REPORT

Effect of phenological stages on nutritional assessment of ten plant species in Tehsil Takht-e-Nasrati, District Karak, Pakistan

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Abstract: The proximate analysis of ten plant species from Tehsil takht-e-Nasrati, district Karak was conducted at three phenological stages using standard techniques. The species showed variable results. In the test species, the moisture content varied from 2.11-14.12 %, 1.85-11.51 and 1.12-11.51%; the ash contents varied from 3.08-17.16%, 5.09-18.12% and 6.13-19.09%; the fibre contents varied from 2.14-11.09%, 2.43-12.31% and 2.78-13.01%; the carbohydrate contents varied from 54-85.1%, (50-84.1) and 47.1-81.1%; the fat contents varied from 1.06-5.46%, 1.09-5.98% and 1.56- 6.57 %; the protein contents varied from 2.11-12.41%, 3.14-15.87% and 4.12-18.54%; the energy value varied from 305.12-394.23 KCal/100g, 314.21-423.13 KCal /100g and 321.23-434.26 KCal /100g at vegetative stage, reproductive stage and post reproductive stage respectively. Proximate analysis of such plant species can help us to determine the health benefits achieved from their use in society. It is concluded that the poor livestock productivity in research area is partially due to insufficient amount of available poor quality forage that requires attention of the range mangers to improve the habitat and livestock breeds.

Keywords: Proximate analysis, phenological stages, productivity, Takht-e-Nasrati.

INTRODUCTION

Forages have always been an extremely important source of nutrients in livestock rations. Additionally, they provide fiber in the ration which enhances proper digestion in forage-consuming animals. Through their conversion into milk and meat products, forages continue to be one of the primary sources of nourishment in the human diet. On some ranches, range forage is the only feed source cattle have except for salt and water. During periods of initial plant growth in the spring and summer all forage species are high in nutrient content although moisture content may also be high and limit dry matter intake. However, as plant growth stages advance, the nutritional differences among forages becomes more obvious, especially during the fall and winter periods. The nutrient value of range forages is best tested by their ability to provide for the nutritional requirements of the grazing animal during the various seasons of production. Plant nutritional values should be compared with the corresponding animal requirements during the year. Many studies have assessed the nutritional value of forage in natural rangelands (Islam *et al*., 2003; Nasrullah *et al*., 2003) and in cultivated fodder species (Azim *et al*., 1989; Ashraf *et al*., 1995). The nutrient evaluation of range forage can be based on how much protein, fat, carbohydrate and energy the plants contain. These can best be discussed by dividing the plants into three common forage classes, grasses, forbs (broad-leaved, herbaceous plants, often called weeds), and shrubs (Khan 2013). Grasses are generally considered good sources of energy primarily because of their high content of cellulose. In very rank grasses however, digestibility will be so low as to reduce intake and thereby reduce total energy intake. Digestibility is the proportion of a dietary nutrient available for animal metabolism and indirectly tells us something about intake (as digestibility goes down, intake may go down). Shrubs are not considered good sources of energy after they reach fruit development. Again, forbs are intermediate between grasses and shrubs in furnishing energy. Studies have indicated that the quality of forage varies with the soil, season, rainfall, chemical nature, and age of the plants that affects palatability and health of grazing animals (Theunissen, 1995; Saleem, 1997; Ganskopp & Bohnert, 2001). Carbohydrates, fats and protein are the essential nutrients of life. The quality and quantity of proteins in the seeds are basic factors and important for the selection of plants for nutritive value, systematic classification and plant improvement programs (Nisar *et al*., 2009). Proximate and nutrient analysis of forage plant species plays a vital

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role in judging their nutritional impact. As various plant species are also used as food along with their benefits, evaluating their nutritional significance can help to understand the worth of these plants species (Pandey, *et al*., 2006). For this purpose, ten plants species were analyzed to evaluate their nutritional value and mineral contents.

MATERIALS AND METHODS

Collection of plants

Ten plant species i.e. *Cymbopogon jwarancusa*, *Eragrostis poaoides*, *Boerhaavia diffusa*, *Chrozophora oblique*, *Datura metel*, *Rhazya stricta*, *Vitex trifolia*, *Withania somnifera*, *Albizia lebbeck* and *Tamarix aphylla* were collected at three phenological stages (vegetative, reproductive and post reproductive) in 2011 from Tehsil Takht-e-Nasrati, District Karak. The identification and nomenclature of these forage plants was based on the flora of Pakistan (Nasir & Ali, 1978). The voucher specimens were deposited in the Herbarium, Department of Botany, University of Peshawar, Khybe Pakhtun Khawa, Pakistan.

Drying and grinding of plants

Each plant were washed thoroughly with deionized water, air dried, spread on an aluminium foil then heat dried first under sunlight then in oven at 60°C. The dried leaves were grinded well into a fine powder (60 mesh sieve size) with pastel mortar. The powdered plant material was then stored in glass bottles at 4°C.

Experimental protocol

Methods were applied to carryout proximate analysis of the samples for moisture, total ash, fiber, fats, proteins and carbohydrates (Anonymous, 1990). The moisture and ash were determined using weight difference method (Haro, *et al*., 1968; Boussama, *et al*., 1999 and Das, *et al*., 1997). The determination of proteins in terms of nitrogen was done by micro Kjeldahl method involving digestions, distillation and finally titration of the sample (Pearson, 1976). The nitrogen value was converted to protein by multiplying to a factor of 6.25. The lipid content of the samples was done using Soxhlet type of the direct solvent extraction method. The crude fibre was also determined by the method described by Haro *et al*. (1968) and Boussama, *et al*. (1999). The energy values (kcal/100 g) were determined by multiplying the values of carbohydrates, lipids and proteins by a factor of 4, 9, and 4 respectively, and taking the sum expressed in kilocalories (Onyeike, *et al*., 1998; Imran, *et al*., 2007). The total carbohydrates were determined by difference method [100- (proteins + fats + moisture + ash in percentage)] (Muller, *et al*., 1980). All the proximate values were reported in percentage (Hussain, *et al*., 2009 and 2010).

RESULTS

Moisture content (%)

The moisture content in the test species varied from 2.11 - 14.12% in vegetative stage, 1.85-11.51 in reproductive stage and 1.12-11.51% in post reproductive stage. The overall average ranged from 1.69-10.58% among the plants at three phenological stages. The overall percentage of moisture composition was maximum in *Datura metel* (14.12%) in vegetative stage as well as in reproductive stage (11.51%) and in post reproductive stage (6.12%). The least moisture percentage was recorded in *Eragrostis poaoides* (2.11%) in vegetative stage, (1.85%) in reproductive and (1.12%) in post reproductive. However, the lowest average was shown by *Eragrostis poaoides*(1.69%) and highest average by *Datura metel* (10.58%). It was observed that the lowest percentage of moisture was found at post reproductive stage in all test species (table 1; fig. 1).

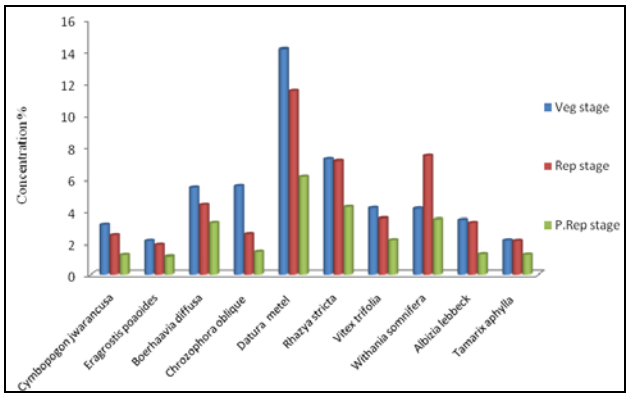

Fig. 1: Moisture contents (%) of some forage plant species of Tehsil Takht-e-Nasrati, district Karak at different phonological stages.

Ash content (%)

In the test species, the ash contents varied from 3.08-17.16% in vegetative stage, 5.09-18.12% in reproductive stage and 6.13-19.09% in post reproductive stage. Among the plants at three phenological stages, the overall average ranged from 4.81-18.12%. The overall percentage of ash composition was maximum in *Vitex trifolia* (17.16%) in vegetative stage as well as in reproductive stage (18.12%) and in post reproductive stage (19.09%). The least ash percentage in vegetative stage was (3.03%), in reproductive stage (5.09%) and 6.13% in post reproductive was found in *Withania somnifera*. However, the lowest average was shown by *Withania somnifera* (4.81%) and highest average by *Vitex trifolia* (18.12%). It was noticed that the highest percentage of ash was present at post reproductive stage in all test species (table 1, fig. 2).

Fibre contents (%)

The fibre contents in test species, varied from 2.14-11.09% in vegetative stage, 2.43-12.31% in reproductive

stage and 2.78-13.01% in post reproductive stage. Among the plants at three phenological stages, the overall average ranged from 2.45-12.13%. The overall percentage of fibres composition was maximum in *Albizia lebbeck* (17.16%) in vegetative stage as well as in reproductive stage (12.31%) and in post reproductive stage (13.01%). The least fibres percentage in vegetative stage was (2.14%), in reproductive stage (2.43%) and 2.78% was in post reproductive recorded in *Chrozophora obliqua*. However, the lowest average of fiber was shown by *Chrozophora obliqua* (2.45%) and highest average by *Albizia lebbeck* (12.13%). It was noticed that the highest percentage of fiber was present at post reproductive stage in all test species (table 1; fig. 3).

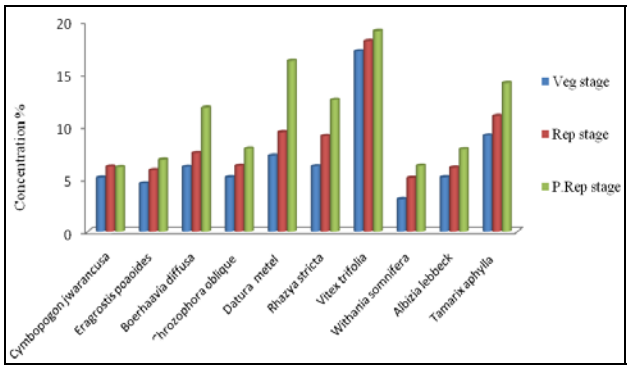

Fig. 2: Ash contents (%) of some forage plant species of Tehsil Takht-e-Nasrati, district Karak at different phonological stages.

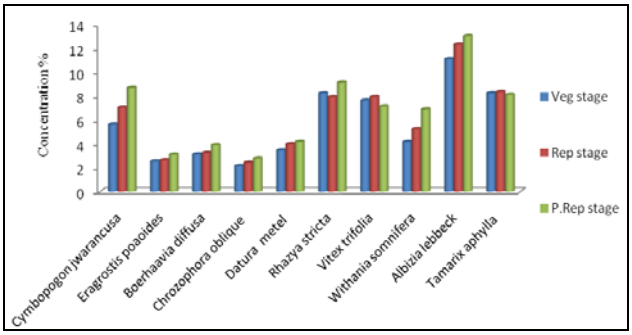

Fig. 3: Fibre contents (%) of some forage plant species of Tehsil Takht-e-Nasrati, district Karak at different phonological stages.

Carbohydrate contents (%)

In the test species, the carbohydrate contents in vegetative stage varied from 54-85.1%, in reproductive stage (50-84.1) and 47.1-81.1% in post reproductive stage. Among the plants at three phenological stages, the overall average ranged from 50.4-83.4%. The overall percentage of carbohydrate composition was maximum in *Eragrostis poaoides* (85.1%) in vegetative stage as well as in reproductive stage (84.1%) and in post reproductive stage (81.1%). The least carbohydrate percentage in vegetative stage was (54%), in reproductive stage (50%) and 47.1% was in post reproductive recorded in *Vitex trifolia*. However, the lowest average was shown by *Vitex trifolia* (50.4%) and highest average by *Eragrostis poaoides* (83.4%). It was noticed that the highest percentage of carbohydrate was present at vegetative stage in all test species (table 2; fig. 4).

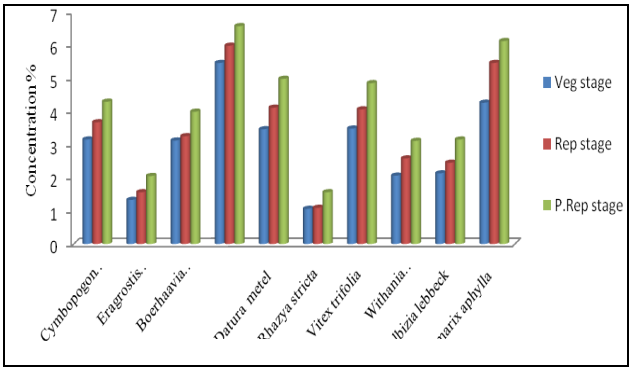

Fig. 4: Fat contents (%) of some forage plant species of Tehsil Takht-e-Nasrati, district Karak at different phonological stages.

Fat contents (%)

In the test species, the fat contents in vegetative stage varied from 1.06-5.46%, 1.09-5.98% in reproductive stage and 1.56- 6.57% in post reproductive stage. Among the plants at three phenological stages, the overall average ranged from 1.23-6%. The overall percentage of fat composition was maximum in *Chrozophora obliqua* (5.46%) in vegetative stage as well as in reproductive stage (5.98%) and in post reproductive stage (6.57%). The least fat percentage in vegetative stage was (1.06%), in reproductive stage (1.09%) and 1.56% was in post reproductive recorded in *Rhazya stricta*. However, the lowest average was shown by *Rhazya stricta 1.23*1%) and highest average by *Chrozophora obliqua* (6%). It was noticed that the highest percentage of fat was present at post-reproductive stage in all test species (table 2; fig. 5).

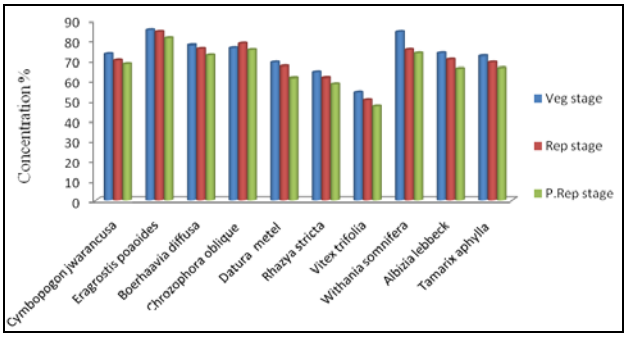

Fig. 5: Carbohydrate contents (%) of some forage plant species of Tehsil Takht-e-Nasrati, district Karak at different phonological stages.

Protein contents (%)

In the test species, the protein contents in vegetative stage varied from 2.11-12.41 %, 3.14-15.87% in reproductive

stage and 4.12-18.54% in post reproductive stage. Among the plants at three phenological stages, the overall average ranged from 3.46-15.6%. The overall percentage of protein composition was maximum in *Vitex trifolia* (12.41%) in vegetative stage as well as in reproductive stage (15.87%) and in post reproductive stage (18.54 %). The least protein percentage in vegetative stage was (2.11%), in reproductive stage (3.14%) and 4.12% was in post reproductive recorded in *Datura metel*. However, the lowest average was shown by *Datura metel* (3.46%) and highest average by *Vitex trifolia* (15.6%). It was noticed that the highest percentage of protein was present at post reproductive stage in all test species (table 2; fig. 6).

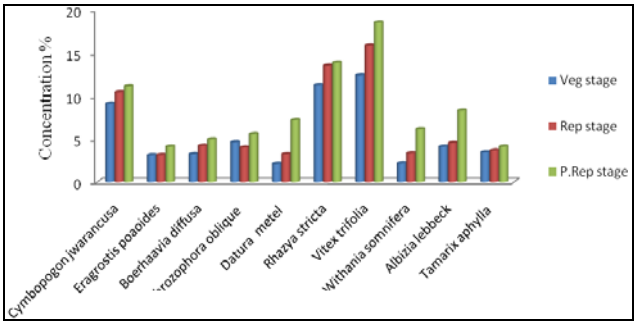

Fig. 6: Protein contents (%) of some forage plant species of Tehsil Takht-e-Nasrati, district Karak at different phonological stages

Energy Value (KCal/100g)

The energy value in the test species varied from 305.12-394.23 KCal/100g at vegetative stage, 314.21-423.13 KCal/100g at reproductive stage and 321.23-434.26 KCal/100g at post reproductive stage. The overall average ranged from 313.52-417.2 KCal/100g among the plants at three phenological stages. The overall highest energy value was found in *Tamarix aphylla* (394.23 KCal/100g) at vegetative stage, 423.13 KCal/100g at reproductive stage and 434.26 KCal/100g at post reproductive stage. The least energy value was recorded in *Eragrostis poaoides;* (305.12 KCal/100g) at vegetative stage, (314.21 KCal/100g) at reproductive and (321.23 KCal/100g) at post-reproductive stage. However, the lowest average was shown by *Eragrostis poaoides* (313.52 KCal/100g) and highest average by *Tamarix aphylla* (417.2 KCal/100g). It was observed that the highest percentage of energy level was found at post reproductive stage in all test species (table 2; fig. 7).

DISCUSSION

Proximate analysis plays an important role in assessing the suitability of plants species for different ruminant's requirement in different phases and subsidiary communities. Livestock nurture is a common observe in the area by the locals to build their livelihood. Low productivity due to deprived health of livestock was chief deliberation in the study area. To explain various proximate parameters like ash, carbohydrate, protein, fiber, fat, moisture and energy of selected forage plant species of Tehsil Takht-e-Nasrati, District Karak in three phenological stages were assessed. The nutritional demands of livestock vary with age and physiological functions of the grazing animal such as development safeguarding, growth, stuffing and lactation etc. Range animal efficiency depends upon the quantity and nutritive value of plant species available to primary consumers.

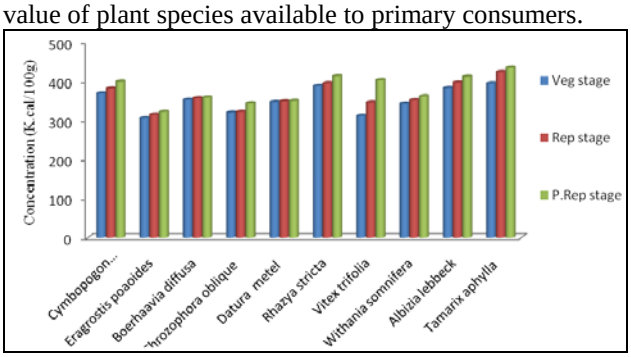

Fig. 7: Energy value (K Cal/100g) of some forage plant species of Tehsil Takht-e-Nasrati, district karak at different phonological stages.

The result showed that moisture contents not only varied among the species but also between the different phenological states of the plants. The result showed that moisture content was high in all test species at vegetative stage. Our result agrees with Hanif *et al*. (2006) who stated that the green leafy vegetables had higher moisture content. The highest percentage of moisture in leaves was also reported by Saidu & Jideobi (2009). The moisture contents of species are also depending upon on water availability. The moisture contents of the irrigated species are more than that of non-irrigated species. In present case the area is semi arid. High moisture content in *Allium sativum* (67.66%) was reported by Hussain *et al*. (2009) while the moisture contents are much less in our results. Adnan *et al*. (2010) agree with our results. They described the ranged of moisture in *Otostegia limbata* and stated that the moisture contents decreased with age. Onwordi *et al*. (2009) reported the mean moisture contents of leaves for *Amaranthus cruentus*, *Celusia argenta* and *Corchorus olitorius* is 23.57, 15.58 and 30.90% respectively. In our result the moisture content was low in post reproductive stage in all test species. Sowemimo *et al*. (2011) reported that the seeds of *Detarium senegalense* contain 5.89% moisture. Ingale & Shrivastava (2011) reported the moisture contents (5.529%) in seed of *Arachis hypogaea*.

The result shows that the ash contents of test species increased progressively with advancing phenological stages. Hussain & Durrani (2009) stated that ash contents increase with age. Hussain *et al*.,(2010) reported ash % in *Melia azadarichta*, *Withania cogulans* and *Fagonia indica* which ranged from 10.6%-16%. Ash content percentage of the herbs and grasses are smaller than shrubs and trees. Cheema *et al*., (2011) explored the nutrational value of *Morus alba*, *Acacia nilotica*, *Syzygium cumuni* and *Ziziphus jujuba* leaves and stated that ash content (10%)

were higher in *Z. jujuba* and *M. Alba*, respectively. Sowemimo *et al*., (2011) reported that the seeds of *Detarium senegalense* contain 1.93% ash. Our result is also similar with that of Hussain *et al*., (2011) who stated that the ash contents were high in shrubs than herbs. Fiber kept the digestive system healthy and functioning correctly in ruminants. In grazing animals, fiber parts that give energy are significant because celluloses and hemicelluloses are easily digested. Fiber aids and speeds up the excretion of toxins and waste product from the body. According to Belewu & Babalola (2009) the fibers can be used for useful purposes if treated with microorganisms. It is noticed from the result that the fibre contents percentage increased with advancing phenological stages. Hussain *et al*., (2010) reported the highest percentage (12.12%) of fibers in selected medicinal plants. Our range of percentage was similar with their value. In investigated area the *Albizia lebbeck* was used for digestion problem in grazing animal specially to cow. Hussain *et al.,* (2010) described that the high level of fiber increase the digestibility but high contents in diet can cause intestinal irritation. Hussain *et al*., (2011) reported the highest fibre contents (40.150%) in *Nepeta suavis*. The fibres contents in the case are much less than that of the cited results. Plant material is dividable into fibrous and non-fibrous portions.

The result showed that the carbohydrate contents decrease with advancing phenological stages. Taiga *et al*., (2008) carried out the proximate chemical analyses of dry vegetables and reported that Carbohydrate content of *P. guineese* and *V. subteranea* (77.17 and 89.42% respectively) was higher than that of *T. occidendalis* (63.64%). Our result is agreed with the above statement on basis of carbohydrate contents percentage. The carbohydrates contents were high in grasses is compare to other plant layers. In investigated area the grazing animals preferred the grasses as compare to other plant. Our result is similar with that of Hussain & Durrani (2009) who stated that sheep generally preferred grasses and concluded that grasses generally had more carbohydrates than shrubs. Our result agrees with Hussain *et al.* (2010) who investigated the carbohydrates ranged between 18.3 - 64.3%. Fats play a vital role in maintaining healthy skin and hair, insulating body organs against shock, maintaining body temperature, and promoting healthy cell function in ruminants. The result showed that the percentage of fat were increase with advancing phenological stages. The test plant species were collected from semi arid area. Adnan *et al*. (2010) stated that the sub-humid region's species had higher nutritional value than humid region's species. Ali *et al*. (2010) studied the nuts of six different walnut cultivars grown in Pakistan and reported the highest fats contents (63.54-69.92%). Hussain *et al*. (2011) carried out the nutritional value of 4 medicinal plants and stated that the highest percentage of fats (12.595%) was present in *Nepeta suavis*. The fat contents in our case are less than that of the cited results. Bangash *et al*. (2011) analyzed 10 vegetables in which the highest (0.40 %) and lowest (0.08 %) of fat was determined. Protein is used as defense against germs. Yao *et al.* (2000) reported that *Morus alba* is a best source of protein for ruminants. Hanif *et al*., (2006) estimated protein (0.9-2.1%) in the selected plants. The plant growing in higher altitudes experiences quite different climate and had higher content of protein than plants of plains. In the investigated area the *Rhazya stricta* and *Cymbopogon jwarancusa* were present through out in the hilly area. Bukhsh *et al.* (2007) stated that the protein contents are much in cultivated plants species as compare to wild plants. They reported that proteins were significantly higher in leaves of *Eruca sativa* as compared to *Carthamus oxyacantha* and *Plantago ovata.* The protein contents in our case are less than that of Taiga *et al*. (2008) who reported the higher protein contents in *M. esculentum* (29.30%) and *C. odorata* (32.40%) the cited results. Shah *et al.* (2009) described that the highest protein contents varied from 23%-33% in plant species. In the present result the protein contents varied at advancing phenological stages. Our result agrees with that of Hussain & Durrani (2009) who state that protein contents changed with advancing phenological stages. Our result is also agrees with James *et al.* (2010) who stated that in plants the protein contents different from part to part. Cheema *et al.* (2011) reported high concentration of protein in leaves of *Morus alba* and stated that it is a best source of protein in ruminant feeding. They also stated that different level of protein is due to differences of protein accumulation. Our results suggested that the investigated plants had sufficient level of protein which is the best source of supplement for grazing animals. Chinedu & Nwinyi (2012) reported the protein contents percentage of two traditional grain legumes and stated that *Voadzeia subterranean* contain 32.40±0.02% protein and 37.21±0.02% proteins in *Sphenostylis stenocarpa*.

From the result it was found that the energy value was high in tree species and least in grasses. The energy value was increased with advancing phenological stages. Hussain & Durrani (2009) stated that the proximate composition of plant species was changed with advancing phenological stages. Ali *et al*. (2010) studied the nuts of six different walnut cultivars grown in Pakistan. They found the highest energy value of the kernels in the range of 698.10-732.44 Kcal/100 g, and stated that energy value were high in fruits. In our case the energy value was high in post reproductive stage. Adnan *et al*. (2010) concluded that sub-humid region's species had higher nutritional value than humid region's species. Hussain *et al.* (2011) carried out the nutritional value of 4 medicinal plants of the Northwest Pakistan. They reported the energy value of herbaceous plant i.e. *Aerva javanica* (398.496 Kcal/100g). In our case the energy value of herbaceous layer was similar with the above sited. Henry-Unaeze (2011) reported the highest energy value (468.3 kcal) in acha

Table 1: Proximate composition (moister, Ash and Fiber) of selected forage species of Tehsil Takht-e-Nasrati, District Karak.

Species	Moister %				Ash %				Fibre %			
	Vegetative	Reproductive	P. Reproductive	Average	Vegetative	Reproductive	P. Reproductive	Average	Vegetative	Reproductive	P. Reproductive	Average
Cymbopogon jwarancusa (Jones) Schult.	3.11	2.45	1.21	2.25	5.12	6.18	6.13	5.81	5.62	7.03	8.69	7.11
Eragrostis poaoides Beauv.	2.11	1.85	1.12	1.69	4.59	5.84	6.84	5.75	2.54	2.63	3.11	2.76
Boerhaavia diffusa L.	5.44	4.36	3.23	4.34	6.15	7.48	11.78	8.47	3.13	3.24	3.89	3.42
Chrozophora obliqua (Vahl) A. Juss.	5.54	2.52	1.42	3.16	5.16	6.26	7.89	6.44	2.14	2.43	2.78	2.45
Datura metel L.	14.12	11.51	6.12	10.58	7.23	9.46	16.25	10.98	3.46	3.98	4.16	3.86
Rhazya stricta Decne.	7.23	7.11	4.23	6.19	6.21	9.08	12.53	9.27	8.23	7.91	9.13	8.42
Vitex trifolia L.	4.16	3.52	2.15	3.27	17.16	18.12	19.09	18.12	7.62	7.92	7.13	7.55
Withania somnifera (L) Dunal.	4.13	7.45	3.45	5.01	3.08	5.09	6.28	4.81	4.15	5.23	6.89	5.42
Albizia lebbeck (L.) Benth.	3.42	3.22	1.26	2.63	5.16	6.08	7.84	6.36	11.09	12.31	13.01	12.13
Tamarix aphylla (L.) Karst.	2.14	2.11	1.23	1.82	9.13	11.01	14.15	11.43	8.24	8.34	8.11	8.23
Maximum	14.12	11.51	6.12	10.58	17.16	18.12	19.09	18.12	11.09	12.31	13.01	12.13
Minimum	2.11	1.85	1.12	1.69	3.08	5.09	6.13	4.81	2.14	2.43	2.78	2.45
Average	5.14	4.61	2.54	4.09	7.83	8.46	10.88	8.74	5.62	6.1	6.69	6.13

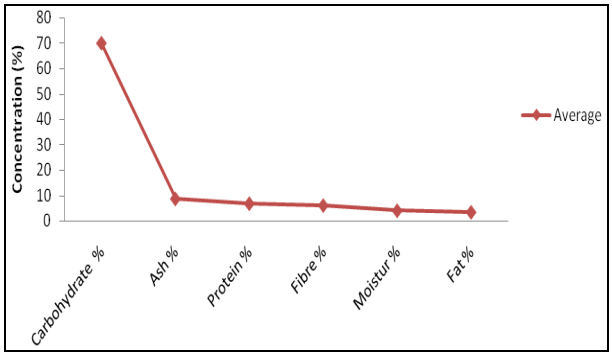

Fig. 8: Mean nutrient value (%) of some forage plant species of Tehsil Takht-e-Nasrati, district karak.

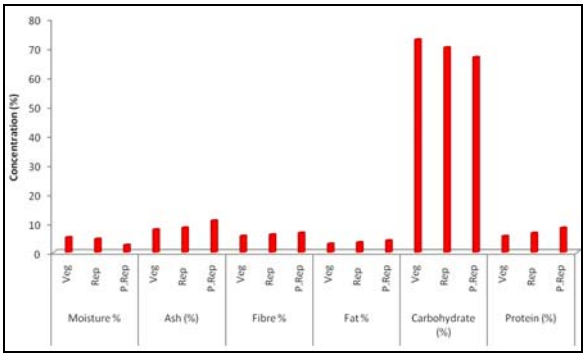

Fig. 9: Mean nutrient value (%) of some forage plant species of Tehsil Takht-e-Nasrati, district Karak at different phonological stages.

porridge used in complementary food of Igbo mother. Ingale & Shrivastava (2011) determined proximate composition and nutritional value of seeds of new variety of *Arachis hypogaea* and stated that groundnut seed contained the highest energy value (601.856%).

The goat and sheep preferred the grasses *Eragrostis poaoides* as compared to shrubs and trees while trees are preferred by camel. It means that these animals preferred those plants, which have more content of carbohydrate. Some plants have relatively a good source of carbohydrate up to 80% while some can yield carbohydrates up to a low amount of 15.51% (Saputera *et al*., 2006 and Shah *et al*., 2009). *Chrozophora obliqua* was preferred by camel. From the above result we may concluded that the plants which have more fat content were preferred by the camels. On average the increasing order of these nutrients among the plant samples of the area were carbohydrate (85.06%)> ash (19.09%) > protein (18.54%)> moisture (14.12%)> fiber (13.01%)> fat (6.57%) (fig. 8).

In summer season the area were free of grasses and herbs. From the result it was observed that the amount of carbohydrate and moisture were decreased with the plant intensification and vise versa while the amount of ash, fat, fiber, protein and energy value were increased with the advancing phenological stages (fig. 9). It was also noticed that the different parameter were also depended on the plant habit. In trees species the energy value and fiber content were increased while in shrubs, the amount of ash, moisture and protein were found in high quantity. High quantity of fat was found in herbs while the high amount of carbohydrate was found in grasses (tables 1, 2).

Table 2: Proximate composition (Carbohydrate, Fat, Protein and energy value) of selected forage species of Tehsil Takht-e Nasrati, District Karak.

Species	Fat %				Carbohydrate %				Protein %				EV (KCal/100g)			
	Vegetative	Reproductive	P. Reproductive	Average	Vegetative	Reproductive	P. Reproductive	Average	Vegetative	Reproductive	P. Reproductive	Average	Vegetative	Reproductive	P. Reproductive	Average
Cymbopogon jwarancusa (Jones) Schult.	3.15	3.67	4.29	3.7	73.1	70.1	68.1	70.4	9.12	10.45	11.14	10.23	368.12	381.03	398.62	382.59
Eragrostis poaoides Beauv.	1.33	1.56	2.05	1.64	85.1	84.1	81.1	83.4	3.12	3.14	4.12	3.46	305.12	314.21	321.23	313.52
Boerhaavia diffusa L.	3.12	3.25	3.99	3.45	77.5	75.8	72.4	75.2	3.25	4.23	4.99	4.15	352.05	356.28	358.06	355.46
Chrozophora obliqua (Vahl) A. Juss.	5.46	5.98	6.57	6	76.2	78.3	75.2	76.6	4.65	4.02	5.61	4.76	319.46	321.23	343.03	327.9
Datura metel L.	3.46	4.11	4.98	4.18	69	67	61	65.7	2.11	3.24	7.23	4.19	346.03	348.13	349.26	347.81
Rhazya stricta Decne.	1.06	1.09	1.56	1.23	64.1	61.1	58.1	61.1	11.25	13.54	13.89	12.89	387.56	394.62	412.23	398.13
Vitex trifolia L.	3.48	4.06	4.85	4.13	54	50	47.1	50.4	12.41	15.87	18.54	15.6	311.25	345.13	402.23	352.87
Withania somnifera (L) Dunal.	2.06	2.58	3.11	2.58	84.1	75.3	73.5	77.6	2.17	3.34	6.18	3.89	342.26	351.03	361.02	351.43
Albizia lebbeck (L.) Benth.	2.13	2.45	3.15	2.57	73.6	70.6	65.8	70	4.12	4.56	8.32	5.66	382.12	396.08	411.03	396.41
Tamarix aphylla (L.) Karst.	4.26	5.46	6.12	5.28	72.1	69	66.1	69.1	3.46	3.68	4.13	3.75	394.23	423.13	434.26	417.2
Maximum	5.46	5.98	6.57	6	85.1	84.1	81.1	83.4	12.41	15.87	18.54	15.6	394.23	423.13	434.26	417.2
Minimum	1.06	1.09	1.56	1.23	54	50	47.1	50.4	2.11	3.14	4.12	3.46	305.12	314.21	321.23	313.52
Mean	2.95	3.42	4.07	3.48	72.9	70.1	66.8	69.9	5.57	6.61	8.41	6.86	350.82	363.09	379.09	364.33

CONCLUSION

Proximate analysis of such plant species can help us to determine the health benefits achieved from their use in society. It is concluded that the poor livestock productivity in research area is partially due to insufficient amount of available poor quality forage that requires attention of the range mangers to improve the habitat and livestock breeds.

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