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Identification and Nutritional Evaluation of Native Forage Species for Establishing Field Gene Bank at Jiri, Dolakha, District

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ABSTRACT

Native forage grows naturally on bunds, marginal lands, forestland, swampy land, terrace riser, barren lands and cultivated lands are resilience to environmental stresses such as drought, floods and diseases and are palatable and nutritious to different types of animals. This study was conducted at the Cattle Genetic Resource Center (CGRC) in Jiri, Dolakha, to identify and evaluate native forage species for ex-situ and on-farm conservation, by establishing field gene bank, and potential registration of land races. The study was done by using key informant interview, focus group discussions (FGDs), and field surveys. Quadrat sampling was used to assess the preliminary status of production potential of native forage species. Laboratory analysis was conducted to determine their nutrient composition. Based on information obtained from the KIIs and FGD, 14 native forage species such as Furke (*Arundinella nepalensis* Trin.), Kharuki (*Capillipedium assimile*), Jere Banso (*Setaria pumila*), Kurkurae (*Equisetum ramosissimum*), Amrisho (*Thysanolaena latifolia*), Halhale (*Rumex nepalensis* Spreng), Sama (*Echinochloa colona*), Chatre (*Cyperus compressus*), Siru (*Imperata cylindrica*), Narkat (*Phragmites australis*), Majito (*Rubia manjith)*, Dubo (*Cynodon dactylon*), Kash (*Saccharum spontaneum)* and Ghogae (*Sporbolus fertilis*) were documented. Among these, Furke, Kharuki, Jere Banso and Amrisho were identified as the most promising species for the local agroclimatic conditions. The forage yield of native forage species ranged from 1.54 to 8.48 t/ha, crude protein content ranged from 6.56 to 9.64 percent and energy content ranged from 3871.22 to 4028.32 kcal/kg. The greater number of

native forages should be identified along with the production potential and nutritive value.

Key words: Nutrient composition, forage yield, production potential, passport

INTRODUCTION

Nepal is rich in biodiversity and ranks the 49th in the world for biodiversity. Among 24,300 total species in the country, 28% are agricultural genetic resources (AGRs), termed as agrobiodiversity which includes 510 both native and cultivated forage species. Despite this richness, agrobiodiversity loss is substantial, estimated at around 40% nationally, with farmers in some regions reporting the complete loss of certain species. Although agrobiodiversity conservation efforts began in Nepal in 1986, systematic conservation through ex-situ, on-farm, in-situ and breeding strategies has been implemented since 2010 under the National Agriculture Genetic Resources Center (National Gene bank). Native forage species are better adapted to their natural environments, which are resilience to environmental stresses such as drought, floods and diseases and are palatable and nutritious to different types of animals. Winter season is the lean period for forage production in mid hills and animals supply their nutrient requirements from the locally available grasses. More numbers of native forage species are unidentified and identified native forage species (NFS), productivity potential and nutritive value are also not known till date. It is essential to have knowledge regarding their morphological traits, production potential, nutrient composition, and variability due to change in sites and season so that their efficient utilization could be achieved.

MATERIALS AND METHODS

This study was conducted at the Cattle Genetic Resource Center in Jiri, Dolakha, to identify and evaluate native forage species for in-situ conservation, the establishment of a field gene bank and potential registration. The study was done by using key informant interview (KIIs) including 3 participants (senior farmers), focus group discussion (FGD) including 12 participants (senior farmers, livestock technicians), and field surveys. The quadrat sampling was used to assess the preliminary status of production potential of native forage species, and laboratory analysis was conducted to determine their nutrient composition. For botanical identification herbarium was sent to National Herbarium and Plant Laboratories,

Godawari. Identified native forage species were permanently labeled and

protected from livestock grazing and are conserved in Cattle Genetic Resource Centre, Jiri, Forage Field Gene bank. Orthodox seeds along with passport will be collected and send to Nepal Genebank for long term conservation.

Figure 1. In-situ conservation of native forage species at CGRC, Jiri, Dolakh

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Figure 2. Herbarium collection of NFS for botanical identification

RESULTS AND DISCUSSION

Production potential and nutrient content of native forage species

Based on information obtained from the KIIs and FGD, 14 native forage species (NFS) were documented, including Furke (*Arundinella nepalensis* Trin.), Kharuki (*Capillipedium assimile*), Jere Banso (*Setaria pumila*), Kurkurae (*Equisetum ramosissimum*), Amrisho (*Thysanolaena latifolia*), Halhale (*Rumex nepalensis Spreng*), Sama (*Echinochloa colona*), Chatre (*Cyperus compressus*), Siru (*Imperata cylindrica*), Narkat (*Phragmites australis*), Majito (*Rubia manjith)*, Dubo (*Cynodon dactylon*), Kash (*Saccharum spontaneum)* and Ghogae (*Sporbolus fertilis*). Among these, Furke, Kharuki, Jere Banso and Amrisho were identified as the most promising species for the local agroclimatic conditions. The forage yield of native forage species ranged from 1.54 to 8.48 t/ha (Fig.3), crude

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protein content ranged from 6.56 to 9.64 and energy content ranged from 3871.22 to 4028.32 kcal/kg (Figure 4).

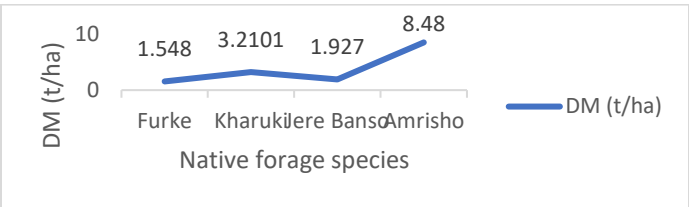

Figure 3. Production potential of four NFS

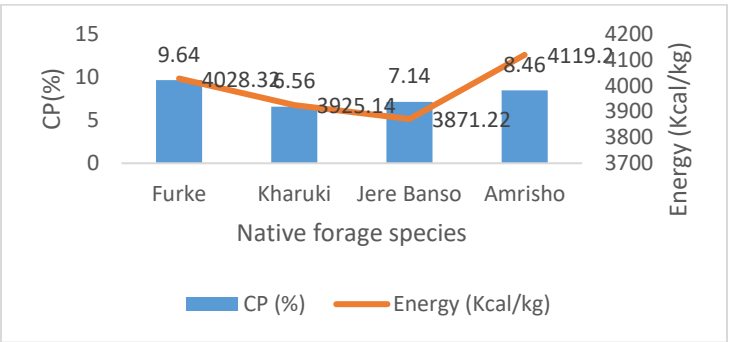

Figure 4. Nutrient composition of four NFS

Availability of NFS in mid hills of Nepal

The most of the native forage species available in the month of May to December and few are available year-round. Besides, most of the native forage species flowering at the time of July to September (Table 1).

The production and nutritional evaluation of native forage species in research sites revealed that native forage species possess significant potential for improving livestock feeding systems in the mid-hill region of Nepal. The dry matter content of Furke was 1.54t/ha which was lowered than the 1.90 t/ha as reported by (KC,2010) while CP was higher 9.64% than the 6.65% as reported by (KC,20101). The crude protein and energy content of the study native forage species, ensures their importance in improving dietary protein and energy availability for ruminants. Establishment of a field gene bank using selected native forage species provides an opportunity for conserving the germplasms hile allowing continuous evaluation and utilization under natural field conditions.

Table 1. Period of native forage species (NFS) availability in mid hills of Nepal

SN	NFS	Botanical name	Flowering months	Available months
1	Furke	*Arundinella nepalensis*	Sept-Oct	June-Dec
2	Kharuki	*Capillipedium assimile*	Aug-Oct	May-Dec
3	Jere Banso	*Setaria pumila*	July-Sept	June-Oct
4	Kurkurae	*Equisetum ramosissimum*	Mar-May	Year round
5	Amrisho	*Thysanolaena latifolia*	Jan-Mar	Year round
6	Halhale	*Rumex nepalensis*	Apr-June	Feb-Sept
7	Sama	*Echinochloa colona*	July-Sept	June-Oct
8	Chatre	*Cyperus compressus*	July-Sept	June-Nov
9	Siru	*Imperata cylindrica*	Mar-May	Year round
10	Narkat	*Phragmites australis*	Aug-Oct	Year round
11	Majito	*Rubia manjith*	June-Aug	May-Nov
12	Dubo	*Cynodon dactylon*	July-Sept	Year round
13	Kash	*Saccharum spontaneum*	Aug-Oct	May-Dec
14	Ghogae	*Sporbolus fertilis*	July-Sept	June-Nov

CONCLUSION

The effective management of native forage species ensures climate resilience, biodiversity conservation and sustainable low-cost livestock feeding and ensuring long-term livestock productivity under changing global climates. Thus, characterization and conservation of native forage species should be performed.

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