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Inorganic Constituents of Blue and White Flowering *Silybum marianum* from Different Districts of Khyber Pakhtoon Khawa, Pakistan

[1]*Farhat Ali Khan,* [2]*Iqbal Hussain,* [3]*Muhammad Zahoor and* [2]*Muneeb Ur Rehman*

[1]Department of Pharmacy Sarhad University of Science and Information Technology Peshawar, Pakistan
[2]Department of Chemistry, Kohat University of Science and Technology Kohat, Pakistan
[3]Department of Chemistry, Malakand University, Malakand, Pakistan

Abstract: Plants and especially medicinal plants need special attention because of their beneficial therapeutic properties and use in cosmetics, food and medicines. The normal growth of plants, animals and man depends on the suitable level of certain elements and minerals. *Silybum marianum* blue and white flowering (whole plant) was evaluated for the inorganic constituents in which the concentration of Na+ was found high 15 mg/ kg in blue flowering collected from Karak district while K+ concentration was detected high 309 mg/kg in the same plant and district. High concentration of Cl^- 89.06 mg/ kg was found in blue flowering plants from Swabi. Concentration of $HCO3^-$ was present high 300 mg/kg in blue flowering plant collected from Karak while $SO4^{2-}$ concentration was found high 23.7 mg/kg in blue flowering plant collected from Karak. Flouride was present in high concentration 1.08 mg/ kg in blue flowering whole plant of *S. marianum* collected from Khyber Agency.

Key words: Inorganic Constituents · Whole Plant · Different Areas · *Silybum marianum*

INTRODUCTION

Elemental analysis of plants and soil has got great importance in environmental sciences, especially for the determination of inorganic constituents present in the matrix and their relative threshold levels of toxicity in these plants. Plants and especially medicinal plants need special attention because of their beneficial therapeutic properties and use in cosmetics, food and medicines [1]. The normal growth of plants, animals and man depends on the suitable level of certain elements and minerals. [2]. some of the medical plants used for strengthening the body immune system are known to have been essential and nutritional elements. Their excess or deficiency may disturb normal biochemical functions of the body [3]. More study on such medicinal plans are related to their organic contents, essential oils, glycosides, vitamins, alkaloids and other active components and their pharmacological or therapeutic effects [4-5]. Several studies have reported elemental contents in plant extracts, which are consumed by humans either as a herbal health drink or medicine [6-8]. These elements are presented at different concentration in various parts of the plants, including roots, seeds and leaves which are used in dietary item as well as ingredient in medical preparations. The leaves of medicinal plants are still used in some countries, as for instance, in Malaysia, Greece and India particularly for their therapeutic effect [9-11].

Although medicinal plants play the most vital role in the traditional medicines, yet plants remain unexplored from medicinal point of view and their use in eastern system of medicines [12]. It should be stressed that for many elements there is a very narrow range between deficiency and toxicity for the human body [13]. On the other hand the contents of macro and micro elements in plant is governed both by the geochemical feature of the soil where they grow and the ability of the plants to transport and accumulate elements selectively. Thus, it is the special importance to determine their concentrations in plants and in the soil where they were cultivated [14-15]. Further, more plants can accumulate metals, such as Pb, Cd, Ni, Cr, Co and Ag, for which direct benefit and no significant physiological role for plants have been established till now; toxic elements and hazardous for human health, as medicinal plants in a part of our food chain [16]. With the increase awareness of the crucial role of phytochemicals in human health there is a revival in the use of a plant as a source for conventional and complementary therapies [17]. *Silybum marianum* an annual or bieneal herb, commonly known as Milk thistle belong to the family easteraseae.The main active constituent is salymarin which is a strong

Corresponding Author: Farhat Ali Khan, Department of Pharmacy Sarhad University of Science and Information Technology, Peshawar, Pakistan.

hepatoprotective agent and used for various types of liver ailments. Keeping in view the importance of *Silybum marianum* the present study was aimed to analyzed the inorganic constituents in blue and white flowering plant of *Silybum marianum* districts wise.

MATERIAL AND METHODS

Plants Sample Preparation: The plants were visually cleaned to remove the dust particle and dried at 150°C to a constant weight the dried plants were grinded to fine powder and then use for dry ashing. The pre-cleaned silica crucible was heated at 600°C to a constant weight. The powder plant material in the crucible was heated in muffle furnace at 600°C until three was no elimination of smoke. The crucible containing plant ash was cooled at room temperature and moistens with de-ionized water to keep it overnight. The undisolved particles were filtered and make up the volume to 100 ml. this solution was used as a sample solution [18].

Methods: Sodium and Potassium was determined by flame photometer model Corning-40. Calcium and Magnesium were determined by complexometric titration. Iron was determined by oxidation reduction titration, phosphate was determined by Calorimetric method, Sulphate was estimated gravimetrically. Bicarbonates were determined by titrimetric method and chlorides were determined by standard argentometric method using potassium chromate indicator [19, 20].

RESULT AND DISCUSSION

Health depends upon the organized state of elements in the body and their imbalance causes diseases [21]. The re-establishment of balance by drug can cure diseases. The significant progress that has been ready in the science of Medical Elementlogy during the past few decades has not only opened avenues for research on human health correlated aspects but also aroused the attention of the pharmaceutical industries to obtain the benefits by formulations containing elements reported to be essential for human health. A large variety of such formulations are available world wide.

Sodium and Potassium: Table 1 and 2 data shows the high level of Na^+ concentration in blue flowering (whole) plant from both Karak and Swabi which is 15 mg/kg and 12 mg/kg respectively.The concentrations of other samples range from 1 mg/kg to 6 mg/kg in the (whole) plants of *S. marianum*. Maximum concentration level of K^+ has been recorded in blue flowering (whole) plants of *S. marianum* from Karak and Sawabi, which is 309 mg/kgand 244 mg/kg respectively. Less concentration level is present in blue flowering (whole) plants of *S. marianum* both from Mardan and Khyber Agency which is 1 mg/kg. Sodium and K^+ are the electrolytes and Na^+ is the major component of the cation of extra cellular fluid while K^+ is the cation of intracellular fluid. Sodium concentration of 139 mg/Kg and K^+ 5 mg/Kg is present in the blood plasma of human being. High concentration of Na^+ leads to hypertension while high concentration of K^+ leads to the dilation of arteries and normalize the blood pressure. Extensive level of K^+ leads to the failure of heart [22-23].

Calcium: Blue flowering (whole) plant *S. marianum* from Karak and white from Sawabi contain equal concentration level of Ca^+ 20 mg/kg, while 1mg/kg is present in blue flowering plants from Charssada, Swabi and in white flowering plants from Peshawar, Charssadda, Khyber Agency Kohat and Karak. Calcium is very important constituent used in the synthesis of new cell walls. 5 mg/liter of Ca^+ is present in the blood plasma of human [22, 24].

Chloride and Bicarbonate: In case of (whole) *S.marianum* plant, high concentration level has been present in both blue flowering (whole) plants from Karak and Swabi which is 95.912 mg/kg and 89.061 mg/kg respectively. 6.850 mg/kg is found in blue flowering of *S. marianum* from

Table 1: Inorganic constituents (mg/kg) in whole plant of blue flowering *Silybum marianum* collected from different areas of KPK

S No:	Sample Code	Na^+	K^+	Cl^-	Ca^{+2}	HCO_3^{-1}	NO_3^{-1}	SO_4^{-2}	F^-
1	C-blue	4	2	6.850	8	30	0.218	5.74	0.00
2	P-blue	1	1	6.850	16	50	0.158	4.51	0.22
3	N-blue	3	22	13.701	20	70	0.188	5.74	0.19
4	M-blue	2	1	6.850	16	40	0.087	15.83	0.03
5	S-blue	12	244	89.061	8	150	0.386	8.20	0.15
6	K-blue	6	1	6.850	12	30	0.144	5.84	1.08
7	Kt-blue	5	5	6.850	12	50	0.175	22.14	0.07
8	Kk-blue	15	309	95.912	12	300	0.598	23.78	0.22

C: Charsadda, P: Peshawar, N: Nowshera, M: Mardan, S: Sawabi, K:Khyber Agency,
Kt: Kohat, Kk: Karak

Table 2: Inorganic constituents (mg/kg) in whole plant of white flowering *Silybum marianum* collected from different areas of KPK

S No:	Sample Code	Na^+	K^+	Cl^-	Ca^+	HCO_3^-	HNO_3^-	SO_4^{-2}	F^-
1	C-white	1	1	13.701	8	20	0.111	4.92	0.11
2	P-white	3	1	6.850	8	20	0.272	6.97	0.17
3	N-white	2	1	6.850	12	20	0.255	5.84	0.25
4	M-white	5	4	6.850	16	30	0.175	10.56	0.17
5	S-white	2	6	6.850	20	50	0.396	7.17	0.09
6	K-white	4	2	6.850	8	30	0.322	8.30	0.08
7	Kt-white	2	0	6.850	8	10	0.218	18.96	0.04
8	Kk-white	2	2	6.850	8	20	0.141	19.58	0.01

C: Charsadda, P: Peshawar, N: Nowshera, M: Mardan, S: Sawabi, K:Khyber Agency,
Kt: Kohat, Kk: Karak

Charsadda, Peshawar, Mardan, Karak and Kohat. Whole plant of blue flowering *S. marianum* collected from Karak contain 300 mg/kg high level of HCO^3 concentration and from Swabi contains 150 mg/kg, while the concentration recorded in other samples is in between10-50 mg/kg (Tables, 1 and 2). Chloride is essential in water balance, osmotic pressure regulation as well as acid base equilibrium. Mostly it is required for cell division in leaves and roots [22].

Nitrate and Sulphate: The concentration of nitrate was found lower in all the studied samples. In (whole) plant of *S.marianum* nearly same concentration level of nitrate was present as in seeds which are in between 0.111 mg/kg to 0.598 mg/kg. The high level of concentration of $SO4^-$ 23.78 mg/kg is present in blue flowering whole plant from Karak and less concentration 4.51 mg/kg is found in blue flowering whole plant of *S. marianum* from Peshawar.

Fluoride: Fluoride is a mineral that occurs naturally in water sources, soils and plants. It is also very important for human teeth. Its concentration was also recorded in variable forms. Whole plant of blue flowering *S. marianum* from Charssadda contain below detectible limit, while maximum level of concentration is present in blue flowering (whole) plant collected from Karak which is 1.08 mg/kg [21].

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