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Evaluation the Adaptability of Staylosanthese Hamata, Staylosanthese Guinea and Desmodium Uncinatum Species on Station of Jinka Agricultural Research Center, Jinka , Ethiopia

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Abstract
The adaptation and evaluation improved forage varieties was conducted at Jinka Agricultural Research Center in the 2013 main cropping seasons under rain fed conditions using the forage legume species to identify adaptable and high biomass yielding forage legume varieties. The field experiment was laid out in a randomized complete block design /RCBD/ with three replications. The tested species used in evaluation trial were Staylosanthese hamata, Staylosanthese guinea and Desmodium uncinatum. Each species was planted in a single plot area of 3 m x 4 m = 12 m^2. The fresh biomass and dry matter yield production potential of tested species to area were 39.5 t/ha, 40.8 t/ha, 27 t/ha and 10.4t/ha, 17t/ha and 8t/ha for Stylosanthes hamata, Stylosanthes guninea and Desmodium uncinatum . The result obtained in current study revealed that there is significant difference ($P \leq 0.05$) recorded between Stylosanthes hamata and Desmodium uncinatum and also Stylosanthes guninea and Desmodium uncinatum. However, there is none significant difference ($P \geq 0.05$) fresh biomass yield between Stylosanthes hamata and Stylosanthes guninea. Out of the tested forge species over cropping season, the one which gave consistently the maximum dry matter yield was Stylosanthes guninea which gave (17 tones ha^{-1}) in the cropping season is advisable for the study areas and their vicinities. Hence, use of the best performing forage species is important in the test community even though further testing is important by including their feeding value under different intervention, chemical composition and their response to the disease and Pest resistance to put the recommendation on strong basis.
Keywords, Desmodium uncinatum, Dry matter yield, Improved Legume, Staylosanthese hamata, Staylosanthese guinea and

Introduction and Justification

Feed shortage has been a chronic problem for animal production in pastoral area of Ethiopia. Chronically it is in terms of both quantity and quality which is resulted the productivity of livestock is less and unsatisfactory. On the hand, the grazing lands which are play a vital role in livestock nutrition are declining due to the opening of the grazing lands for food crop production (Ermias et al., 2005). One way of improving the livestock production and productivity is by introduce improved forage development and proper supplementation with leguminous forages (Poppi and McLennan 1995). Forage legumes have several advantages to tropical farming systems especially in being protein source, which are usually the most limiting nutrients in tropical Animal diets and can be grazed, harvested and fed fresh or stored as hay or silage (Harricharan et al 1988). Desmodium intortum is one of improved vigorous perennial legume forage which can be best adapted to high rainfall areas exceeding 900 mm, with altitude range 800–2500 m.a.s.l and can be produced dry matter yield that varies widely from 3–20 t/ha DM. On the other hand, Stylosanthes guianensis can grows best under warm climate with range of rainfall 600–2500 mmand can be produce dry matter yield which varies widely from 2.5–10–15 t/ha (Solomon et al,. 2010). In the study district, livestock are nutritionally depend on poor grazing on low quality range forages in terms of energy and protein due to inadequate knowledge of pastoralist on nutrient content of legume forage, lack of a stratrategic improved forageintroduction and development practice, poor agricultural extension services and low emphasis on importance of livestock production in improving the income and livelihood of communities. These phenomena leads to undernourishment, slow growth rate, low daily body weight gain, loss of body condition and prolonged time to reach marketable weight which makes less benefits of the pastoral communities from livestock production in to the area . On the other hand, however, in the study district, evaluation the adaptability of different improved legume forage species (Staylosanthese hamata, Staylosanthese guinea and Desmodium uniciucitum) are yet not has been carried out . The evaluation and introduction of these species imperative in order to overcome the feed constraints both in quality and quaintly to the study area therefore, the study was designed with objectives to identify high yielding improved legume species and demonstrates to pastoralists' communities.

Material and Methods

Description of the Study Area

A field experiment was conducted at on station of Jinka agricultural research center, which 550 km far from Southern Nations Nationalities and Peoples Region capital city of Hawassa. Jinka Agricultural Research Center

is astronomically it lies between 4^0 43' North to 6^0 46' North latitude & 35^0 79' East to 36^0 06' East longitude, and 1450 m above sea level. It has average annual rainfall to area is 840 mm and the average annual minimum and maximum temperatures were 16.8ºC and 27.8ºC). The main rainy season extends from June to October interrupted by some dry periods in July and August. The Soil of the experimental site is loam.

Experimental Design and Treatment

Experimental material (seed) was collected from Debre zeit Agricultural Research Center and transported to trial site. 0.125 hectare of land was selected and prepared for carried out the research and it was divided in to 3 replications, each with 3 plots and there is 50 cm area between each plot. Each species was planted in plots area of 3 m x 4 m using randomized complete block design with three replications. The experimental materials were planted at a spacing of 30 cm and 50 cm between plants and rows respectively by using a seed rate 15 kg per hectare .

Crop management and data collection

The planted species management activity such as hoeing, weeding and diseases and Pest inspection carried out and trial farms were continuously monitored. The agronomic data like, date of planting, data of emergency, stem height, leaf area, days to 50 % of heading were collected. In order to measured the plant height per each species at 50% heading stage, five plant from middle of two row per plots were randomly taken for height of plant measurement and average height of plant had been considered for their height growth potential. Conversely, the each legume forage species were harvested two months after establishment and thereafter at interval of 32 weeks to determine fresh herbage and dry matter yield. Three samples were randomly taken per plot at quadrates of 50cm x50 cm area by cutting using sickle and weighed right at the field and then allotted to cut in to small pieces and made pooled it. After representative samples were made samples were subjected to oven dried at 105^oc for 24hrs at Jinka Agricultural Research Center Animal Feed evaluation Laboratory. Then the dry matter yield per each species was calculated by the final weight collected from oven dried was divided by initial weight before the subjecting to the oven dried.

Statistical Analysis

Analysis of data was performed using GLM procedure of SAS statistical soft ware version 9.1. Effect of species were consider significantly in all statistical calculation if ($P \leq 0.05$). Means were separated using Duncan's least significant difference (LSD) test with following model.

$$Y_{ij} = a + ß_i + t_j + e_{ij}$$

Where: Y_{ij} = dry matter yield , a = General mean of the treatments, ßi = block effects,
tj = treatment(species) effects and eij = experimental (random) error

Results and Discussion

Agronomic traits measured

The agronomic traits such as Seed emergency , Plant height and day of at 50 % heading of Staylosanthese Hamata , Staylosanthese Guniea and Desmodium Uniciucitum are presented in Table 1. The result on the Staylosanthese hamata , Staylosanthese guniea and Desmodium unicitum revealed that there is none significant differences ($P > 0.05$) in the days to seed emergence, between Staylosanthese hamata , Staylosanthese guniea and Desmodium unicitum. The Staylosanthese hamata , Staylosanthese guniea and Desmodium unicitum. The species were germinated on average range within 7 - 10 days. Contrary, result on plant height at 50% heading depicted that there were significant difference ($P<0.05$) between Staylosanthese hamata and Staylosanthese guinea and Staylosanthese hamata and Desmodium unicitum. Moreover, there is none significance difference ($P > 0.05$) observed between Staylosanthese hamata and Desmodium unicitum. The plant height growth species to the area is 84.6 cm, 92.20 cm and 140.9 cm respectively for Stylosanthes hamata, Desmodium unicutum and Staylo santhes guniea . Similarly , there is also significance different ($P<0.05$) to days to 50 % heading observed between Staylosanthese hamata and Desmodium Unicitum and also Staylosanthese hamata and Staylosanthese guniea however, there is none significance difference($p > 0.05$) observed between Desmodium unicitum and Staylosanthese guniea. The Staylosanthese hamata headed 50% earlier with mean of 65 days, while Desmodium unicitum and Staylosanthese guniea headed last with average mean of 118 and 145 days (table 1).

Table 1. Mean of Seed emergence , days to 50 % heading and Plan height of tested species grown on - station of Jinka Agricultural Research Center in 2013 main cropping Season **.**

Forage varieties	**agronomic traits measured**		
	Date of seed emergency (in days)	**Date 50%heading (in days)**	**Plant height(cm) at 50% heading**
Stylosanthes hamata	10a	65a	84.6a
Staylo santhes guniea	10a	145b	140.9b
Desmodium unicutum	7a	118b	92.2a
LSD 0.05	**4.5**	**56**	**21**
CV(%)	**6.5**	**22.9**	**8.8**

(Means with the same letter in column for seed emergency, days to 50% heading and plant height are not significantly different P<0.05), LSD = least standard difference and CV = Coefficient of variance.

Biomass yield traits measured

Pertaining to the biomass yield potential among the tested species in study area , revealed that there is significant yield (P≤ 0.05) variability among the species (table 2). The fresh biomass and dry matter yield production potential of tested species to area were 39.5 t/ha, 40.8 t/ha, 27 t/ha and 10.4t/ha, 17t/ha and 8t/ha for Stylosanthes hamata, Stylosanthes guninea and Desmodium unicutum) . The result obtained in current study revealed that there is significant difference (P≤ 0.05) recorded between Stylosanthes hamata and Desmodium unicutum and also Stylosanthes guninea and Desmodium unicutum (table 1). However, there is none significant difference (P ≥ 0.05) fresh biomass yield between Stylosanthes hamata and Stylosanthes guninea. In study district The dry matter yield(DMY) obtained from the Desmodium unicutum in the current study similar to investigation that reported by the Tadesse (1990) at middle altitude of Ethiopia. However, half time lowered fresh biomass yield (FBY) was recorded in the current study which is unlikely to what Tewedoros and Messert (2010) reported. Pertaining to the dry matter yield(DMY) for Stylosanthes hamata from this study is corroborated to the findings that reported by Nandanwar e tal .(1991) and conversely, for Stylosanthes guninea from this study is almost similar what reported by Gilchrist (1967) .

Table 2. Mean of fresh biomass yield and dry matter yield of Stylosanthes hamata, Stylosanthes guninea and Desmodium unicutum) grown on - station of Jinka Agricultural Research Center in 2012 cropping Season **.**

Forage varieties	**Biomass yield traits measured**	
	FBY /plot/gm ±SE	**DMY /plot/gm ±SE**
Stylosanthes hamata	988.89±495^{a}	361.1±126.22^{ab}
Staylo santhes guniea	1058.80±495^{b}	527.01±126.22^{ac}
Desmodium unicicatum	680.40±495^{c}	196.01±126.22^{ab}
LSD 0.05	**1124**	**384**
CV(%)	**6.3**	**5.9**

(Means with the same letter in column for fresh biomass yield and dry matter base to 50% heading stage are not significantly different P<0.05)**,** FBY = Fresh biomass yield (t/ha) , DMY = dry matter yield (t/ha) , SE = standard error , gm = grams , LSD = least standard difference and CV = Coefficients of variance

Conclusion and Recommendation

In the study area , the fresh and dry matter (DM) yield production of tested species were 39.5 t/ha , 40.8 t/ha , 27 t/ha and 10.4t/ha , 17t/ha and 8t/ha for Stylosanthes hamata, Stylosanthes guninea and Desmodium unicicutum. The result obtained from current study from the tested species indicated that tested species equal potential in producing the fresh biomass yield. However, in terms of dry matter yield, variability observed among the species this is might be linked to difference in species genotype potential, seasons of year or soil fertility. However, Stylosanthes guninea produced more dry matter yield than Stylosanthes hamata and Desmodium unicicutum, therefore, it is highly recommended to the study area. On the other hand, result reported in the current study is from data of one year cropping season. However, for the forage species yields may be variable in other seasons. Likewise, the further research should be conducted to identify their feeding value under different intervention, chemical composition and their response to the disease and Pest resistance. Moreover, the information obtained would benefit in promotion of the forage species in wider scale out through pre-scale-up program.

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