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Research Article

Spatial Variability in Proximate Composition of Lambsquaters (*Chenopodium album*) Grown in District Mianwali, Punjab, Pakistan

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Abstract: The current study was conducted to assess the proximate composition of *Chenopodium album* collected from different tehsils i.e. Mianwali, Esakhel, Piplan, of district Mianwali. The highest moisture (84.22±0.86%) and ash (29.96±2.12%) content was found in *Chenopodium album* collected from Piplan and Mianwali respectively. The maximum crude fiber (14.61±1.83%) and ether extract (27.11±0.21%) was reported in Piplan. The maximum crude protein (0.87±0.036%) and carbohydrates (11.67±1.38%) was observed in Esakhel while variation in proximate composition of *Chenopodium album* collected from different localities may be attributed to environmental factor (soil composition, water, temperature, light etc.) or may be due to spatial variation.

Keywords: Proximate composition, *Chenopodium album,* District Mianwali.

1. INTRODUCTION

This plant belongs to family Amaranthaceae which is used as vegetable [1], common names are as follows like Lambsquarters, Bathoo, Marathi, Fat-hen, Goosefoot, Papukurra. The height of plant is ranges from 10-120 cm. The leaves of *Chenopodium album* can be varied and are alternating in appearance [2].

Some important material such as alkaloids, nutrients, antioxidants, tannins, phenols, glycosides are present in *Chenopodium album* [3] which are very essential for the proper functioning of the body. This plant has retained aromatic compounds used in all over the world. Sugars, protein, fat, fiber are also present [4]. They are also important due to their effective efficiency of curing diseases with no side effects [5]. The Ethno-medicinal use of *Chenopodium album* plant is laxative, Anthelmintic, stimulant, and diuretic. The extracts of this plant are used to control digestive problems such as troubled stomach, constipation by enhancing the activity of the stomach [10].

It is stated that the district Mianwali, Punjab, Pakistan has great possibility of plant resources with wealthy heritage of native information about apply of these species. There is need of time to awake the local communities to guard and protect their plant resources by educating each other for sustainable growth and consumption.

The main aim of study is to explore the proximate composition of medicinal plant (*Chenopodium album*) in district Mianwali based on medicinal plant resources with particular importance on citations of native knowledge from neighboring communities.

2. MATERIALS AND METHODS

2.1 Area of study

Mianwali is situated between 32°-10° to33°-15° north latitude and 71°-08 to 71°-57° east. The most

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of these parts are the persistence of Potohar Pleatue and Salt Range the District Mianwali is surrounded on the north by Kheber Pukhtun Khawa and Attock district of Punjab, on the east by Kohat districts, the south by Bhakkar district of Punjab and on the west by Lakki, Karak and Dera Ismail Khan district of Kheber Pukhtun Khawa again. The climate of the Mianwali District as an entire is severe with extended hot summer and cold dry winters. Summer season from May to September and winter season from October till February. July is the hottest month in Mianwali with standard temperatures of 43°C while December and January are the coldest months with average minimum temperature 6°C -7°C [12].

2.2 Collection of samples

Plant leave samples were collected from three tehsils of district Mianwali i.e. Mianwali (T1), Esakhel (T2), Piplan (T3) for analysis. Each sample is comprised on three replicates, randomly picked up, wrapped in a particular black envelope and labeled.

2.3 Measurements

For proximate analysis plant leave samples were ground into fine powder. The AOAC method [6] is used to determine the proximate composition (moisture, dry matter, mineral matter, crude protein, crude fiber, ether extract, carbohydrates). Experiment was performed in Institute of Food Science and Nutrition, University of Sargodha, Sargodha.

2.3.1 Moisture: (%)

Fresh weight of plant samples. Then transferred these samples into the oven at 600°C for 24 hour. Then these samples were collected and weight noted on electrical balance.
The following formula was used for the determination of moisture contents

$$\text{Moisture \%} = \frac{\text{Dry weight of sample}}{\text{Fresh weight of sample}} \times 100$$

2.3.2 Mineral matter: (%)

Dehydrated samples were scorched with the oxidizing blaze until fumes formed. The plant samples were then ignited at 550°C furnaces to flame all the whole matter.

The given formula was used to determine the mineral matter percentage composition

$$\text{Mineral matter} = \frac{\text{weight of ash}}{\text{weight of sample}} \times 100$$

2.3.3 Ether extract: (%)

Soxhlet apparatus was used for extraction of crude fat with petroleum ether (45°C – 60°C). This method was used to eliminate the part that was ether soluble. Plant leave samples were used in this process. It was dehydrated up at 70°C until the stable weight achieved.

The following formula was used for the determination of ether extract contents

$$\text{Ether extract} = \frac{\text{Wt of flask with ether extract} - \text{Wt of empty flask}}{\text{weight of sample}} \times 100$$

2.3.4 Crude fiber: (%)

Acid-base digestion method was used to determine the crude fiber composition. Firstly, the samples were dried into oven. Soxhlet apparatus was used to remove the fat and digested the plant samples in 1.26% NaOH and H_2SO_4 separately to remove acid-base contents from the samples. Then the samples were washed three to four times by means of distilled water, transferred in Petri dishes and placed in kiln on 105°C for one day. The variance among the weights of the plant samples were the contents of crude fiber.

The following formula was used for the determination of crude fiber content

$$\text{Crud fiber \%} = \frac{\text{Wt of flask with sample after drying} - \text{Wt of empty flask}}{\text{weight of sample}} \times 100$$

2.3.5 Crude protein: (%)

The Kjeldhal method was used for determination of protein, first total nitrogen was determined by using

Kjeldhal apparatus [7], and then protein contents were obtained by multiplying nitrogen to a factor of 6.25.

Crude protein = % Nitrogen × 6.25

2.3.6 Carbohydrates: (%)

Carbohydrates concentration were determined by subtracting ether extract, mineral matter, protein, fiber and moisture contents from 100.

Carbohydrates = 100 - (Moisture, mineral matter, crude protein + ether extract + crude fiber).

2.4 Statistical analysis

Descriptive statistics was carried out using Microsoft Excel 2007 [13].

3. RESULTS

The results showed that there is significant variations in proximate composition of *Chenopodium album* are present. However, the moisture and crude fiber content in *Chenopodium album* varies from 84.22±0.86, 14.61±1.83 (T3) to 80.04±2.32, 11.72±0.43 (T1) with a mean value of 82.53±1.23, 12.98±1.12 respectively, while the mineral matter and ether extract varies from 29.96±2.12 (T1), 27.11±0.21 (T3) to 29.12±1.92 (T2), 11.72±0.43 (T1) with a mean value of 29.64±1.76, 24.98±0.57 respectively. Maximum crude protein content was found in T2 (0.87±0.036) while the lowest in T1 (0.18±0.006) with a mean value of 0.42±0.02, while carbohydrates content was found to be highest in T2 (11.67±1.38) and minimum was noted in T1 (6.94±0.46) with a mean value of 9.30±0.64.

4. DISCUSSION

The human body is basically water. Babies are comprised of 70 percent water, while grown-up guys are 60 percent and females are 55 percent [14]. Water gives the medium to make your blood, helps move nourishment through your stomach related tract and expels squander from each cell in your body [15]. Water hydrates the body by filling in as an oil to soak joints, and furthermore ensures your eyes, mind and spinal line [16]. The stomach related framework utilizes water for indispensable liquids, for example, blood, salivation and stomach related liquids to help in the transportation of supplements and evacuation of waste items. Water helps move your sustenance through your digestive organs, which is vital in avoiding constipation [17]. Results regarding moisture content were in collaboration with the findings of Hussain et al [18] and Singh et al [19]. Moisture content in different samples vary from 84.33±0.01 to 87.5±1.1 in *Chenopodium album*. The mature plant of *Chenopodium album* was retained 97.4 ± 0.1% moisture content [8]. While according to Gqaza et al [9] that *Chenopodium album* was retained 9.13% moisture content in South Waziristan area of Pakistan.

Chenopodium album contain many important minerals that are very essential for proper functioning of the body [20]. They are important for our survival as part of hemoglobin, myoglobin., acting as a catalyst in many biological reactions [21], are also important for our nervous system (Transmission of messages from one part of body to another), also important for proper food digestion [22], metabolism, utilization of all nutrients in food [20]. Results regarding mineral matter content are in collaboration with the findings of Singh et al [19] and Hussain et al [18]. Mineral matter concentration in different samples of *Chenopodium album* vary in range from 2.07±0.3 to 22.15±0.09 in fresh and dehydrated leaves, while 23.25±0.25% also noted by Adedapo et al [23]. In Okra, Amaranth vary from 9.036±0.01% to 22.84±0.04% respectively [9].

Table 1: Proximate Composition of Bathoo (*Chenopodium album*) from three different tehsils of Mianwali District

Tehsils	Moisture	Mineral matter	Crude fiber	Ether extract	Crude protein	Carbohydrates
T1	80.04±2.32	29.96±2.12	11.72±0.43	21.21±0.61	0.23±0.029	6.94±0.46
T2	83.34±0.63	29.12±1.92	12.63±1.11	26.64±0.89	0.87±0.036	11.67±1.38
T3	84.22±0.86	29.84±1.31	14.61±1.83	27.11±0.21	0.18±0.006	9.31±0.09
Mean	82.53±1.23	29.64±1.76	12.98±1.12	24.98±0.57	0.42±0.02	9.30±0.64

Dietary fiber is that piece of plant material in the eating regimen which is impervious to enzymatic absorption which incorporates non-cellulosic and cellulosic polysaccharides, for example, pectic substances, mucilage, hemicellulose, gums and a non-starch segment lignin. The eating regimens wealthy in fiber positively affect wellbeing in relieving a few problems. It is also useful for stomach related framework, enhances inside working and soothes bowl drive in patients [24], may likewise go about as a defensive factor in malignancy, decreasing the measure of cancer-causing agent that interacts with the gut divider, good for diabetic patients [27, 28], reduce the risk of heart failure by reducing the cholesterol level [29], lowering both serum cholesterol and triglycerides [24]. Results regarding crude fiber were in collaboration with the findings of Dai et al [11] and Singh et al [19]. crude fiber content in *Chenopodium album* noted as 13.92% in Nigeria. It varies from 0.81±0.08 to 6.26±0.11 in fresh and dehydrated leaves of *Chenopodium album*. In Okra, Ribbed loofah, Amaranth vary as 14.71±0.02, 10.25±0.01, 10.13±0.05 respectively.

Ether extract or fats (crude) are a kind of supplement that you get from your eating regimen. It is essential to eat a couple of fats, anyway it is in like manner dangerous to eat excessively. These makes body energetic that it needs to work truly. These are second source of energy for body [17]. Fat in like manner need to keep skin and hair strong, moreover holds fat-dissolvable (vitamins K, D, A and E), furthermore fills your fat cells and ensures body to help keep you warm. The fats your body gets from your sustenance give your body crucial unsaturated fats called linoleic and linolenic destructive. They are called "essential" in light of the fact that your body can't make them itself, or work without them [30]. Your body needs them for psychological well-being, controlling disturbance, and blood coagulating [21].

Results regarding crude fat were in collaboration with the findings of Adedapo et al [23] and Singh et al [19]. The crude fat content in *Chenopodium album* varies from 0.63 to 13.92%. In *Bidens pilosa* noted as 6.0± 1.0.

Results regarding crude fat were in collaboration with the findings of Adedapo et al [23] and Singh et al [19]. The crude fat content in *Chenopodium album* varies from 0.63 to 13.92%. In *Bidens pilosa* noted as 6.0± 1.0.

Protein is key to good health - it's involved in transport of oxygen, maintains the health of muscle tissues, improve immune functions. It also important for growth and development in children, teens, and pregnant women. They are large, complex molecules that have many critical roles in the body. They are composed of amino acids and bound together by peptide bonds. They also play important role in the formation of DNA, enzymes, neurotransmitters, antibodies, hairs and nails [30]. Results regarding crude protein were in collaboration with the findings of Singh el al [19] and Gqaza et al [8]. The crude protein in different samples of *Chenopodium album* rang vary from 3.7±0.12 to 32.95±0.24. In *A. viridus, L. acutangula* noted as 16.41±0.03, 13.43±0.06 respectively reported by Hussain et al [18].

Much the same as your auto needs fuel to influence it to run, your body needs fuel to influence it to go. your body doesn't keep running on gas - it keeps running on sugars. Starches which are present in our diet like grains, milk products, beans, vegetables and fruits, are by a wide margin your body's most loved wellspring of vitality. The primary capacity of starches is to provide energy for the brain and body [31]. A sufficient admission of carbs likewise saves proteins and assists with fat digestion. The greater part of your body cells utilizes the straightforward sugar glucose for vitality, yet your mind is especially needing glucose as a vitality source. Along these lines, we can include that a critical capacity of carbs is providing vitality to the cerebrum. On the off chance that you have ever gone on a low-carb eating routine and felt like your cerebrum was foggy for a couple of days, at that point you encountered exactly how imperative starches are to appropriate mind work [32]. Another capacity of sugars is to keep the breakdown of proteins for vitality. By expending adequate measures of starches in your eating routine, you guarantee that your body can meet its vitality needs, yet in the event that your admission of carbs is too low or you are utilizing them up too rapidly, for example, during forceful work or exceptional exercise, at that point your body is compelled to break down proteins for vitality [33]. Results regarding carbohydrate content are in collaboration with the findings of Gqaza et al

[9] and Singh et al [19]. Carbohydrate content in different samples of Chenopodium album vary from 4.0±0.0 to 34.46±0.85 %. Some others also noted in *Chenopodium album* range from 29.41±0.1 to 41.58±0.3 %.

5. CONCLUSION

The results of the analysis suggest that observed plant collected from all tehsils contain good source of nutritional composition (proximate) and may use as useful forage for animals but there is fluctuation in nutritional content (proximate) of *Chenopodium album* present in all tehsils which may attributed to different environmental factors (Soil composition, Water, Temperature, Light) or may be due to spatial variation. Exploration of nutritive value of this plant will not only be of economic importance but would be a step toward better utilization of these plants as phytomining, biofuel production or may be used for additional feed and medicine production (homeopathic, allelopathic).

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