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Assessments of Alfalfa (*Medicago sativa*) and Rhodes grass (*Chloris gayana*) at Soddo and Kedidagamila districts of southern Ethiopia

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Abstract
Assessments of Rhodes grass (Chloris gayana) and Alfalfas **(**Medicago sativa) was carried out on 36 farmers fields in soddo and kedidagamila districts of Southern Ethiopia during 2010/2011 cropping season in order to test the adaptability of grass and legume forages, create awareness to the farmers and evaluate the yield performance of the technologies by farmers evaluation criteria. The range and mean performance of annual grass and legume forages have showed considerable amount of variability among the traits. For instance, fresh biomass yield of rhodes grass varied from 31.9-98.0 and 27.8-39.3 tones/ha for soddo and Kedidagamila districts respectively. The plant height and number of branch/plant of rhodes grass also varied from 128.9-172.9cm and 4.0-16.0 for soddo and 110.8- 129.5 cm and 7.0-16.0 for Kedidagamila. Moreover, the fresh biomass yield of alfalfa in soddo is varied from 21.9-44.1 and 22.1-34.30 t/ha and dry matter 8.26-23.26 and 10.6-17.6 t/ha for soddo and Kedidagamila districts respectively. Based on farmers evaluation, both alfalfa and Rhodes grass are the most vigorous, persistent and highly adapted species, and thus can be safely suggested for the soddo district. Furthermore, the growth performance of Rhodes grass in kedidagamila also good but, productivity of alfalfa was poor and this probably resulting from unfavorable climatic conditions. The over all mean of the result, 90.26% and 69.43% of soddo farmers were selected rhodes grass and alfalfa. In kedidagamila, 88.88 % of the farmers were preferred Rhodes grass over 40.25 % of alfalfa.
Key words: Assessments, adaptation, Evaluation Medicago sativa, Chloris gayana

Introduction

Feed scarcity in both quantitative and qualitative dimensions is one of the major impediments for the promotion of the livestock sub-sector in Ethiopia (Alemu, 1997; Tesema and Halima, 1998).Animals are kept on poor quality natural pasture that commonly occur on permanent grasslands, roadsides, pathways and spaces between cropped plots. Much of these feed resources are utilized to support maintenance requirement of the animals with little surplus left for production and there are marked seasonality in quantity and quality of the available feed resources due to various environmental determinants (drought, frost, human interference such as deforestation etc) (Othill,1986). Moreover, the available grazing lands are decreasing in size and quality particularly in the highlands due to high population pressure and encroachment of cropping on to communal grasslands. The double pressure is that the livestock population of the country is increasing from time to time and expected to reach about 63 Million by 2020. The increase in the livestock population and the subsequent rise in feed demand are expected to occur largely in regions of Ethiopia, where livestock feed production is already insufficient (Lulseged, 1995). This situation warrants the use of appropriate technologies that can optimize utilization of available feed resources and alternative technologies to replace traditional practices.

The introduction of improved forage technologies into Ethiopia goes back to the early 1950s. The historically significant on station research activities conducted since those early days successfully dealt with the identification of

high yielding and better quality legume and grass forages that are adaptable to various agro-ecologies of the country, although all the required information's are not fully developed and data base required for the generation of technologies are grossly lacking both at feed and animal level in the country (Nnadi and Haque 1986 and 1988).Unfortunately however, the production of improved forage technologies are not yet adopted and developed by the farming community due to inadequate knowledge, poor extension service. On the contrary, the adoption of improved forage technologies in a sustainable manner at the household level is expected to assume a pivotal role in increasing animal production. These being the cases, this research project was aimed at on farm assessments of the performance of Alfalfa (*Medicago sativa*) and Rhodus grass (*Chloris gayana*) in Soddo and Kedidagamila Districts of Southern Nation and Nationality Regional State.

Materials and methods

Description of the Study Area

This study was conducted at Soddo zuria and Kedidagamila districts of Wolayta and Kambata-tembaro zones of southern Ethiopia. The environmental conditions of both districts are favorable for production of Alfalfa (*Medicago sativa*) and Rhodus grass (*Chloris gayana*). Both districts have diverse agro-ecologies with an altitude range of 1675-2500 m.a.s.l, representing one of the major Alfalfa (*Medicago sativa*) and Rhodus grass (*Chloris gayana*) growing areas in the country.

Participatory evaluation with farmers

Eighteen households (10 men and 8 women) each from Soddo zuria and Kedidagamila district were used to evaluate Alfalfa (*Medicago sativa*) and Rhodus grass (*Chloris gayana*) technologies. Selection of individual farmer was made on meeting with key informants that are familiar with the two crops to determine the adaptability and growth performance throughout the entire growing period. The interviews were later extended to group participatory discussions of selected farmers in two clusters from each district. Group discussions were to carefully build on and critically examine, the information derived from individual farmers of different households. It was also intended to clear conflicting ideas on issue like adaptability and growth performance of the two crops technologies. The group discussions focused on i) Preference and selection of forage technologies ii) availability of feed during the dry season iii) growth performance of the two technologies iv) types of utilization options iiv) storability and biomass yield of each crop and other related parameters.

Focus group interviews and key informants were used to understand the underlying factors influencing farmers' decisions to conserve and sustainable utilization of improved technologies on farmers' field. Information obtained from the interviews (individual households and group discussion) and key informants was used to obtain a broad understanding of the technologies in the study areas.

Selection of Participating Households

Thirty six households eighteen from each district was selected by giving equal chances based on consultation with agricultural experts and key informants. The selection focused different social groups (Young, Men, Women and wealth status) from six kebeles/groups. Three farmers considers as a group from each district. This process was repeated for all possible groups until six possible groups have been made for each district. An aggregation was then realized on the scores for each group over the farmers participating in the exercise represents the district score. The ranking of these scores provides the position of the varieties in the district. The same process was applied to in the Sodo zuria district.

Plantation, Data collection and Statistical Analysis

The seed of Alfalfa and Rhodes grass were sown as broadcast over the entire plots of each farmer (10m x10m of each). All plots received a recommended seed rate of 15kg/ha and 10 kg/ha for Rhodes grass and alfalfa respectively. The recommended fertilizer rates for all plots are 18/46 N/P2O5 kg/ha were used at planting. Seed viability was determined by germinating scarified seed on moist filter paper in Petri dishes. In this study, approximately 85% and 89% of Rhodes grass and alfalfa seeds were germinated and the seeding rates were adjusted to give similar numbers of viable seeds per plots before sowing.

The plantation of both plant materials was in completely randomized block design with 18 replications. All the plants of all the plots were harvested at 5 cm above ground level. Yield was expressed as tone of dry matter per hectare. Dry

matter content of the plants was measured after oven-drying at 60°C, for 24 hours. Forty plants were randomly selected from each plot to collect data on mean plant height and number of branches/ plant. Finally the analysis of yield and other quantitative traits were performed using SAS computer software packages (SAS, 2001).

Results and discussion

Survey Results

Soddo Zuria District

The result of farmers' evaluation obtained from Soddo Zuria District indicated that there were many important practices carried out by farmers' concerning selection and utilization options of grass, legume and other local forage cultivars. The results of the household interviews showed that 55.55% of the respondents reported that they select and collect forage materials from their own gardens and the remaining 44.4% reported that they gather planting material from the market and grazing lands due to lack of improved forage technologies in the area.

All the farmers communicated were asked to evaluate performance of the improved forage technologies (Alfalfa and Rhodus grass) based on their own criteria. About 88% of the respondents said to have' preferred the improved forage technologies and the remaining 12% reported that they selected both local and improved forages. The general indication is that farmers preferred both local and improved technologies to solve their seasonal feed shortage during the dry season in the Soddo Zuria District when other crops are not in the field. The improved forage technologies especially Rhodes grass seems to be used to fill seasonal feed gap in the area.

Farmers in the area have a good trend of using alfalfa leaves as poultry feed. Based on growth performance, biomass yield and growth habit of the crop, almost all the respondents reported to have a good interest in the improved technologies, which might be attributed to the fact that farmers in the area have high land shortage and thus the improved technologies produces high fresh bio mass yield, had high tillering capacity and have good performance as compared to their local forage cultivars. Based on ease of harvesting, all (100%) of the farmers prefer the improved technologies (both alfalfa and rhodus grass) over local cultivars.

There was no disease and insect pests observed during the entire growing period of the two crops, as a result of which the farmers did not evaluate the susceptibility and resistance of the technologies to diseases and insect pests in the study area. In general, farmers' preference or selection criteria were found to be highly dependent on the needs of individual farmers, available land and the accessibility of planting materials.

Kedidagamila District

The results of the survey conducted in the Kedidagamila District showed that almost all the farmers approached have the same knowledge about the utilization of grass and legume forages which provides a good setting to study, selection and evaluation of improved forages in traditional agriculture within the farmers. The results of the preliminary observation made within the farming population of the study area suggested that the technologies have distinct strengths and weaknesses and the farmers use their own criteria's to select the technologies found in the fields.

About 67% of the respondents reported that they collect and utilize forage materials from crop by products and forage trees whereas the remaining 33% said that they collect planting material from district bureau of agriculture and rural development office. The results of the survey clearly indicated that there are many selection and utilization options of local and improved forage cultivars at the household level in the study area. The results of the interview made with the households indicated that all farmers (100%) select rhodes grass based on biomass yields, growth performance, seed set at maturity, , easiness to harvest and long time storage. About 44% of the respondents replied that they select grass forage based on their suitability or acceptance by livestock and none of them reported to have selected Rhodes grass as poultry feed in the study area. The results of the survey conducted in the Kedidagamila District showed that farmers enforced to feed poultry from their crop by products and prefer alfalfa over grass forages as poultry feed Legume forages have high nitrogen content, but easily spoil during long time storage which intern results in decrease in nutritive quality. Thus all the respondents reported to prefer rhodus grass over alfalfa for conservation as feed of dry period. On the other side, all the farmers communicated said to have preffered both alfalfa and rhodus grass over local cultivars based on ease of harvesting. Generally, the selected forage crops are high

yielder and have better quality compared to natural pasture and local forage cultivars.

Results of Field Plantations

Soddo Zuria District

The results of the field plantations showed that the growth performance of both crops tested in Soddo Zuria District is good and strongly persistent in most of the farmers fields (Table 1). Both the short season Rhodes grass and Alfalfa had high tillering capacity, resistance to insect and disease and good in seed and flower production as a result of which the majority of the farmers in the study area showed a good interest in the technologies.

The mean fresh and dry matter yield of Rhodes grass planted in the study district of Soddo Zuria was 54.75t/ha. and 25.83t/ha respectively (Table 1), with the corresponding range of 31.9-98.0 t/ha for fresh yield and 13.19-61.27 dry matter yield. Rhodes grass was found to be very persistent and
vigorous with high tillering capacity (11.30/plant), in all the farmers plote . On the other side, the mean fresh and dry matter yield of Alfalfa planted in the same study area was 30.20 t/ha and 13.95 t/ha respectively (Table 1) with a corresponding range of 21.9- 44.1 t/ha for fresh yield and 8.26-23.26 t/ha for dry matter yield indicating that Alfalfa also performed very well on farm condition in Soddo Zuria District. This result showed that Soddo Zuria District is very suitable and favourable for the production of Alfalfa. Thus, it coulde safely and economically be suggested that both Alfalfa and Rhodes grass are highly productive under household farming system of Soddo Zuria District.

Kedidagamila District

The results of the field plantations of Alfala and Rhodes grass initiated in Kedidagamila District are shown in Tablee 1. The results obtained showed that both grass and legume forages performed well in the Kedidagamila district. Perennial, Rhodes grass had densely fine stems, high degree of resistance to disease and insect pests, good seed set and an excellent seedling regenerative capacity. The mean fresh biomass and dry matter yield ranged from 27.8-39.3 t/ha and 10.08-20.33 t/ha respectively (Table 1) with the corresponding mean value of 33.36 t/ha for fresh yield and 15.06 t/ha for dry matter yield. Moreover, it is well established in all tested farmers fields and had got good impression of farmers.

According to the data given in Table 1, Alfalfa, was found to be more strongly persistent and highly resistance to disease and insect pests. A mean fresh and dry matter yield of 26.22 t/ha and 12.38 t/ha was recorded from Alfalfa planted on farmers field respectively. In some farmers' fields, the performance of Alfalfa was quite low, with poor seedling, regenerative capacity, and poor establishment and growth performance as compared to Soddo Zuria District (Table 1), which might be attributed to poor cultural practices was done during the life span of the crop. Based on the over all results of these on farm experiments Rhodes grass could safely be recommended in the Kedidagamila District.

Discussion

This study, basically focus on: test adaptability and create awareness on grass and legume forages. Toward this effort, alfalfa (*Medicago sativa*) and rhodus grass (*Chloris gayana*) were used for assessment. The range and mean performance of annual grass and legume forages have showed considerable amount of variability among the traits. For instance, fresh biomass yield of rhodus grass (*Chlorisgayana*) varied from 31.9-98.0 and 13.19-61.27 t/ha. for soddo zuria and kedidagamila respectively. The plant height of rhodus grass also varied from 128.9-172.9 and 110.8-129.5 cm for soddo zuria and Kedidagamila districts respectively. Moreover, the fresh biomass yield of alfalfa in soddo zuria is varied from 21.9-44.1 and 22.1-34.30 t/ha and dry matter 8.26-23.26 and 10.6-17.6 t/ha for soddo zuria and Kedidagamila districts respectively. Moreover, the performance of *Chloris gayana* in kedidagamila good in all tested farmers, however, the performance of *Medicago sativa*, is poor it is probably resulting from unfavourable climatic conditions. The result of farmers' evaluation criteria revealed that, farmers in the study areas possess considerable knowledge about alfalfa (*Medicago sativa*) and rhodus grass (*Chloris gayana*) and the attributes of each crop. Based on the overall mean evaluation criteria, 90.26% and 69.43% of soddo farmers were select rhodus grass (*Chloris gayana*) and alfalfa (*Medicago sativa*). Besides, 88.88% of farmers in kedidagamila were prefer rhodus grass (*Chloris gayana*) and the remaining 40.25% were select alfalfa (*Medicago sativa*) for their livestock feed.

Conclusion and Recommendation

Our present data are not yet conclusive and since there is little information on these important grass and legume

forages, there is a need to investigate further other indices of evaluation. However, based on the overall results of experiments; both *Medicago sativa* and *Chloris gayana* are the most vigorous, persistent and highly adapted species, and thus can be safely recommended for the soddo zuria district. Furthermore, the growth performance of *Chloris gayana* in kedidagamila also good but, productivity of *Medicago* was poor and this probably resulting from poor cultural practices that made by farmers during growing season. Thus, only *Chloris gayana* can be recommended for farmers who live in kedidagamila.

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Table 1. Means, standard deviation and ranges of four quantitative traits of Alfalfa and Rhodes grass grown on 36 farmers' fields of Soddo and Kedidagamila districts of Southern Ethiopia, 2010/2011 cropping seasons.

Characters	Forage types							
	Rhodes grass				Alfalfa			
	Soddo		Kedidagamila		Soddo		Kedidagamila	
	Mean ± Sd	Range	Mean ± Sd	Range	Mean ± Sd	Range	Mean ± Sd	Range
NBr/pl	11.30 ± 2.40	4.0-16.0	12.41 ± 2.37	7.0-16.0	9.08 ± 3.65	3.0-17.0	10.25 ± 3.6	4.0-17.0
PH	148.63 ± 10.7	128.9-172.9	119.7 ± 6.42	110.8-129.5	127.2 ± 6.29	121.3-138.9	83.7 ± 12.4	73.7-92.3
FBY	54.75 ± 18.40	31.9-98.0	33.36 ± 3.84	27.8-39.3	30.2 ± 8.75	21.9-44.1	26.22 ± 7.5	22.1-34.3
DMY	25.83 ± 11.33	13.19-61.27	15.06 ± 3.41	10.08-20.33	13.95 ± 5.62	8.26-23.26	12.38 ± 3.4	10.6-17.6

NBr/pl =Number of branches/plant, PH=Plant height (cm), FBY=Fresh biomass yield (t/ha) and DMY=Dry matter yield (t/ha).

Table 2. Summery of major farmers evaluation criteria of alfalfa and rhodes grass at Soddo and). Kedidagamila districts of Southern Ethiopia and their rankings (n= 36 farmers).

Rank: 1= Best; 2= fair; 3= worst. The scoring represents farmer's evaluation criteria of rhodes grass and alfalfa. This scoring reveals the degree of satisfaction provided by each variety in considering each criteria (n=36). Only farmers who held evolutional knowledge on each given technology were requited to assess it

Criteria	Soddo zuria				Kedidagamila			
	Rhodes grass		Alfalfa		Alfalfa		Rhodes grass	
	No of farmers	%	No of farmers	%	No of farmers	%	No of farmers	%
Bio mass yield	36	100	36	100	16	44.4	36	100
Selection of forage	28	77.7	36	100	8	22.2	24	66.67
Growth performance	36	100	24	66.67	16	44.4	36	100
Avail during dry season	36	100	8	22.2	8	22.2	36	100
Type of utilization	16	44.4	36	100	24	66.67	16	44,4
Seed set	36	100	16	44.4	0	0.00	36	100
Easiness to harvest	36	100	36	100	36	100	36	100
Storability	36	100	8	22.2	8	22.2	36	100
Overall mean		**90.26**		**69.43**		**40.25**		**88.88**
Overall rank		**1**		**2**		**2**		**1**