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Nutritional, Anti-Nutritional, Mineral And Heavy Metal Assessment Of Chlorophytum Tuberosum Leaf

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ABSTRACT:

Chlorophytum tuberosum (Family: Liliaceae) popularly known as Safed musli is important plant which is used in different systems of medicine. Present study shows the Nutritional, anti-nutritional, mineral and heavy metal assessment of *Chlorophytum tuberosum* leaf. Results showed that the species is rich in nutritional and mineral content while the estimated concentration of anti-nutritional components and heavy metal was found to be below permissible limit.Present study will be important for agricultural sector to study cultivation practices for *Chlorophytum tuberosum*s as well as important link in biochemical sciences.

KEY WORDS: *Chlorophytum tuberosum*, nutritional, mineral, anti-nutritional.

INTRODUCTION:

Chlorophytum tuberosum (Family: Liliaceae) locally known as *safed musli* is consider as economically important because root tubers and leafs are harvested as wild edible vegetable plant and also for ayurvedic formulations (Mishra e*t al.*, 2009). Due to high saponin and carbohydrates content in root tuber different species of *Chlorophytum* are reported from Rajasthan, Madhya Pradesh and Gujarat (Nikam *et al.*, 2009).Various wild species of *Chlorophytum* in are traditionally considered as medicinal and nutritional plants in India (Sharma and Chandrul, 2017). Since immemorial time *Chlorophytum* species are considered as natures gift to whole mankind, as chief ingredient in Ayurvedic formulations used as rejuvenator, Immuno-modulator, vitalizer, curative for pre-natal and post-natal problems,

remedy for diabetes; etc. (Singh *et al*, 2012).

Recent global problems such as climatic change, extreme weather condition, financial crisis and their implications in food storage, leads to the interest among researcher to change and increase agriculture and food production along with standard supply to growing population (Arora,2019).It is very important to carry a work on plants for appropriateness as dietary alternatives to conventional foods (Paramasivan and Pasupathi, 2016).These sectors are globally searching for functional foods, nutraceuticals and botanicals to meet demand of consumers for natural, immunity-boosting and health promoting plant (Soni e*t al*., 2013;Padwalet *al*, 2016).

Chlorophytum tuberosum can not only reach the demand of daily diet by supplying proteins, carbohydrates, fats, minerals and other nutrients, but also contains prominent secondary metabolites, especially phenolic and nitrogen containing compounds; that could add commercial value. This renewed awareness, in agro based industrial sectors of developing and developed countries has provoked new research approaches to the exploitation of *Chlorophytum tuberosum* (Varpe *et al*, 2021). Furthermore, characterization of the physicochemical, nutritional, anti-nutritional, chemical composition and phenolic profile of *Chlorophytum tuberosum*, a wild vegetable would contribute to further development of natural health products and the native food industry in India. It is important to estimate proximate, elemental and secondary metabolite content from the same. Considering above importance proximate, elemental, nutritional and anti-nutritional analysis of *Chlorophytum tuberosum* have been carried out.

MATERIALS AND METHODS:

COLLECTION, IDENTIFICATION AND SAMPLE PREPARATION: *Chlorophytum tuberosum* leaves selected for the study was procured from the local area of Sangamner tehsil of Maharashtra, India. Plant identification was carried out at Department of Botany, Maulana Azad College of arts, Science and Commerce, Dr. Rafiq Zakaria Campus, Rauza Baugh, Aurangabad, Maharashtra. Collected *Chlorophytum tuberosum*, leaves were washed with tap water and cut into small stripes with scissor and shade dried at room temperature for 15 days. The dried plant material was pulverized into fine powder using a grinder (mixer).

DETERMINATION OF PROXIMATE, NUTRITIONAL AND VITAMIN CONTENT: Ash content, moisture content, dry matter, energy value and dietary fibers were analyzed as proximate analysis. Nutrients composition analyzed were protein, fat, amino acid, reducing

sugar and carbohydrate.

ESTIMATION OF ASH CONTENT: Total Ash content leaf powder was determined by using prescribed method of Association of official agricultural chemists (1980).

DETERMINATION OF DRY MATTER: Determination of dry matter from *Chlorophytum tuberosum* was performed using prescribed method of Association of Official Agricultural Chemists (1980). The percentage dry matter production of the leaf was calculated.

ESTIMATION OF TOTALAMINO ACID: Estimation of total amino acid content was performed by ninhydrin method (Theymoli and Sadashivam, 1987). Amount of total amino acid was estimated by plotting a graph of absorbance versus concentration (microgram). Percent amino acid present was expressed as percentage equivalent of leucine.

ESTIMATION OF REDUCING SUGAR: Reducing form of sugar present was estimated by prescribed dinitrosalicylic acid method (Miller G.L. (1972) which detects the presence of free carbonyl group (C=O) of reducing sugars. Amount of reducing sugar present was calculated using the standard graph and values are expressed in percentage.

ESTIMATION OF TOTAL CARBOHYDRATE: Carbohydrate content was calculated by using antrone reagent (Hedge and Hofreiter; 1962). Using this graph the amount of carbohydrates present was determined.

ESTIMATION OF PROTEIN: Estimation of protein content was performed using prescribed method (Sadashivam and Manickam, 2008) by estimating the total nitrogen content. Protein percentage was calculated by using bovine serum albumin (BSA) as a standard protein.

ESTIMATION OF DIETARY FIBERS: Dietary fibers present were determined gravimetrically after chemical digestion of undesirable materials present. The fiber residue weighted is then corrected for ash content after ignition as per (Association of Official Agricultural Chemists, 1980).

ESTIMATION OF CRUDE FAT: Percent crude fat from leaf sample was estimated by method suggested by Oderinde and Ajayi (1998).

DETERMINATION OF VITAMIN AASB-CAROTENE: Determination of vitamin A as β-Carotene was performed by tricloro acetic acid method (Bayfeild and Cole, 1980). Concentration of vitamin A per gram of powder was calculated.

DETERMINATION OF VITAMIN –C AS ASCORBICACID: Determination of Vitamin C was carried out by spectroscopic method (Sadashivam et al; 1987).

ELEMENTAL COMPOSITION OF *CHLOROPHYTUM TUBEROSUM* LEAF:

ESTIMATION OF NITROGEN CONTENT: Nitrogen content was estimated by Micro-

Kjeldahl method (Indian standards, 2004).

ESTIMATION OF PHOSPHOROUS: Estimation of phosphorous content performed using quinolone phosphomolybdate gravimetric method (Indian standards, 2004). In which precipitation, after hydrolysis of orthophosphate ions in the form of quinolone phosphomolybdate, in an acid medium and in the presence of acetone was done.

ESTIMATION OF POTASSIUM: Estimation of potassium was done by using prescribed method (Indian standards, 1985). Standard curve of potassium (100 ppm) was prepared using calibrated flame photometer, K2O content percent by mass was measured from concentration of ppm of K read from standard curve.

ESTIMATION OF CALCIUM: Estimation of Calcium present was performed using standard method prescribed by Indian standard (1985).

ESTIMATION OF IRON: Estimation of calcium was carried out using prescribed method of Indian standard (1992).

DETERMINATION OF ZINC: Determination of zinc was done by using atomic absorption spectrophotometer (Indian standards, 1985)**.**

ESTIMATION OF MAGNESIUM: Estimation of magnesium present was calculated using prescribed method (Indian Standard, 1985). The number of micrograms of magnesium equivalent to the observed intensity was calculated from a previously prepared curve and accordingly finds out the magnesium content.

ESTIMATION OF SODIUM: Estimation of sodium was performed by standard method (Indian standards, 1980).

ANTI-NUTRITIONALFACTOR ANALYSIS OF *CHLOROPHYTUM TUBEROSUM* LEAF:

DETERMINATION OF TANNIN CONTENT: Determination of tannin content was estimated by Folin-Denis method of Schanderl (1970) and Association of Official Agricultural Chemists (1980).

ESTIMATION OF PHYTIC ACID CONTENT: Determination of Phytic acid composition present in *Chlorophytum tuberosum* leaf was analyzed according to Wheeler and Ferrel (1971).

ESTIMATION OF OXALATE CONTENT: Estimation of oxalate present was determined by by Raguramulu *et al.* (2003).

DETERMINATION OF CONDENSED TANNINS (PROANTHOCYANIDINS) AND SAPONIN CONTENT: Determination of Condensed Tannins as Proanthocyanidins was carried out according to the method of Porter *et al.* (1986). While estimation of Saponin content

was performed using gravimetric method determined by Manbir Kaur and Handa (2015).

HEAVY METAL COMPOSITION OF *CHLOROPHYTUM TUBEROSUM* LEAF:

DETERMINATION OF CADMIUM: Determination of Cadmium present was carried out using method suggested by Indian Standard (1983).

DETERMINATION OF LEAD: Determination of lead accumulated was estimated using atomic absorption spectrophotometer as per Indian Standard (1987); the concentration of lead was determined in ppm.

DETERMINATION OF ARSENIC: Determination of arsenic was performed by hydride generation technique using absorption spectrophotometric method as prescribed in Indian Standard (1984). From the standard graph concentration of arsenic in ppm is calculated.

DETERMINATION OF MERCURY: Determination of Mercury was carried as per standard prescribed method of Indian Standard (1987); concentration of mercury was determined in ppm by using the standard graph of mercury plotted with help of atomic absorption spectrophotometer.

RESULTS AND DISCUSSION:

Total Ash content shows that 7.8% of ash content was observed in *Chlorophytum tuberosum.* Whereas dry matter and dietary fibers was about 92.2% and 21.39%; respectively was observed. Percent crude fat estimated using soxhlet assembly and petroleum ether shows that 1.88%ofcrude fat is present which is suggested to undergo fatty acid composition for its uniqueness .Estimation of protein content shows about 4.81%of protein content in leaf and determination of total free amino acid shows 0.98mg/g of free amino acids are observed. Moreover, reducing form of sugar present was estimated which detects the presence of free carbonyl group (C=O) of reducing sugars. About 2.07% of reducing sugar was observed.

While carbohydrate content was found to be 15.32% of carbohydrates were observed. Furthermore, Determination of vitamin A and Vitamin-C present in *Chlorophytum tuberosum* leaf was calculated and values expressed in µg/100g, results estimated by standard graphs for respective test shows presence of 5.315 µg/100g vitamin A and 242.85 µg/100g vitamin C.

Table 1. Proximate, nutritional, vitamin and mineral composition of *Chlorophytum tuberosum* leaf:

Parameter	Concentration	Parameter	Concentration
AshContent	7.8%	VitaminC	242.85µg/100g
Drymatter	92.2%	Nitrogen	3.6303%
Totalaminoacid	0.986mg/g	Phosphorous	0.741%
ReducingSugar	2.782%	Potassium	0.08%
Total Carbohydrate	15.32%	Calcium	0.673%
Protein	4.814%	Iron	0.163ppm
Dietary fibres	21.3908%	Zinc	39.72ppm
Fat/ Lipid	1.88%	Magnesium	9.68%
VitaminA	5.315µg/100g	Sodium	0.5%

Table2. Anti-nutritional and Heavy metal composition of *Chlorophytum tuberosum leaf*:

Parameter	Concentration (µg/100mgdrywt.)	Parameter	Concentration (in ppm)
TanninContent	24.631	Cadmium	0.224
Phyticacidcontent	2.68	Lead	2.50
OxalateContent	9.54	Arsenic	0.85
CondensedTannin	9.73	Mercury	0.77
Saponin	6.57		

Determination of element is sub divided into macro element, micro element and heavy metal performed using prescribed methods. Results shows that maximum content of nitrogen content (3.6303%) was observed followed by Phosphorous (0.741%), Magnesium (0.96%), Calcium (0.673%), Sodium (0.5%) and Potassium (0.08%). While 0.163ppm of iron and 39.72ppm of zinc was observed., Results shown indicate the amount of heavy metal accumulated show that *Clorophytum tuberosum* contains very less amount of Cadmium (0.224 ppm), Lead (2.50 ppm), Arsenic (0.85 ppm) and mercury(0.77).Determination of anti-nutritional composition was carried using spectrophotometer and expressed in microgram per 100 milligram dry weight. Result indicated summarized that *Chlorophytum tuberosum* leaf contains highest 24.63 microgram tannins, about equal amount of oxalate (9.54 microgram) and condensed tannin (9.73) was followed by 6.57 microgram of saponin in 100 milligram of leaf power.

Determination of phytic acid composition present was analyzed and 2.68 microgram of phytic acid was found.

CONCLUSION:

Under this study attempts have been made to determine the proximate, nutritional, anti-nutritional, elemental and heavy metal composition of *Chlorophytum tuberosum* leaf. Estimation of elements and anti-nutritional factors as well as heavy metal analysis present in *Chlorophytum tuberosum* leaf has been evaluated. Quantitative assessment of proximate content, nutritionally important constituents reveals that this wild vegetable contains balanced and rich source of protein, carbohydrate and lipid as well as estimation of phenols and flavonoids shows that together with nutrition rich source it can also plays an important role as antimicrobial agent. Anti-nutritional factors are harmful for health at high concentration but at minimum concentration it can be useful for treating different ailments. However presence of such factors in leaf was less and further effect can be minimizing by treatments during cooking. Present study will be important for agricultural sector to study cultivation practices for *Chlorophytum tuberosum*s as well as important link in biochemical sciences.

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