Evaluation of the Adaptability of Different Sweet Lupin (Lupinus spp. L.) Varieties for Feed production

Reducing Land Degradation and Farmers' Vulnerability to Climate Change in the Highland Dry Areas of North-Western Ethiopia

TECHNICAL REPORT OF EXPERIMENTAL ACTIVITIES

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Implemented by

ICARDA
Science for Better Livelihoods in Dry Areas

In collaboration with

ARARI

BOKU

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About the Project

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Cover photo: Performance of Sweet lupin varieties | 22 September 2015 |M. Gebretsadik

About ICARDA

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Synthesis

Activity type: Technology generation

Report submitted by: Alemu Tarekegn

Summary report

According to the results from the baseline study of the watershed, feed shortage was mentioned as the important problem for livestock productivity. This study was conducted to give the solution to this end. Sweet lupin seed and forage are used as the animal feeds in different part of the world. However, sweet lupin is new for our country and little information on the adaptability in different part of the country. Its objective was therefore, to evaluate the adaptability and yield performance of sweet Lupin cultivars under the ecological condition of Gumara- Maksegnit watershed. Five sweet lupin cultivars were evaluated for their productivity and adaptability in Gumara –Maksegnet watershed for two years in RCBD. The analysis of variance showed that there is no statically difference among the tested cultivars for important forage parameters dry mater yield and grain yield. The dry mater yield and grain yield were ranged from 1.233 to 1.72 ton/ hectare and 1069.57 to 1778.16 kg/hectare in the first year, respectively. The corresponding values for the second years were 1.53 to 1.67 ton/hectare and 501.44 to 731 kg/hectare.

Schematic summary of information

Location (locality, town, province….)	Dinzaz kebele, Gonder zuria wereda, North Gonder zone
Abakaloye site	
Northing;	1374279
Easting;	3464000
Elevation	2087m a.s.l.
Dinzaz site	
Northing;	1373845
Easting;	3490990
Elevation	2073m a.s.l.
Period of implementation:	April, 2014 to December, 2015
Duration of trials:	(2 years)
Activity leader(s):	Alemu Tarekegn
Other researchers involved:	Yengusie demsew, Belete Shimelash and Tikunesh Zelalem

1 Background and rationale

In the highland areas of Ethiopia livestock production is inseparably linked with crop production because of the mixed crop livestock farming system. According to Gryseels and Anderson (1983) as cited by Lulseged and Jamal (1999) crop and livestock are closely integrated throughout the highlands in a complex of competitive and complementary ways. The major feed resources in these areas are natural pasture and crop residues. However, due to the high rate of human population growth, natural pasture is being cultivated and converted in to a cropland. On the other hand, crop residues especially cereals have a very poor feeding value with poor metabolically energy, negligible available protein, and seriously deficient in mineral and vitamins (Staniforth, 1979 as cited by Lulseged and Jamal, 1999). The availability of commercial protein and mineral supplements is limited and even available they are expensive and are beyond the capacity of the subsistence farmer.

With the intention to solve the burden of feed shortage under the existing situation in the mixed crop-livestock farming system of Ethiopia it is very important to look for a multipurpose, highly productive and less labor demanding leguminous crop so that it can be used to develop efficient feeding system in the area and easily adopted by farmers.

Lupins are annual or perennial legumes belonging to the genus Lupinus which contains 250 - 300 species (Highes et al., 1952 as cited by Muyekho; May et al., 1993). Most of these species are native to America. However, the large-seeded species have commercial importance that includes blue lupin (Lupinus angustifolius), white lupin (L. albus) and yellow lupin (L. luteus) which are native to Mediterranean basin of Europe. According to Moss et al. (1999) Lupins have the potential to meet nutrient needs by incorporating either the seed or the forage in to ruminant diets. Both seed and forage have been utilized in ruminant diets worldwide, but data relative to lupin forages is limited. That is why this research proposal focuses on conducting adaptability of different species of Lupines.

2 Objective

The main objective of this research activity was to evaluate the adaptability and yield performance of sweet Lupin cultivars under the ecological condition of Gumara-Maksegnit watershed in Gondar Zuria district.

3 Experimental Methods

Five sweet lupin cultivars (Bora, Haags, Probor, Sanabor and Vitabor) were used. These cultivars were planted in two sites. The design was a randomized complete plot design with three replications. Plot size was 1.2m* 4m. Spacing will be 30 cm between rows and 7 cm between plants. During sampling each plot was divided in to two halves crosswise with an effective plot size of 1.2m*2m. One half was used for forage sampling and the other half for seed sampling. Forage sampling was done at 50% flowering stage. The data was analysed by ANOVA procedure of SAS and the treatment means difference was tested by LSD (5%).

4 Results

Year one (2015)

The mean yield and yield component of five sweet lupin cultivars in year 1 are presented in Table 1. Analysis of variance in the first year trail showed that there is a significant difference between treatments in plant height, seed per pod and 1000 seed weight. Haags (44.86cm) and Probor (40.81cm) had significantly ($P<0.05$) shorter than the other cultivars. Among the tested cultivars Haags gave a significantly higher seed per pods. However, there is no statically significant difference among the tested cultivars for important forage parameters (dry matter yield and grain yield).

Table 1: Mean of yield and yield components of five sweet lupin cultivars at Gumara Maksegnit water shade in the year 1(combined for two locations)

Treatments	PLH(cm)	DMY (ton/h)	GY(kg/h)	POD	SPOD	1000SW
Bora	51.60a	1.72	1763.00	9.23	3.83 b	10.30 a
Probor	40.81b	1.44	1069.57	7.88	3.50 b	8.58 c
Sanabor	49.96a	1.33	1327.16	8.03	3.83 b	9.26 b
Vitabor	49.83 a	1.52	1257.16	7.18	3.83 b	10.38 a
Haags	44.86b	1.48	1778.16	8.23	4.83 a	9.60 b
Mean						
CV(%)	8.45	27.06	30.11	27.41	12.62	3.16
LSD (5%)	4.78	NS	NS	NS	0.59	0.36

Year two (2016)

The performances of five sweet lupin cultivars at different parameters are described in Table 2. Except 1000 seed weight, there is no statically (difference between the tested cultivars for all parameters. Haags gave significantly ($P<0.05$) higher 1000 seed weight than the other cultivars. Even though, there is no statically significant difference between the cultivars, Haags cultivar gave relatively higher yield for important forage parameters (dry mater yield and grain yield).

Table 2: Yield and Yield components of Lupine cultivars in year 2 combined by location (site 1 and site 2)

Treatments	PLH(cm)	DMY(t/ha)	GY(kg/ha)	POD	SPOD	1000SW
Bora	53.25	1.57	624.49	9.83	3.86	8.16[b]
Probor	48.23	1.66	656.13	7.45	3.21	8.50[b]
Sanabor	51.25	1.56	731.29	9.11	3.51	8.66[b]
Vitabor	49.83	1.53	501.44	6.25	3.43	8.66[b]
Haags	48.75	1.67	723.88	9.35	3.35	9.16 [a]
Mean						
CV (%)	17.19	22.76	32.02	43.42	15.93	8.62
LSD(5%)	NS	NS	NS	NS	NS	0.88

5 Conclusions and recommendation

All sweet lupin cultivars tested in this study showed similar performance for important parameters such as dry mater yield and grain yield. Therefore, this is recommended to use any off the varieties in the study area and similar agro-ecology and farther studies on the agronomic practice and animal evaluation should be done.

***NOTE**: The data presented in this report are currently being elaborated for scientific publication, thus some of them are not final. The aim of this report is to summarize the nature and quality of the activities conducted and of the dataset generated, and to illustrate the main results obtained.*

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