) compared to other range species plants (0.41 liter) and also increased significantly (P <0.001) when feeding range species plants compared to the control (0.33 liter).

Keywords: *Clitoria ternatea, Cyamopsis tetragonoloba, Phaseolus trilobus, Moringa oleifera,Yield,* Milk yields, Butana area

INTRODUCTION

Sudan is a country with huge natural and human resources, Butana area is a semiarid clay region covering most of the present Kassala and Gedaref States in Eastern Sudan. It lies between Latitude 13°40' and 17° 50' North and Longitude 32° 40' and 36° 00' East. It is one of the best grazing lands in Sudan (Elhag, 2006), which has natural rangelands that form the basic feed resource for livestock production. The climax vegetation in the Butana, is *Blepharis edulis* (Siha) (Harrison, 1955), where herbs are abundant and often occupied large areas as pure stands. The perennial type of vegetation in Butana includes bushy grasses scattered all over the region. Grasses include *Schoenefeldia gracilis* (Gabash), *Sorghum Purpureo Sericeum* (Adar) and *Sehima ischaemoids*, while herbs include *Ipomea cardiosepala* (Hantut), *Ipomea Cordofana* (Taber) and *Blepharis edulis* (Siha). These herbaceous plants are dominant during the wet season, but after the rainy season they wither and disappear and only a few species can be seen during the dry season.

Recently, Butana was affected by changes in temperature and water availability which had impacts on pasture quantity and quality. Rangelands are showing a decrease of palatable 'desirable' species and increase in unpalatable and invader species. The basic problem for the pastoralists is to maintain the maximum number of

Table 1. Dry matter productivity (ton/ha) for two years in two sites

Dry matter productivity (ton/ha)	Sobagh Area		EL-Adid ELtuwal village	
	Year 1	Year 2	Year 1	Year 2
Clitoria	0.71	0.72	0.65	0.71
Guar	0.70	0.71	0.62	0.68
Moringa	0.40	0.50	0.45	0.47
Phillepesara	0.33	0.28	0.27	0.30
Mean	0.53	0.55	0.50	0.54
P-Value	<.001	<.001	<.001	<.001
±SE	0.07	0.08	0.06	0.07
LSD 5%	0.16	0.18	0.13	0.16
CV%	18.2	19.8	15.9	18.3

animals under dry season conditions in order to make use of the plentiful supplies of both water and forage during the rest of the year (*Salah et al.,* 1999*).* During the dry season milk yield is significantly reduced due to the lower quantity and quality of forage on offer. Multi-purpose forage legumes have had considerable success in West Africa, with potential for extended adoption (Elbasha *et al*., 1999).

Plantation of good forage species could be predominantly based on legumes. Therefore, it is assumed that the potential adoption and impact of forages, in particular legumes, may be much greater than anticipated by (Elbasha *et al*., 1999), especially if species even better adapted to the productions systems and demand of farmers are developed.

The objective of this study was to enhance range yield and to provide animals with good fodder quality throughout the year.

MATERIALS AND METHODS

The experimental trials were carried in Butana area at Sobagh village (15°.3.123 N-034°.78728E) (IFAD enclosure) and at EL-Adid ELtuwaltoal village (15°.29637 N -034°.79056E) (farmers' fields). The study area is characterized by low rainfall (302mm - 280mm).

Three forage legumes *Clitoria ternatea* (Clitoria), *Cyamopsis tetragonoloba* (guar), *Phaseolus trilobus* (phillepesara), and *Moringa oleifera* (moringa) seeds were planted as means of range improvement. Plantations were replicated a Randomized Complete Block Design (RCBD). The trials were conducted during two rainy seasons (2013 and 2014) in which four parallel blocks (1 meter apart) were divided into four equal plots each 3x4 meter. Phillepseara, Clitoria, guar, and moringa, were randomly planted in the plots. The traditional form "Teras" of water harvesting, similar to trapezoidal bunds was used.

Forage production (t/ha)

At 60 days after cultivation, dry yield was determined on an area of 1 square meter in the middle of each plot. It was taken as the quantity of forage produced each year expressed in grams of dry matter per square meter (g DM m^{-2}) then dry matter in ton per hectare was calculated.

Feeding trials

All range plant species were hand-cut by machete after 60 days, sundried for 24 hours and homogenized mixtures of leaves and stems were packed in sacks and stored in a well-ventilated storeroom to be used as goat feed.

Six goats were subjected to a feeding trial where their milk yields were recorded before feeding the mixed range plant species. The goats were allocated to a Randomized Complete Design (RCD) where they were divided into two groups of three goats. Moringa was allowed to grow as a fodder was also offered to the goats. Goats received 500 grams per day from range plants and Moringa. Milk yields were recorded for each goat milked twice a day in the evening and afternoon for four weeks. Pre-experimental milk yields of each goat were used for analysis.

RESULTS AND DISCUSSION

Herbaceous dry matter yield (ton/ha)

Herbaceous dry matter yield (ton/ha) for two successive years at the two sites showed that Clitoria and guar had the higher (<0.001) yields than Moringa and phillepesara (Table 1). The forage legume C. *ternatea* produced the highest dry yield (0.72 t/h) compared to other legumes this because to the fact this plant has a number of features that make it high yielder and drought tolerant,

Table 2. Milk yield (liter) after feeding herbaceous and Moringa fodder in the morning and evening

fodder	Morning yield	Evening yield
Herbaceous (clitoria,guar and phillepesara)	0.50	0.41
Moringa fodder	0.54	0.56
mean	0.52	0.46
P value	0.06	<.001
Lsd 5%	0.04	0.03
CV%	27.1	22.1

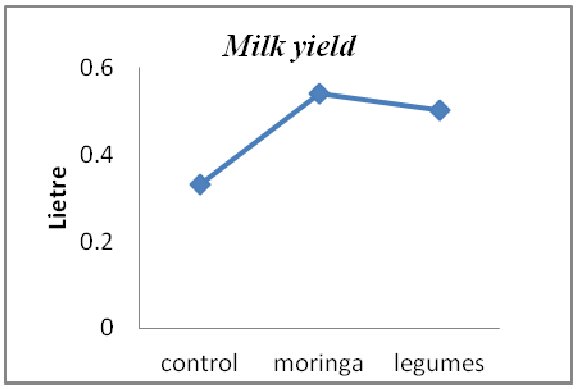

Figure 1. Milk yield (liter) in the morning

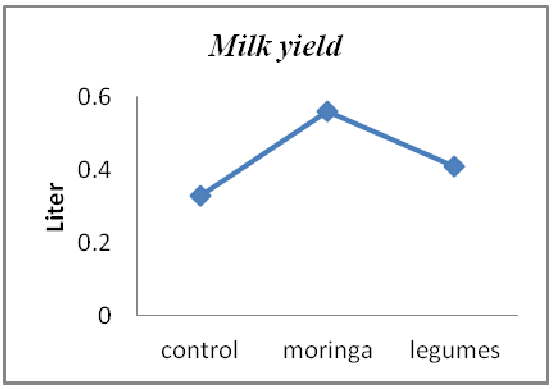

Figure 2. goats milk (liter) yields in the evening

this is in agreement with (Abdalla, 2009) findings ,who reported that C. *ternatea* is well adapted to a variety of soil types and surviving in both the extended rain fall regions and prolonged periods of drought. Similar findings (0.85 t/h) were obtained by (Suleiman, 2007) when comparing *Clitoria ternatea* in mixture and pure stand, obtained after 60 days of plantation. Within the legumes, guar showed a yield of 0.71t/h during the second year at Sobagh village The higher forage yield might be due to the bushy branches similarly (ELhag, 2000) suggested that differences among the guar varieties in hay yield could be related to the number of branches to seed yield per unit area. It could be also shown by the significant increase (<0.001) in moringa yield compared to phillepesara (almost double) at both areas and for the two successive years (Table 1). Moringa was grown intensively as means of range improvement, yields varied from 0.5 to 0.47 ton/ha at Sobagh and EL-Adid ELtuwaltoal respectively. Phillepesara scored the lowest yield at both sites which might be to vigorous weed competition.

Animal production (milk yield)

Data collection for milk yield during the morning showed that feeding Moringa to the milking goats resulted in better milk yield than the herbaceous range species, although significant differences could not be detected (Table 2). However different yields were recorded when feeding forage range legumes (0.5 liter) compared with moringa (0.54 liter) and control (0.33 liter) (Figure 1). The increase in yields could be related to higher nutritional quality of legumes (Manugbat, 2010 and 2011).

Data for milk yields in the evening showed the same trend, but here significant (P< 0.001) differences could be detected with moringa (0.56 liter) being higher when feeding Moringa fodder and also with the control (P <0.001) (Tables 2, Figure 2). This result is similar to that reported by (Reyes-Sánchez *et al*., 2006b; Sarwatt *et al*., 2004) who found that Moringa increased milk yield in goats.

CONCLUSIONS

- Herbaceous range species and moringa tree could be grown at the rainy season and stored to bridge the gap of forage scarcity during the dry season as animal fodder, improving animal production and maintaining milk yield in study area.
- Clitoria ternatea (Clitoria) and Cyamopsis tetragonoloba (guar) were the best in yield compared with other varieties of sowing.
- Moringa olifera grown intensively as means of range improvement proved to increase milk yield in goats.

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