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Research Article

Assessment of Proximate and Nutritional Contents in Selected Weedy Grasses for Potential Use as Fodder in District Charsadda, KP

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Abstract: Indigenous people have been using local grasses for the rearing of their animals. This botanical endeavor is the first study about the documentation from district Charsadda regarding the traditional awareness of the usage of grasses and their feeding system. Perennial grasses show numerous useful traits as energy crops and have been expanding enthusiasm for their utilization since the last century. Proficient production of energy from such enduring grasses requires the decision of the most proper grass species for the natural, climatic, and ecological conditions. In the present study, eleven grass species (*Alopecurus myosuroides, Apluda mutica, Bromus catharticus, Cenchrus ciliaris, Cymbopogon jwarancusa, Desmostachya bipinnata, Dichanthium annulatum, Hordeum murinum, Leptochloa chinensis, Phalaris minor,* and *Polypogon fugax*) were collected and screened to check their potential of usage as forage at three phenological stages (pre-reproductive, reproductive and post-reproductive stages). The selected forage grasses were evaluated for proximate and mineral contents in three phenological phases. The principal minerals (C, Al, Mg, Si, S, P, Cl, Ca, K, Mn, N, Cu, Fe, Zn, and Na) were investigated which are vital for the appropriate development, growth, health, and other physiological functions in cattle's. The level of common essentials elements improved in plants through various phenological stages except for a few species. All eleven species have a high value of carbohydrates and a low value of crude protein. Percent moisture contents were maximum in *Phalaris minor*10.4% but low ash contents in *Alopecurus myosuroides* 6.423 %. Palatability classes revealed that 2 forage grasses were moderately palatable, 5 kinds of grasses were highly palatable and 4 species were less palatable. All the highlighted species in the present results (proximate and nutrient composition) suggest that they have a high potential for cattle as fodder and fulfill the current gap of fodder. Grasses were mainly available and had ethno-veterinary value during August and October. This document of traditional livestock feeding in Charsadda will underline the value of maintaining traditional information that has been poorly recorded before.

Keywords: Minerals, Nutraceutical study, Palatable, Ruminants, Wild grasses.

1. INTRODUCTION

Agro-pastoral activities play a crucial role in the growth of the local economy in rural areas of Pakistan, accounting for over half of the total agricultural production and 10.6 % of the national GDP [1]. In the economy of the world, where land cultivation is difficult and livestock husbandry is

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the key and sometimes unique survival strategy and source of income for the local communities, these activities are especially significant. Besides, milk and meat production can counteract the effect of climate unpredictability on fluctuations in the food supply, especially in areas where crop shortages are frequent. In Pakistan, 8.1 % of buffaloes, 13.5 % of cattle, 15.3 % of sheep, and 14.4 % of goats are raised in different districts, according to data stated [2]. Sustainable livestock production under harsh climatic conditions requires effective strategies to enhance the use and management of fodder [3]. Fodder plant species provide a huge potential source of protein for ruminants of those regions.

Until recent time, ruminant feeding systems generally ignored these feed resources, mainly due to insufficient information and knowledge about different aspects of their valuable use and as well as lack of initiative step related to the advancement of more new innovative systems of feeding [4]. The demand for milk, meat, and other products obtained from animal increase day by day in the country. However, these products are limiting in the dry season due to a shortage of feed [5]. There are several alternatives, which can increase these productivity levels. Among these alternatives, improved grasses and legumes are better solutions. However, grasses have great natural occurrences in most regions and high adaptation to environmental stresses and other harsh conditions [6]. Deficient nutrient composition in livestock takes frequently related to substantial losses to the ranchers because of conditional losses, cattle weight, reduced capacity of reproduction, and increased mortality rate [7, 8]. Today, it has been a big challenge to provide a safe, healthy, and nutritious source of food for poor income group and the undernourished population of the developing world.

Scarcity, high cost, and unreliable supply of healthy food in the developing and underdeveloped countries have resulted in the find out the cheap and alternative source of healthy and nutritious food [9]. The proximate and elemental analysis has a key role to study the potential of nutrient contents in the selected weed grasses which provide a proper level of nutrition to ruminants for their existence in the biosphere. Weedy grasses and also forbs plants are necessary to study their contents as well as their benefit to livestock management and study the wealth of the key palatable species for grazing purposes [10]. In the family Poaceae, various types of grasses are locally used for different purposes like many therapeutic uses decorative as well as for forage purposes [11]. There are two steps for considering plant elements for their potential function in livestock. In the first step, those elements are selected which are the main constituents of each diet which is the main source of energy for the normal metabolism and growth, while the development of pathogenic symptoms in livestock, while in the second food diet heat pathogenic symptom can be comforted by substituting the key elements. The trace elements and macro-microelements when no function then it is combined with other elements for proper functioning which prevent the improper deficiency of elements which have a key role in the sustainable life of a ruminant's animal [12]. About 40 elements are known as the key elements for the life system of plants and animals in an ecosystem.

An element is deliberated vital when the decline of its acquaintance under a positive range marks reliably in a decrease in a physiologically basic function, or the elements which are the core part of carbon-based structured compounds acting a vital for that organism existence [13]. Plants possessed basic nutrients like fats, protein, carbohydrates, etc. along with phytochemical residents of the plants which are imperative medicinally and these are accountable for the growth and change of living beings [14]. The Protein macromolecule is a type of nitrogen complex organic compound, which are the basic constituents of plants and animals on earth [15].

Various nutrient indices like nutrient value, antioxidant capacity, and antioxidant composition examination provided by the following grasses species available in our nation, which provide potency for various herbal medicines preparation [16]. Shortage of quality animal feeds, especially in developing international locations has necessitated investigations of several novel opportunity sources of feeding substances for viable incorporation into animal diets [17]. The grazing animals get their nourishment from the plants while these plants get their mineral nutrient and nutrient requirement from the soil source. Grass species generally have different minerals concentrations among them and these are also influenced by climatic factors, soil, water treatment, chemical application, plant development stage, and plant parts [18]. The weedy grasses have a high potential of macro-micro minerals and are considered the best food for livestock management [19]. Grasses play a vital role in supporting and enhancing grassland and animal production in any region. Along these, there is a great need for continuous search of high productively, edaphically, and environmentally adapted grass species to react prevailing and embryonic limitations, altering stresses and prospects to build feed supply for animals particularly during the dry season under various systems [20]. The data regarding the mineral nutritive potency of natural grasses in dry grasslands in diverse zones of Pakistan. In directive to improve livestock production in ruminant animals for feed on the pasture fodders, particularly, throughout wintertime or dry season, therefore it is a basic requirement to increase with micro and macro mineral sources [21].

Traditional knowledge can be an important source of information on local wild forage resources and their nutritional properties from this viewpoint. Several studies have shown that smallholder farmers have a strong practical knowledge of the value and quality of plants used for feeding animals in many parts of the world. Therefore, information on wild grasses regarding their nutritional value, cell wall composition, secondary metabolites, antioxidant activities, antimicrobial activities, and their biological significance must be useful for future use.

2. MATERIALS AND METHODS

2.1. Collection of grasses samples

A total of eleven wild weedy grasses (*Alopecurus myosuroides, Apluda mutica, Bromus catharticus, Cenchrus ciliaris, Cymbopogon jwarancusa, Desmostachya bipinnata, Dichanthium annulatum, Hordeum murinum, Leptochloa chinensis, Phalaris minor* and *Polypogon fugax* were collected from district Charsadda, Pakistan in three phenological stages (pre-reproductive, reproductive and post-reproductive). Two kg of each sample were collected and dried in shade for 21 days (3 weeks), grinded into a powder, and then kept in air polythene bags.

2.2. Site Details

The Charsadda district has an area of 996 km^2, situated in 34° 03' to 34° 28' N latitude and 71° 28' to 71° 33' E longitude surrounded in the north by district Malakand, in the east side by Mardan, on the south by two district Peshawar and Nowshera and on the west side by Mohmand Agency with porous sandy soil. The area has fine alluvial deposits with porous and light nature of sandy soil to a depth of 1 to 6m. Below this, the sand mixture of clays, frequently collective with cots of nodular limestone tracked by shingle and sands. The mean annual maximum temperature is 29.4 ºC and the minimum temperature is 15.9 ºC with mean annual precipitation of 403.8 mm and relative humidity is 54.7 % [22].

2.3. Macro and micronutrient analysis

For the minerals profile of the plants, plant samples were dried in an air broiler at 70^{o}C for 48 hours, crushed through a strainer (0.001 m), and exposed to wet acid digestion [23]. The minerals, Phophorys (P) and Potasium (K) were qualified following flame Photometer and UV/visible Spectro Photometer (Shimadzu UV-1601PC). Different nutrients like Ca, Mg, Fe, Mn, Zn, Cu, and Pb were screened out using Atomic Absorption Spectrometer.

2.4. Proximate analysis

The collected specimens were analyzed for proximate analysis of dry material, moisture, total ash contents, crude fiber, crude protein, fat, nitrogen-free extract, and carbohydrates.

i. Dry Matter (%)

Dry Matter (DM) percentage of the forage plants was determined from oven-dried samples at 65 ^{o}C for 72 hours following the AOAC method [24].

$$\text{Dry Matter (\%)} = \frac{\text{Weight of dried sample}}{\text{Weight of fresh sample}} \text{ x } 100$$

ii. Ash Content (%)

Ash Content was determined using one to two grams of plant sample in Muffle furnace at 550-600 ^{o}C, kept for eight hours according to the AOAC method [24].

$$\text{Ash contents (\%)} = \frac{\text{Weight of ash}}{\text{Weight of fresh sample}} \text{ x } 100$$

iii. Crude Protein (CP)

Crude Protein percentage was quantified following the micro Kjeldahl method [24].

$$\text{Crude protein (\%)} = \frac{(\text{ml } H_2SO_4 \text{ - blank}) \times N \times 6.25 \times 14.01}{\text{Sample weight} \times 1000}$$

iv. Crude Fibers (CF)

Crude fibers (CF) were evaluated following the AOAC method [24].

$$\text{Crude fiber (\%)} = \frac{\text{Loss in weight in ignition}}{\text{Weight of Sample}} \times 100$$

v. Crude Fat (Cf)

Crude Fats were determined from ether extract by using the reflux apparatus described by May and Galyean [25].

$$\text{Ether extract (\%)} = \frac{\text{Weight of extract}}{\text{Weight of sample}} \times 100$$

vi. Nitrogen Free Extract (NFE)

Nitrogen free extract (NFE) was calculated as below by method of May and Galyean [25].

NFE = Dry matter % (% Ash + % CF + % Ether extract *+ % CP).

3. RESULTS AND DISCUSSIONS

3.1 Macro and Micronutrient Assessment, Distribution, and Palatability Ratio of Forage Grasses

Grasses contain a high quantity of silicates and potash due to which it is non-palatable to cattle. Leaves contain more ether concentration and crude protein than stems and lower in lignin, cellulose, and rough fiber. As grasses and wide leaved herbs develop, they decline in crude proteins and increase in rough fibers, lignin, cellulose, and carbohydrates level. Mineral constituents influence the palatability of species as well as diminish health growth, productivity, and regenerative limit of browsing and grazing animals. The mineral contents of fodder plants commonly expanded/ diminished conflictingly with the advancing phenological development stages in many plants [26, 27 and 28]. Result in Table 1 shows that all the eleven weedy grass species has high nutritional and proximate value and can be used as a good source of fodder. Different variation has been depicted in the composition of macro and micro minerals as well as nutrients.

In the present work, a total of fifteen minerals were analyzed in three different phenological stages. The outcomes display that content of magnesium is present only in the pre-reproductive stage in *Alopecurus myosuroides* (0.10 %) while in the reproductive stage and post-reproductive stage magnesium contents were not detected. In *Apluda mutica* magnesium contents is maximum in post-reproductive stage (0.42 %) while low magnesium contents in reproductive stage (0.18 %), in *Bromus catharticus* (0.42 %), *Cenchrus ciliaris* (0.23 %), *Hordeum murinum* (0.42 %) and *Phalaris minor* (0.26 %) magnesium contents is maximum in only pre-reproductive stage. While *Cymbopogon jwarencosa* (0.28 %), *Dichanthium annulatum* (0.30 %) and *Polypogon fugax* (0.29 %) magnesium contents is present in post-reproductive stage. In *Leptochloa chinensis* (0.39 %) magnesium contents are maximum in the reproductive stage while in *Desmostachya bipinnata* no magnesium contents were detected in all phenological stages (Table 1).

In general, forage Mg concentrations have been improved at a comparatively low level of Mg application on acid, sandy soils. In comparison, calcareous and fine textured soil requires very high rates of Mg application to increase forage Mg concentrations, often making Mg fertilization impractical [29]. Based on investigation with fine textured soil it was determined that Mg fragmentation did not confirm tolerable level of Mg for livestock's. Low level of magnesium cause hypomagnesaemia disorders in gastrointestinal tract of grazing ruminants [30, 31]. Mg shortage is characteristically linked with observable intervene which causes phenomenon of chlorosis and growth pattern [32]. Carbon, silicon, chlorine, potassium and calcium contents were detected in all eleven species in all phenological stages (Table 1). Silicon is responsible for the formation of bones and teeth in cattle [33]. Potassium level can be increased for cattles in the form of freely obtainable food diets such as KCl_2, $KHCO_3$, KCO_3 or KSO_4. The high content of calcium might be described by a quantity of fodder plant species [34]. Aluminium content is present in *Alopecurus myosuroides* (0.13 %) and *Desmostachya bipinnata* (0.10 %) only in pre reproductive stage while in Polypogon fugax (0.14 %) aluminium content is present only in post reproductive stage. Aluminum content is high than15 mg/kg could be a sever tricky and beyond 50 mg/kg lethal in case of the economics of the liming would be measured to overcome this difficult [35]. Manganese content is present only in

Table 1. Mean mineral content (%) of fodder grass species of District Charsadda, Pakistan

S. No .	Botanical Name	Phenological stages	Mineral content (%)														
			C	Mg	Al	Si	P	S	Cl	K	Ca	Mn	Cu	N	Fe	Zn	Na
1.	*Alopecurus myosuroides* Hudson.	Pre reproductive stage	57.50	0.10	0.13	1.33	0.19	0.16	0.20	0.90	0.33	-	0.61	-	-	-	-
		Reproductive stage	52.55	-	-	1.18	0.16	-	0.13	0.74	0.39	-	1.08	4.24	-	-	-
		Post reproductive stage	56.81	-	-	1.01	-	-	0.35	0.99	0.30	-	0.94	-	-	-	-
2.	*Apluda mutica* L.	Pre reproductive stage	46.35	0.31	0.96	5.70	0.21	0.14	0.72	1.94	0.73	-	0.55	2.78	0.76	0.39	-
		Reproductive stage	43.34	0.18	0.52	8.78	-	-	0.38	0.85	0.62	-	0.60	3.74	0.59	-	-
		Post reproductive stage	48.10	0.42	0.79	3.71	-	0.19	0.28	0.91	0.65	-	0.76	3.70	0.80	0.47	-
3.	*Bromus catharticus* Vahl.	Pre reproductive stage	45.83	0.42	0.22	1.87	0.10	0.62	0.94	2.56	0.97	-	0.72	8.46	0.27	-	-
		Reproductive stage	47.42	0.38	-	0.83	0.27	0.45	1.02	3.14	0.70	-	0.55	6.31	-	-	0.21
		Post reproductive stage	53.95	0.29	0.17	1.31	0.16	0.43	1.38	2.31	0.98	-	-	-	-	-	-
4.	*Cenchrus ciliaris* L.	Pre reproductive stage	51.62	0.23	0.32	2.26	0.13	-	1.05	1.61	0.66	-	0.80	4.43	0.31	0.60	-
		Reproductive stage	53.27	0.23	0.26	4.78	0.18	0.17	1.08	1.67	0.54	-	0.62	-	0.34	-	-
		Post reproductive stage	50.39	-	0.20	4.32	-	0.18	0.99	1.80	0.51	-	0.77	-	0.15	0.55	-
5.	*Cymbopogon jwarancusa* (Jones) Schult.	Pre reproductive stage	49.29	0.26	0.29	1.23	-	0.33	1.13	0.86	1.09	-	0.85	4.66	0.35	-	0.33
		Reproductive stage	51.61	0.18	0.30	1.84	0.14	0.32	1.11	0.98	0.90	-	0.63	-	0.29	-	0.31
		Post reproductive stage	52.45	0.28	0.45	1.90	0.17	0.28	0.88	1.39	1.25	-	0.67	-	0.63	-	0.23
6.	*Desmostachya bipinnata* (Linn.) Stapf	Pre reproductive stage	53.39	-	0.10	1.36	-	-	0.65	2.01	0.16	-	0.77	-	-	-	-
		Reproductive stage	53.40	-	-	1.28	0.11	0.24	0.27	1.76	0.20	-	0.24	-	-	0.47	-

S. No.	Botanical Name	Phenological stages	Mineral content (%)														
			C	Mg	Al	Si	P	S	Cl	K	Ca	Mn	Cu	N	Fe	Zn	Na
		Post reproductive stage	48.55	-	-	3.17	-	0.17	0.26	1.13	0.39	-	0.93	5.62	-	0.43	-
7.	*Dichanthium annulatum* (Forssk.) Stapf	Pre reproductive stage	53.83	0.27	0.19	2.64	0.24	0.23	1.41	1.93	0.52	-	0.43	-	0.44	0.68	-
		Reproductive stage	48.69	0.15	0.29	3.25	-	0.23	1.31	2.10	0.67	-	0.87	5.87	0.35	-	-
		Post reproductive stage	52.33	0.30	0.18	4.05	0.20	0.30	1.51	1.92	0.50	-	-	-	-	-	-
8.	*Hordeum murinum* L.	Pre reproductive stage	48.40	0.42	0.62	2.90	0.94	0.24	0.60	1.39	0.91	-	0.75	6.01	0.59	0.76	-
		Reproductive stage	48.26	0.24	0.20	0.94	0.18	0.20	1.16	2.18	0.35	-	0.61	4.13	-	-	-
		Post reproductive stage	56.22	0.16	0.21	3.21	0.23	0.13	0.93	1.64	0.44	-	0.65	-	-	-	-
9.	*Leptochloa chinensis* (Linn .) Nees.	Pre reproductive stage	50.71	0.24	0.47	2.63	0.22	0.23	0.49	0.88	0.64	-	0.61	5.97	0.65	-	0.15
		Reproductive stage	48.49	0.39	0.26	1.01	0.24	0.30	0.84	1.06	1.52	-	0.53	-	0.21	-	-
		Post reproductive stage	45.50	0.26	0.66	3.51	0.21	0.16	0.94	2.02	0.91	0.14	0.62	5.55	0.50	-	0.24
10.	*Phalaris minor* Retz.	Pre reproductive stage	42.89	0.26	-	1.95	0.33	-	0.84	2.02	0.37	-	-	12.90	-	-	0.25
		Reproductive stage	53.42	0.24	0.15	1.81	-	0.31	0.81	1.98	0.77	-	0.63	-	-	-	1.00
		Post reproductive stage	49.07	0.22	0.10	1.39	0.27	0.31	0.69	2.10	0.51	-	0.60	6.72	-	0.43	0.85
11.	*Polypogon fugax* Ness. Ex. Steud.	Pre reproductive stage	58.14	0.17	-	1.69	0.26	0.27	0.38	1.08	0.25	-	-	-	-	-	-
		Reproductive stage	58.81	0.22	-	1.14	-	0.45	0.65	1.61	0.77	-	0.60	-	-	-	-
		Post reproductive stage	56.44	0.29	0.14	0.71	0.17	0.31	0.13	1.12	0.27	-	-	-	-	-	-

Leptochloa chinensis (0.14 %) in post reproductive stage while absent in all other species in all stages. High amount of the level of Mn in fodder grasses can delay the development of animals [36]. Phosphorous, sulphur and copper contents were observed in all species in all phenological stages. High amount of phosphorous content can confine the accessibility of the macro-microelements and trace elements [37]. Sulphur and phosphorous are the major components of muscle proteins in cattle and poultry [33].

Grass and green fodder from such pastures and fields are unable to meet the animals' demand for copper, and young individuals are not supplied with adequate amounts of Cu in milk [38]. The total protein contents of grazed pastures only need to be among 2.0-2.6% (12.5-16%) of dry material contents for productivity of beef cattles [37]. Nitrogen contents are maximum in *Phalaris minor* (12.90 %) in prereproductive stage while minimum contents in *Apluda mutica* (2.78 %) in pre reproductive stage and in *Polypogon fugax* no nitrogen contents were detected in all phenological stages. Ferric (iron) contents were not detected in *Alopecurus myosuroides, Desmostachya bipinnata, Phalaris minor* and *Polypogon fugax* in all stages except *Apluda, Bromus, Cenchrus, Cymbopogon, Dichanthium, Hordeum,* and *Leptochloa.* Iron deficiency causes Anemia disease in cattle [39]. Zinc and sodium contents also present in trace amounts in all species. Zinc deficiency may contribute to skin changes, including peeling, scabbing, itching, and hair loss. Zinc deficiency may also be accompanied by inflammations of oral and nasal cavities with excessive salivation, swelling of the gums, and teeth grinding [40-42]. Sodium ions are the major cations responsible for the maintenance of blood pH values in animals [43].

Macro-micro mineral scarcity normally leads to reduced protection, introverted growth, propagative disorders, and minor output in animals [33]. Mineral components occupy the core place in livestock nutrition for creation as well as the condition of health [44]. In Darazinda FRDI Khan, Pakistan Samreen et al. [45] also conducted the same work on grasses in which 12 nutrients were screened to study the potential of these elements for normal function. Palatability class revealed that 2 forage grasses were moderately palatable, 5 kinds of grass were highly palatable and 4 species were less palatable (Table 2).

3.2. Proximate Composition

Proximate analysis is the partitioning of compounds in a plant extract into various components based on the chemical properties of the compounds. These components are moisture, crude protein, crude fibers, crude lipid, ash contents, and nitrogen-free extracts. Proximate analysis of all weedy grass species showed essential variation in dry matter, moisture, ash, crude fiber, crude protein, fat, nitrogen-free extract, and carbohydrates values from species to species were observed (Table 3).

Generally, percent dry matter contents is maximum in *Apluda mutica* (91.74%, 91.45%, 91.70%) followed by *Alopecurus myosuroides* (91.46%, 91.23%, 91.56%) in all phenological stages while the lowest contents detected in *Phalaris minor* had 89.6%, 88.3%, 89.9%, and the remaining species had less than the above contents. The long storage ability of dry matter flavors the growth of certain microbes [46]. Begum et al., [14] also result in the presence of moisture content that varied in different species which is dependent on the physiology and environment of the plant.

Moisture analysis resulted maximum values in *Phalaris minor* (10.4%, 11.2%, 11.9 %) followed by *Bromus catharticus* (9.79%, 9.56%, 9.81%), *Leptochloa chinensis* (9.48%, 9.14%, 9.34%) and *Desmostachya bipinnata* (9.35%, 9.27%, 9.21%) in all the three growth stages. Percent ash contents had high values in *Dichanthium annulatum* (18.12%, 17.67%, 17.12%) followed by *Leptochloa chinensis* (16.63%, 15.34%, 16.01%), *Hordeum murinum* (16.13%, 15.43%, 16.01%), *Apluda mutica* (14.31%, 14.37%, 14.24%) and *Bromus catharticus* (13.77%, 13.71%, 13.79%) while the remaining had less than the above in all phenologies. The ash content is imperative due to the mineral present in the plant, which may be responsible for any therapeutic result [47]. The crude fiber content was within a range of 35.89%, 35.46%, 35.89 in *Apluda mutica* and 13.39%, 13.33%, 13.41% in *Bromus catharticus* while crude protein within a range of 10.55%, 10.43%, 10.52% in *Bromus catharticus* and 4.308%, 3.334%, 3.987% in *Polypogon fugax* in all three phenological stages. Sultan et al., [48]

Table 2. Botanical, common names, palatability, and distribution of Fodder grass species.

S. No.	Botanical Name	Common name	Palatability	Distribution in Pakistan	Distribution in the world
1.	*Alopecurus myosuroides* Hudson.	Black grass, Slender meadow foxtail	Moderately Palatable	Baluchistan, Khyber Pakhtunkhwa & Kashmir	Europe and temperate Asia; introduced in North America and other temperate regions
2.	*Apluda mutica* L.	Mauritian grass	Highly palatable	Sind, Punjab, Khyber PakhtunKhwa & Kashmir	Arabia and Socotra; throughout tropical and New Caledonia, Oman and New Guinea
3.	*Bromus catharticus* Vahl.	Rescue grass	Highly palatable	Punjab & Khyber PakhtunKhwa	Native to South America, Europe, Australia and North America.
4.	*Cenchrus ciliaris* L.	Buffel grass, koluk katai	Less palatable	Khyber PakhtunKhwa , Sind, Baluchistan & Punjab	Distributed throughout Africa, extending through Arabia and the Middle East to India
5.	*Cymbopogon jwarancusa* (Jones) Schult.	Oil grass	Less palatable	Khyber PakhtunKhwa , Sind, Baluchistan, Punjab, & Gilgit	Westwards to Iraq and Socotra also in Nepal and Northwest India
6.	*Desmostachya bipinnata* (Linn.) Stapf	Salt reed-grass	Less palatable	Sind, Baluchistan, Punjab Kashmir & PakhtunKhwa	Throughout the Middle East to Indo-China, North and tropical Africa.
7.	*Dichanthium annulatum* (Forssk.) Stapf	Hindi grass, Sheda grass	Highly palatable	Sind, Baluchistan, Punjab Kashmir & Khyber PakhtunKhwa	Kenya, Tanzania and Senegal, through the Middle East to Indonesia, introduced to southern Africa, Tropical America and Australia.
8.	*Hordeum murinum* L.	False barley	Less palatable	Khyber PakhtunKhwa & Kashmir	Mediterranean region eastwards to Central Asia and China.
9.	*Leptochloa chinensis* (Linn.) Nees.	Asian sprangletop, or Chinese sprangletop	Moderately palatable	Sind, Punjab & Khyber PakhtunKhwa	China, Bhutan, Cambodia, India, Indonesia, Japan, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand, Vietnam; Africa
10.	*Phalaris minor* Retz.	Canary grass	Highly palatable	Baluchistan, Punjab, Khyber PakhtunKhwa & Kashmir	Cosmopolitan
11.	*Polypogon fugax* Ness. Ex. Steud.	Asia Minor Blue grass	Highly palatable	Baluchistan, Punjab, Khyber PakhtunKhwa & Kashmir	Iraq eastwards to Burma, mainly in the Himalayas.

Table 3. Mean proximate composition of weedy grasses of District Charsadda, Pakistan.

S. No	Botanical Name	Phenological stages	Proximate composition (%)							
			% DM	% Moisture	% ASH	% CF	% CP	%FAT	% NFE	% Carbohydrate
1.	*Alopecurus myosuroides* Hudson.	Pre-reproductive stage	91.46	8.54	6.423	31.78	4.313	13.77	35.17	66.95
		Reproductive stage	91.23	8.51	6.345	31.08	4.210	13.72	35.16	66.97
		Post-reproductive stage	91.56	8.94	6.237	31.56	4.153	13.69	35.32	66.32
2.	*Apluda mutica* L.	Pre-reproductive stage	91.74	8.26	14.31	35.89	5.555	11.93	24.08	59.97
		Reproductive stage	91.45	8.32	14.37	35.46	5.457	11.71	24.07	59.89
		Post-reproductive stage	91.70	8.17	14.24	35.89	5.382	11.52	24.08	59.83
3.	*Bromus catharticus* Vahl.	Pre-reproductive stage	90.21	9.79	13.77	13.39	10.55	14.67	37.91	51.29
		Reproductive stage	90.18	9.56	13.71	13.33	10.43	14.18	37.84	51.22
		Post-reproductive stage	90.20	9.81	13.79	13.41	10.52	14.49	37.92	51.27
4.	*Cenchrus ciliaris* L.	Pre-reproductive stage	90.24	9.76	14.67	23.26	8.675	14.92	28.73	51.99
		Reproductive stage	90.14	8.78	13.97	23.10	7.892	14.42	27.28	50.48
		Post-reproductive stage	89.10	8.91	12.12	22.51	8.111	14.67	27.01	52.13
5.	*Cymbopogon jwarancusa* (Jones) Schult.	Pre-reproductive stage	90.19	9.81	10.01	32.33	4.931	14.01	28.91	61.24
		Reproductive stage	90.11	8.77	10.14	32.71	3.983	14.23	28.81	61.49
		Post-reproductive stage	91.23	8.63	10.07	31.90	4.122	14.87	27.91	62.01
6.	*Desmostachya bipinnata* (Linn.) Stapf	Pre-reproductive stage	90.71	9.35	9.961	30.95	6.186	13.08	30.52	61.47
		Reproductive stage	90.34	9.27	8.123	29.62	5.398	13.91	30.14	60.58
		Post-reproductive stage	91.07	9.21	8.947	29.89	6.127	13.02	31.19	61.09
7.	*Dichanthium annulatum* (Forssk.) Stapf	Pre-reproductive stage	90.74	9.26	18.12	28.32	7.433	14.27	22.66	50.98
		Reproductive stage	90.12	9.71	17.67	27.01	7.875	13.56	21.82	49.87
		Post-reproductive stage	90.35	9.38	17.12	28.03	7.371	12.89	21.09	49.52
8.	*Hordeum murinum* L.	Pre-reproductive stage	90.13	9.87	16.13	29.54	8.675	13.58	22.25	51.74
		Reproductive stage	90.31	9.74	15.43	29.32	8.534	13.12	22.78	50.49
		Post-reproductive stage	90.12	8.90	16.01	28.29	8.701	12.89	23.90	50.41
9.	*Leptochloa chinensis* (Linn.) Nees.	Pre-reproductive stage	90.52	9.48	16.63	29.89	6.809	13.75	23.44	53.33
		Reproductive stage	90.43	9.14	15.34	29.80	5.786	13.33	23.80	53.39
		Post-reproductive stage	90.11	9.34	16.01	28.98	5.989	12.67	24.67	54.12
10.	*Phalaris minor* Retz.	Pre-reproductive stage	89.6	10.4	12.07	31.56	6.18	14.24	25.55	57.11
		Reproductive stage	88.3	11.2	12.34	31.22	6.32	14.13	25.26	57.60
		Post-reproductive stage	89.9	11.9	11.88	31.87	5.98	13.77	25.11	56.77
11.	*Polypogon fugax* Ness. Ex. Steud.	Pre-reproductive stage	90.31	9.69	9.293	17.19	4.308	12.6	46.91	64.19
		Reproductive stage	90.02	9.58	9.654	16.99	3.334	11.4	46.78	63.90
		Post-reproductive stage	90.56	9.31	9.432	16.56	3.987	12.9	45.97	63.87

find out that about 13.5 to 110.3 m tons ranges of crude proteins and digestible macro-micronutrients are required for every livestock for their proper body function but the resources of the current nutrients provide about 40% to 75% of natural contents of crude proteins and digestible nutrient contents. Shah et al., [19] also conducted the same nutritional study of forage grasses from Mastuj valley as stated that the level of natural crude fibers quantity is become low in *Cynodon dactylon* due to changes in phenological stages of plants like pre-reproductive to the post-reproductive stage and persisted varying in *Saccharum, Phragmites*, and *Calamogrostris.* Crude fat contents were found to be maximum in *Cenchrus ciliaris* 14.92%, 14.42%, 14.67%, and minimum in *Apluda mutica* 11.93%, 11.71%, 11.52% in all stages. High-fat contents show the suitability of a species as a food and also the level of palatability as their essential role in the production of energy [46].

The nitrogen-free extract contents were observed and decrease from 46.91%, 46.78%, 45.97% (*Polypogon fugax*) to 22.66%, 21.82%, 21.09% (*Dichanthium annulatum*) in all grasses species. Daccord et al., [49] also reported that a decrease in NFE values from pre-reproductive to advanced stages supporting the current results. The carbohydrates range from 66.95 % (*Alepecurus*) to 50.98 % (*Dichanthium*) in decreasing orders. In the present study, the selected fodder plant species contain a very low amount of moisture while dry matter contents have more amount.

Khan et al., [50] also reported a comparative proximate study of some weedy grasses for potential use as fodder from district Peshawar. As grasses and wide leaved herbs develop, they decline in crude proteins and increase in rough fibers, lignin, cellulose, and carbohydrates level. It is assumed that similar changes would occur because of repeated and occasional grazing and that the relative amounts of certain chemical substances influence palatability.

5. CONCLUSIONS

From the current study, it can be concluded that all the eleven wild grass species under investigation have good protein, carbohydrates, fiber, and mineral values required for the growth of cattle and therefore can prove better feeds for animals as compared to other vegetation found in present area. Due to the low productivity of fodder and high grazing pressure on pastures, there is an instant need for forage grasses. Thus based on current findings we suggest that all grass species have a high potential for their utilization as fodder and forage which provide a baseline to overcome the current shortage of fodder throughout the country as well as globally.

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