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Proximate and Minerals Composition of *Mentha Piperita* Varieties of Valley Peshawar, Khyber Pakhtunkhwa, Pakistan

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Abstract : The present studies were carried out to investigate the physiochemical and minerals analysis of the two varieties of mentha grown in Khyber Pakhtunkhwa-Pakistan. The proximate composition was determined according to standard official approved methods. The highest proximate values moisture 6.5±1.0% (stem), ash 10±2.0% (leaves), fat 2.4±0.5% (leaves), fiber 10±0.5% (stem) and protein 5.5±2.0% (leaves) of Mentha *piperita* citrate were found. Flame Photometer and Atomic Absorption Spectrometric techniques were applied for the minerals analysis. Na, K, Mg, Cu and Mn, were highest in leaves of M*. piperita* citrate. While maximum quantity of Fe and Zn were determined in leaves of M*. piperita* perpeta, P and Cr were not found in any varieties parts.

Keywords: *Mentha piperita*, Protein, Fiber, Nitrogen, Micro-minerals, Macro- minerals

Introduction

A perennial plant M*entha piperita* is found in different parts of the world both as wild and cultivated. M*entha piperita* is utilized internally as extract, oil, tincture and tea, while externally applied as liniment or rub. Plant experts consider as an anti-aging, stimulant, emmenagogue, rubefacient, antimicrobial, astringent, anticatarrhal, antipyretic, antispasmodic and antiseptic properties (Ali *et al*., 2002).

Nutrient and proximate analysis of edible vegetables and fruits play a vital role in assessing their nutritional importance. As a variety of therapeutic herbs species are also used as food beside with their curative benefits, evaluating their dietary importance can assist to recognize the attraction of these flora species (Pandey et al., 2006). For proper biochemical and physiological functioning, both animals and plant require mineral nutrients. The core reason of numerous health problems in human are moreover lack of minerals. Plant is one of the sources of mineral for animals and man. Scientists are trying to discover the elemental ingredients of therapeutic plant and show a relationship to cure the diseases (Muhammad *et al*., 2013). Hence, the objective of the study was to assess the physiochemical and minerals properties of the locally grown mint plant leaves and stem.

Materials and Methods

Plant Collection and Preparation

Healthy plants (*Mentha piperita* L.) were collected from Medicinal Botanical Garden of Pakistan Council of Scientific and Industrial Research Laboratories Complex Peshawar Khyber Pakhtunkhwa-Pakistan, washed thoroughly in tap water and shade dried for two weeks.

Physiochemical Analysis

The leaves and stem powder of *Mentha piperita* were utilized for physiochemical analysis, which included parameters like moisture, ash, fat, crude fiber, nitrogen, protein. These analyses were carried out according to the standard procedures (AOAC, 2003).

Minerals Analysis

Elemental compositions were carried out by wet digestion procedure. Minerals like sodium and potassium were determined with the help of Flame Photometer (Jenway, PFP7). Heavy and alkaline metals like Ca, Mg, Fe, Al, Mn, Zn, Si, Ba, Cd, Pb, Cr and Ni, were determined by Atomic absorption spectrophotometer (Hitachi Zeeman Japan Z-8000) according to the standard methods (AOAC, 2003).

Statistical Analysis

Means and standard deviations were calculated for three independent determinations for each variable using SPSS programme.

Results

In the proximate composition, moisture contents were determined on dry basis while other parameters (inorganic matters, crude fat, crude fiber, protein and nitrogen-free extract) on the wet basis in the leaves and stem of *M. piperita citrate and M. piperita perpeta,* as present in Table 1. The organic matters of leaves of *M. piperita* citrate and *M. piperita* perpeta (10±2.0 and 8.0±2.0) were significantly higher than stem of the same plants. Similar, the protein and carbohydrate values of leaves of *M. piperita* citrate and *M. piperita* perpeta were also found higher as compared to the stem of the both plants. The crude fiber of leaves of *M. piperita* citrate and *M. piperita* perpeta were recorded lower (8.0±1.0 and 7.0±1.0) than stem of the both plants.

Mineral composition of leaves and stem of M. piperita are shown in Table 2. In mineral composition, macro- and microminerals were determined in leaves and stem of *M. piperita c*itrate and *M. piperita* perpeta. The most abundant among macrominerals were Na, K and Mg (900±4, 600±2 and 650±3) in the leaves of *M. piperita* citrate than stem of the same plant. Similar trend was found in the leaves of *M. piperita* perpeta. The most concentrated microminerals in this study were Zn and Mn (75±1 and 70±1) in the leaves of *M. piperita* citrate and *M. piperita* perpeta as compared to the stem of the same plants. The lead and chromium metal was not detected in leaves and stem of *M. piperita* citrate and *M. piperita* perpeta.

Discussion

Mint tea is widely used as herbal tea; therefore, mineral content of its herbs can meet daily elemental mineral demand of human body when consumed as herbal tea. Minerals are most important in the diet, even though they comprise only 4–6% of the human body (Ozcan, 2004). Their excess or deficiency in organs and tissues leads to diseases. It is very important to know the possible influence of metals on pharmacological properties of herbal infusions (Queralt et al., 2005).

Geographical origin of plants belonging to the same species can result in different concentrations of elements and their bioavailability, depending on environmental pollution and soil topographies (Queralt et al., 2005). The World Health Organization cites maximum permissible levels in raw plant materials for cadmium as 0.3

mg kg-1, for chromium as 2 mg kg^{-1}, and for copper as 20 mg kg^{-1} (Queralt et al., 2005; WHO, 2005). This study showed that Cd, Cr, Cu content of mint species were lower than that recommended by World Health Organization (WHO, 2005).

Minerals play vital and important role in our body; sodium and potassium normalize acid base balance and osmotic pressure of body fluid (Bashir & Ali 2013). Calcium, a macro-mineral, is vital for bones and teeth health. It is needed for cardiac muscles and nerve impulses, blood and milk clotting (Muhammad *et al.*, 2013). Zinc is required for wound healing, normal growth, normal insulin secretion, behavioral development and brain health. The permissible limit for edible plants is 27.4 ppm (Muhammad *et al.*, 2013). Manganese play a very important function during biological process because this element is a part as well as enhancer of some enzymes (Naseem et al., 2012). Copper is also an essential micro-mineral but may be toxic if taken in large amount. The permissible amount to be present in edible plants is 3ppm (Muhammad *et al.*, 2013). Iron is an important trace element. It is part of hemoglobin and plays role in the metabolism of lipids, carbohydrates and protein. Its deficiency can lead to anemia (Naseem et al., 2012).

Herbal medicine development research is in progress throughout the world, so the present current report will be helpful for the isolation and production of new drugs, medicine and health care product. At the end, it can be concluded that the active minerals component found in the *Mentha piperita* would definitely find place to cure minerals deficiency. Finally, this aromatic plant should be further studied extensively for exploration of its ability to cure different ailments.

Competing interests

The author declares that they have no competing interests.

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Table 1. Physiochemical Analysis of Leaves and Stem of *M. piperita*.

Parameters	*M. piperita* citrate		*M. piperita* perpeta	
	Leaves	Stem	Leaves	Stem
Moisture (%)	6.0±1	6.5±1.0	5.0±1	6.0±1.0
Ash (%)	10±2.0	9±1.0	8.0±2.0	7.5±1.0
Crude Fat (%)	2.4±0.5	0.5±0.4	2.0±0.5	0.3±0.4
Crude Fiber (%)	8.0±1.0	10±0.5	7.0±1.0	8±0.5
Protein (%)	5.5±2.0	4.0±1.0	4.5±2.0	3.0±1.0
Nitrogen (%)	2.5±0.5	1.5±0.5	2.0±0.5	1.0±0.5

Results of the average of three replicates, ± = Standard Deviation.

Table 2. Minerals Analysis of leaves and stem of *M. piperita*.

Minerals (ppm)	*M. piperita* citrate		*M. piperita* perpeta	
	Leaves	Stem	Leaves	Stem
Na	900 ±4	730 ±2	850 ±4	700 ±2
K	600 ±2	400 ±1	500 ±2	450 ±1
Mg	650 ±3	500 ±2	600 ±3	550 ±2
Fe	380 ±1	280 ±1	430 ±1	300 ±1
Zn	75 ±1	50 ±1	80 ±1	60 ±1
Mn	70 ±1	55 ±1	60 ±1	50 ±1
Cu	12 ±0.5	5 ±0.5	10 ±0.5	4 ±0.5
Pb	ND	ND	ND	ND
Cr	ND	ND	ND	ND

Results of the average of three replicates, ± = Standard Deviation, ND= Not detected.