

# Growth, Yield and Quality Performance of Pearl Millet (*Pennisetum americanum* L.) Varieties under Faisalabad Conditions, Pakistan

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## Abstract

Livestock industry of Pakistan is expanding day by day. To meet its growing demand high fodder yielding and nutritious varieties of fodder crops are needed. Pearl millet (*Pennisetum americanum* L.) is an excellent choice for this purpose. In order to explore the possibility of the better yield potential varieties of pearl millet performed in a good manner under agro ecological conditions of Faisalabad during the year 2012. A field experiment was conducted at Agronomic Research Area, University of Agriculture, Faisalabad, Pakistan. Randomized complete block design was used with three replications; the net plot size was 1.8 m × 6 m. The experiment was comprised of nine millet varieties named Cholistani Bajra, Barani Bajra, MB-87, Sargodha Bajra 2011, 18-BY, Super Bajra-1, PARC-MS-2, 86-M-52 and FB-822. All other agronomic practices were kept normal and constant. Data on yield and yield components were recorded by standard procedure. Significant results were recorded among the varieties for forage growth and yield. The variety 86-M-52 produced maximum forage and dry matter yield because of more number of leaves (14), leaf area (3540.1 cm<sup>2</sup>) followed by Sargodha Bajra-2011. All cultivars have statistically significant differences in respect of quality characteristics. However, non-significant differences were observed among cultivars regarding ash contents. The cultivar Sargodha Bajra-2011 has the highest crude protein (10.347%) and the cultivar FB-822 has the minimum crude protein percentage (6.733%). While PARC-MS-2 has the highest crude fiber percentage (34.667%) but variety MB-87 has the minimum crude fiber (24.333%). Variety 86-M-52 proved better for getting higher forage yield followed by Sargodha Bajra-2011 than all other varieties. Sargodha Bajra-2011 is the best cultivar that performed well in respect of quality parameters under irrigated conditions of Faisalabad.

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## Keywords

### Forage, Fiber, Varieties, Quality

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## 1. Introduction

Pearl millet (*Pennisetum americanum* L.) is a tall, warm season and an annual grass belongs to family Poaceae. It locally known as Bajra is a very important dual-purpose summer crop grown for both fodder and grain. It can grow up to height of 6 to 10 feet as conditions of high temperatures and favorable moisture prevails [1]. Numerous varieties of millet have been grown for centuries in Indo Pak Sub-Continent, China, Africa and other parts of the world. Tall varieties are cultivated for fodder while dwarf varieties are grown for grain purposes. It is a nutritious coarse grain cereal. Pearl millet is one of the oldest cultivated foods known to humans. It is also grown and used for hay, pasture, silage, seed crops, food, building material and fuel. Its green forage (without prussic acid, a poisoning potential commonly found in sorghum and sundal grass) is a valuable feed for livestock [2].

Livestock has 11.5% share in total GDP of Pakistan [3]. The livestock sector has a 55.1% share in the agriculture, while in 2011-2012 it was increased by 4.0%. This sector occupies a unique position in the National Agenda of economic development of the present government. The sector provides a net source of foreign earnings. It also helps to reduce income variability, especially in cases of crop failure due to a variety of causes. Livestock can play an important role in poverty alleviation. It can uplift the condition of Pakistan's rural masses [4].

The population of livestock (buffaloes, cattle, goats, sheep, donkey, camels, horses and mules) is 163.0 million heads in Pakistan [5]. Livestock population is increasing 4.2% per year; its feed requirements are also increasing accordingly. It is essential to supply adequate and nutritious forage on regular basis for promotion and development of livestock. The main and cheapest sources of feed for livestock are forage crops. However, shortage of forage production is the major restraining factor for livestock production in our area. Two percent reduction in forage area in each decade along with two important forage scarcity periods, one in winter (November to January) and the other in summer (May-June) further worsening the situation.

At present, forage crops are grown over 10.3% of the total cropped area of 22.6 million hectares. Area under forage cultivation in Punjab is 82.56%, Sindh—11.50%, KPK—4.48%, and Baluchistan—1.46%. The area under various forage crops in the country is estimated as 2.31 million hectares and annual forage production is 51.92 million tons. The average forage production is 22.5 t·ha<sup>-1</sup> [3], which is too low to meet even half of the maintenance requirements of the present livestock population in the country. The estimated shortfall is 15% - 30% of total requirements in terms of nutrients.

In 2012 the area under pearl millet crop was 458,000 hectares and production was 304,000 tones. A lot of potential for increasing the production of forage in country is available. Generally, farmers grow single cut type desibajra having the short vegetative period under rainfed condition, while under irrigated conditions, there is much scope for the cultivation of improved varieties.

There is the dire need to develop such pearl millet cultivars which have the higher yield potential so that the growing demand of forage for livestock can be achieved [6]. Although millet has adequate nutritional value but the increase is essential to meet the nutritional standards of forage for livestock. The nutritional quality of livestock feeds stuff is assessed by its dry matter, crude protein (CP), fat, ash contents and crude fiber (CF) contents [7]. Among many options to overcome the shortage of forage the best one is introduction of high yielding crop varieties [8]. Under the current scenario, it is the dire need for further selection of high yielding cultivar and broad adaptation in pearl millet. Keeping the above particulars in view the present study was designed to explore the possibility of the better yield potential varieties of pearl millet performed in a good manner under agro ecological conditions of Faisalabad.

The above mentioned findings were further strengthened by [9] after comparing the pearl millet genotypes for forage yield under irrigated conditions and found significant differences for height of plant, the number of leaves per tillers and green forage yield. The highest green forage yield was produced by the variety composite-2000 and the check variety MB-87 produced the lowest forage yield. [10] compared the performance of ten varieties of pearl millet and reported significant differences for height and green fodder yield among these varieties. Under the current

scenario, it is the dire need for further selection of high yielding cultivar and broad adaptation in pearl millet. Keeping the above particulars in view the present study was designed to explore the possibility of the better yield potential varieties of pearl millet performed in a good manner under agro ecological conditions of Faisalabad.

## 2. Materials and Methods

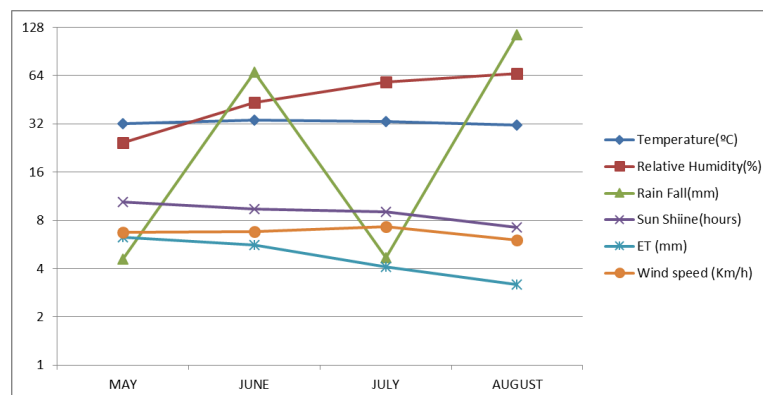
### 2.1. Experimental Materials, Design and Treatments

A field experiment was conducted at Agronomic Research Area, University of Agriculture, Faisalabad during spring 2012. Randomized complete block design was used with three replications and net plot size was 1.8 m × 6 m. The experiment was comprised of nine millet varieties named Cholistani Bajra, Barani Bajra, MB-87, Sargodha Bajra 2011, 18-BY, Super Bajra-1, PARC-MS-2, 86-M-52 and FB-822 and was sown with single row hand drill in 30 cm apart rows on May 31, 2012 by using a seed rate of 15 kg·ha<sup>-1</sup>. The soil was sandy clay loam with pH 7.5, electrical conductivity 1.15 dS·m<sup>-1</sup> and organic matter 1.88%. NPK was applied at the rate of 60-60-00 kg·ha<sup>-1</sup>. Full dose of P and half dose of N were applied by broadcasting at sowing while remaining dose of N was applied in split with first irrigation. All other agronomic practices were kept normal and constant.

### 2.2. Experimental Site

The experiment was conducted on sandy clay loam soil at research area of department of agronomy, university of agriculture Faisalabad, Pakistan. The climate of the area was semi-arid and subtropical. The experimental area is located at 73° east longitudes, 31° north latitudes of 135 meter above sea level.

### 2.3. Weather Data



### 2.4. Morphological Characteristic of Varieties



**Sargodhabajra** (plant height, 250 - 275, panicle conical 23 - 25 cm long, medium compact, seed shape oval and grey, high yielder).

**MB-87** (plant height, 240 - 250, panicle conical 22 - 25 cm long, seed shape round and grey, high yielder).



**Cholistanbajra** (plant height, 250 - 260, panicle conical 23 - 25 cm long, seed shape oval and grey to brown, bold, medium yielder).

**Baranibajra** (plant height, 225 - 250, panicle conical 21 - 24 cm long, seed shape oval and brown, bold, high yielder).



**BY-18** (plant height, 210 - 230, panicle conical 21 - 23 cm long, seed shape round and yellowish brown, bold, medium to high yielder).

**Super Bajra** (plant height, 200 - 220, panicle conical 20 - 25 cm long, seed shape round and yellowish, high yielder).

**FB-622** (plant height, 175 - 190, panicle conical 20 - 23 cm long, seed shape oval and light brown, medium yielder).

**PARC-MS-2** (plant height, 215 - 225, panicle conical 22 - 24 cm long, seed shape round, bold and brown, medium to high yielder).

**86-M-52** (plant height, 200 - 210, panicle conical 21 - 24 cm long, seed shape round, bold and yellowish to grey, medium to high yielder).

## 2.5. Data Collection

The crop was harvested 65 DAS with hand sickle when the crop reached to 50% heading stage, data on yield and yield components (number of plants per m<sup>2</sup> at harvest, plant height at maturity, number of leaves per plant, stem diameter, leaf area per plant, green forage yield and dry matter yield) while quality parameters (crude protein percentage, crude fiber percentage and total ash percentage) both were recorded by standard procedure.

## 2.6. Crude Protein

The crude protein percentage was determined by using standard procedure as recommended by [11].

Nitrogen percentage =  $A - B \times 100 \times 100 \times 0.0014 / \text{volume of digested sample used}$

where A = quantity of acid (N/10 H<sub>2</sub>SO<sub>4</sub>) used,

B = blank reading (N/10 H<sub>2</sub>SO<sub>4</sub> used in blank reading),

100 = volume made after digestion,

100 = for percentage,

0.0014 = factor (which is equal to grams of N in 1 mL of N/10 H<sub>2</sub>SO<sub>4</sub>).

The crude fiber percentage was determined by using standard procedure as recommended by [11]. To determine crude fiber two grams of oven dried sample was digested in 200 mL of 1.25% H<sub>2</sub>SO<sub>4</sub> in 500 mL beaker for 30 minutes. Then contents were filtered by linen cloth and residues were washed and digested again with 200 mL 1.25% NaOH for 30 minutes and thereafter, it was again filtered and washed. The residues were put in a weighed china dish, and dried in an oven for 24 hours at 105°C. After recording the dry weight samples were placed in muffle furnace at 600°C until grey or white ash was obtained. The weight of the ash was recorded.

Crude fiber (%) =  $\text{weight of dried residues} - \text{weight of ash weight of moisture free sample} \times 100$ .

To determine ash 5 g of oven dried sample was placed in a clean previously weighed china dish (W1). The samples were placed in a muffle furnace at (550°C - 650°C) until white or grey ash was obtained. After that, residues were cooled in desiccators and recorded the weight (W2) and percentage was calculated as follows:

Total ash% =  $W2 - W1 / \text{weight of the sample} \times 100$ .

Total ash percentage was determined by using standard procedure as proposed by [11].

## 2.7. Statistical Analysis

The data was subjected statistical analysis using Fisher's Analysis of Variance technique and treatment means were compared by LSD at 0.05 probability level [12].

### 3. Results and Discussion

#### 3.1. Plants per m<sup>2</sup> at Harvest

The number of plants per unit area at harvesting time is one of key yield contributing features in forage crops. The statistical analysis pointed out in **Table 1** that number of plants was significantly different in all forage pearl millet varieties. Statistically the maximum number of plants per meter square were observed in Barani Bajra (118 plants·m<sup>-2</sup>) followed by MB-87 with 113 plants·m<sup>-2</sup>. The minimum plant populations was observed in Sargodha Bajra 2011 (90 plants·m<sup>-2</sup>), FB-822 (87 plants·m<sup>-2</sup>), PARC-MS-2 (86 plants·m<sup>-2</sup>) and 18-BY (92.33 plants·m<sup>-2</sup>) and were statistically at par with each other and reflecting non-significant results. These differences in plant population per unit area of various pearl millet varieties either due to difference in seed viability or difference in 1000 grain weight of these varieties and also due to variable soil fertility level. These results are in line with [13] who described significant difference in plant density per meter square among pearl millet varieties.

#### 3.2. Plant Height at Maturity (cm)

The plant height is a significant growth attribute directly linked with the productive prospective of plant in terms of forage yield. In this study the statistically analyzed data presented in **Table 1** revealed that all pearl millet varieties differ significantly regarding plant height. Pearl millet varieties Sargodha Bajra 2011 and Cholistani Bajra gained maximum plant heights of (262.40 cm) and (251.17 cm) followed by Barani Bajra (243.57 cm) and MB-87 (244.53 cm). The lowest plant height (178.40 cm) was observed in FB-822 followed by (199.40 cm) in 86-M-52 as shown in (**Table 2**). The variation in plant height in different pearl millet varieties may be due to disparity in genetic makeup of these varieties. Significant difference in pearl millet varieties in respect of plant height have also been reported by [6] and [13]. [14] also perceived significant dissimilarities among different varieties regarding plant height.

#### 3.3. Number of Leaves per Plant

In forage crops, the number of leaves have huge effect on final yield having better quality considerations as compare to stem in forage crops. Statistically analyzed data presented in **Table 1** revealed that in pearl millet cultivars number of leaves were statistically significant. Pearl millet cultivar 86-M-52 produced maximum number of leaves per plant (14) followed by Sargodha Bajra-2011 (13). While minimum number of leaves per plant was observed in FB-822 (10) followed by 18-BY (11). Variation in number of leaf per plant in different

**Table 1.** Comparison among different pearl millet varieties for the growth and yield related attributes.

Varieties	Plant population (m <sup>-2</sup> )	Plant height (cm)	No. of leaves per plant	Stem diameter (cm)	Leaf area per plant (cm <sup>2</sup> )	Forage yield (t·ha <sup>-1</sup> )	Dry matter yield (t·ha <sup>-1</sup> )
Cholistani Bajra	101.00 <sup>cd</sup>	251.17 <sup>a</sup>	12.13 <sup>b</sup>	0.9633 <sup>cd</sup>	2583.7 <sup>cde</sup>	95.00 <sup>cd</sup>	23.147 <sup>cd</sup>
Barani Bajra	118.33 <sup>a</sup>	243.57 <sup>ab</sup>	12.93 <sup>b</sup>	0.8767 <sup>d</sup>	2494.2 <sup>cde</sup>	110.00 <sup>c</sup>	25.522 <sup>c</sup>
MB-87	112.67 <sup>ab</sup>	244.53 <sup>ab</sup>	12.06 <sup>bc</sup>	0.9033 <sup>cd</sup>	2344.3 <sup>de</sup>	113.33 <sup>bc</sup>	30.087 <sup>b</sup>
Sargodha Bajra 2011	90.00 <sup>e</sup>	262.40 <sup>a</sup>	13.13 <sup>ab</sup>	1.1100 <sup>a</sup>	3103.0 <sup>ab</sup>	130.00 <sup>ab</sup>	31.280 <sup>ab</sup>
18-BY	92.33 <sup>de</sup>	225.97 <sup>bc</sup>	11.00 <sup>cd</sup>	0.9867 <sup>bc</sup>	2227.1 <sup>e</sup>	103.33 <sup>cd</sup>	23.997 <sup>cd</sup>
Super Bajra-1	100.67 <sup>cd</sup>	215.80 <sup>cd</sup>	12.60 <sup>b</sup>	0.9733 <sup>cd</sup>	2958.6 <sup>bc</sup>	87.33 <sup>de</sup>	20.163 <sup>de</sup>
PARC-MS-2	86.00 <sup>e</sup>	218.53 <sup>cd</sup>	12.33 <sup>b</sup>	1.1367 <sup>a</sup>	2870.8 <sup>bc</sup>	105.00 <sup>cd</sup>	24.165 <sup>cd</sup>
86-M-52	106.00 <sup>bc</sup>	199.40 <sup>de</sup>	14.10 <sup>a</sup>	0.9300 <sup>cd</sup>	3540.1 <sup>a</sup>	144.33 <sup>a</sup>	34.697 <sup>a</sup>
FB-822	87.00 <sup>e</sup>	178.40 <sup>e</sup>	10.47 <sup>d</sup>	1.0900 <sup>ab</sup>	2748.7 <sup>bcd</sup>	71.67 <sup>e</sup>	16.927 <sup>e</sup>
LSD (p ≤ 0.05)	10.21	21.214	1.1241	0.1059	483.19	19.687	4.5351
F-value	11.4 <sup>**</sup>	14.3 <sup>**</sup>	8.5 <sup>**</sup>	7.1 <sup>*</sup>	6.4 <sup>*</sup>	10.9 <sup>**</sup>	13.7 <sup>**</sup>

\*Significant. \*\*Highly significant. <sup>NS</sup>Non significant. Means sharing the same case letter do not differ significantly at p < 0.05.

**Table 2.** Comparison of different pearl millet varieties for quality related attributes.

Varieties	Crude protein%	Crude fiber%	Total ash%
Cholistani Bajra	9.47 <sup>ab</sup>	24.17 <sup>d</sup>	0.89
Barani Bajra	9.55 <sup>ab</sup>	32.67 <sup>ab</sup>	0.88
MB-87	8.97 <sup>bc</sup>	24.33 <sup>d</sup>	0.90
Sargodha Bajra 2011	10.35 <sup>a</sup>	26.50 <sup>cd</sup>	0.90
18-BY	8.013 <sup>cd</sup>	25.67 <sup>cd</sup>	0.90
Super Bajra-1	7.51 <sup>de</sup>	29.33 <sup>bc</sup>	0.89
PARC-MS-2	7.63 <sup>de</sup>	34.67 <sup>a</sup>	0.88
86-M-52	9.18 <sup>b</sup>	30.17 <sup>abc</sup>	0.89
FB-822	6.73 <sup>e</sup>	27.00 <sup>cd</sup>	0.90
LSD ( $p \leq 0.05$ )	1.119	4.87	NS
F-value	10 <sup>**</sup>	5.2 <sup>*</sup>	1.3 <sup>NS</sup>

<sup>\*</sup>Significant. <sup>\*\*</sup>Highly significant. <sup>NS</sup>Non significant. Means sharing the same case letter do not differ significantly at  $p < 0.05$ .

varieties may be due to their internodal distance as well as the plant height may also influence the number of leaves per plant. These results endorsed the findings of [1] who also indicated that varieties differ significantly for number of leaves per tiller. In the same way these results are in line to the findings of [15] who noted highest response to selection in number of leaves per plant when they observed genetic components of variance in a pearl millet population in respect for fodder yield. While genetic variation for number of leaves was previously reported by [16].

### 3.4. Stem Diameter (cm)

Stem diameter is one of important yield contributing factor in forage crops. More the thick stem more will be the yield and higher the crude fiber contents. Analysis of variance of data shows that stem diameter at harvest was significant in all pearl millet varieties. Supreme stem thickness (1.13 cm) and (1.11 cm) was observed in PARC-MS-2 and Sargodha Bajra-2011 followed by (1.09 cm) and (0.98 cm) in FB-822 and 18-BY. Minimum stem diameter (0.87 cm) was observed in Barani Bajra. This variation in stem diameter may be due to difference in heredities of the varieties. These results are in line with the results of [2] and [16] who found significant difference in pearl millet varieties regarding stem diameter. [17] also found variation in the stem diameter of different sorghum cultivars grown for forage purposes.

### 3.5. Leaf Area per Plant (cm<sup>2</sup>)

Leaf area is considered very important factor for proper growth of plant because it is a platform for light catching. Leaf area is the measure of the size of assimilatory system of the plant and is the product of leaf length and breadth. Although, it is considered to be mainly concerned with accumulation and partitioning of photosynthesis to the economic parts of the plant but it has also an important role in the final biomass of the crop. Statistically analyzed data (Table 1) shows that leaf area per plant was significantly different in all forage pearl millet varieties. Variety 86-M-52 produced maximum leaf area per plant (3540.1 cm<sup>2</sup>) followed by Sargodha Bajra 2011 with leaf area (3103 cm<sup>2</sup>). Minimum leaf area per plant was observed in 18-BY (2227.1 cm<sup>2</sup>) followed by MB-87 (2344.33 cm<sup>2</sup>). Maximum leaf area in 86-M-52 (3540.1 cm<sup>2</sup>) and Sargodha Bajra 2011 (3103 cm<sup>2</sup>) may be due to more number of leaves per plant while minimum leaf area in 18-BY (2227.1 cm<sup>2</sup>) and MB-87 (2344.33 cm<sup>2</sup>) may be due to less number of leaves per plant in these forage pearl millet varieties. Variation in leaf area per plant is due to genetic difference amongst these forage pearl millet varieties. These results are similar to the results of [1] who observed that varieties differed significantly for number of leaves per tiller. [18] and [6] also perceived difference in leaf area per plant of various pearl millet cultivars.



### 3.6. Forage Yield (t·ha<sup>-1</sup>)

Final best forage yield is the ultimate goal, which depends upon the genomic as well as environmental factors. Statistically analyzed data (**Table 1**) indicated that forage yield was significantly differing in all forage pearl millet varieties. The data presented in table shows that maximum green forage yield (144.33 t·ha<sup>-1</sup>) was observed in 86-m-56 followed by Sargodha Bajra-2011 (130 t·ha<sup>-1</sup>). Forage yield was statistically similar in Cholistani Bajra, 18-BY and PARRC-MS-2. Similarly there was no statistical difference in forage yield (t·ha<sup>-1</sup>) in Sargodha Bajra 2011 and MB-87 (**Table 1**). While MB-87 was statistically the same as Barani Bajra, Cholistani Bajra and PARS-MS-2. Minimum forage yield (71.67 t·ha<sup>-1</sup>) was observed in FB-822 followed by Super Bajra-1 (87.33 t·ha<sup>-1</sup>). More forage yield in 86-M-56 and Sargodha Bajra 2011 may be due to more stem diameter, more number of leaves per plant and more leaf area per plant and more fresh weight per plant in these varieties. These results were matched with the findings of [19] that the association and path coefficient analysis exhibited increase in the forage yield ability due to tillers per plant, plant height and leaf to stem ratio. [2] and [20] reported significant differences in term of forage yield in pearl millet cultivar. [21] also reported variation in fresh forage yield while evaluating 9 varieties of pearl millet. [22] also observed significant differences among the pearl millet genotypes for green fodder yield. High forage yield is closely associated with high values for plant height, number of leaves and leaf area.

### 3.7. Dry Matter Yield (t·ha<sup>-1</sup>)

Final best forage yield is the ultimate goal, which depends upon the genomic as well as environmental factors. Analysis of variance states that dry matter yield tons per hectare were significantly differing in all forage pearl millet varieties. The data presented in **Table 2** shows that variety 86-M-52 produced maximum dry matter yield (34.697 t·ha<sup>-1</sup>) followed by Sargodha Bajra-2011 (31.280 t·ha<sup>-1</sup>). Dry matter yield was statistically similar in Cholistani Bajra, 18-BY and PARRC-MS-2 and these varieties have average dry matter yields (t·ha<sup>-1</sup>) of 23.147, 23.997 and 24.165 respectively. Similarly there was no statistical difference of forage yield (31.28 t·ha<sup>-1</sup>) and (30.087 t·ha<sup>-1</sup>) in Sargodha Bajra 2011 and MB-87 respectively. FB-822 produced minimum dry matter yield (16.927 t·ha<sup>-1</sup>) followed by Super Bajra-1 (20.163 t·ha<sup>-1</sup>) shown in **Table 2**. More dry matter yield in variety 86-M-56 and Sargodha Bajra 2011 may be due to more stem diameter, more number of leaves per plant and more leaf area per plant and more dry weight per plant in these varieties. [1] also reported significant difference among pearl millet varieties regarding dry matter yield.

## 4. Quality Attributes

### 4.1. Crude Protein Percentage

Crude protein is one of the most important quality determinants of forage crops. Forage with high crude protein contents is considered best quality forage. Higher the crude protein contents in forage better will be its palatability and digestibility. The data from analysis of variance specified that crude protein percentage were statistically highly significant in all pearl millet varieties (**Table 2**). The maximum crude protein percentage (10.347%) was given by Sargodha Bajra 2011 followed by Cholistani Bajra (9.547%) and Barani Bajra (9.477%). FB-822 had minimum crude protein percentage (6.733%) followed by super Bajra-1 and PARC-MS-2 and these two varieties are alike among each other in term of crude protein percentage. The difference among genotype may be due to relative contribution of leaves to total biomass and concentration of protein in dry matter. The higher protein contents in dry matter ultimately will result higher protein yield on unit area. [13] [14], also revealed that pearl millet varieties significantly varied regarding crude protein%. The significant differences in crude protein contents in dry matter of various genotypes have also been confirmed by [23] and [24].

### 4.2. Crude Fiber Percentage

Crude fiber is one more parameter that influences the quality of forages. The forages with less fiber contents are considered good quality forages, because lower the crude fiber in forages, better will be the intake, palatability and digestibility of the forages. The data of crude fiber percentage is given in **Table 2** that describes statistically significant results among all forage pearl millet varieties. The maximum crude fiber percentage (34.667%) was recorded in the variety PARC-MS-2 followed by Barani Bajra (32.667%) and 86-M-56 (30.167%). The varieties

Sargodha Bajra-2011, 18-BY, 86-M-56, Super Bajra-1 and FB-822 are statistically same among each other. The minimum crude fiber percentage (24.167%) and (24.333%) was observed in Cholistani Bajra and MB-87, respectively that was statistically similar to the 18-BY, Sargodha Bajra-2011 and FB-822 having (25.667%), (26.500%) and (27.00%) crude fiber percentage, respectively. [13] and [22] also revealed that pearl millet varieties significantly varied regarding crude protein%. The significant differences among sorghum varieties have already been confirmed by [18] and [23].

### 4.3. Total Ash Percentage

The statistically analyzed data of total ash percentage presented in **Table 2** revealed that pearl millet varieties were non-significant in respect of total ash percentage. Maximum ash percentage (0.9033%) and (0.9033%) was recorded in Sargodha Bajra-2011 and 18-BY, respectively followed by Cholistani Bajra, MB-87, Super Bajra-1, PARC-MS-2 and 86-M-52 but these cultivars were statistically similar among each other in term of total ash percentage while Barani Bajra produced minimum total ash percentage (0.88%). These results indicated that all varieties of forage pearl millet might have same rooting pattern and efficiency in absorbing nutrients from the soil. The above mentioned results (**Table 2**) are in line with the findings of [2] and also [25] who found no significant results in oat varieties in respect of total ash% while these results are contradictory to the studies of [26] and [18] that different sorghum cultivars have significant difference in ash percentage.

## 5. Conclusion

It is obvious from the results that pearl millet cultivars have great differences regarding yield and quality parameters. There is a need to compromise between yield and quality, however, the variety 86-M-52 performed better than other varieties regarding yield. So for getting higher forage yield the variety 86-M-52 should be sown under Faisalabad conditions and for better quality it should be harvested earlier while Sargodha Bajra-2011 is also good variety in respect of quality and somehow green forage yield. So we can say that both performed well under environmental conditions of Faisalabad and can give better results if grown by the farmers.

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