PJN
ISSN 1680-5194

PAKISTAN JOURNAL OF NUTRITION

ANSInet
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan
Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorpjn@gmail.com

Pakistan Journal of Nutrition 8 (5): 620-624, 2009
ISSN 1680-5194

Proximate and Nutrient Investigations of Selected Medicinal Plants Species of Pakistan

Javid Hussain[1], Abdul Latif Khan[1]*, Najeeb ur Rehman[1], Zainullah[1], Farmanullah Khan[1], Syed Tasleem Hussain[1] and Zabta Khan Shinwari[2]
[1]Department of Chemistry, Kohat University of Science and Technology, Kohat 26000, Pakistan
[2]Qarshi University, Lahore, Pakistan

Abstract: Eight medicinal plants species were investigated for proximate analysis and micronutrient analysis. These species included *Coriandrum sativum,* Amomum subulatum, Zizphus vulgaris, *Punica grantham,Pistacia vera, Mentha sylvestris, Sphaeranthus hirtius*, and *Cassia angustifolia*. In proximate analysis carbohydrate, protein, fiber, fat, ash and energy values were calculated for the eight species. In comparative assessment of the various species, the results showed that *Pistacia vera* is most significant species having higher concentrations of fat, protein and energy values compared to the other species. In case of micronutrient analysis, fabulous concentration level of Fe was revealed in *Sphaeranthus hiritus*, considerable amount has also been found in *Mentha sylvestris*. The level of Zn was highest in *Mentha sylvestris* while the concentration of Co was highest in *Sphaeranthus hiritus*.

Key words: Proximate analysis, micronutrients analysis, medicinal plants species, Pakistan

INTRODUCTION

Pakistan has been bestowed with ample wealth of plant resources of which 12% i.e. more than 1,000 species has been reported to carry medicinal values and used by marginal communities to cure various diseases (Latif *et al*., 2004; Shinwari *et al*., 2004). Besides collection from the wild, at minor spaces these are cultivated either at large level or at garden levels. *Coriandrum sativum, Amomum subulatum, Zizphus vulgaris, Punica grantham, Pistacia vera, Mentha sylvestris, Sphaeranthus hirtius* and *Cassia angustifolia* were collected and subjected to proximate and nutrient analysis. These species are used by the local communities to cure various diseases and has also been reported for many important chemical constituents. *Punica grantum* is a small deciduous tree or shrub. Local people use its fruit, stem, roots and leaves. The fruit is cardiac and stomachic; stem and root bark is astringent, anthelmintic and fresh juice is used as cooling agent by the local people of the area. The bark of the plant is composed of some important chemical constituents like alkaloids (like peletrierine, iso and methyl peletierine) (Shinwari *et al*., 2006). *Coriandrum sativum* is famous for its essential oils and some important chemical constituents like coriandol, oxalic acid, ascorbic acid, and carotene etc and for its important medicinal uses like anti-diabetic, anti-inflammatory (Bown, 1995; Gray and Flatt, 1999; Chithra and Leelamma, 1999; Kubo *et al*., 2004; Masood *et al*., 2006; Shinwari *et al*., 2006).

Pistacia vera, locally known as pista, is used in Traditional Chinese Medicines (TCM) and local herbal products, for abdominal ailments, abscesses, amenorrhoea, bruises, chest ailments, circulation, dysentery, gynecopathy, pruritus, rheumatism, sclerosis of the liver, sores and trauma (Duke and Ayensu, 1985; Shinwari *et al*., 2004). *Cassia angustifolia,* an important medicinal plant used as stimulant, expectorant, laxative, wound dresser, antidysentric and carminative vermifuge and cathartic, and for relieving habitual constipation (Ali *et al*., 1999; Hussain *et al*., 2007). *Zyzphus vulgaris* is used locally to improve the muscular strength and vitality and enhances liver function (Chevallier, 1996). The leaves and flowering stems of *Mentha sylvestris* are antiasthmatic, antispasmodic, carminative and stimulant (Grieve, 1984; Niebuhr, 1970; Chopra, 1986). *Amomum subulatum* is used as a condiment. The seeds contain 2–3% essential oils, which possess medicinal properties and are used as adjuncts to various medicinal preparations (Gupta *et al*., 1984). The Rhizome of *Sphaeranthus hirtius* are mostly used as mild nerve stimulant and antispasmodic. *Mentha sylvestris* is used as antispasmodic, carminative, stomachic, stimulant and diuretic and its oil is invaluable anti neuralgic (Padmathilake *et al*., 2007; Silva *et al*., 2006; Wazir *et al*., 2004; Ghorsi and Miraj, 2002).

Proximate and nutrient analysis of edible fruit and vegetables plays a crucial role in assessing their nutritional significance (Pandey *et al*., 2006). As various medicinal plant species are also used as food along with their medicinal benefits, evaluating their nutritional significance can help to understand the worth of these plants species (Pandey *et al*., 2006). These eight medicinal plants species were subjected to proximate and micronutrient analysis. In proximate analysis ash, carbohydrate, protein, fat, moisture and energy values

were analyzed for the first time of these species while in case of micronutrient analysis, Cu, Ni, Pb, Co, Cr, Fe, Zn and Cd were scrutinized.

MATERIALS AND METHODS

Plants collection: Whole parts of the selected eight plant species were collected from various areas of NWFP Pakistan. All the plants were packed in the Kraft paper and herbarium sheets were prepared. These plants were identified and classified by a plant taxonomist of Botany Department, Kohat University of Science and Technology, Kohat. The details of each plant species, in respect of their local names, part used and collection areas are elaborated in Table 1.

Sample preparation: The samples were washed under running water and blotted dry. The moisture content of the leaf samples was determined at 60°C (AOAC, 1990). The dried matter obtained was ground to a fine powder and stored at 5°C in air-tight containers prior to further analysis.

Proximate analysis: The proximate analyses (moisture, ash, crude fats, proteins and carbohydrates) of all the samples were determined. The moisture and ash were determined using weight difference method. The nitrogen value, which is the precursor for protein of a substance, was determined by micro Kjeldahl method described by Pearson (1976), involving digestions, distillation and finally titration of the sample. The nitrogen value was converted to protein by multiplying a factor of 6.25. Carbohydrate was determined by difference method. All the proximate values were reported in % (AOAC 1990; AOCS 2000).

Micronutrient analysis: The micronutrients contents, namely Cu, Ni, Zn, Pb, Co, Cd, Fe and Cr of the eight selected vegetable species was done using atomic absorption spectrometer mineral (Perkin Elmer AA Analyst 700). The results were obtained while using a working standard of 1000 ppm for each of the species.

Statistical analysis: Each experiment was repeated three times. The results are presented with their means, standard deviation and standard error.

RESULTS AND DISCUSSION

Proximate analysis: The result of proximate analysis shows variant concentration/proportions of biochemicals and other contents. The moisture contents of each species are different. Looking at the overall percentage of moisture composition, it was highest in *Punica grantham* followed by *Zizphus vulgaris* and *Amomum subulatum*, while other had comparatively lesser composition (Fig. 1a). In case of ash contents, it was highest in *Mentha sylvestris* and *Cassia angustifolia* (Fig. 1b).

According to the results revealed, *Pistacia vera* and *Coriandrum sativum* had highest and significant level of energy values (Fig. 1c) while rest of the other plant species had minor values. Looking at the results obtained from carbohydrate analysis, *Zizphus vulgaris* and *Sphaeranthus hirtius* had prominent levels compared to other species (Fig. 1d).

While analyzing the protein contents in the selected eight medicinal plant species, the results showed that *Pistacia vera* and *Coriandrum sativum* had highest concentration of protein as compared to other species (Fig. 1e). The results are in compliance with the data shown in (Fig. 1d). The results of fat analysis showed that *Pistacia vera* and *Coriandrum sativum* has higher concentration compared to other species (Fig. 1e). Looking at the resulted achieved from fiber analysis, it was high in *Cassia angustifolia* and *Amomum subulatum* compared to other species (Fig. 1f).

In comparative assessment of the various species, the results showed that *Pistacia vera* is most significant species having higher concentrations of fat, protein and energy values compared to the other species (Table 2 and Fig. 1).

Looking at the correlation analysis of the selected parameters, it was found that similar parameter has highly significant correlation while among parameters the correlation is either non-significant or less significant or moderate relation (Table 3). Ash and moisture, ash and fat, ash and protein showing negative or non-significant correlation and similar pattern for other parameter as well (Table 3). However, moisture and energy values and protein and fats have shown significant correlation (Table 3).

Micronutrients analysis: The micronutrients analysis of the medicinal plant species showed significant variation among different micronutrients (Table 4). In case of Cu, it was highest in *Cassia angustifolia* followed by *Mentha sylvestris* and *Sphaeranthus hiritus*. Fabulous concentration level of Fe was revealed in *Sphaeranthus hirtius* however, considerable amount has also been found in *Mentha sylvestris*. The concentration on which Zn effect human health ranges from 100 to 500 mg/l (Macnicol and Beckett, 1985). The level of Zn was highest in *Mentha sylvestris* while the concentration of Co was highest in *Spharanthus hiritus*. In case of Cd concentration, *Punica garantum* had the highest among all the species (Table 4).

While the remaining nutrients like Ni, Pb and Cr had negligible concentration levels (Table 4). It has been reported that for many plant species Cr proved to be toxic at 5 mg/l. In this regard, all the studied plants have very lesser concentration of Cr as compared to that of recommended level for toxicity in plants (Adriano, 1986). In case of the Pb concentration, the suggested

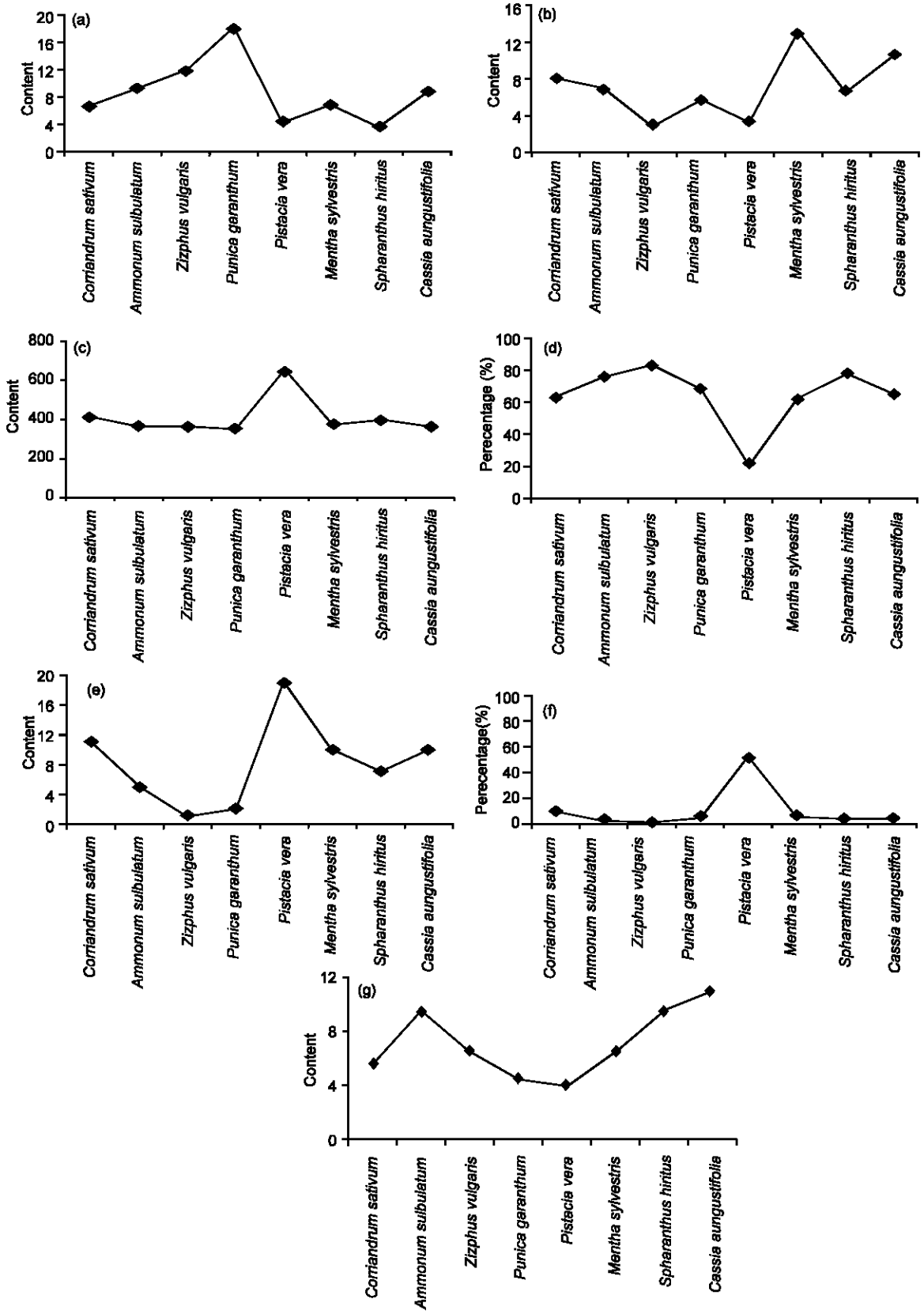

Fig. 1: Graphical presentation of the various parameters of proximate of selected medicinal plants species

Table 1: Vegetables collected for the study and pattern of local use

Species Name	Family Name	Local Name	Parts Used	Status
Coriandrum sativum	Apiaceae	Kashneez	Leaves/Fruits	Cultivated/ Wild
Ammonum sulbulatum	Zingiberaceae	Illiachi Kalan	Fruit	Cultivated Wild/
Zizphus vulgaris	Rhamnceae	Unnab	Fruit/Leaves	Wild/Gardening
Punica garanthum	Punicaceae/ Chenopodiaceae	Annardana	Fruits/Leaves	Cultivated/ Gardening
Pistacia vera	Anacardiaceae	Maghaz Pista	Seed/Fruit	Wild
Mentha sylvestris	Lamiaceae	Podina	Leaves	Cultivated/Wild
Spharanthus hirtus	Orchidaceae	Mundi Booti	Leaves/Fruit	Wild
Cassia aungustifolia	Caesalpiniaceae	Barg-e-Sanna	Leaves/Fruit	Wild

Table 2: Proximate Analysis of selected medicinal plant species

Species Name	Moistures	Ash	Carbohydrate	Protein	Fat	Energy Values	Fiber
Corriandrum sativum	6.659±0.01	8.036±0.01	63.71±0.02	11.75±0.00	9.83±0.01	390.39±0.05	5.536±0.075
Ammonum sulbulatum	9.246±0.01	6.97±0.00	76.20±0.02	5.44±0.03	2.079±0.00	345.47±0.01	9.517±0.095
Zizphus vulgaris	11.84±0.01	2.84±0.00	83.12±0.00	1.81±0.01	0.41±0.00	343.87±0.15	6.557±0.052
Punica garanthum	18.21±0.00	5.75±0.01	68.42±0.04	2.84±0.01	4.91±0.01	328.70±0.01	4.449±0.106
Pistacia vera	4.36±0.00	3.26±0.01	21.49±0.02	19.12±0.00	51.75±0.00	628.22±0.04	3.888±0.018
Mentha sylvestris	6.85±0.00	13.05±0.01	62.86±0.01	10.93±0.00	6.09±0.00	350.75±0.02	6.474±0.065
Spharanthus hiritus	3.71±0.00	6.54±0.00	78.42±0.05	7.41±0.03	3.68±0.00	377.40±0.01	9.499±0.032
Cassia aungustifolia	8.81±0.01	10.65±0.01	65.76±0.04	10.55±0.03	4.22±0.01	343.31±0.08	10.617±0.068

+shows the standard deviation and standard error

Table 3: Correlation matrix of proximate parameters

	Moisture	Ash	Energy values	Carbohydrate	Protein	Fat	Fiber
Moisture	1						
Ash	-0.259	1					
Energy values	0.373	-0.17	1				
Carbohydrate	-0.142	0.36	0.131	1			
Protein	0.237	-0.71	0.130	-0.882	1		
Fat	0.056	-0.41	-0.370	-0.959	0.828	1	
Fiber	0.045	-0.51	-0.426	-0.907	0.823	0.985	1

Table 4: Micronutrient composition of selected medicinal plant species

	Micronutrient (ppm)							
Species Name	Cu	Ni	Zn	Pb	Co	Cd	Fe	Cr
Corriandrum sativum	41.4	<0.006	59.4	<0.015	4.8	2.4	150.4	<0.003
Ammonum sulbulatum	7.4	<0.006	57.6	<0.015	5.4	0.2	111.2	<0.003
Zizphus vulgaris	0.2	<0.006	14.6	<0.015	<0.009	1	7.6	<0.003
Punica garanthum	10.2	<0.006	34.2	<0.015	5	11	531	<0.003
Pistacia vera	25	<0.006	39.6	<0.015	3.4	9.8	81	<0.003
Mentha sylvestris	48.6	<0.006	114.8	<0.015	6.8	0.2	808	<0.003
Spharanthus hiritus	47.4	<0.006	45	<0.015	10.4	1.6	4225	<0.003
Cassia aungustifolia	73.4	<0.006	50.4	<0.015	3.8	1.4	209.6	<0.003

concentration in plant species is 2 to 6 mg/l (Broyer *et al*., 1972) however, the plant species under investigation carries very lesser level of Pb, which further clarify their use as food supplement.

Conclusion: Conservation and use of medicinal plants has taken considerable amount of attention in recent years. It has been used globally by the indigenous and marginal communities for curing various diseases from time immemorial. Most of the plant species are also used as food supplement along with its oral decoctions. However, little have been done so far to verify the uses in this regard. The present research is an effort in doing so. However, it should not be forgotten that this medicine can cause adverse effects. *Cassia angustifolia* is a plant used as a laxative not only in Turkey but also in many other countries around the world. It is known to cause hepatotoxicity if a large amount of it is used chronically; however, this case suggests that long term use may be associated with PVT.

REFERENCES

Adriano, D.C., 1986. Trace Elements in the Terrestrial Environment. P. Imprenta: New York, Springer-Verlag, 533.

AOAC, 1990. Official Methods of Analysis. 15th Edn. Association of Official Analytical Chemists Washington, DC, USA.

AOCS (American oil chemist society) 5th edition, 2000. Section BC. 2-49, BC. 3-49, BC. 4-91, BC 5-49, BC 6-49, BD 2-52, BD 3-52.

Ali, M.S., I. Azhar, 1999. Antimicrobial screening of some Caesalpiniaceae. Fitoterapia, 70: 299-304.

Broyer, T.C., C.N. Johnson and R.E. Paull, 1972. Some aspects of lead in plant nutrition. Forest Sci., 21: 33-35.

Bown, D., 1995. Encyclopaedia of Herbs and their Uses. Dorling Kindersley, London. ISBN 0-7513-020-31.

Chevallier, A., 1996. The Encyclopedia of Medicinal Plants Dorling Kindersley. London ISBN 9-780751-303148.

Chopra, R.N., S.L. Nayar and I.C. Chopra, 1986. Glossary of Indian Medicinal Plants (Including the Supplement). Council of Scientific and Industrial Research, New Delhi.

Chithra, V. and S. Leelamma, 1997. Hypolipidemic effect of coriander seeds (*Coriandrum sativum*): mechanism of action. Plant Foods Hum. Nutr., 51: 167-72.

Duke, J.A. and E.S. Ayensu, 1985. Medicinal Plants of China Reference Publications, Inc. ISBN 0-917256-20-4.

Grieve, A., 1984. Modern Herbals. Penguin ISBN 0-14-046-440-9.

Gray, A.M. and P.R. Flatt, 1999. Insulin-releasing and insulinlike activity of the traditional anti- diabetic plant *Coriandrum sativum* (coriander). Br. J. Nutr., 81: 203- 9.

Gorsi, M.S. and S. Miraj, 2002. Ethnomedicinal sutvery of plants of Khanabad Village and its allied areas, District Gilgit. Asian J. Plant Sci., 1: 604-615.

Gupta, P.N., A.N. Naqvi, L.N. Mishra, T. Sen and M.C. Nigam, 1984. Gas chromatographic evaluation of the essential oils of different strains of *Amomum subulatum* Roxb. growing wild in Sikkim. Sonderdruck aus Parfumeric kodmetik, 65: 528-529.

Hussain, S., S.U. Siddiqui, S. Khalid, A. Jamal, A. Qayyum and Z. Ahmad, 2007. Allelopathic potential of Senna (*Cassia angustifolia* VAHL.) on germination and seedling characters of some major cereal crops and their associated grassy weeds. Pak. J. Bot., 39: 1145-1153.

Kubo, I., K. Fujita, A. Kubo, K. Nihei and T. Ogura, 2004. Antibacterial Activity of Coriander Volatile Compounds against *Salmonella choleraesuis*. J. Agric. Food Chem., 52: 3329-32.

Latif, A., H. Ahmad, S. Begum, S.K. Hussian and S.M. Adnan, 2004. Medicinal and other economic plants as substitute to forest logging in Miandam and Sulatanr Valley-Swat. Proc. of international workshop on conservation and sustainable use of medicinal and aromatic plants in Pakistan. WWF-Pakistan.

Masood, N. A. Chaudhry and P. Tariq, 2006. Bactericidal activity of black pepper, bay leaf aniseed and coriander against oral isolates. Pak. J. Pharm. Sci., 19: 214-218.

Macnicol, R.D. and P.H.T. Beckett, 1985. Critical tissue concentrations of potentially toxic elements. Plant Soil, 85: 107.

Niebuhr, A.D., 1970. Herbs of Greece. Herb Society of America.

Pearson, D., 1976. The Chemical Analysis of Foods, 7th ed. Churchill Living stone, London.

Padmathilake, K.R.E., V.N. Wickramaarachchi, M.A.M.S. Anver and D.C. Bandara, 2007. Biological and Economic Feasibility of Growing Mint (*Mentha sylvestris* L.), Mustard (*Brassica integrifolia* L.) and *Asamodagam* (*Trachyspermum involucratum* L.) under Hydroponics. Trop. Agri. Res., 19: 193-201.

Pandey, M., A.B. Abidi, S. Singh and R.P. Singh, 2006. Nutritional Evaluation of Leafy Vegetable Paratha. J. Hum. Ecol., 19: 155-156.

Silva, D.B., R.F. Vieira, R.B.N. Alves, R.A. Mendes, L.D. Cardoso, L. Queiroz and I.R.I. Santos, 2006. Mint (*Mentha* spp) germplasm conservation in Brazil. Pl. Med. Botucatu, 8: 27-31.

Shinwari, Z.K., A.A. Khan and T. Nakaike, 2004. Medicinal and useful plants of District Swat. WWF-Pakistan.

Shinwari, Z.K., M. Rehman, T. Watanabe and T. Yoshikawa, 2006. A pictorial guide to medicinal plants of Pakistan. Kohat University of Science & Technology, Kohat Pakistan.

Wazir, S.M., A.A. Dasti and J. Shah, 2004. Common medicinal plants of Chapursan Valley, Gojal II, Gilgit-Pakistan. J. Res. Sci.,15: 41-43.