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EVALUATION OF NUTRITIVE VALUE OF SOME NATIVE FORAGE SPECIES IN TIKUR INCINNI DISTRICT, OROMIA, ETHIOPIA

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SUMMARY

Conservation and sustainable use of forage species is important for increasing livestock productivity and ensuring food security in mixed crop-livestock production systems of smallholder farmers. This study was conducted to evaluate nutritive values of selected grass and forbs in Tikur Inchini District West Shoa Zone, Oromia, Ethiopia. Ten selected herbaceous species were identified by knowledgeable local farmers. Sample of the selected species were collected at 50% flowering, full flowering and post flowering stages and their nutritive values were analyzed at Holeta Research Center, Animal Nutrition Laboratory following established procedures. Semi-structured questionnaire was prepared and perceptions of farmers were documented. The data were analyzed using excel spreadsheet, and SPSS version 20. Mean CP of forbs (7.68%) was higher than that of grasses (6.58%). On the other hand, mean NDF and ADF content were higher in grasses (65.04 and 49.03%, respectively) compared with the contents in forbs (62.13 and 45.41%, respectively). The result showed that there was significant difference ($p<0.05$) between the grass and forb species. The low CP content in the study area could be due to continued rangeland degradation as a result of overgrazing. It was noted that there was positive correlation between the indigenous knowledge of farmers and laboratory results on nutritive value of some forage species. Farmers perceived that highly desirable forage species such as *Sporobolus affinis, Satureja punctata,* and *Cynodon* spp were threatened due to expansion of crop land and overstocking. Conservation and sustainable use of forage species, rangeland rehabilitation, improving livestock management to minimize overgrazing and increasing options for feed availability from diverse sources were recommended as a result of this study.

Key words : Forage species, forbs, grass, perception

High number of livestock population and decrease in rangeland due to unregulated expansion of crop farm land into rangelands has been leading to overgrazing and loss of forage species in rangelands of highland ecosystems in Ethiopia. And also little attention was given to forage species conservation in highlands. Rangeland ecosystems are important ecosystems that have been significantly contributing to alleviating poverty and ensuring food security in many developing countries. They provide diverse ecosystem services including forage for livestock, wild edibles, medicinal plants, tourism and commercial products such as gums and resins. Sustainable rangeland production is based on grass management, animal management, and livestock marketing.

Livestock in Sub-Saharan Africa are dependent primarily on native grasslands and crop residues (Teklu *et al*., 2010). Natural pasture comprises of the largest feed resource in Ethiopia, but estimates of its contribution vary. Alemayehu (1998) estimated that 80- 85% of the livestock feed comes from natural rangelands. Grazing is the predominant form of ruminant feeding in most part of the crop-livestock farming areas in Ethiopia (Eshete, 2002). Despite such a significant contribution to animal feed and other ecosystem services, rangelands in highlands of Ethiopia have been degrading over years.

Rangeland degradation can be defined as the retrogression of vegetative cover leading to surface layers exposure to wind and soil erosion by washing away the organic compositions that give vigor to plants development (Solomon, 2003). Degradation of rangeland can also reflect the natural disturbance of grassland vegetation by woody plants and invasive weeds (Gemedo Dalle *et al*., 2006a). The vegetation indicators that are usually considered as useful detectors of rangeland degradation include low grass cover, predominance grasses of low palatability, and

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change from species composition where perennials predominate to one dominated by annuals - particularly forbs, and increase in woody vegetation density known as bush encroachment (Gemedo Dalle *et al*., 2006b). Reduction in the capacity of the ecosystem to support livestock production and productivity is one indicator for rangeland degradation.

Overgrazing is among the most important causes of rangeland degradation (Gemedo Dalle *et al*., 2006a). According to Herlocker (1999), overgrazing reduces ground cover, forage quality and productivity and results in replacement of tall perennial grasses by annual grass and forbs. Increased grazing pressure causes replacement of highly desirable grass species by less desirable and unpalatable species (Crawley, 1986). Furthermore, heavy grazing changes species composition, reduces productivity and increases erosion (Ahmed, 2006).

Due to combined effects of climate change, intensification of land use, and overgrazing, highly palatable indigenous grass and browse species are being replaced by non palatable ones. Health and productivity of livestock depends on the nutritional value of available forage and therefore, determination of it nutritional dynamics of forage is important (Ganskopp and Bohner, 2001).

Livestock productivity in the study area has been decreasing over years due to lack of quality forage. Loss and decrease in abundance of highly desirable forage species was increasing due to anthropogenic causes such as agricultural expansion, settlement, overgrazing and climate change. Furthermore, no or limited effort has been made to assess the nutritive value of forage plants of Tikur Inchini rangeland. Therefore, this study aimed at filling this gap with scientific data. Accordingly, the objective of this study was to determine the nutritive value of some forage grass and forb species and also to evaluate *in vitro* digestibility of these species.

MATERIALS AND METHODS

Location of the Study Area

The study was conducted in Tikur Inchini district located in West Shoa Zone, Oromia Regional State about 162 km from Addis Ababa and 50 km from zonal town Ambo. This study was conducted in two Kebeles (smallest administrative units) of the district, namely Homi Hene which is located at 10 km from Incinni town and Nanno Jedue which was adjacent to Homi Hene and around 15 km from Inchini town. Map of the study area is given in Fig.1. These kebeles were identified based on reconnaissance survey that was conducted with knowledgeable local people, experts from the district, development agents and researcher. According to the local people, Homi Hene and Nanno Jedue were formerly known for their large sized communal rangeland, large livestock population but recently encroachment of unregulated crop farm to the rangeland, land redistribution for landless youth, and increase in stocking rate were identified as major factors affecting forage quantity and quality as well as sustainability of natural rangeland.

Data Collection

Forage Sample Collection and Laboratory Analysis

A total of twenty seven forage samples were taken from ten different forage species at different phenological stages: 50% flowering, full flowering and at maturity stage. Sample collection was undertaken from mid September to end of October 2014. Highly desirable and well-known species were identified based on animals' preference. Preference information was obtained by interviewing the local community using a structured questionnaire and cross checked with the information from literature. The identified forb species included *Viola abyssinica, Achyranthes aspera, Plectranthus punctatus, Trifolium tembense, Ipomoea purpurea* and *Satureja punctata*. Similarly, *Andropogon schirensis*, *Cynodon dactylon, Cynodon* sp. and *Sporobolus affinis* were the identified grass species considered for this study.

The Dry Matter (DM) content of forage species was determined by drying a representative sample in an oven at 65°C for 72 h (ILCA, 1990). The dried samples were grinded to pass through a one mm sieve size and get ready for laboratory analysis. Crude Protein (CP) was determined using Kjeldahl method (AOAC, 1980). Procedures described by Goerin and Van Soest (1972) were used for analysis of Neutral Detergent Fiber (NDF), Acid Detergent Fiber (ADF), lignin, and ash content. Crude fiber content was determined as per AOAC, 1990. Hemicelluloses (HC) were calculated as NDF less ADF. The in vitro Dry Organic Matter Digestibility (DOMD) was determined according to the two stages method outlined by Tilley and Terry (1963). To determine ash, samples were ignited in a muffle furnace at 550°C (AOAC, 1990). All chemical composition and *in vitro DOMD* analyses were carried out at Holeta Agricultural Research

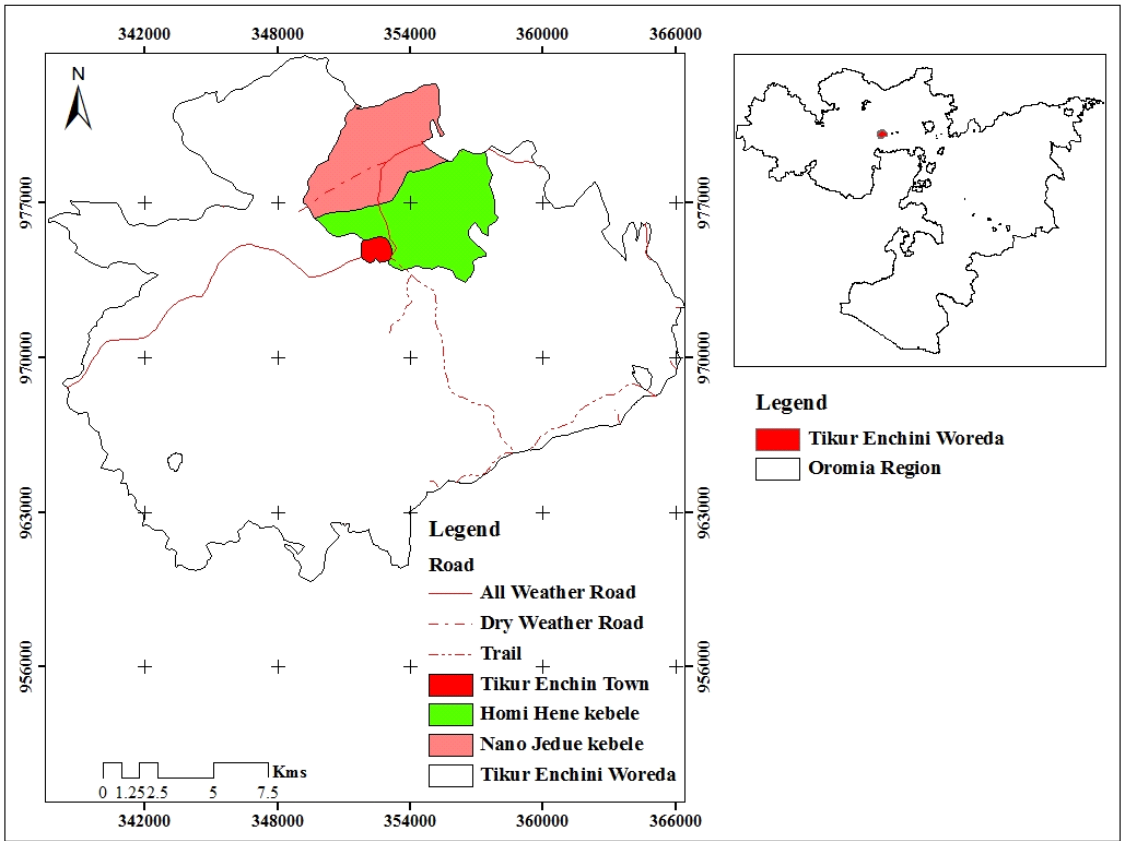

Fig. 1. Map of the study area in Tikur Incinni District, Oromia, Ethiopia.

Center, Animal Nutrition laboratory of the Ethiopian Institute of Agricultural Research.

Documenting Indigenous knowledge of Local Communities

Before starting face-to-face interview with farmers, discussions were made with the leader (chairperson) of each peasant association to introduce the purpose of the study and to get permission to conduct planned interview. A total of 60 livestock owners who have access to communal rangeland were selected purposely from the two Kebeles (Homi Hene and Nanno Jedue) and involved in individual interview. Data was collected using semi-structured questionnaire. The interview was mostly made in the morning at the time when farmers were at home. The major information collected by the survey included: palpability of common and well known forage species, additional values of native forage species for local people, common rangeland resource utilization management practices, impacts of decreased forage yield on animal productivity and its perceived solutions.

Data Analysis

The computer program SPSS version 20 software was used to analyze the nutrition data. A t-test was applied to calculate mean value of nutritive parameters for each species and to compare the mean values of grasses and non-grass forbs at different phenological stages. Simple descriptive statistics was used for data analysis on farmers' indigenous knowledge.

RESULTS AND DISCUSSION

Nutritive Value of Grasses

The chemical composition of the selected grass species was summarized in Table 1. Mean CP was highest for *Andropogon schirensis* followed by *Sporobolus affinis* and *Cynodon dactylon*. The CP of selected grass species ranged from 4.7% for *Cynodon sp* to 9.70% for *Andropogon schirensis* (Table 1). Most of the grass species showed the highest CP value at 50% flowering while the least CP value was observed in post flowering stage. This result was in agreement

TABLE 1
Mean Chemical Composition of selected Grass Species (%) in Tikur Inicinni District, Oromia, Ethiopia

Grass species	Phenological stage	DM%	Ash%	OM%	NDF%	ADF%	Hemi-Cell%	Lignin%	CP%	DOMD%
Cynodon dactylon	50% flowering	93.05	8.03	91.97	64.31	41.98	22.33	9.39	6.17	62.20
	Full flowering	94.52	7.60	92.40	64.03	36.14	27.89	7.11	4.91	67.32
	Mean	93.78	7.81	92.18	64.17	39.06	25.11	8.25	5.54	64.76
Cynodon sp	50% flowering	96.46	7.59	92.41	64.57	46.30	18.27	8.50	5.51	45.65
	Full flowering	95.67	7.61	92.39	64.52	42.36	22.16	8.16	4.21	42.76
	Post flowering	93.73	6.96	93.04	64.21	43.35	20.86	7.27	4.40	47.69
	Mean	95.28	7.38	92.61	64.43	44.00	20.43	7.97	4.70	45.36
Sporobolus affinis	50% flowering	95.54	8.07	91.93	65.63	35.14	30.49	4.43	5.67	57.60
	Full flowering	95.13	8.03	91.97	65.08	37.61	27.47	5.76	5.99	57.96
	Mean	95.33	8.05	91.95	65.35	36.15	28.98	5.09	5.83	57.78
Andropogon schirensis	50% flowering	95.43	8.16	91.84	65.61	49.16	16.45	6.99	11.22	47.90
	Full flowering	95.41	8.03	91.97	65.29	42.72	22.57	5.64	8.11	49.50
	Post flowering	95.39	8.24	91.76	65.99	41.22	24.77	4.70	9.15	50.86
	Mean	95.41	8.14	91.85	65.63	44.36	21.26	5.77	9.49	49.42

with previous reports. Kamalak *et al.* (2005) reported that the CP concentration of tumbleweed hay harvested at the beginning of flowering was very high (14.5%) and decreased with increasing maturity. Review of many studies showed a drastic fall in CP content and a sharp rise in NDF and lignin content with advancing stage of maturity for tropical grasses (Mlay *et al*, 2006). The CP content of the various plant species should be greater than 8% CP to satisfy maintenance requirement of ruminant animals (Kramberger and Klemencic, 2003); to provide sufficient nitrogen required by rumen microorganisms to support optimum activity (Ganskopp and Bohner, 2001; Mc Donald *et al*., 2002) and for adequate intake of forages. Voluntary feed intake also rapidly falls if CP content of forages is below 6.2% (Balogun *et al.,* 1998). This low protein levels have been pointed out as one of the factors that contribute to poor digestibility and animal performance (Mlay *et al*., 2006).

As indicated in Table 1, only *Andropogon schirensis* had CP value greater than 8%. This species may serve as supplementary feed for fibrous feed resource in the study area. According to Kilcher (1981) low CP and high fiber contents are usually associated with low digestibility. In general, mean CP values of grass species from the study area was 6.58%. This result was less than the report from other places in Ethiopia. Gobena (2018) reported mean CP of 7.8% and Megersa *et al*. (2017) reported 11.5% for some grasses. Furthermore, the CP of *Cynodon dactylon* was much lower that the report from Ethiopia and other African Country (Gobena, 2018; Musco *et al.*, 2016). For example, CP of *Cynodon dactylon* was reported to be 11.30% from Ethiopian Highlands (Gobena, 2018) and 12.63% from Benin (Musco *et al.,* 2016). The low CP content could be due to continued rangeland degradation as a result of overgrazing in Tikur Inicinni District. Recent research report showed that highest protein and the lowest fiber contents were associated with moderately grazed areas (Baranova *et al*., 2019). Overgrazing in the study area has contributed to not only lower forage quality but also to less productivity in livestock sector.

The average DM content for the sampled grasses was 94.95% in agreement with previous research results. For example, Megersa *et al*. (2017) reported mean DM for some grasses as 95.30%. Dry matter is the fraction of feed obtained from non-moisture portion and of the feed. It has the essential organic component as well as ash (mineral) residues. In other words, it is that portion of feed which animal utilizes for growth and maintenance by converting it into essential components (McDonald*, et al.,* 2002). Among the selected grass species, highest dry matter content was observed in *Andropogon schirensis* followed by *Sporobolus affinis* and *Cynodon sp* (Table 1). The dry matter content of the grass species in the study area did not show constant trends with growth stage. Some species showed increase in DM continent while other species shows decrease in DM yield. In contrary to this result, previous study reports showed increased dry matter with increasing maturity of fodder plants (Kramberger and Klemencic, 2003).

Among grass species, highest ash content was observed in *Andropogon schirensis* followed by *Sporobolus affinis and Cynodon dactylon* (Table 1). Ash content of some species increased at 50% flowering and full flowering but decreased at post flowering stage. However in some species like *Andropogon schirensis,* it decreased at 50% flowering

and full flowering but increased at post flowering stage. Liu (1993) reported high ash contents with increasing degree of maturity of plants. However, Kilcher (1981) reported that ash contents of forage progressively declined with advancing maturity. Increase or decrease in ash contents with advancing age of different plants species could be due to variations in soil and soil fertility, microbial activities and drought.

The trend of NDF value was almost similar to that of ADF value at 50% flowering, full flowering and post flowering stages (Table 1). The highest NDF content was observed in *Andropogon schirensis* followed by *Sporobolus affinis* and *Cynodon* sp. There was an increasing trend of NDF from 50% flowering to full flowering stage and thereafter, it declined. Higher levels of NDF have been reported to have negative effect on DM intake and DM digestibility (Schroeder, 2004). NDF is correlated to those indigestible fractions of the feed (cellulose, hemicelluloses and lignin). Most of the unpalatable grasses species contain the high content of NDF values. The highest ADF content was observed in *Andropogon schirensis* followed by *Cynodon* sp *and Cynodon dactylon* following similar trend with NDF values. In *Andropogon schirensis*, ADF content increased at 50% flowering and then decreased at full flowering and post flowering stages (Table 1). Most of the sampled species had highest ADF values at 50% flowering stage with minor decline at full flowering and post flowering stages. This result was in agreement with the report by Wahid (1990).

Hemicelluloses content was highest in *Sporobolus affinis* followed by *Cynodon dactylon* and Andropogon *schirensis* (Table 1). *Sporobolus affinis* showed highest hemicelluloses content at 50% flowering while other species showed highest hemicelluloses value at full flowering and post flowering stages (Table 1).Variation in the amount of structural carbohydrates occurs with seasonal changes as well as with growth stages of plant. Among the sampled grass species, highest lignin content was observed in *Cynodon dactylon* followed by *Cynodon sp* and *Sporobolus affinis* (Table 1). At 50% flowering stage, *Cynodon dactylon* had highest lignin content. The highest *In-vitro* digestibility was observed in *Cynodon dactylon* followed by *Sporobolus affinis* and Andropogon *schirensis*. Digestibility of some species decreased at 50% flowering and increase at full flowering and post flowering stage. Higher levels of NDF and ADL have been reported to have negative effect on DM intake and DM digestibility (Schroeder, 2004).

TABLE 2
Chemical composition of selected forbs at different stages of maturity in Tikur Incinni District, Oromia, Ethiopia

Forbs species	Phenological stage	DM%	Ash%	OM%	NDF%	ADF%	Hemi-Cell%	Lignin%	CP%	DOMD%
Violla abyssinica Oliv	50% flowering	90.59	7.08	92.92	64.32	19.14	45.18	2.43	2.71	36.30
	Full flowering	91.27	7.25	92.75	64.73	31.21	33.52	4.99	7.74	30.60
	Mean	90.93	7.17	92.84	64.53	25.18	39.35	3.71	5.23	33.45
Trifolium tembense Frese	50% flowering	90.19	8.03	91.97	66.66	47.09	19.57	1.94	3.01	41.84
	Full flowering	91.44	9.57	90.43	66.80	56.30	10.50	7.63	3.00	42.78
	Post flowering	89.45	7.73	92.27	64.28	40.35	23.93	10.51	5.38	40.74
	Mean	90.36	8.44	91.56	65.91	47.91	18.00	6.69	3.80	41.79
Ipoomoea purpurea (L)	50% flowering	90.60	6.36	93.64	67.46	49.07	18.39	4.74	6.86	55.85
Roth	Full flowering	90.75	6.95	93.05	68.73	46.51	22.22	4.65	5.48	54.32
	Post flowering	90.90	6.77	93.23	67.92	42.95	24.97	4.77	6.79	55.38
	Mean	90.75	6.69	93.31	68.04	46.18	21.86	4.72	6.38	55.18
Achyranthes aspera L	50% flowering	91.78	7.21	92.79	63.33	24.14	39.19	3.96	3.35	50.77
	Full flowering	92.02	7.19	92.81	63.28	39.15	24.13	4.95	2.30	49.65
	Post flowering	91.37	6.99	93.01	63.11	38.53	24.58	2.50	7.99	57.16
	Mean	91.72	7.13	92.87	63.24	33.94	29.30	3.80	4.55	52.53
Plectranthes lanuginosus	50% flowering	89.64	7.51	92.49	65.13	48.58	16.55	5.79	2.74	39.89
(Benth) Agnev	Full flowering	91.04	7.81	92.19	65.21	40.24	24.97	2.39	2.76	40.59
	Post flowering	89.56	8.03	91.97	66.06	49.35	16.71	1.35	2.21	41.59
	Mean	90.08	7.78	92.22	65.47	46.06	19.41	3.18	2.57	40.69
Satureja punctata	50% flowering	94.48	16.24	83.76	67.21	14.77	52.44	3.85	22.09	66.56
(Benth) Birq	Full flowering	94.57	15.79	84.21	33.67	14.08	19.59	3.50	22.17	66.47
	Post flowering	93.31	14.30	85.70	40.14	18.84	21.30	5.16	22.74	66.64
	Mean	94.12	15.44	84.56	47.01	15.90	31.11	4.17	22.33	66.56

Nutritive Values of Selected Forbs

Table 2 summarizes mean chemical composition of selected forb species. The CP contents among forbs ranged from 2.57% (*Plectranthes lanuginosus*) to 22.33% *(Satureja punctata*). *Satureja punctata* had highest CP value at 50% flowering whereas *Plectranthes lanuginosus* contained the lowest CP at post flowering stages. This finding was in agreement with Hussain and Durrani (2009) who reported high CP content during early growth stage and lowest after plant maturity. However, in *Satureja punctata, Trifolium tembense* and *Plectranthus lanuginosus* high CP was observed at post flowering stages. Again, the deficiency of proteins leads to reduced appetite, low feed intake and poor food efficiency that in turn results in poor growth and development of livestock.

Among the sampled forb species, the DM content ranged from 90.08% to 94.120% (Table 2). It was least at 50% flowering stage that gradually increased with the advancing age in *Viola abyssinica*. Ash content of these forbs varied from 6.693% to 15.443%. The highest DM and ash content was found in *Satureja punctata* (Table 2). The lowest ash contents were recorded in *Ipoomoea purpurea* and *Achyranthes aspera* at their 50% flowering stage. Generally, the ash contents were higher at full flowering stage, which gradually decreased with maturity of plants. Similar to this finding, Kilcher (1981) and Liu (1993) reported that ash contents of forage progressively declined with advancing maturity.

Comparison of Nutritive Value of Selected Grasses and Forbs

The average CP content of forbs (7.68%) was higher than that of grasses (6.58%) and the difference was statistically significant (Table 3). This finding was in agreement with previous research reports (Robles and Boza,1993; Megersa *et al*., 2017). The high value of CP recorded in non-grass forbs was an indication that these various browse plants could serve as potential protein supplements to enhance the intake and utilization of low quality grass and fibrous crop residues by ruminants. The mean CP content for both grasses and forbs in our study area was less than the amount reported from many places. For example, Megersa *et al*. (2017) reported 11.51% and 13.16% for grasses and browse, respectively. This might be due to the high rangeland degradation in Tikur Inicinni District. For healthy productivity of livestock, a continuous supply of CP is required (Holechek *et al.,* 1998).

TABLE 3
Comparison of NDF, ADF, Hemicellulose, CP and In-vitro Digestibility of grasses and forbs in Tikur Inicinni District, Oromia, Ethiopia

NDF	50% Flowering		Full Flowering		Post Flowering	
	Grasses	Forbs	Grasses	Forbs	Grasses	Forbs
Sum	65.30	65.69	64.73	60.40	65.10	60.30
SD	0.66	1.68	0.57	13.23	1.26	11.42
t-Test	198.85	95.66	227.65	11.18	73.15	11.81
df	3.00	5.00	3.00	5.00	1.00	4.00
P-value	0.00	0.00	0.00	0.00	0.01	0.00
ADF						
Sum	65.10	60.30	39.71	37.92	42.29	38.00
SD	1.26	11.42	3.33	14.37	1.51	11.47
t-Test	73.15	11.81	23.86	6.47	39.70	7.41
df	1.00	4.00	3.00	5.00	1.00	4.00
P-value	0.01	0.00	0.00	0.00	0.02	0.00
Hemicelluloses						
Sum	21.89	31.89	25.02	22.49	22.82	22.30
SD	6.24	15.63	3.08	7.52	2.77	3.44
t-Test	7.01	5.00	16.26	7.33	11.67	14.51
df	3.00	5.00	3.00	5.00	1.00	4.00
P-value	0.01	0.00	0.00	0.00	0.05	0.00
DOM						
Sum	53.34	48.54	54.39	47.40	49.28	52.30
SD	7.86	11.43	10.63	12.38	2.24	11.04
t-Test	13.57	10.41	10.23	9.38	31.09	10.60
df	3.00	5.00	3.00	5.00	1.00	4.00
P-value	0.00	0.00	0.00	0.00	0.02	0.00
CP						
Sum	7.14	6.79	5.81	7.24	6.78	9.02
SD	2.73	7.66	1.70	7.60	3.36	7.97
t-Test	5.23	2.17	6.82	2.33	2.85	2.53
df	3.00	5.00	3.00	5.00	1.00	4.00
P-value	0.01	0.08	0.01	0.01	0.22	0.07

NB : P-Value was calculated at α=0.5.

Mean NDF concentration of grasses (65.04%) was significantly higher than that of forbs (62.13%). In agreement with this finding, Megersa *et al*. (2017) also reported average NDF content of 75.37% and 56.43% for the grasses and browse species, respectively. Similarly, mean ADF of grasses (49.03%) was higher than that of forbs (45.41%) which was in agreement with many previous reports. As the ADF increases, the forage becomes less digestible (Reagain, 1996).

This study showed that mean DOMD content of grasses (54.00%) was higher than that of forbs (49.41%) in agreement with previous reports (Megersa *et al*., 2017). However, the in vitro digestibility in the study area was relatively lower compared with the

TABLE 4
Farmers' perception on Palatability of selected Forage Species in Tikur Incinni District, Oromia, Ethiopia

Forage Species Name	Species of Livestock	
	Cattle	Sheep
Andropogon schirensis Hochst.ex A.Rich	Highly Palatable	Highly Palatable
Achyranthes aspera L	Palatable	Highly Palatable
Cynodon dactylon (L) pers	Highly Palatable	Highly Palatable
Cynodon spp	Highly Palatable	Palatable
Ipomoea purpurea (L) Roth	Palatable	Highly Palatable
Plectranthes lanugiosus (Benth) Agnew	Highly Palatable	Highly Palatable
Satureja punctata (Benth) Bhig	Highly Palatable	Highly Palatable
Trifolium tembense Fresen	Highly Palatable	Palatable
Viola abyssinica Oliv	Palatable	Highly Palatable

DMD values reported by Megersa *et al*. (2017). For example, Megersa et al. (2017) reported in vitro digestibility of grasses and browses as 64.45% and 59.3%, respectively. Schroeder (2004) also reported that the cell wall components, NDF, ADF, and lignin were negatively correlated with DOMD in tree leaves. It was suggested that differences in nutrient digestibility may be related to differences in chemical composition of the forages particularly in fiber, lignin and, forage species, soil fertility and other environmental factors.

Perception on Forage Species Preference

Interviewed farmers have described the preference of livestock towards some selected forage species that are well known in the study are (Table 4). There was positive correlation between the CP content of forage species and indigenous knowledge of farmers. For example, *Andropogon schirensis* and *Satureja punctata* had the highest CP and also was perceived as highly palatable by both cattle and sheep. According to local farmers, grasses were more desirable by cattle and sheep. But it was also mentioned that there were variations in palatability among plant species. Grazers like sheep and cattle showed higher preference to perennial grasses. Animals graze on the palatable species first and graze on less palatable only when the density and availability of palatable species is magnificently decreased. This will give more chance of survival and establishment for less palatable plant species. This will also favor less palatable species in competition for the limited resources like water/ moisture, nutrients, and light (Hautier *et al.,* 2009). Farmers pointed out that there were no management plan and action to conserve these important forage species. Overgrazing is perceived as major problem leading to loss of local biodiversity including highly palatable species. Highly palatable grass species are gradually replaced by less palatable and unpalatable species as a result of such increased grazing pressure (Crawley, 1986).

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