Scientific Papers. Series A. Agronomy, Vol. LXVIII, No. 2, 2025
ISSN 2285-5785; ISSN CD-ROM 2285-5793; ISSN Online 2285-5807; ISSN-L 2285-5785

EVALUATION OF BIOCHEMICAL COMPOSITION AND NUTRITIONAL VALUE OF FODDERS FROM *Lablab purpureus* L.

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Abstract

The identification of alternative forage crops that need less water and produce high yields of proteins is important for animal husbandry and agricultural durability. The aim of this paper was to evaluate the biochemical composition and nutritional value of fodders from Lablab purpureus introduced and grown in monoculture in the experimental plot of the NBGI Chișinău. The results of our research revealed that the dry matter of harvested whole plants contained 176 g/kg CP, 90 g/kg ash, 281 g/kg ADF, 453 g/kg NDF, 44 g/kg ADL, 196 g/kg TSS, 237 g/kg Cel, 171 g/kg HC with 742 g/kg DMD, 709 g/kg DOM, RFV=138, 10.78 MJ/kg ME and 6.80 MJ/kg NEl. The prepared silage was characterized by agreeable olive colour with pleasant smell and the dry matter contained 186g/kg CP, 120 g/kg ash, 307g/kg ADF, 510 g/kg NDF, 37g/kg ADL, 270 g/kg Cel, 203 g/kg HC with 748 g/kg DMD, 686 g/kg DOM, RFV=119, 10.48 MJ/kg ME and 6.50 MJ/kg NEl. It has been found that the prepared hay had 167 g/kg CP, 94 g/kg ash, 45 g/kg ADL, 158 g/kg TSS, 260 g/kg Cel and 198 g/kg HC, 720 g/kg DMD, 664 g/kg DOM, RFV=120, 10.48 MJ/kg ME and 6.22-6.52 MJ/kg NEl. Lablab purpureus contains many nutrients, which make it suitable to be used as fodders for farm animals.

Key words: *biochemical composition, green mass, hay, Lablab purpureus, nutritional value, silage.*

INTRODUCTION

Climate change affects crop production by directly influencing animal growth and productivity. The assessment of the effects of global climate change on agriculture can be helpful to anticipate and adapt farming to maximize the agricultural production more effectively. The identification of alternative forage crops that need less water and produce high yields of proteins is important for animal husbandry and agricultural durability. The plants of the *Fabaceae* family have been gaining attention recently. The introduction and use of new *Fabaceae* plants are considered an essential part of the process of intensification of agricultural production, can help improving the soil fertility, reducing the use of chemical fertilizers, providing for the production of food and fodder rich in protein and essential amino-acids (European Parliament resolution, 2018; ECPGR, 2021).

Regarding various attributes and multiple uses, one of the most versatile domesticated species of the *Fabaceae* family is *Lablab purpureus* (L.) Sweet (syn. *Lablab purpureus* (L.) Sweet., *Dolichos purpureus* L., *Dolichos lablab* L.; *Dolichos bengalensis* Jacq., *Lablab leucocarpos* Savi, *Lablab niger* Medik., *Lablab vulgaris* Savi), which is also known by the common names Hyacinth bean, Egyptian kidney bean, Lablab or Dolichos Lablab. It is an ancient domesticated crop, widely distributed in Africa, the Indian sub-continent and Southeast Asia. It is a summer-growing annual or, occasionally, a short-lived perennial forage legume. It is a twining, climbing, trailing or upright herbaceous plant, which can grow to a length of 3-6 m. Lablab leaves are alternate and trifoliate. The leaflets are rhomboid in shape, 7.5-15 cm long and 1.5-14 cm wide, acute at the apex. The upper surface is smooth while the underside has short hairs. Inflorescences are many-flowered racemes borne on elongated peduncles. The flowers are white to blue or purple in color, about 1.5 cm long. The flowers are typically cross-pollinated. Pods – variable in shape and colour, flat or inflated, 5-20 x 1-5 cm, straight or curved, usually with 3-6 ovoid, laterally compressed seeds, 0.5-1.2 cm long, 0.3-0.9 cm wide, and 0.2-0.7 cm thick, white or cream to light and dark brown, red to black, sometimes mottled of varying colour and size. The weight

of 1000 seeds varied from 60 to 1000 g. Germination is epigeal and normally takes 5 days. Lablab is a short-day plant. It requires high temperatures to grow well (18-30°C), and minimum temperature for growth is 3°C. Lablab can be grown on a wide range of soil textures and types, pH regimes ranging from 5.9 to 7.8, varying from deep sands to heavy clays, provided that they are well drained. It has a strong tap root with many lateral and well-developed adventitious roots, capable of extracting soil water from at least 2 metres deep in the soils; therefore, it can make use of residual soil moisture. Lablab is excellent to suppress weeds and provides soil erosion control, besides it is a very good N-fixer with *Bradyrhizobium lablabi* sp. and *Rhizobium leguminosarum*. Also, *Lablab purpureus* is a good candidate for intercropping with grass, corn, sorghum crops. As a multipurpose legume, lablab is used as a pulse crop in the human diet, as a fodder crop for livestock, as a rotational and cover crop, as well as a pioneer species to improve soil fertility and soil organic matter. For livestock production, lablab can be used as a fodder crop, rather provided in form of hay, crop residues, silage, or directly grazed and, can be mixed with other feed (Murphy & Colucci, 1999; Madzonga&Mogotsi, 2014; Heuzé et al., 2016; Maass, 2016; Naeem et al., 2020; Aleme, 2022; Kumsa, 2022; Umesh et al., 2022;).

The main goal of this study was to evaluate the biochemical composition and nutritional value of fodders from *Lablab purpureus* introduced and grown under the soil climatic conditions of the Republic of Moldova

MATERIALS AND METHODS

The introduced species lablab *Lablab purpureus* grown in monoculture on the experimental land of National Botanical Garden (Institute) Chişinău, N 46°58′25.7″ latitude and E 28°52′57.8″ longitude, served as subject of the research, and the local cultivar *'Clavera'* of soybean, *Glycine max* and the local biennial ecotype of white sweet clover *Melilotus alba* were used as controls. The experimental design was a randomised complete block design with four replications, and the experimental plots measured 10 m^2. *Lablab purpureus* and *Glycine max* were sown in early May, at a depth of 4.0 cm, in rows at a distance of 45 cm. The green mass was harvested manually. The lablab and soybean samples were collected in early pod stage, while the white sweetclover sample was collected in full flowering period, in the second year of vegetation. The leaf/stem ratio was determined by separating the leaves from the stem, weighing them separately and establishing the ratios for these quantities (leaves/stems). The prepared hay was dried directly in the field. The silages were prepared from harvested green mass, cut into small pieces and compressed in glass containers. The containers were stored for 45 days, and after that, they were opened and the organoleptic assessment and the determination of the organic acids composition of the persevered forage were done in accordance with the Moldavian standard SM 108. The fresh mass and fermented fodder samples were dehydrated in an oven with forced ventilation at a temperature of 60°C. At the end of the fixation, the biological material was finely ground in a laboratory ball mill. The quality of the fodders was evaluated by analysing such indices as: crude protein (CP), crude fibre (CF), crude ash (CA), total soluble sugars (TSS), acid detergent fibre (ADF), neutral detergent fibre (NDF), acid detergent lignin (ADL), digestible dry matter (DDM), digestible organic matter (DOM) which have been determined by near infrared spectroscopy (NIRS) technique PERTEN DA 7200 of the Research and Development Institute for Grassland Braşov, Romania. The concentration of hemicellulose (HC) and cellulose (Cel), the digestible energy (DE), the metabolizable energy (ME), the net energy for lactation (NEl) and the relative feed value (RFV) were calculated according to standard procedures.

RESULTS AND DISCUSSIONS

Analysing the results of the assessment of bio-morphological peculiarities of the studied legume crops, it can be noted that the harvested *Lablab purpureus* whole plants contained 22.6% dry matter, 68.57% leaves + flowers, while controls leguminous plants *Glycine max* - 26.5% dry matter, 57.8% leaves + flowers

+pods and *Melilotus albus* - 27.8% dry matter and 73.7 % leaves + flowers.

The biochemical composition, nutritive and energy value of the green mass from the studied leguminous plants are presented in Table 1.

We found that the dry matter nutrient content varied and depending on the leguminous plants species: 132-178 g/kg CP, 261-381 g/kg CF, 281-386g/kg ADF, 453-567 g/kg NDF, 44-64 g/kg ADL, 86-196 g/kg TSS, 237-322 g/kg Cel, 171-181g/kg HC, 81-94 g/kg ash, 525-742 g/kg DMD, 449-709 g/kg DOM, RFV= 97-138, 11.66-13.33 MJ/kg DE, 9.57-10.78 MJ/kg ME and 5.59-6.80 MJ/kg NEl. Analysing the results of the biochemical composition of green mass, we would like to mention that the concentrations of crude protein and hemicellulose in the dry matter from *Lablab purpureus* and *Glycine max* do not differ significantly, but are much higher than in *Melilotus albus.*

The *Lablab purpureus* fodder is characterized by lower level of crude fibre, structural carbohydrates and acid detergent lignin, but high amount of total soluble sugars, hemicellulose and digestible matter which have a positive effect on the nutritional value and energy supply of the feed.

Table 1. The biochemical composition and the fodder value of the green mass from the studied crops

Indices	*Lablab purpureus*	*Glycine max*	*Melilotus albus*
Crude protein, g/kg DM	176	178	132
Crude fibre, g/kg DM	261	286	381
Minerals, g/kg DM	90	94	81
Acid detergent fibre, g/kg DM	281	310	386
Neutral detergent fibre, g/kg DM	453	484	567
Acid detergent lignin, g/kg DM	44	49	64
Total soluble sugars, g/kg DM	196	142	86
Cellulose, g/kg DM	237	261	322
Hemicellulose, g/kg DM	171	174	181
Digestible dry matter, g/kg DM	742	686	525
Digestible organic matter, g/kg DM	709	634	449
Relative feed value	138	124	97
Digestible energy, MJ/ kg	13.13	12.73	11.66
Metabolizable energy, MJ/ kg	10.78	10.45	9.57
Net energy for lactation, MJ/ kg	6.80	6.46	5.59

Different results regarding the biochemical composition and the nutritive value of the green mass from *Lablab purpureus* are given in the specialized literature. According to Murphy & Colucci (1999), whole plants contained 17% CP, 27.8% CF, 43.0% NDF, 38.6% ADF and 7.1% ADL. Amodu et al. (2005) remarked that the dry matter from *Lablab purpureus* plants contained 17.5% CP, 1.4% EE, 29.8% CF and 46.3% NFE. Contreras-Govea et al. (2011) reported that *Lablab purpureus* whole plants had 270-272 g/kg DM, 19.0-19.9% CP, 42.1-42.6% NDF, 29.9-30.7% ADF, 875-880 g/kg IVDMD, 665-670 g/kg TDN. Amole et al. (2013) found that the concentrations of nutrients and energy in the leaf dry matter during the growing season of *Lablab purpureus* plants were 20.4-22.6% CP, 5.56-7.56 % EE, 29.2-37.1% CF, 15.0-58.9% NFE, 5.50-6.87% ash and 47.3-67.8 kJ/kg GE, while stem dry matter 18.1-20.4% CP, 5.29-7.04% EE, 30.4-42.2 % CF, 15.9-96.0% NFE, 8.09-8.63 % ash and 53.2-76.2 kJ/kg GE. Hassan et al. (2014) mentioned that the chemical composition of lablab forage was 13.90-15.33% CP, 0.63-0.94% EE, 15.79-16.72% CF, 56.79-58.24% NDF, 19.18-21.46% ADF, 52.49-59.42% NFE, 9.01-9.43% ash, 8.1-8.8 g/kg Ca and 8.9-13.2 g/kg P. Amole et al. (2015) reported that the studied lablab genotypes had 15.3-15.7% CP, 5.55-7.39 % EE, 42.5-47.4% NDF, 31.7-34.1% ADF, 1.20-1.28% ADL and 11.6-12.4% ash. Heuzé et al. (2016) revealed that *Lablab purpureus* aerial part contained 211 g/kg DM, 18.4% CP, 2.6 % EE, 28.2 % CF, 44.6% NDF, 32.0% ADF, 7.2% lignin, 11.1% ash, 13 g/kg Ca and 2.9 g/kg P, 67.0% ODM, 18.2 MJ/kg GE, 11.7 MJ/kg DE, 9.2 MJ/kg ME. González-García et al. (2017) reported that *Lablab purpureus* aerial part contained 258.3 g/kg DM, 18.17% ash, 19.65% CP, 1.16% EE, 45.94% NDF, 29.83% ADF, 8.48% ADL, 16.11% HC,

21.35% Cel, 65.67% DDM, 625.05% TDN, RFV=133, 2.74 Mcal/kg DE, 2.24 Mcal/kg ME. Washaya et al. (2018) remarked that the *Lablab purpureus* forage, harvested in different growth stages, contained 17.51-21.14% CP, 1.87-3.00% EE, 46.51-52.61% NDF, 33.65-39.87% ADF, 12.74-13.61% HC, 10.67-12.67% ash. Omodewu et al. (2019) found that *Lablab purpureus* plants contained 27.36% CP, 19.72% CF, 8.72% ash, 1.55% EE, 27.63% NFE, 51.68% NDF, 41.93% ADF, 4.83 % ADL. Bah et al. (2020) revealed that the nutritive content of the *Lablab* forages harvested at different stages of growth, from week five up to fifteen, was 377.2-884.0 g/kg DM, 9.03-14.90% CP, 5.51-13.34% ash, 9.45-13.14% EE, 11.16-41.23% CF. Adem et al. (2021) found that the nutritive value of lablab was 21.59% CP, 11.82% ash, 40.84% NDF, 28.79% ADF, 4.3 % ADL, 632.3 g/kg TDN, 656.7 g/kg IVDMD. Wangila et al. (2021) found that the concentration of dry matter and nutrients in fresh plants was 168.7 g/kg DM, 22.0% CP, 8.7% ash, 46.6% NDF, 33.6% ADF, 10.5% ADL, 709 g/kg IVDMD. Aleme et al. (2022) remarked that recently released lablab variety had 22.1-23.6% CP, 13.5-15.7% ash, 47.6-49.3% NDF, 33.0-35.7% ADF, 6.3-6.7% ADL, 609-621 g/kg IVDMD and RFV=113.6-117.6. Angadi et al. (2022) reported that the fodder value of harvested mass of lablab at 58 days after sowing was: 29.0-29.1% CP, 22.9-25.6% ADF, 578-593 g/kg IVTDMD, RFQ=265-292, while the harvested mass at 124 days after sowing: 13.0-17.2% CP, 36.6-37.2% ADF, 39.9-43.7% NDF, 769-812 g/kg IVTDMD, RFQ=151-136. Omodewu et al. (2022) reported that the dry matter chemical composition of *Lablab purpureus* whole plants was 127.29-153.25 g/kg CP, 91.25-92.25 g/kg EE, 105.83-115.00 g/kg ash, 216.17-247.29 g/kg NFC, 427.50-442.50 g/kg NDF, 353.33-365.00 g/kg ADF, 143.33-165.00 g/kg ADL, 74.17 -77.50 g/kg HC. Umesh et al. (2022) remarked that green mass quality from pure *Lablab purpureus* was 17.91% CP, 38.21% ADF, 43.75 % NDF, 577.9 g/kg TDN, RFQ=145.0. Ishiaku et al. (2023) remarked that the chemical composition and energy nutritional value of lablab harvested fresh mass was 22.53% CP, 6.37% EE, 22.14% CF, 38.69% NFE, 52.08% NDF, 27.82% ADF, 14.22% ADL, 24.26% HC, 13.60% Cel, 10.32% ash, RFV=120.03, 12.13 MJ/kg ME. Aguerre et al. (2023) reported that fresh plants contained 313 g/kg DM, 18.7% CP, 15.4% ash, 40.0% aNDFom, 25.7% ADFom, 5.35% ADL 7.9% WSC, 731 g/kg IVDMD. Jabessa et al. (2023) mentioned that the investigated genotypes contained 10.8-23.5% CP, 11.2-22.23% NDF, 9.25-21.00% ADF, 3.42-14.75% ADL, 499.3-62.40 g/kg IVDMD, 422.6-500.4 g/kg IVOMD. Munza et al. (2023) reported that the quality of white lablab was 12.87-14.70% CP, 7.05-8.13% EE, 22.14% CF, 35.88-44.37% NFE, 23.93-24.80% NDF, 19.84-22.86% ADF, 6.73-7.75% ADL, 7.17-8.87% HC, 6.53-7.52% Cel, 10.15-11.82% ash. Belete et al. (2024) remarked that the chemical composition and *in vitro* organic matter digestibility of fresh forages from *Lablab purpureus* were 3.8-8.8% ash, 15.0-26.5% CP, 44.0-59.4% NDF, 24.2-47.3% ADF, 1.7-8.3% ADL and 42.2-68.7% IVOMD; while from *Medicago sativa:* 8.0-15.0%ash, 11.3-30.1% CP, 25.8-72.0% NDF, 14.7-49.5% ADF, 1.9-16.7% ADL, 68.9-79.5% IVOMD and from *Vicia* species 6.7-11.2% ash, 10.43-34.6% CP, 29.3-66.4% NDF, 21.6-46.0% ADF, 5.7-18.1% ADL, 64.6-82.0% IVOMD.

The ensiling process has substantial effects on the nutritive value of the prepared feed and animal performance. During the sensorial assessment, it was found that, in terms of colour and smell, the silage from *Lablab purpureus* had homogeneous agreeable olive colour with pleasant smell specific to pickled watermelon, while silage from *Melilotus albus* olive stems with dark green leaves and smell specific to pickled apples. The texture of ensiled mass was preserved well, without mould and mucus. The results regarding the quality of the prepared silages from *Lablab purpureus* and *Melilotus albus* are shown in Table 2. It has been determined that the fermentation profile of the prepared legume silage depending on the species and was: pH = 4.11-4.42, 24.0-56.0 g/kg organic acids, including 0.3-6.9 g/kg free acetic acid, 2.3-7.1 g/kg free lactic acid, 3.1-7.3 g/kg fixed acetic acid, 18.3-34.5g/kg fixed lactic acid, 0-0.2 g/kg fixed butyric. *Lablab purpureus* silage had lower pH value and higher content of organic acids than *Melilotus albus* silage. The

concentrations of nutrients, nutritive and energy values of the prepared silages were: 127-186 g/kg CP, 281-414 g/kg CF, 307-407 g/kg ADF, 510-581 g/kg NDF, 37-58 g/kg ADL, 62-107 g/kg TSS, 270-349 g/kg Cel, 174-203 g/kg HC, 99-129 g/kg ash, 509-748 g/kg DMD, 411-686 g/kg DOM, RFV= 92-119, 11.38-12.76 MJ/kgDE, 9.34-10.48 MJ/kg ME and 5.30-6.50 MJ/kg NEl. It was found that during the process of ensiling, the concentrations of minerals, crude fibre, neutral detergent fibre, acid detergent fibre increased, but the level of total soluble sugars and acid detergent lignin decreased in comparison with the initial green mass. In lablab silage the amount of crude protein was high compared with the initial green mass. The silage prepared from *Lablab purpureus* plants has higher concentration of protein, total soluble sugars, hemicellulose and a lower concentration of structural carbohydrates and acid detergent lignin, a higher level of digestibility, metabolizable energy and net energy for lactation.

Several studies have evaluated the quality indices of *Lablab purpureus* silage. Quigley et al. (2000) reported that lablab silage with grain was characterized by 493 g/kg DM, pH 5.0, 11.4 g/kg lactic acid, 4.90 g/kg acetic acid, 0.04 g/kg butyric acid, 21.9 g/kg N, 448 g/kg ADF, 544 g/kg NDF, 550 g/kg IVDMD and 6.8 MJ/kg ME. Contreras-Govea et al. (2011) reported that the silage from *Lablab purpureus* plants had pH=4.56-4.58, 81.2-82.4 g/kg lactic acid, 40.3-42.1 g/kg acetic acid, 248-257 g/kg DM, 20.2-20.6% CP, 39.6-40.2 % NDF, 32.5-32.6 % ADF, 829-834 g/kg IVTDMD, 631-644 g/kg TDN. Wangila et al. (2021) mentioned that *Lablab purpureus* silage was characterized by pH= 4.37-4.81, 427.4g/kg DM, 16.0% CP, 8.9% ash, 42.4% NDF, 28.6% ADF, 7.3% ADL, 754 g/kg IVDMD.

Table 2. The biochemical composition and the nutritive value of the silage fodder from the studied crops

Indices	*Lablab purpureus*	*Melilotus albus*
pH index	4.11	4.42
Organic acids, g/kg DM	56.0	24.0
Free acetic acid, g/kg DM	6.9	0.3
Free butyric acid, g/kg DM	0	0
Free lactic acid, g/kg DM	7.1	2.3
Fixed acetic acid, g/kg DM	7.3	3.1
Fixed butyric acid, g/kg DM	0.2	0
Fixed lactic acid, g/kg DM	34.5	18.3
Total acetic acid, g/kg DM	14.2	3.4
Total butyric acid, g/kg DM	0.2	0
Total lactic acid, g/kg DM	41.6	20.6
Acetic acid, % of organic acids	25.36	14.20
Butyric acid, % of organic acids	0.36	0
Lactic acid, % of organic acids	74.28	85.80
Crude protein, g/kg DM	186	127
Crude fibre, g/kg DM	281	414
Minerals, g/kg DM	129	99
Acid detergent fibre, g/kg DM	307	407
Neutral detergent fibre, g/kg DM	510	581
Acid detergent lignin, g/kg DM	37	58
Total soluble sugars, g/kg DM	107	62
Cellulose, g/kg DM	270	349
Hemicellulose, g/kg DM	203	174
Digestible dry matter, g/kg DM	748	509
Digestible organic matter, g/kg DM	686	416
Relative feed value	119	92
Digestible energy, MJ/ kg	12.76	11.38
Metabolizable energy, MJ/ kg	10.48	9.34
Net energy for lactation, MJ/ kg	6.50	5.30

Table 3. The biochemical composition and the fodder value of the hay from the studied crops

Indices	*Lablab purpureus*	*Glycine max*
Crude protein, g/kg DM	167	173
Crude fibre, g/kg DM	273	303
Minerals, g/kg DM	94	105
Acid detergent fibre, g/kg DM	305	331
Neutral detergent fibre, g/kg DM	503	504
Acid detergent lignin, g/kg DM	45	53
Total soluble sugars, g/kg DM	158	110
Cellulose, g/kg DM	260	278
Hemicellulose, g/kg DM	198	173
Digestible dry matter, g/kg DM	720	646
Digestible organic matter, g/kg DM	664	578
Relative feed value	120	116
Digestible energy, MJ/kg	12.76	12.42
Metabolizable energy, MJ/kg	10.48	10.20
Net energy for lactation, MJ/kg	6.52	6.22

Hay making is one of the oldest techniques used for preserving forage, plays an important role in the livestock feeding system, representing a low-cost and abundant source of nutrients, it is vital to keep animals healthy and productive. The hays prepared from the studied legume crops (Table 3) contained 167-173 g/kg CP, 273-303 g/kg CF, 94-105 g/kg ash, 305-331g/kg ADF, 503-504 g/kg NDF, 45-53 g/kg ADL, 110-158 g/kg TSS, 260-278 g/kg Cel and 173-193 g/kg HC. The nutritive and energy value of studied legume hays were 646-720 g/kg DMD, 578-664 g/kg DOM, RFV=116-120, 12.42-12.76 MJ/kg DE, 10.20-10.48 MJ/kg ME and 6.22-6.52 MJ/kg NEl. We would like to mention that in the hay making process of the studied legume crops, we noticed an increase in the concentration of structural carbohydrates, minerals and a decrease in the content of crude protein, total soluble sugars, digestibility, relative feed value and energy concentration as compared with the initial harvested green mass. The lablab hay is characterized by lower level of minerals, crude fibre, acid detergent fibre, acid detergent lignin, cellulose, but high amount of total soluble sugars and hemicellulose, but lower level of crude fibre, cellulose, which have a positive effect on the nutritive and energy value.

Some authors mentioned various findings about the quality of *Lablab purpureus* hay. Mupangwa et al. (2006) mentioned that dried lablab forage at 8 weeks of growth stage contained 25.1-25.4% CP, 28.2-29.4% ADF, 32.8-37.3% NDF, 8.9-9.6% ADL, 9.5-11.4 % ash, 7.2-7.6 g/kg Ca, 1.1-1.2 g/kg P, while lablab forage at 20 weeks of growth stage contained 16.2-18.3% CP, 35.3-38.6% ADF, 52.2-56.6% NDF, 5.86-7.83% ADL, 6.80-7.74 % ash, 16.5-19.0 g/kg Ca, 1.0-1.2 g/kg P. Heuzé et al. (2016) revealed that lablab *Lablab purpureus* hay contained 16.3% CP, 2.2% EE, 32.0% CF, 45.5% NDF, 31.9% ADF, 6.7% lignin, 10.5% ash, 14.3 g/kg Ca and 2.9 g/kg P, 60.0% ODM, 18.3 MJ/kg GE, 10.3 MJ/kg DE, 8.2 MJ/kg ME. Kumsa et al. (2022) mentioned that the chemical composition of *Lablab purpureus* hay was: 24.00% CP, 9.53 % ash, 44.53% NDF, 24.53% ADF, 4.8 % ADL, but *Vigna unguiculata* hay 18.24% CP, 11.07 % ash, 22.90% NDF, 20.63% ADF, 6.42% ADL. Seid & Animut (2018) remarked that lablab hay had 958 g/kg DM, 89.1% OM, 20.2% CP, 44.3% ADF, 50.1% NDF, 9.7% ADL, while alfalfa hay 962 g/kg DM, 88.3% OM, 23.0% CP, 40.0% ADF, 46.0% NDF, 7.5% ADL. Wangila et al. (2021) reported that that *Lablab purpureus* hay had 834.8 g/kg DM, 17.80% CP, 8.8% ash, 54.2% NDF, 39.7% ADF, 10.4% ADL, 681 g/kg IVDMD. Shibeshi et al. (2022) showed that lablab hay contained 871 g/kg DM, 21.5% CP, 12.0% ash, 42.7% NDF, 32.4% ADF, 6.10% ADL, 10.3% HC, 26.3% Cel. Kumsa (2022) mentioned that lablab hay had 976 g/kg DM, 19.47% CP, 7.68% ash, 38.23% NDF, 22.41% ADF. Tulu et al. (2024) reported that that concentration of nutrients in lablab hay was 22.92-23.46% CP, 43.89-44.57% NDF, 25.34-26.94% ADF, 5.57-5.64% ADL, 10.08-13.46% ash. Belete et al. (2024) remarked that the nutrient content of *Lablab purpureus* hays was 37.9-11.9 % ash, 16.1-

24.0% CP, 41.0-51.3% NDF, 24.4-41.3% ADF, 4.4-9.7% ADL; *Medicago sativa* hays – 12.7-13.1% ash, 13.6-20.1% CP, 46.4-51.1% NDF, 13.7-40.9% ADF, 4.2-9.0% ADL, and from *Vicia* species hays – 8.0-11.8% ash, 14.9-21.1% CP, 36.5-58.4% NDF, 27.1-48.2% ADF, 4.6-16.6% ADL.

CONCLUSIONS

The concentration of nutrients in the dry matter of the *Lablab purpureus* whole plants contained reached 176 g/kg CP, 90 g/kg ash, 281 g/kg ADF, 453 g/kg NDF, 44 g/kg ADL, 196 g/kg TSS, 237 g/kg Cel and 171 g/kg HC with 10.78 MJ/kg ME and 6.80 MJ/kg NEl. The *Lablab purpureus* silage was characterized by pH= 4.11, 56.0 g/kg organic acids and the dry matter contained 186g/kg CP, 120 g/kg ash, 307g/kg ADF, 510 g/kg NDF, 37g/kg ADL, 270 g/kg Cel and 203 g/kg HC, with 10.48 MJ/kg metabolizable energy and 6.50 MJ/kg net energy for lactation.
The *Lablab purpureus* hay had 167 g/kg CP, 94 g/kg ash, 45 g/kg ADL, 158 g/kg TSS, 260 g/kg Cel, 198 g/kg HC, 720 g/kg DMD, 664 g/kg DOM, RFV=120, 12.76 MJ/kg DE, 10.48 MJ/kg ME and 6.52 MJ/kg NEl.
Lablab purpureus plants contains many nutrients, which make it suitable to be used as fodders for farm animals.

ACKNOWLEDGEMENTS

This study has been financially supported by the subprogram no. 01.01.02 *"Identification of valuable forms of plant resources with multiple uses for the circular economy".*

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