

Purity strength and trace elements contents evaluation of *Chlorophytum borivillianum* for export purpose

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ABSTRACT

Safed Musli grows wild in thick forests and is a traditional medicinal plant. Mainly its tuberous roots are used in *Ayurvedic* medicines. *Safed Musli* has been named in the *Atharva Veda* as one of the divine herbs, offering cure for many ailments and health related problems. Because of its significant medicinal properties, *Chlorophytum borivillianum*, a variety of *Safed Musli* has got today maximum demand and commercial value. There are around 256 varieties of *Chlorophytum* in the world; in India, we have around 17 of them, of which, *borivillianum* has got a good market demand all over the world especially in the Gulf countries and the West. It would not be an exaggeration to call *Safed Musli* a unique, potent and versatile medicine discovered by the genius of ancient India. It is a rich source of over 25 alkaloids, vitamins, proteins, carbohydrates, steroids, saponins, potassium, calcium, magnesium, phenol, resins, polysaccharides etc. *Safed Musli* is an important ingredient of more than a hundred *Ayurvedic*, *Allopathic*, Homeopathic and Unani medicinal preparations. It is one of the chief ingredients of *Ayurvedic* "Chyawanaprash". As a (protein rich) food supplement, there is a tremendously growing International demand for processed *Safed Musli*. Here we report indirect value addition of the raw material and also the processed products by incorporating some measurements during the time of handling and processing of raw material and Phytoformulation of herbal drug for purity and the strength. The present study also indicates towards assessing the metal contaminants as per AYUSH and WHO recommendations which has become mandatory for export purpose.

Key words: *Chlorophytum borivillianum*, vital ingredients, export.

INTRODUCTION

Chlorophytum borivillianum which is commonly known as *Safed Musli* is an herb found in tropical moist and dry deciduous forest under Indian System of Medicine, as it holds a highly reputed position for vitality having great potential to become an alternative to *Viagra*^{1,7}. *Safed Musli* is a valuable gift from the nature to human kind and is used in manufacture of many *Ayurvedic*, *Allopathic* and *Unani* medicines. Unwanted presence of metals in herbal products indicate metal contamination, which might have come into the products before, during or after processing inadequately or it might occur through soil, water or industrial pollution,

agriculture technology and other environmental pollution^{2-5,6,8}. Some elements like sodium, potassium, calcium, copper, zinc and iron which are found to be essential for the life, whether it is in human beings or plants, but they may be posed some harmful effect in excessive concentration and cause ill effects when consume at higher levels. Similarly some selected inorganic elements like mercury and arsenic are found to cause deleterious effects even in low levels⁹⁻¹¹.

Testing of heavy and trace metals in herbal medicine has become compulsory and their labeling for heavy metals within permissible limits would be mandatory January, 1st, 2006. The Department of

Ayurveda, Yoga, and Naturopathy, *Unani*, *Siddha* and Homeopathy (AYUSH) has issued a notification under the Drugs and Cosmetics Act 1940, stating that testing should be made compulsory and the container for processed herbs or medicines meant for export or within country must clearly display "Heavy Metals within permissible limits". The testing of heavy metals has become mandatory for export purposes on the basis of permissible limits for heavy metals will be recommended by World Health Organization (WHO) on Quality Control Methods for Medicinal Plants and Materials.

Looking to the urgent need of Testing of Heavy metals in Herbal Medicine a must and holding of reputed position of Safed Musli under the Indian System of Medicine, present study has been undertaken to explore the possibility of value addition of raw material and processed products by assessing heavy and trace elements evaluation in Safed Musli collected from different source. Present study has been under taken to examine the purity of the *Chlorophytum borivillianum* (Safed Musli) roots and its Phytoformulation.

MATERIAL AND METHODS

Roots and the powder drug of *Chlorophytum borivillianum* were obtained as complimentary packet from Minor Forest Produce. The roots of the selected plant were also collected from herbal drugs plants and material suppliers of the local market, than drying and preservation of the material was done followed by physico-chemical examination of the selected species, Standardization of the methods related to quality assurance of herbal product as per the Standard procedures (AOAC, 2000)⁹. Protocol for sample preparation for metal contaminants and other essential trace element was established¹⁰⁻¹¹ for Instrumental methods of analysis by flame atomization technique of Atomic Absorption Spectrophotometer (Model 4141), ECIL, Hyderabad. Procedural steps were followed as per the conditions prescribed in the manual provided by the company.

RESULTS AND DISCUSSION

During the investigation, the moisture content of the root on an average was found to be 9.1607 % to 9.3078 % in the samples collected

from Minor Forest Produce park (MFP) where as in the roots of different Safed Musli samples obtained from local market was found to be ranged between 10.2331 % to 12.080 %. Similarly the moisture content of the powder drug sample of *Safed Musli* was done and it was found that the Phytoformulation of the drug showed its moisture content in the ranged between 9.8998 % to 9.5965 % and 10.5960 % to 11.986 % in MFP Park and local market's samples respectively. The total ash percent of MFP sample was found to be ranged from 0.8313 % to 0.9950 % and local Market's sample showed its value ranged from 1.2369 % to 1.5862 %. Acid insoluble ash content for local market's sample was found in a ranged from 1.0321 % to 1.2001 % where as the MFP sample showed the value from 0.1959% to 1.1059 % (Table-1).

Moisture content is one of the most commonly measured properties of food materials spices and specifically in herbal drugs. That's why the moisture content of herbal products can therefore be determined accurately by measuring the number or mass of water molecules present in a known mass of sample. It is not possible to directly measure the number of water molecules present in a sample because of the huge number of molecules involved. The ash content is a measure of the total amount of minerals present within an herbal drugs and raw materials. Determination of the ash is important for a number of reasons like nutritional labeling, which is necessary to determine the concentration and type of minerals present which must often be stipulated on the label of food, and the herbal products as well as the quality which depends again on the concentration and the minerals they contain, including their taste, appearance, texture and stability. Besides this, microbiological stability as high mineral content is sometimes used to retard the growth of certain microorganism, and Nutritional aspects.

Water soluble extract and alcohol soluble extract for the samples obtained from different sources were also carried out under the present study period and it was observed that the sample of MFP Park which showed its solvability in the afore said solvents found to be ranged between 30.57 % to 32.10 % and 31.59 % to 32.99 % respectively, where as the samples of local market

Table 1: Physico-Chemical profile of Chlorophytum borivillianum (Safed Musli)

S. No.	Samples	Foreign matter (%)	Moisture content Root (%)	Moisture content Powder (%)	Total Ash (%)	Acid Insoluble Ash (%)	Alcoholic Soluble Extractive	Water Soluble Extractive
Minor Forest Produce								
1	HD-1	Nil	9.1607	9.8990	0.9950	0.1959	30.57	30.57
2	HD-2	Nil	9.3078	9.5962	0.8313	1.1959	32.10	32.10
Local Market								
3	HD-1	Nil	10.2330	10.9958	1.5862	1.2001	23.20	21.90
4	HD-2	Nil	11.0196	10.5960	1.2369	1.0596	23.56	25.56
5	HD-3	Nil	11.9890	11.2830	1.2501	1.0321	22.59	24.50
6	HD-4	Nil	12.0800	11.9861	1.2932	1.0844	21.89	22.70
Indian Pharmacopoeia		Not less than 2.0 %	Maximum 10.0 %		Not more than 5.0 %	Maximum 2.0 %	Not less than 20.0 %	Not less than 20.0 %

Table 2: Standard condition of Atomic Absorption Spectrophotometer, ECIL, Hyderabad (4141)

S. No.	Conditions	Copper ppm	Zinc (ppm)
1	Wave length(nm)	324.8	213.9
2	Slit(nm)	0.7	0.7
3	Relative noise	1.0	1.0
4	Sensitivity (mg/l)	0.77	0.018
5	Sensitivity check	4.0	1.0
6	Linear range	5.0	1.0
7	Recommended flame	Air acetylene (lean, blue)	Air acetylene (lean blue)

Table 3: Heavy and Trace elements concentration in Chlorophytum borivillianum (Root)

S. No.	Samples	Copper(ppm)	Zinc(ppm)	Heavy metals (Nickel/ Arsenic in ppm)
Minor Forest Produce				
1	HD-1	0.0820	0.0983	BDL
2	HD-2	0.0790	0.0861	BDL
Local Market				
3	HD-1	0.3907	0.2590	BDL
4	HD-2	0.2005	0.2350	BDL
5	HD-3	0.2110	0.2010	BDL
6	HD-4	0.1895	0.1632	BDL

BDL* below detectable limit less than 0.001

supplier ranged between 21.89 % to 23.56 % and 21.90 % to 25.89 % respectively (Table-1).

Trace elements level in the selected drugs was estimated to find out the facts as, some minerals are essential to a healthy diet which was found in the powdered drug as Sodium - 0.03 mg/g, Potassium - 0.70 mg/g, Calcium - 5.8 mg/g, Magnesium - 1.7 mg/g, Copper 0.097 mg/g and Zinc 0.021 mg/g, whereas others can be toxic viz. Nickel, Mercury, Arsenic. Present study reports that the concentration of heavy metals like nickel/ arsenic in root samples, which was found below detectable limit i.e. 0.001 ppm where as the copper and zinc concentration in the samples of MFP Park was 0.079 ppm to 0.082 ppm and 0.086 ppm to 0.098 ppm respectively. On the other hand the samples from local supplier were found with a level of copper and zinc as 0.2110 ppm to 0.3907 ppm and 0.2010 ppm to 0.2590 ppm respectively (Table - 2). The standard condition for operating methods of AAS has been given in the Table-3. The values obtained during the present study reveals that the moisture contents of the herbal drugs found towards higher side which is certainly due to the moisture in the atmosphere because of the rainy season and also the packaging and the storage of the particular herbs.

The present findings suggest that value addition of the medicinal plants can be achieved directly by improving the quality of cultivated or collected plant material and indirectly by quality assurance of the plant material or the semi-processing of the material to a value added product. Medicinal plants materials must be stored under specified conditions in order to avoid contamination and deterioration and also avoid formation of moulds due to the moisture contents in the products or in the raw material, which may produce aflatoxins, as an excess of water in the herbal drugs or the plant materials will encourage microbial growth and also causes decomposition of the active constituents following the hydrolysis.

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