Effects of accessions and fertilizer levels on agronomic characteristics, forage biomass yield and nutritive value of lablab (lablab purpureus L) under irrigation in dry lands of Ethiopia

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Abstract: The objective of the experiment was to evaluate effects of fertilizer level on lablab accessions (Lablab purpureus, (L.) Sweet) agronomic performance, forage yield and chemical composition under irrigation condition. The field study conducted in factorial arrangement of randomized complete block design (RCBD) using two factors (three lablab accessions and four fertilizer levels) with three replications. The three lablab accessions were accession 147, 11640 and Tulu combined with four fertilizer levels of NPS (0, 50, 100 and 150 kg/ha). All levels of nitrogen, phosphorus and sulfur (NPS) were applied at time of planting for all lablab accessions. The agronomic characteristics and forage yield data were collected at 50% flowering stage, weighed (for yield estimation), dried and then ground subsamples taken for analysis of crude protein, ash, dry matter, fiber contents, in vitro dry matter digestibility and total digestible nutrients. The collected data were subjected to general linear model for statistical analysis system (SAS) version 9.0. The result indicated that there was significant interaction (P < 0.05) effect in the fertilizer level and accession only in the length and number of leaves per plant, but not for all chemical compositions of lablab. The three accessions showed significant difference (P < 0.001) in the majority of agronomic characteristics. Also fertilizer level showed

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PUBLIC INTEREST STATEMENT

Despite the significant importance of livestock in Ethiopia, productivity of livestock per se is low due to various constraints including inadequate feed supply, widespread disease, poor health care services, poor genetic potential of indigenous animals and insufficient knowledge of animal husbandry. Of these factors, the most limiting one is shortage of feed in terms of quantity and quality. To combat this problem, the use of improved forage species as a feed source is an important intervention. The problem is more prevalent in drought-prone areas of the country such as dry land areas. The current finding could be one of the most important inputs for future research and development as an intervention of forage production using irrigation in these areas. Hence, the researchers believe that opted lablab variety and management methods will help in designing forage production and management in the study areas and other similar parts of Ethiopia.
significant effect (P < 0.001) on the majority of agronomic characteristics. The lablab accessions grown in higher level of NPS fertilizer (150 and 100 kg/ha) had better agronomic performance and dry matter yield than those grown in lower fertilizer levels. Overall, significantly (P < 0.001) maximum dry matter yield (19.6 t/ha) was recorded from Tulu varieties while the lowest dry matter yield (11.21 t/ha) was from lablab accession 147. Regarding fertilizer levels, maximum dry matter yield was recorded from 150 kg fertilizer NPS application (17.03 t/ha) while the lowest (13.5 t/ha) was recorded from control treatment group. The highest CP content (21.6%) was recorded from 11640 lablab accession while the lowest (20.5%) was from Tulu lablab accession. With regard to fertilizer levels, the highest CP content was recorded from 150 kg/ha fertilizer (22.9%) while the lowest (19.6%) CP was recorded from control. Therefore, among tested lablab (Tulu and 11640) accessions with the 100 kg/ha fertilizer rate given priority in terms of their yield and chemical composition and are recommended for wider utilization under smallholder farmers condition in the farming system with similar agro-ecologies using irrigation season. Further research on the economic analysis of cultivars under different systems of production is required to increase viability of this finding.

Subjects: Agriculture & Environmental Sciences; Plant & Animal Ecology; Zoology

Keywords: Fertilizer; forage yield; irrigation; lablab; morphological characteristics

1. Introduction
Agriculture in Ethiopia is the key economic activity in which more than 80% of the population being dependent on it (IGAD, 2011). The agricultural production contributes with approximately 50% of the overall gross domestic product (GDP), generates 90% of export earnings. Ethiopia has the largest livestock population in Africa with estimation of 60.39 million cattle, 31.3 million sheep, 32.74 million goats, 11.32 million equines, 1.42 million camels and 56.06. million poultries (CSA, 2018). Of the agriculture sector, the livestock sub-sector also has been contributing considerable portion to the economy of the nation by providing food, cash income, social functions and employment (CSA, 2018; IGAD, 2011). The livestock subsector contributes about 47.7% of agricultural GDP, 16.5% of national GDP and 5–17% of total export earnings (IGAD, 2011). Despite the significant importance of livestock in the country, animal productivity is low due to constraints like inadequate feed, wide spread disease, poor health care services, and poor genetic potential of indigenous animals and lack of good husbandry practices (CSA, 2018; Shapiro et al., 2015). Of these factors, the most limiting one is shortage of feed in terms of quantity and quality (Shapiro et al., 2015). To mitigate this problem, introduction and evaluation of available forage species like lablab are important in the current study area using irrigation where rain fall is a limiting factor. Lablab is among the improved annual legume forages species that has heat-tolerant ability and contains high protein contents form other legumes, according to previous studies in other countries. However, in study area there was inadequate information on agronomic characteristics, forage yield and chemical composition of lablab accessions under irrigation in different fertilizer level of application. Hence, the selected lablab varieties have been evaluated under irrigation. Therefore, this current study was initiated to evaluate the effects of accessions and fertilizer level on agronomic characteristics, biomass yield and chemical composition of lablab accessions under irrigation condition in Afar Region, Ethiopia. Our hypothesis was variety and fertilizer level had no effect on forage agronomic characteristics, dry matter yield and forage qualities.

2. Materials and methods

2.1. Description of the study area
The study was conducted at Ambiara district at Werer Agriculture Research Center in Afar Region, Ethiopia (Figure 1). The study site is located at an altitude of 740 meters above sea level to the southern
part of Afar region where pastoral livestock production system is abundant. Monthly average temperature of the area is 26.7°C (15 to 37.8). (Ashenafi & Bobe, 2016).

The climate is typically semi-arid with short rainy season of 2 to 3 months duration with average. The average annual rainfall of the area is 590 mm. The soil type of the study area is chromic Vertisols (clay to silty clay) with particle size distribution: sand 3.83 %, silt 61.1 % and clay 35.07 % with a bulk density of 1.17. The pH of the soil is slightly alkaline and ranges from 7.5 to 8 (Ashenafi and Bobe, 2016).

2.2. Experimental design, treatment and management
The experiment was conducted using a 3 by 4 factorial arrangement in a randomly complete block design (RCBD) with replications. The first factor was accessions (147,11640 and Tulu) and second factor was fertilizer level (0, 50,100 and 150 kg/ha) based on national recommendation for 100 kg/ha fertilizer for most forage species. The experiment had 12 treatment combinations having three replications and a total of 36 plots in the total experiment. The experiment had required a total area of 903 m² (64.50 m × 14) with the plot size being 3 m × 4 m (12 m²). The net plot area (harvestable area) was 4.8 m² (4 m*1.2 m) used by excluding two border rows on both sides of each plot. The space between blocks and plots were 1.5 and 0.5 m, respectively but the spacing between plants and rows were 10 and 40 cm, respectively. Total rows in each plot were seven which resulted (7*12) in 84 rows in total.

Before sowing, the experimental land was first cleared of weeds and unwanted debris and it was ploughed and leveled by tractor two times before subdividing it into blocks and plots. The seed rate was as per recommendation, i.e. was 15 kg/ha and was calculated based on the size of a plot. The fertilizer rates used in the experiment were 0, 50,100 and 150 kg/ha which were applied uniformly on each row with in plot at the time of planting. Fertilizer NPS (19 N-46P₂O₅-75) was obtained from Werer Agricultural Research center. Weeding was done earlier the sowing season and was regularly done two times per month until the final harvest is accomplished, to eliminate re-growth of undesirable plants and removal of the dry root in order to promote fodder re-growth by increasing soil aeration. Watering was done using furrow irrigation method with interval of five days after sowing.

2.3. Data collection

2.3.1. Plant height (PH)  
A measurement of plant height was undertaken at the time of 50% flowering. From the total of seven rows within each plot the middle three rows were selected by excluding the two border rows
and then five plants were randomly selected for the measurement of plant height. It was measured from the base of a plant to tip of the upper leaves of the main stem and mean height was calculated for each treatment.

2.3.2. Number of branches per plant (NBPP)
The numbers of branches per plant were counted from the randomly selected sample of five plants of each plot from middle of three rows at 50% flowering from net plot area and mean was calculated.

2.3.3. Number of leaves per plant (NLPP)
The numbers of leaves per plant was counted from the sample of five randomly selected plants from the middle of three rows at 50% flowering stage. Mean number of leaves per plant was calculated to determine the number of leaves per plant.

2.3.4. Leaf length per plant (LLPP)
Leaf length per plant was measured from the base of the collar region of the leaf to the tip of the leaf. It was measured from randomly selected five plants from the three rows at 50% flowering stage and mean was calculated.

2.3.5. Dry matter yield (DMY)
The dry matter yield was determined at 50% flowering stage of lablab accessions. To estimate dry matter yield the three rows at the middle of each plot were cut at five cm above the ground. A fresh herbage yield was measured immediately after harvest and weighed on the field, soon after mowing using a field sensitive spring balance having sensitivity of 0.1 g. The samples were weighed while fresh using a spring balance and then sub-samples of about 1000 g fresh plants were taken from the sample and were air dried to give dry weights. On the basis of the DM% and fresh biomass yield from the sample area of each plot were used to calculate total dry matter yields for each plot, thereafter, converted to metric ton per hectare.

2.3.6. Days to 50% emergence and days to 50% flowering (DF)
Days to 50% emergence was counted from the sowing date to the day of 50% emergence of the plants and days to 50% flowering was recorded from sowing date to the initiation of 50% flowering stage.

2.4. Forage chemical composition analysis
To determine the chemical constituents of the samples, samples were dried and then ground to pass a 1-mm Wiley mill screen and stored in airtight containers for chemical analyses. All samples were subjected to chemical analysis for determination of organic matter following the methods of AOAC (2004). Forage quality measurements such as determination of crude protein (Kjeldhal procedure), acid detergent fiber (ADF), neutral detergent fiber (NDF) and acid detergent lignin (ADL) were done using the procedures of Van Soest et al. (1991). Ash was determined by igniting the sample at 550°C overnight, total DM by drying at 105°C for three hours. Total digestible nutrient value was determined by a calculation from a predication equation of 111.8—(0.95 x % protein)—(0.36 x % acid detergent fiber)—(0.7 x % neutral detergent fiber) (Reference). To determine invitro dry matter digestibility, the procedures of (reference) was used and the calculation was IVDMD (%)= [(initial DM input—(Residue—Blank)/initial DM input) (Tilley & Terry, 1963)]

2.5. Data analysis
The collected data were managed and organized with MS-Excel (2013). Initially, the dataset was checked for outliers by doing a Shapiro–Wilk's and Levene's tests for the analysis of normality of data and homogeneity of variances, respectively. All collected data were statistically analyzed using the procedure outlined by Steel and Torrie (1986) for a factorial experiment in a randomized complete block design using General Linear Model (GLM) procedure of SAS statistical computer package version 9.0. Data on morphological characteristics, total DM yields, and nutritive values were subjected to analysis of variance (ANOVA). Pearson correlation (r) was run to describe the
relationships between plant agronomy, dry matter yield and chemical composition. Significant treatment means were compared by Duncan’s Multiple Range Test (DMRT) (p < 0.05). The statistical model for the data analysis was: 

\[ Y_{ijk} = \mu + F_i + V_j + F_i \cdot V_j + E_{ijk} \]

Where \( Y_{ijk} \) = all dependent variables (morphological data, forage yield and forage nutritive value)

\( \mu \) = Overall mean

\( F_i \) = the effect of fertilizer levels (0, 50, 100, and 150 kg)

\( V_j \) = effect of lablab accessions (147, Tulu and 11640)

\( F_i \cdot V_j \) = interaction effect of fertilizer and accessions

3. Results and discussion

3.1. Effect of NPS fertilizer levels on agronomic parameters and dry matter yield of lablab accessions

The results of the effect of NPS fertilizer levels, accession and their interactions on plant agronomic parameters and dry matter yield of lablab accessions are presented in Table 1. The results obtained indicated that with the exception of days to 50% flowering stage, (DF), the other agronomic parameters of lablab were very highly significantly (p < 0.001) and (p < 0.05) significantly affected by fertilizer level and lablab accessions. Lablab accessions grown by application of higher level of fertilizer (150 kg/ha) had better agronomic characteristics and dry matter yield which might be due to the fact that higher fertilizer rate added nutrients like nitrogen in the soil which are in turn important for plant growth. The overall analysis of the current study showed that there was significant difference among the effects of NPS fertilizer and lablab accessions. Generally, the effect of NPS fertilizer levels and lablab accessions had very highly significant (P < 0.001) and significant (p < 0.05) effects on agronomic parameters and dry matter yield of lablab accessions in the present study.

3.1.1. Plant height (PH)

The result indicated that NPS fertilizer and accession had very highly significant (P < 0.001) effect on plant height of lablab (Table 2). The longest plant height (194.33 cm) was recorded from lablab accession Tulu on application of 150 kg/ha NPS fertilizer level while the shortest plant height (151.33 cm) was recorded from lablab accession Tulu with control group. Similarly, the longest plant height (192.33 cm) was recorded from lablab accession 11640 with the maximum NPS fertilizer rate (150 kg/ha) while the shortest plant height (148 cm) was recorded from control group. This significant difference among lablab accessions in the plant height might be due to genetic potential of accession response to fertilizer and ability to fast growth. On the other hand, the longest plant height (143.67 cm) was recorded from lablab accession 147 with 150 kg/ha of fertilizer level while the shortest plant height (110.27 cm) was recorded from control group. Regarding accession difference, the longest plant height was recorded from both 11640 (175.67 cm) and Tulu (174.67 cm) accessions while the shortest plant height (128.57 cm) was recorded from lablab accession 147. Weldeyesus (2017) reported that lablab 147 accessions had shown a plant height of 57 cm. This result was lower than current study with similar 147 lablab accession. This variation might be due to environmental versions such as soil, temperature and moisture of the area. Similarly, Abduselam et al. (2017) reported that plant height of 147 lablab accession was 87.9 cm at double cropping system for Sorghum production at Fedis, Eastern Ethiopia, which is lower than the current finding. On the other hand, Hidosa et al. (2016) reported that PH of lablab was 216 cm in irrigated lowlands of Beno Tsemay Woreda, South Omo Zone, Ethiopia. The current result of PH from all lablab accessions and fertilizer levels was lower than the findings of this report.
Table 1. Effect of NPS fertilizer, accessions and their interaction on agronomic characteristics and dry matter yield of lablab

| Factors         | Parameters |          |          |          |          |          |          |          |          |          |
|-----------------|------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Accession       | NPS        | PH (cm)  | LLPP (cm)| NBPP (count) | NLPP (count) | DE | DTF | DMY(t/ha) |
| fertilizer level (kg) |           |          |          |          |          |          |          |          |          |          |
| Tulu            | 0          | 151.33<sup>a</sup> | 10.33<sup>bc</sup> | 13.23<sup>bc</sup> | 137.23<sup>c</sup> | 8 | 85 | 16.95<sup>c</sup> |
|                 | 50         | 169.33<sup>a</sup> | 10.63<sup>b</sup> | 14.33<sup>c</sup> | 141.33<sup>c</sup> | 8 | 85 | 19.08<sup>b</sup> |
|                 | 100        | 183.67<sup>b</sup> | 11.13<sup>ab</sup> | 15.67<sup>c</sup> | 162.33<sup>b</sup> | 8 | 85 | 20.91<sup>ab</sup> |
|                 | 150        | 194.33<sup>a</sup> | 11.55<sup>b</sup> | 18<sup>bc</sup> | 178.33<sup>a</sup> | 8 | 85 | 21.46<sup>a</sup> |
| Mean            |            | 174.67<sup>bc</sup> | 10.9<sup>bc</sup> | 15.2<sup>b</sup> | 154.81<sup>b</sup> | 8 | 85 | 19.6<sup>b</sup> |
| SE              | 1.68       | 0.186<sup>c</sup> | 0.394<sup>c</sup> | 2.51<sup>c</sup> | 0 | 85 | 1.18<sup>c</sup> |
| SL              | ***        | ***<sup>c</sup> | ***<sup>c</sup> | ***<sup>c</sup> | ***<sup>c</sup> | 85 | 1.38<sup>c</sup> |
| 11640           | 0          | 148<sup>c</sup> | 10.34<sup>b</sup> | 11<sup>c</sup> | 124.8<sup>b</sup> | 9 | 95 | 13.45<sup>c</sup> |
|                 | 50         | 176.67<sup>b</sup> | 10.6<sup>b</sup> | 11.67<sup>c</sup> | 125.6<sup>b</sup> | 9 | 95 | 14.22<sup>b</sup> |
|                 | 100        | 185.67<sup>b</sup> | 11.23<sup>b</sup> | 14.3<sup>b</sup> | 138.1<sup>c</sup> | 9 | 95 | 15.85<sup>a</sup> |
|                 | 150        | 192.33<sup>a</sup> | 11.8<sup>a</sup> | 16.13<sup>a</sup> | 143.67<sup>a</sup> | 9 | 95 | 16.94<sup>a</sup> |
| Mean            |            | 175.67<sup>bc</sup> | 11.01<sup>c</sup> | 13.28<sup>c</sup> | 133.04<sup>b</sup> | 9 | 95 | 15.11<sup>c</sup> |
| SE              | 3.845      | 0.265<sup>c</sup> | 0.46<sup>c</sup> | 2.97<sup>c</sup> | 0 | 0 | 1.501<sup>c</sup> |
| SL              | ***        | ***<sup>c</sup> | ***<sup>c</sup> | ***<sup>c</sup> | ***<sup>c</sup> | Ns | Ns | 1.18<sup>c</sup> |
| 147             | 0          | 110.27<sup>c</sup> | 8.27<sup>c</sup> | 6.67<sup>c</sup> | 96.67<sup>c</sup> | 5 | 75 | 10.1<sup>b</sup> |
|                 | 50         | 125.33<sup>b</sup> | 9.75<sup>b</sup> | 7.67<sup>c</sup> | 102.03<sup>b</sup> | 5 | 75 | 10.49<sup>b</sup> |
|                 | 100        | 135.73<sup>b</sup> | 9.02<sup>b</sup> | 10.33<sup>a</sup> | 117.67<sup>b</sup> | 5 | 75 | 11.57<sup>ab</sup> |
|                 | 150        | 143.67<sup>a</sup> | 10.23<sup>a</sup> | 12.2<sup>a</sup> | 129<sup>a</sup> | 5 | 75 | 12.68<sup>a</sup> |
| Mean            |            | 128.75<sup>bc</sup> | 9.32<sup>b</sup> | 9.22<sup>c</sup> | 111.34<sup>c</sup> | 5 | 75 | 11.21<sup>c</sup> |
| SE              | 3.27       | 0.151<sup>c</sup> | 0.837<sup>c</sup> | 1.241<sup>c</sup> | 0 | 0 | 1.653<sup>c</sup> |
| SL              | ***        | ***<sup>c</sup> | ***<sup>c</sup> | ***<sup>c</sup> | ***<sup>c</sup> | Ns | Ns | 1.18<sup>c</sup> |
| Over all mean   |            | 159.69<sup>c</sup> | 10.41<sup>c</sup> | 12.6<sup>c</sup> | 133.06<sup>c</sup> | 7.33 | 85 | 15.31<sup>c</sup> |
| SEM             | 4.62       | 0.173<sup>c</sup> | 0.562<sup>c</sup> | 3.77<sup>c</sup> | 0.29<sup>c</sup> | 4.09 | 0.73 |
| CV              | 4.4        | 3.7<sup>c</sup> | 7.3<sup>c</sup> | 3.4<sup>c</sup> | 0 | 16.54 | 17.64<sup>c</sup> |
| P value Accession | ***        | ***<sup>c</sup> | ***<sup>c</sup> | ***<sup>c</sup> | ***<sup>c</sup> | Ns | Ns | 1.18<sup>c</sup> |
| 11640           | 175.67<sup>b</sup> | 11.01<sup>c</sup> | 13.28<sup>c</sup> | 133.04<sup>b</sup> | 9<sup>b</sup> | 95 | 15.11<sup>b</sup> |
| Tulu            | 174.67<sup>b</sup> | 10.9<sup>b</sup> | 15.32<sup>c</sup> | 154.81<sup>c</sup> | 5<sup>b</sup> | 85 | 19.6<sup>b</sup> |
| 147             | 128.75<sup>b</sup> | 9.32<sup>b</sup> | 9.22<sup>c</sup> | 111.34<sup>c</sup> | 5<sup>c</sup> | 75 | 11.21<sup>c</sup> |
| NPS Fertilizer  | ***        | ***<sup>c</sup> | ***<sup>c</sup> | ***<sup>c</sup> | ***<sup>c</sup> | Ns | Ns | 1.18<sup>c</sup> |
| 150             | 176.79<sup>c</sup> | 11.18<sup>c</sup> | 15.44<sup>c</sup> | 150.33<sup>c</sup> | 7.33 | 80 | 17.03<sup>b</sup> |
| 100             | 168.36<sup>b</sup> | 10.45<sup>b</sup> | 13.43<sup>c</sup> | 139.36<sup>b</sup> | 7.33 | 80 | 16.11<sup>b</sup> |
| 50              | 157.11<sup>c</sup> | 10.27<sup>c</sup> | 11.22<sup>c</sup> | 122.99<sup>c</sup> | 7.33 | 80 | 14.6<sup>b</sup> |
| 0               | 136.53<sup>a</sup> | 9.73<sup>c</sup> | 10.31<sup>c</sup> | 119.58<sup>b</sup> | 7.33 | 80 | 13.5<sup>c</sup> |
| Interaction     | Ns<sup>c</sup> | Ns | ***<sup>c</sup> | Ns<sup>c</sup> | Ns | Ns | Ns | 1.18<sup>c</sup> |

Means in the same column at each factors followed by different letters differ significantly at P 0.05. SL = Level of significance, ***P 0.001, NS = Non-significant, PH = Plant height, LLPP = length of leaves per plant, NBPP = number of branches per plant, NLPP = numbers of leaves per plant, DE = Days to 50% emergence stage, DF = days to 50% flowering stage DMY T/ha = dry matter yield ton per hectare, SEM = standard error of mean CV = Coefficient of variation, SL = Significance level.

On the other hand, NPS fertilizer level had significant effect on lablab accessions in the current study. The longest plant height (176.79 cm) was from the higher<sup>c</sup> NPS fertilizer group (150 kg/ha).
while the shortest (136.53 cm) was recorded from the control group (0 kg/ha). This result is in line with Samapika et al. (2019) who reported that different levels of NPK fertilizer had significant effect on plant height of lablab. The highest level of NPK fertilizer (150 kg/ha) had longest plant height (98.35 cm) followed by 100 kg/ha (95 cm) while the shortest was from non-fertilized group (76.6 cm). Similarly, Jaisankar and Manivannan (2018) reported that different levels of fertilizer had significant effect on PH of lablab. The highest level of NPK fertilizer (100 kg/ha) had longest plant height (95.73 cm) followed by 50 kg/ha (73.53 cm) while the shortest was from non-fertilized group (60.1 cm) which is in line with current study. On the other hand, Akter et al. (2018) reported that the longest PH of lablab was 90.9 cm with phosphorus fertilizer group while shortest was from non-fertilized group (40.7 cm) and is in line with current study. In this finding, PH from all NPS fertilizer levels and lablab accessions was higher than reported by different authors, this difference might be due to soil fertility and type, climate conditions, season of planting, accession deference, level and type of fertilizer. Generally, the longest plant height was from highest NPS fertilizer treatment, which might be due to the fact that addition of maximum level of fertilizer that increased development resulting in higher plant height of the lablab accessions.

3.1.2. Length of leaves per plant (LLPP)
The fertilizer levels and accessions of lablab had very highly significant (P < 0.001) effect on length of leaves per plant (LLPP) of lablab (Table 2). The NPS fertilizer and accession had significant interaction effect on LLPP of lablab. The longer LLPP (11.13 and 10.63 cm) were recorded from lablab accession Tulu with the highest NPS fertilizer groups (150 kg/ha and 100 kg/ha) while the shorter LLPP were recorded (10.63 and 10.33 cm) from 50 kg/ha and no fertilizer application. Regarding effects of accession, the longer LLPP were observed (11.8 cm and 1.23 cm) in the lablab accession 11640 in the application of NPS fertilizer rate (150 and 100 kg/ha), respectively, while the shortest was from control group (10.34 cm). Overall significantly (P < 0.001) longest LLPP were recorded from both 11640 (11.01 cm) followed by Tulu (10.9 cm) lablab accessions while the shortest (9.32 cm) was from lablab accession 147. Similarly the longest overall mean of LLPP (11.18 cm) was from the higher NPS fertilizer group (150 kg/ha) while the shortest (9.73 cm) was recorded from the control group (0 kg/ha). Generally, the longest LLPP were recorded from higher NPS fertilizer group, and this could be due to the fact that fertilizer might have added some nutrients to the soil which were important for leaves growth and significant different between lablab accessions to fertilizer applications.

3.1.3. Number of leaves per plant (NLPP)
The effects between NPS fertilizer and accessions had very highly significant (P < 0.001) effect on number of leaves per plant (NLPP) of lablab accessions. The NPS fertilizer and accession had very highly significant interaction effect on NLPP of lablab. The maximum number of leaves per plant in lablab accession Tulu were recorded from 150 kg/ha of NPS fertilizer application (178.3) followed by 100 kg NPS fertilizer application (162.33) while the lower NLPP (141.33 and 137.23) were recorded from 50 kg/ha NPS fertilizer application and control, respectively. Similarly, the maximum NLPP were (143.67 and 138.1) recorded in the lablab accession 1640 was recorded from NPS fertilizer rate (150 and 100 kg/ha), respectively, while the lower (125.6 and 124.8) were from 50 kg/ha NPS fertilizer and control treatment groups, respectively. Moreover, the maximum NLPP (129) in the lablab accession 147 was from 150 kg/ha of NPS fertilizer level followed by 100 kg/ha NPS fertilizer application (117.67) while the lowest was from control group (96.67). Regarding accessions, maximum NLPP were recorded from lablab accession Tulu (154.81) followed by 11640 (133.04) while the lowest (9.32 cm) was recorded from 147 lablab accession 147. Similarly, the maximum overall mean of NLPP (150.33) was from the higher NPS fertilizer group (150 kg/ha) while the lowest (119.58) was recorded from the control group (0 kg/ha). The maximum NLPP recorded from higher level fertilizer which could be due to the fact that large amount of fertilizer increased the quantity of nutrients that in turn promoted plant development particularly number of leaves.

3.1.4. Number of branches per plant (NBPP)
The effects between NPS fertilizer and accession had highly significant (P < 0.001) effect on number of branches per plant (NBPP) of lablab accessions. The maximum number of branches per plant in
Table 2. Effect of NPS fertilizer, accession and their interaction on chemical composition of lablab accessions

| Factors | Parameters |
|---------|------------|
| Accession | NPS fertilizer level (kg) | DM | ASH | CP  | NDF | ADF | ADL | IVDMD | TDN  |
| 147      | 0           | 93.87 | 14.2” | 19.17 c | 43.92 | 34.93 | 4.81 | 64.29 | 60.33 |
|          | 50          | 93.56 | 12.1” | 20.66” | 45.85 | 31.33 | 5.72 | 63.67 | 56.18 |
|          | 100         | 93.64 | 12.23” | 20.79” | 43.42 | 32.55 | 5.05 | 62.23 | 56.92 |
|          | 150         | 93.71 | 12.33” | 22.91” | 44.15 | 33.24 | 5.29 | 63.71 | 59.77 |
| Mean     | 93.69       | 12.77 | 20.88 | 43.90 | 33.01 | 5.24 | 63.23 | 58.29 |
| SE       | 0.064       | 0.397 | 0.427 | 1.09 | 0.96 | 0.268 | 0.59 | 1.15 |
| SL       | Ns          | **    | ***   | Ns   | Ns   | Ns   | Ns   | Ns    |
| Tulu     | 0           | 93.62 | 13.4” | 19.28” | 46.48 | 33.78 | 5.90 | 64.42 | 53.86 |
|          | 50          | 93.41 | 12.46” | 20.64” | 45.66 | 33.6  | 5.94 | 62.53 | 57.71 |
|          | 100         | 93.69 | 11.75” | 20.76” | 44.64 | 35.4  | 5.97 | 63.34 | 57.50 |
|          | 150         | 93.66 | 11.75” | 21.35” | 47.84 | 35.82 | 6.35 | 62.43 | 55.15 |
| Mean     | 93.59       | 12.3   | 20.5  | 46.15 | 34.65 | 6.04 | 63.18 | 56.05 |
| SE       | 0.069       | 0.297 | 0.27  | 0.9  | 0.94 | 0.17 | 0.67 | 1.13 |
| SL       | Ns          | **    | **    | Ns   | Ns   | Ns   | Ns   | Ns    |
| 11640    | 0           | 93.7” | 12.75” | 19.79b | 41.27 | 29.2  | 4.36 | 65.23 | 62.8  |
|          | 50          | 93.6” | 10.63” | 20.67” | 42.23 | 29.4  | 4.31 | 65.72 | 62.6  |
|          | 100         | 93.2” | 11.82” | 21.43” | 40.90 | 28.98 | 4.38 | 65.57 | 63.03 |
|          | 150         | 92.3” | 11.12” | 24.49” | 38.90 | 27.62 | 4.14 | 65.15 | 64.6  |
| Mean     | 93.47       | 11.82 | 21.59 | 40.84 | 28.79 | 4.3  | 65.67 | 63.23 |
| SE       | 0.09        | 0.151 | 0.61  | 0.79 | 0.65 | 0.12 | 0.23 | 0.75 |
| SL       | **          | **    | **    | Ns   | Ns   | Ns   | Ns   | Ns    |

(Continued)
Table 2. (Continued)

| Factors | Parameters | NPS fertilizer level (kg) | DM     | ASH     | CP      | NDF    | ADF    | ADL    | IVDMD  | TDN    |
|---------|------------|---------------------------|--------|---------|---------|--------|--------|--------|--------|--------|
|         | Accession  | Over all mean             | 93.59  | 12.3    | 20.99   | 43.77  | 32.15  | 5.19   | 64.03  | 59.2   |
|         | SEM        |                            | 0.046  | 0.195   | 0.268   | 0.645  | 0.64   | 0.164  | 0.36   | 0.77   |
|         | CV         |                            | 0.27   | 7.16    | 4.12    | 8.15   | 10.2   | 14.7   | 3.17   | 0.56   |
|         | P value    | Accession                 | **     | **      | **      | **     | ***    | **     | **     | **     |
|         |            | 11640                      | 93.5b  | 11.83b  | 21.6a   | 40.8b  | 28.8b  | 4.3c   | 65.7a  | 65.24a |
|         |            | Tulu                       | 93.6a  | 12.3a   | 20.5a   | 46.2a  | 34.6a  | 6.04a  | 63.2a  | 56.1a  |
|         |            | 147                        | 93.7a  | 12.8a   | 20.9ab  | 44.3a  | 33.3a  | 5.24b  | 63.2b  | 58.3b  |
|         |            | NPS Fertilizer             | Ns     | **      | ***     | Ns     | Ns     | Ns     | Ns     | Ns     |
|         |            | 150                        | 93.56  | 12.1b   | 22.9a   | 43.6   | 32.23  | 5.26   | 63.76  | 55.82  |
|         |            | 100                        | 93.52  | 11.88a  | 20.96b  | 42.9   | 31.77  | 5.13   | 64.19  | 59.15  |
|         |            | 50                         | 93.53  | 11.73a  | 20.7a   | 44.6   | 32.64  | 5.32   | 63.5   | 58.82  |
|         |            | 0                          | 93.75  | 13.52a  | 19.42c  | 42.98  | 31.97  | 5.06   | 64.65  | 58.19  |
|         | Interaction(V*F)|                   | Ns     | Ns      | Ns      | Ns     | Ns     | Ns     | Ns     | Ns     |

Means in the same row at each factors with different subscript significantly at P 0.05. SL = Level of significance, ***P 0.001, NS = Non-significant, DM = Dry matter content, ASH = ash, CP = Crude protein content, NDF = NDF = Neutral detergent fiber, ADF = Acid detergent fiber, ADL = Acid detergent lignin, TDN = Total digestible nutrient, CV = Coefficient of variation, SL = Significance-level.
lablab accession Tulu were recorded from 150 kg ha of fertilizer application (18) followed by 100 kg fertilizer application (15.67) and 50 kg NPS fertilizer application group (14.33) while the lowest NBPP (13.23) was recorded from control treatment group. Similarly, the maximum NBPP were (16.13) in the lablab accession1 1640 was recorded from NPS fertilizer rate (150) followed by 100 NPS fertilizer application (14.3) while the lowest (11) was from control treatment groups. Moreover, the maximum NBPP (12.2) in the lablab accession 147 was from 150 kg NPS fertilizer group followed by 100 kg NPS fertilizer group (10.33) while the lowest was from control group (6.67). Regarding the overall mean of accessions, the maximum NBPP were recorded from Tulu (15.32) followed by 11640 lablab (13.28) while the lowest NBPP (9.22) was recorded from lablab accession 147. Similarly, regarding to the overall mean of NPS fertilizer the maximum NBPP were recorded from 150 kg NPS fertilizer application (15.44) followed by 100 kg NPS fertilizer application (13.43) while the lowest (10.31) was recorded from the control group (0 kg/ha). Generally, the maximum NBPP were from all fertilizer application group, this might be due to the fact that fertilizer application could have added some important nutrients to the soil which were important for more additional number of branches per plant.

The effect of fertilizer level on the NBPP of lablab accessions in the current study is in line with Samapika et al. (2019) who reported that different levels of NPK fertilizer had significant effect on NBPP of lablab. The highest level of NPK fertilizer (150 kg /ha) had maximum number of branches per plant (7.17) followed by 100 kg/ha (7) while the shortest was from non-fertilized group (4.23). The current result from fertilizer levels and lablab accessions were different from the previous author who might be due to accession difference, environmental conditions, and season and management systems. Similarly, Ahmed (2007) reported that DAP fertilizer had significant effect on the number of branches per plant which is in line with current study. The maximum NBPP were record from 100 kg/ha DAP fertilizer (16.1) followed by 50 g/ha (14.6) while the lowest was from control group (11.9). Moreover, Jaisankar and Manivannan (2018) reported that different levels of fertilizer had significant effect on NBPP of lablab. The highest level of fertilizer (100 kg /ha) had maximum number of branches per plant (10.89) followed by 50 kg/ha (7) while the shortest was from non-fertilized group (2.5). The current result from fertilizer levels were higher NBPP than as reported by different same author at the same levels of fertilizer application (Baghdadi et al., 2018).

3.1.5. Days to 50% emergence
The effect of accession on days to 50% emergence (DE) is shown in Table 2. The current result showed that lablab accessions had significant effect on days to 50% emergence. The longest days to 50% emergence were recorded from 11640 lablab accession (9 days) followed by Tulu (8 days) while shortest days (5 days) to 50% emergence were from lablab accession 147. This significant difference among lablab accessions could be due to their accession difference. The findings of Weldeyesus (2017) for lablab accession 147 was 5 days to 50% emergence stage or germination from soil is in line with current study with similar 147 lablab accession. Similarly the current result is comparable with Hidosa et al. (2016) who reported that date of 50% emergence of lablab was 6 days in Irrigated Lowlands of Ben Tsemay Woreda, South Omo zone, Ethiopia.

3.1.6. Dry matter yield of lablab (DMY)
The effects between NPS fertilizer and accession had significant (P < 0.001) effect on dry matter yield (DMY) of lablab accessions. The highest dry matter yield in lablab accession Tulu was recorded from 150 kg ha of NPS fertilizer application (21.46 t/ha) followed by 100 kg NPS fertilizer application (20.91 t/ha) and 50kgNPS fertilizer application group (19.08 t/ha) while the lowest DMY (16.95) was recorded from control treatment. Similarly, the highest DMY was 16.94 and 15.85 t/ha in the lablab accession 11640 was recorded from NPS fertilizer rate (150 and 100 kg) respectively followed by 50 kg NPS fertilizer application (14.22 t/ha) while the lowest (13.45 t/ha) was from control treatment. Moreover, the highest DMY (12.68) in the 147 lablab accession was from 150 kg fertilizer group followed by 100 kg NPS fertilizer group (11.57 t/ha) while the lowest was from control group (10.1 t/ha).
On the other hand the maximum over all dry matter yield was recorded from Tulu (19.6 t/ha) followed by 11640 lablab (15.11 t/ha) while the lowest DMY (11.21 t/ha) was from 147 lablab 147 accession. Similarly, the maximum overall mean of DMY was recorded from 150 kg NPS fertilizer application (17.03 t/ha) followed by 100 kg NPS fertilizer application (16.11) while the lowest (14.6 and 13.5 t/ha) was recorded from the 50 kg and control treatments group respectively. Generally, the highest DMY was from all NPS fertilizer application group, this might be that NPS fertilizer application have added some important nutrients to soil which were important for more additional number of leaves, branches per plant, length leaves per plant and longer plant height.

The DMY in the current study were significantly different among lablab accessions and this might be due to their genetic potential of accession respond to NPS fertilizer application to produce higher DMY. Hidosa et al. (2016) reported that DMY of lablab was 10.68 t/ha days in Irrigated Lowlands of Bena Tsemay Woreda, South Omo Ethiopia. The current overall mean of DMY (15.31 t/ha) result was higher than as reported by Hidosa et al. (2016). On the other hand Zeleke et al. (2018) reported that DMY of lablab was 15.2 t/ha under Small Scale Irrigated Condition in Amibara District of Afar Region, Ethiopia, is comparable with current result of overall mean of DMY (15.31 t/ha). The overall mean of DMY of 147 lablab was (11.21 t/ha) which is higher than that of Weldeyesus (2017) who reported dry matter yield of lablab 147 accession of 8.3 ton per hectare. The DMY was higher in the NPS fertilizer treatment group in current study is in line with Akter et al. (2018) who reported that the highest DMY (13.07 t/ha) of lablab was recorded from phosphorus fertilizer group while lowest was from non-fertilized group (5.08 t/ha). Similarly the current study is in line with Ahmed (2007) who reported that NPK fertilizer had significant effect on the number of DMY of lablab. The highest DMY was record from NPK 100 kg/ha (8.5 t/ha) followed by 50 NPK kg/ha (6.7 t/ha) while the lowest was from control group (4.7 t/ha). The current result was higher than as reported by Ahmed (2007). There was limited information on the effect of lablab accessions on the DMY in the different countries. However Abduselam et al. (2017) reported that DMY of lablab accession 147 was 6.17 ton per hectare at double cropping System for Sorghum Production at Fedis, Eastern Ethiopia. On the other hand Tulu et al. (2018) reported that DMY of lablab was 5.4 ton per hectare grown under sub-humid climatic condition of western Oromia, Ethiopia. The current result of DMY from all NPS fertilizer levels, accessions and even within the same 147 lablab accession was higher than as reported by both authors which could be due due environmental conditions such as soil, temperature and moisture, genetic variations, management systems, type of fertilizer application and management systems.

3.2. Effect of NPS fertilizer, accession and their interaction on nutritive value of lablab accessions

3.2.1. Dry matter content (DM)
The effect of accession, NPS fertilizer and their interaction on the DM is indicated in Table 2. The analysis result showed that accession had significant (P < 0.05) effect on DM of lablab accession while the highest DM content (93.7 and 93.6%) was recorded from 147 and Tulu lablab accession respectively while the lowest (93.45%) was from 11640 lablab accession. The overall mean of DM content in the current study was (93.56 %). There was limited information on the effect of lablab accession on the DM content in the different countries. However, Abuye et al. (2018) reported that DM content of lablab was 92.6% grown under sub-humid climatic condition of western Oromia, Ethiopia. But that result was lower than current study.

3.2.2. Ash
The effect of accession, NPS fertilizer and their interaction on the Ash content was presented in Table 2. The analysis result showed that accession and NPS fertilizer had a significant (P < 0.05) effect on ash content of lablab accession while the highest ash content (12.8 and 12.3%) was recorded from 147 and Tulu lablab accessions respectively while the lowest (11.75 %) was from 11640 lablab accession. On the other hand the highest ash content was recorded from non-fertilizer or control treatment group which accounted as 13.52%. The ash content of lablab accession grown under non-fertilized group in the current study is comparable with Zeleke et al.
(2018) who reported that ash of lablab was 13.1% under small-scale irrigated condition in Amibara district of Afar region. However, the current result of ash from fertilized group was lower than as reported by different authors. This difference could be due to environmental conditions such as soil type, temperature and moisture sampling procedures, and management systems. Similarly Ash content of current result from all treatment groups was higher than as reported by Abuye et al. (2018) reported that Ash content of lablab was 6.45% grown under sub-humid climatic condition of western Oromia, Ethiopia. This current result is higher than as reported by both authors.

3.2.3. Crude protein (CP)
Both accession and fertilizer had significant (P < 0.05) effect on CP of lablab accession in Table 2. The highest CP content (21.6 and 20.9%) was recorded from 11640 and 147 lablab accessions, respectively while the lowest (20.51%) was from Tulu lablab accession. On the other hand the highest CP content was recorded from 150 kg/ha NPS fertilizer (22.91%) followed by 100 and 50 kg/ ha NPS fertilizer (20.96 and 20.7%), respectively while significantly lowest CP (19.42%) content was recorded from control or non-fertilized groups. The result of highest CP content in the NPS fertilizer treatment could be due to the fact that fertilizer might have added the soil nitrogen which was important for growth of plant leaves that contributed increment in CP of plants.

The difference in CP content of lablab accessions in the current study can be explained by the inherent characteristics of each of lablab accessions associated with the ability to extract and accumulate nutrients from the soil and fix nitrogen from the atmosphere as reported by (Yusuf & Muritala, 2013). According to Van Soest et al. (1991), CP level of 7.5 % is required for rumen function. The CP content of current study from all lablab accessions is satisfying more above the minimum requirements of ruminant livestock production with all treatment groups.

The CP content of lablab accessions grown under all treatment groups in the current study is lower than as reported by Zeleke et al. (2018) that CP content of lablab was 23.4% under small scale irrigated condition in Amibara district of Afar region. The current CP value of lablab accessions is almost the same as the findings reported in Nigeria by Hassan et al. (2014). Similarly CP content of current result from all treatment groups was higher than as reported by Abuye et al. (2018) who reported that CP content of lablab was (18.78%) grown under sub-humid climatic condition of western Oromia, Ethiopia. The current result is higher than as reported by both authors, this difference could be due to environmental conditions such as soil type, temperature and moisture, genetic variations, and management systems.

3.2.4. Neutral detergent fiber (NDF)
The effect of accession, fertilizer and their interaction on the NDF content is presented in Table 2. The analysis result showed that accession had significant (P < 0.05) effect on NDF of lablab accession. The highest NDF content (44.3 and 46.2%) was recorded from 147 and Tulu lablab accessions respectively while the lowest (40.8%) was recorded from 11640 lablab accession. According to Van Saun (2006), forage with less than 50% NDF is described as high nutritive value whereas NDF greater than 60% considered as low nutritive value. Therefore, the current result of NDF content form all experimental lablab accessions and fertilizer levels are classified as high nutritive value forage according to the same author classification.

The NDF content of lablab accessions grown under all treatment groups in the current study is higher than as report of Zeleke et al. (2018) who indicated that NDF content of lablab was 39.9% under small scale irrigated condition in Amibara district of Afar region. This might be due to, environmental conditions including soil type, temperature and moisture accession variations, management systems etc. Similarly, NDF content of current result from all treatment groups was lower than as reported by Abuye et al. (2018) who reported that NDF content of lablab was (55.34%) grown under sub-humid climatic condition of western Oromia, Ethiopia. This current result is lower than as reported by both different authors, this difference could be due to
environmental conditions such as soil type, temperature and moisture accession variations and management systems.

3.2.5. Acid detergent fiber (ADF)

The effect of accession, fertilizer and their interaction on the ADF content is presented in Table 3. The analysis result showed that accession had very highly significant (P < 0.001) effect on ADF of lablab accession. The highest ADF content (33 and 34.6%) was recorded from 147 and Tulu lablab accessions, respectively while the lowest (28.8%) was recorded from 11640 lablab accessions. Acid detergent fiber is the percentage of highly indigestible and slowly digestible material in a feed or forage. Higher forage ADF results in reduced digestibility dry matter because of increased lignifications of cellulose in the latter stage of the plants.

The ADF content of lablab accessions grown under all treatment groups except lablab 11640 in the current study is higher than report of Zeleke et al. (2018) who noted that ADF content of lablab was 29.1% under small-scale irrigated condition in Amhbara district of Afar region. This might be due to, environmental conditions, accession variations and management systems. Similarly, ADF content of current result from all treatment groups was lower than as reported by Abuye et al. (2018) who reported that ADF content of lablab was (29.81%) grown under sub-humid climatic condition of western Oromia, Ethiopia. The current result is lower than from these results.

3.2.6. Acid detergent lignin (ADL)

The effect of accession, NPS fertilizer and their interaction on the ADL content is presented in Table 3. The analysis result showed that accession had significant (P < 0.001) effect on ADL of lablab accession. The highest ADL content (6.04%) was recorded from Tulu accession followed by 147 (5.24%) lablab accession while the lowest (4.3%) was recorded from 11640 accession. Forages with higher ADL content had low overall digestibility of the feed by limiting nutrient availability (Van Soest., 1994). This low lignin content of experimental lablab accessions might be the ability to accessions to produce low cellulose, hemicelluloses and help them from being digested and utilized efficiently by the rumen microbes. The ADL content of current result from all treatment groups was higher than reported by Abuye et al. (2018) who reported that ADL content of lablab was (3.54%) grown under sub-humid climatic condition of western Oromia, Ethiopia. This current result is higher than as reported by the different author, this difference could be due to environmental conditions, accession variations, and management systems.

3.2.7. In vitro dry matter digestibility (IVDMD) and total digestible nutrient (TDN)

The effect of accession, NPS fertilizer and their interaction on the in vitro dry matter digestibility was presented (Table 3). The analysis result showed that accession had significant (P < 0.05) effect on IVDMD of lablab accession. The highest IVDMD (65.7%) was recorded from 11640 lablab accession while the lowest (63.23 and 61.8%) was recorded from 147 and Tulu lablab accessions respectively. In vitro dry matter digestibility is one of many factors influencing animal productivity (Mathison et al., 1995). This influenced by the availability of the degradable materials of the feed nutrients. There was limited information on IVDMD of lablab accessions in different parts of Ethiopia however it had some reports on the IVOMD. Abuye et al. (2018) reported that IVOMD of lablab was 45.7% grown under sub-humid climatic condition of western Oromia, Ethiopia. The effect of accession, fertilizer and their interaction on the total digestible nutrient was presented (Table 3). The analysis result showed that accession had significant (P < 0.05) effect on TDN of lablab accession. The highest TDN (65.24%) was recorded from 11640 lablab accession while the lowest (58.3 and 56.1%) was recorded from 147 and Tulu lablab accessions, respectively.

3.3. Correlation among nutritive value, agronomic characteristics and dry matter yield lablab accessions

The relationship between nutritive, morphological characteristics and dry matter yield lablab accessions is presented in Table 3. The DM content had moderate positive correlation with ADF and moderate negative significant correlation with CP, IVDMD, TDN and PH. Though there was no
Table 3. Correlation among nutritive value chemical composition, agronomic characteristics and dry matter yield of lablab accession

|       | DM  | Ash | CP  | NDF | ADF | ADL | IVDMD | TDN | PH  | LLP | NBPP | NLPP | DE  | DTF | DMY |
|-------|-----|-----|-----|-----|-----|-----|-------|-----|-----|-----|------|------|-----|-----|-----|
| DM    | .239 | .309 | .375* | .295 | .340* | .366* | .353* | .236 | .232 | .181 | .213 | .243 | .143 |
| Ash   | -220 | -159 | -138 | -086 | -014 | .098 | .290 | .269 | .077 | .117 | .089 | .155 | .047 |
| CP    | -326 | -266 | -233 | 193  | .329* | .514* | .441** | .589** | .513** | .084 | .037 | .399* |
| NDF   | .895** | .830** | .511** | .869** | .243 | .300 | .316 | .230 | .259 | .200 | .259 | .088 |
| ADF   | .916** | .681** | .939** | .122 | .227 | .138 | .064 | .196 | .181 | .068 |
| ADL   | .730** | .848** | .072 | .128 | .062 | .063 | .183 | .207 | .134 |
| IVDMD | .639** | .076 | .097 | .036 | .073 | .220 | .255 | .097 |
| TDN   | .186 | .340* | .186 | .128 | .241 | .222 | .026 |
| PH    | .820** | .892** | .825** | .781** | .701** | .737** |
| LLP   | .810** | .753** | .743** | .676** | .616** |
| NBPP  | .925** | .639** | .499** | .804** |
| NLPP  | .573** | .398** | .806** |
| DE    | .96** | .550** |
| DF    | .369* |
| DMY   | . | . | . | . | . | . | . | . | . | . | . | . | . | . |

DM = Dry matter content, ASH = ash, CP = Crude protein content, NDF = Neutral detergent fiber, ADF = Acid detergent fiber, ADL = Acid detergent lignin, TDN = Total digestible nutrient, PH = Plant height, LLP = length of leaves per plant, NBPP = number of branches per plant, NLPP = numbers of leaves per plant, DE = Days to 50% emergence stage, DTF = days to 50% flowering stage. DMY = dry matter yield. Level of significance = **P < 0.01, *P < 0.05.
significant correlation in most parameters, there was positive correlation of ash, NDF and ADL with DMY. But there was negative correlation with LLPP, NBPP, NLPP, DE, and DTF with DMY.

The Ash content was no significant correlation with all parameters, even, the relation was positive with TDN and negative with other all remaining parameters. The CP content was moderate positive significant correlation with TDN, PH, LLPP, NBPP, NLPP and DMY while there was no significant correlation with other parameters. The CP content was non-significant negative relation with fiber contents and positive relation with IVDMD, DE and DF.

4. Conclusions and recommendations
The current finding revealed that on all aspects of evaluations, Lablab (11640 and Tulu) accession could be selected as adaptive and better production performance to fulfill the forage quantity and quality shortage to enhance the livestock production and productivity in lowland area of Afar region. Among the lablab accessions, 11640 are recommended for wider adaptation and on-farm evaluation in study areas, similar agro-ecological zones of Ethiopia. The finding showed that application of fertilizer on lablab accessions resulted better agronomic characteristics, dry matter yield and crude protein than control treatment, hence addition of 100 kg/ha NPS fertilizer is recommended for better forage productivity in the current study area and similar agro-ecological areas. As a final remark, one of the limitations of this study was lack of economic analysis which requires further research in this regard.

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