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COMPARATIVE STUDY OF HEAVY METALS FROM RIPENING STAGES OF 'WATERMELON' CITRULLUS LANATUS (THUNB.) FRUIT PULP FROM DIFFERENT GEOGRAPHICAL REGIONS

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ABSTRACT

Heavy metals as environmental contaminants of terrestrial ecosystems are not a recent phenomenon. As certain plants have a tendency of storing heavy metals from soils, polluted water and atmosphere, heavy metals are a matter of concern in the herbal drugs. Therefore test for heavy metals is essential for herbal drugs. Because of such wide use of these fruits pulp in various type of food product, herbal formulations, it is necessary to analyze at least common heavy metal with different geographical region. Therefore the present research study variation in heavy metals at ripening stages of "Kalinda" *Cittrulus lanatus* (Thunb.) fruit pulp from different Geographical Regions i.e. of Chhattisgarh (Mahasamund) Mahanadi river region, Uttar Pradesh (Agra) Yamuna river region and Odisha, (Kendrapara), Gobari river region.

Keyword: Heavy metal, *Kalind*, *Citrulus lanatus* (Thunb.)

INTRODUCTION

Heavy metals are a matter of concern in herbal drugs, especially as certain plants have a tendency of accumulating them from soils, polluted water and atmosphere (Raskin et al. 1994). In all, there are 38 heavy metals (Passaw 1978). All metals play a variety of roles in biological systems. The main sources of metal contaminants in soil are from metalliferous mining and smelting activities, industrial emissions and effluent, urban development, vehicle emmisions, dumped waste materials, contaminated dusts, rainfall fertilizers and pesticides. A trace element is considered as essential for both man and animals, but when it crosses the limits, it becomes toxic and will degenerate the system. That's why it's important to know, which type of watermelon are beneficial for health found in 3 different geographic regions.

Citrullus lanatus (Thumb.) belongs to the family Cucurbitaceae, also referred to as cucurbits from a large group with approximately 800 species and 130 genera (Najafi et al., 2010). This family includes spe-

cies like pumpkins, melons, gourds and squashes, that are cultivated worldwide for medicinal and consumption purpose.

Citrullus lanatus (Thunb.) "Watermelon" produces a fruit that is about 93% water, hence the name "water" melon. The "melon" part came from the fact that the fruit is large and round and has a sweet, pulpy flesh. The scientific name of the watermelon is derived from both Greek and latin roots. The citrullus part comes from a Greek word "citrus" which is a reference to the fruit. The lanatus part is Latin and has the meaning of being wooly, referring to be small hair on the stems and leaves of the plant[1].

In ancient Ayurvedic texts, Charaka and Susruta mentioned timely collection of medicinal plant parts and specific seasons are mentioned for the collection of plants according to the part of plant which is used for the medicine preparation[2]. In Astang Hridaya, the factor affecting the quality of the herbs have been stated viz. (1) period of harvesting, (2) age, (3) soil, (4) altitude, (5) collecting person and (6) post-harvest conditions. Appropriate period of collection of plant part was mentioned in Charaka Samhita (Kalpasthana), according to which the fruit should be collected only after the completion of seed shedding and in the case of fruits time should be near the ripening period i.e., full grown but unripe. It is self-explanatory that ancient physicians were aware about relation between period of collection and distribution of active principles. In the present study, variation in heavy metal studies of the medicinal plant *Citrullus lanatus* (Thunb.) collected from three different geographical regions[3].

AIM AND OBJECTIVES

The present investigation deals with the Comparative study of Some Heavy Metals from ripening stages of 'Watermelon' *Citrullus lanatus* (Thunb.) fruit pulp from different Geographical regions.

MATERIAL AND METHODS

Collection of the plant

First sample of *Citrullus lanatus* Fruit pulp was collected in the month of April 2017 from Mahasamund regions (21.1091' N latitude and 82.0979' E longitude) of Chhattisgarh, India. Second sample of *Citrullus lanatus* Fruit pulp was collected in the month of April 2017 from Agra regions (27.1767' N latitude and 78.0081' E longitude) of Uttarpradesh, India. Third sample of *Citrullus lanatus* Fruit pulp was collected in the month of April 2017 from Kendrapara regions (20.5848' N latitude and 76.6611' E longitude) of Odisha, India.

Authentication of the Drug

Taxonomic identification of collected material was done in the Raw Material Herbarium & Museum, Delhi (RHMD), National Institute of Science Communication and Information Resources (CSIR-NISCAIR) Dr. K.S. Krishna Marg, New Delhi,

Heavy Metal analysis

Elemental analysis by AAS technique - All samples for AAS was weighed. Weighted amount of dried and powder samples were dissolved in a mixture of Conc. Acid (HCl and HNO3). This solution was heated gently and then filtered and the un-dissolved portion of the sample was again heated in the acid mixture. The procedure was repeated several times until a clear solution remained, rejections the residue and was used for the analysis after the appropriate dilution. The solutions thus obtained were analysed for the elements of interest on a Perkin Elmer 3100 atomic absorption spectrometer with suitable hollow cathode lamps. The concentrations of the different elements in these samples were determined the corresponding standard calibration curve obtained by using standard AR grade solutions if the elements of interest as standard[4].

RESULT

Heavy metals presented in different sample of *Citrullus lanatus* (Thunb.) fruit pulp are shown in Table No.1.

Table 1: Trace elements (ppm) as determined by Atomic Absorption Spectroscopy (AAS)

S. No.	Parameters	Sample 1 (ppm)	Sample 2 (ppm)	Sample 3 (ppm)
1.	**Ca**	1680	1732	1601
2.	**Cd**	1.20	1.24	0.844
3.	**Cr**	3.43	4.38	3.37
4.	**Cu**	4.86	5.43	4.48
5.	**Fe**	280	290	260
6.	**K**	3820	3640	3731
7.	**Mg**	6264	6432	6241
8.	**Mn**	1.18	2.20	1.14
9.	**Na**	142	154	142
10.	**Ni**	1.14	1.16	1.150
11.	**Pb**	6.32	6.32	5.21
12.	**Zn**	20.4	18.2	17.20

Sample 1 (Chhattisgarh, Mahasamund, Mahanadi River Region)
Sample 2 (Uttar Pradesh, Agra, Yamuna River Region)
Sample 3 (Odisha, Kendrapara, Gobari River Region)

DISCUSSION

Value of Calcium, Cadmium, Chromium, Copper, Iron, Magnesium, Manganese, Sodium and Nickel are maximum in Sample 2. Value of Potassium and Zinc is maximum in Sample Value of Lead maximum in both Sample 1 and 2. The level of Ca ranged from 1732 ppm, being the highest in sample 2 to 1601 ppm being the lowest in sample 3.Calcium is the most abundant mineral in the body. Around 99 percent of calcium is stored in your bones and teeth, where it supports their structure and function. The remaining one percent is used to support metabolic functions. The level of Cd ranged from 1.24 ppm, being the highest in sample 2 to 0.844 ppm being the lowest in sample 3. Cadmium (Cd) is a non-essential toxic heavy metal in food and natural waters and it accumulates principally in the kidneys and liver. Cd level will therefore pose an insignificant health risk to consumers but an accumulation in the bodies of the consumers over a long period of time is of major concern as it can result to serious health implications. The level of Cr ranged from 4.38 ppm, being the highest in sample 2 to 3.37 ppm being the lowest in sample 3. Excess intake of chromium may cause skin rashes, stomach upset, kidney and liver damage, lung cancer and ultimately death. Prolonged consumption of unsafe concentrations of chromium through foodstuffs may lead to the chronic accumulation of heavy metals in kidney and liver of humans causing disruption of numerous biochemical process, leading to cardiovascular, nervous, and kidney and bone diseases. Cu level between 4.48 and 5.43 ppm, with sample 3 having the lowest and sample 2 having the highest Cu levels. Copper is an essential micronutrient which functions as a biocatalysts, required for body pigmentation in addition to iron, maintain a healthy central nervous system, prevents anaemia and interrelated with the function of Zn and Fe in the body. The level of Fe ranged from 290 ppm, being the highest in sample 2 to 260 ppm being the lowest in sample 3. Iron helps make many proteins, including haemoglobin, a protein that carries oxygen to your tissues, and myoglobin, which brings oxygen to your muscles. Body also uses iron for growth and development, and to make some connective tissue and hormones. The level of K ranged from 3820 ppm, being the highest in sample 1 to 3640 ppm being the lowest in sample 2. Potassium helps nerves and muscles communicate, moves nutrients into cells and waste products out of them, and helps regulate blood pressure. The level of Mg ranged from 6432 ppm, being the highest in sample 2 to 6241 ppm being the lowest in sample 3. Magnesium helps manage muscle and nerve function, control blood glucose levels, regulate blood pressure, and make DNA, protein

and bones. The level of Mn ranged from 2.20 ppm, being the highest in sample 2 to 1.14 ppm being the lowest in sample 3. Manganese plays a role in connective tissue and bone formation, calcium absorption, fat and carbohydrate metabolism, blood sugar control, and normal brain and nerve function. The level of Na ranged from 154ppm, being the highest in sample 2 to 142 ppm being the lowest in sample 1 and 3. Need some sodium to balance the fluids in body, control blood pressure and blood volume, and help your muscles and nerves work properly. However, many people get more sodium than they need and too much sodium can increase blood pressure, which raises the risk of heart disease and stroke. The level of Ni ranged from 1.16 ppm, being the highest in sample 2 to 1.15 ppm being the lowest in sample 3. Nickel is necessary for the biosynthesis of the hydrogenase, carbon monoxide dehydrogenase and found in a number of genera of bacteria. A nickel-tetrapyrrole coenzyme, Cofactor F430, is present in the methyl coenzyme M reductase, which powers methanogenic archaea. One of the carbon monoxide dehydrogenase enzymes CODH consists of a Fe-Ni-S cluster which helps to remove and oxidize 108 tons of CO from earth's lower atmosphere every year, helping to maintain low CO levels. Pb contents for ranged between 6.32 ppm being the highest in sample 1, 2 to 5.21 being the lowest in sample 3. Lead is a highly toxic metal whose widespread use has caused extensive environmental contamination and health problems in many parts of the world. The level of Zn ranged from 20.4 ppm, being the highest in sample 1 to 17.20ppm being the lowest in sample 3. The body needs zinc during pregnancy, infancy and childhood to promote growth and development. Zinc also helps make proteins and DNA, heal wounds and boost the immune system to fight off infections, and support taste and smell.

CONCLUSION

In most developing city the quest for rapid economic growth through industrialization and modern agriculture have been resulted Kalinga of Agra region (Uttarpradesh) is more contaminants (such as heavy metals) then Kalinga of Mahasamund region (Chhattisgarh) and Kendrapara region (Odisha). Heavy metals intake more than recommended level causes many health problems.

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