*International Research Journal of Environmental Sciences*_____ ISSN 2319–1414
Vol. **7(8),** 24-26, August **(2018)** *Int. Res. J. Environmental Sci.*

Short Communication

Assessment of heavy metal contamination in tubers sold in local markets of Bangalore, Karnataka, India

Swati Baliyan[1], Guru Prasad V.[1], Tejaswini M.[1] and Jessen George[1,2*]
[1]Department of Microbiology, Center for Research & PG Studies, IADC-Autonomous, Bangalore-560043, Karnataka, India
[2]Eben-Ezer Degree College, Eben-Ezer Group of Institutions, No.19, Hennur-Bagalur Main Road, Kothanur Post, Bangalore, Karnataka, India
georgejessen@gmail.com

Available online at: www.isca.in, www.isca.me
Received 4th April 2018, revised 6th July 2018, accepted 14th August 2018

Abstract

A study was carried in three different local markets in Bangalore city to check the concentration of heavy metals in tubers. The bio-accumulation of heavy metals was studied in tubers such as potato, sweet potato, elephant yam, raddish, carrot, ginger, beetrooot were collected from three different markets of Bangalore city (HAL Market, Russel Market, Yellahanka Market). In tubers unpeeled showed relatively more accumulation in comparison with peeled one. This study concludes that the unpeeled tuber samples showed more accumulation of heavy metals than the peeled samples and the elevating levels of heavy metals in tubers having potential health hazards to consumers of locally produced food items.

Keywords: Heavy metal, atomic spectrophotometer, cadmium, chromium, peeled, unpeeled.

Introduction

Heavy metals are becoming concentrated in natural environment as result of human activities and penetrate into plants and animals, and human tissues via inhalation and diet. Manual handling tubers are important source of human nutrition and efficient producers of dietary fibers, vitamins, minerals and latter is ultimate source of carbohydrates[1,2]. Heavy metal occurs naturally in earth's crust and their admixture varies from localities[2,3]. Heavy metal has been used by humans for various purposes but health risks associated with them have been studied extensively for years and became a topic of worldwide concern[3,4]. Exposure to heavy metal continues and even increasing in some parts of the world[5]. One of the most crucial properties of metals is that they are not biodegradable in the environment[6,7].

The toxic effect produced by trace amount of heavy metals in human beings concerned as risky to health. Heavy metal occurs in solution as free radical (cation) and absorbed by negatively charged particles. There is a positive relation between atmospheric heavy metal and upper layer of soil and deposited on the surface of plants[7,8]. As tuber crops are most important concerned with worlds food security and are major source of energy in the population fast settling urbanization[1]. They are the most cultivated crop in tropical region and are produced with very low aid so that it can be consumed by poor people. The consumption of heavy metal contaminated tubers which produce toxological effects including, disorders, malfunction and malformation of organs, mutagenic effect due to metal toxicity have been reported[2]. Hence the present study was focused on trace metal concentration in tubers.

Materials and methods

Study area: The area chosen for the study is Bangalore a district of Karnataka state which extends 18° 30' North latitude and 74° East longitude.

The main sources of the tubers to the market are from Hoskote, Narsapur, Malur and Anekal. *The bio-accumulation of heavy metals was studied in tubers such as potato, sweet potato, elephant yam, raddish, carrot, ginger, beetrooot were collected from three different markets of Bangalore city (HAL Market, Russel Market, Yellahanka Market).*

Sample preparation and analysis: The collected samples were washed and rinsed with distilled water and then sliced to small pieces. Then the samples were dried at 105°C for 24 hours. The dried samples were grounded into fine powder and stored in plastic polythene bags ready for digestion[1,2]. Analysis of heavy metals (Chromium (Cr) and Cadmium)were carried out by using Atomic Absorption Spectrophotometer[1,4].

Results and discussion

In the present study, tubers were taken as sample and heavy metal contamination was assessed in peeled and unpeeled tubers.

The trace metal concentration of Chromium (Cr) was showed higher in unpeeled samples compared to peeled samples (Figure-1). This may be due to the use of industrial and wastewater for irrigation purpose in India and other developing countries[9-13].

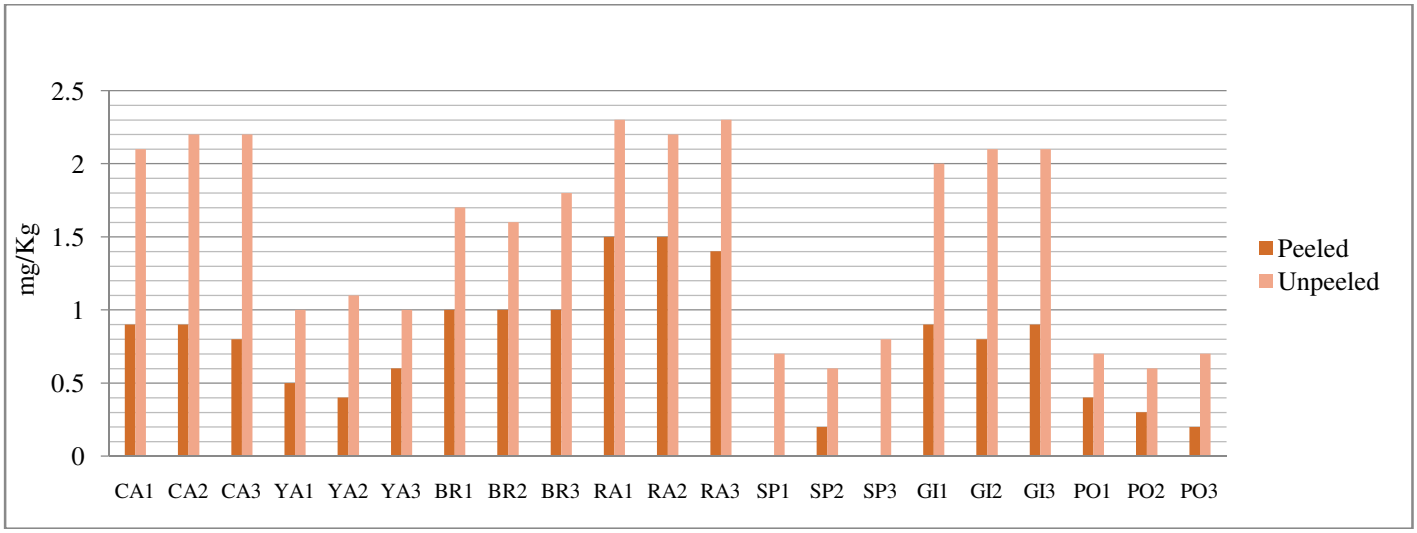

Figure-1: Concentration of Chromium (Cr).

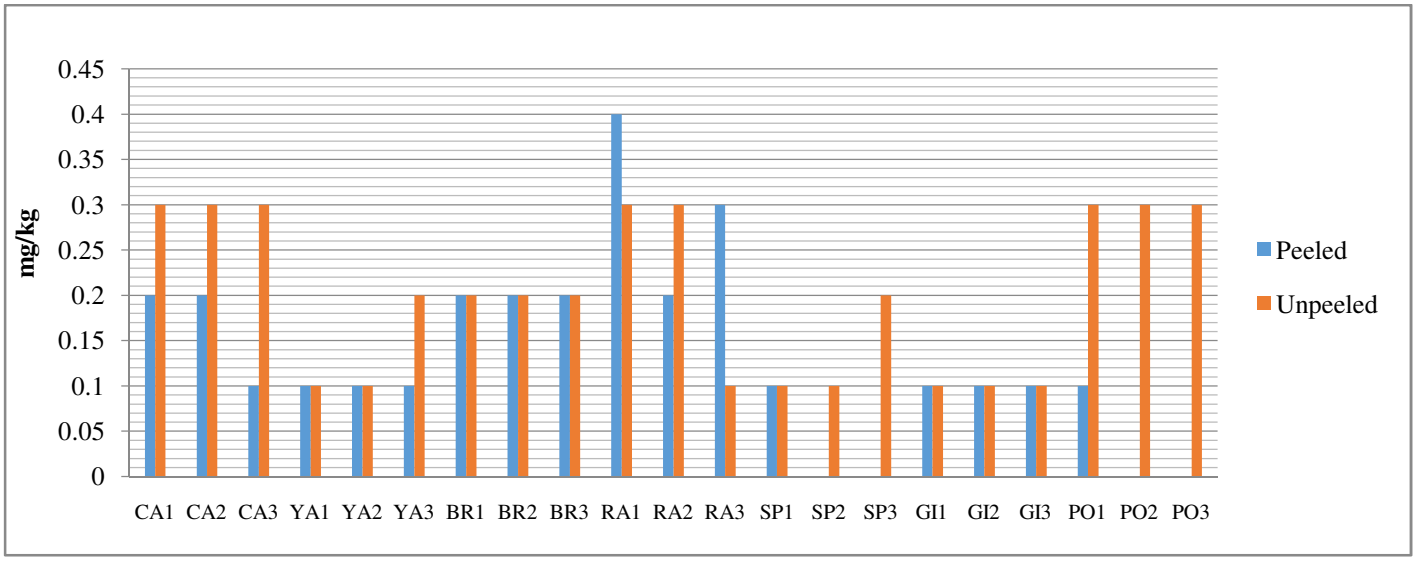

Figure-2: Concentration of Cadmium (Cd) in peeled and unpeeled tubers.

In case of the trace metal concentration of Cadmium (Cd) were also showed the similar pattern (Figure-2). The growing public concern over potential contamination of heavy metal and significant threat to human health and associated diseases, heavy metal have been extensively studied and reviewed by national and international bodies. In tuber crop unpeeled had more heavy metal concentration than the peeled once, because peel surface of tubers have in direct contact with the soil contaminated with heavy metal.

Conclusion

The present study has generated preliminary data on heavy metal concentration in tubers sold in local markets of Bangalore city. This study was focused on the trace metal concentration of Chromium (Cr) and Cadmium (Cd) in tuber foods. In this study the concentration of Chromium (Cr) were showed more in unpeeled Carrots, Raddish and Ginger when compared to other samples. The concentration of Cadmium (Cd) were found to be more in unpeeled Carrots, Raddish and potato samples. In case of peeled samples the concentration of Chromium (Cr) was found to be more in Raddish sample and the Concentration of Cadmium (Cd) were also more in Raddish samples.

Acknowledgements

We sincerely thank to Department of Microbiology, IADC for successful completion of the project.

References

1. Divya L., George J. and Midhun G. (2015). Heavy Metal Contamination of Some Common Tubers Sold in Local Markets of Ernakulam District, Kerala, India. *International Research Journal of Biological Sciences,* 4, 49-52.

2. Raphael E.C., Eunice O.E. and Frank E.O. (2010). Trace metals distribution in some common tuber crops and leafy vegetables grown in the Niger Delta Region of Nigeria. *Pakistan Journal of Nutrition*, 9(10), 957-961.

3. Fiona M.A., Ravi A., Dolf T.L., Bhupal D.S., Rana P.B., Neela M., Chandra S., Nigel P., Madhoolika A and Singh S.D (2003). Heavy metal contamination of vegetable in Delhi. *Indian Agricultural Research Institute*, 3, 121-125.

4. Neelam K. (1995). Handbook of Agriculture. *Indian Council of Agricultural Research*, New Delhi, 3, 60-65.

5. Neogi B., Tiwari A.K., Singh A.K. and Pathak D.D. (2018). Evaluation ofmetal contamination and risk assessment tohuman health in a coal mine region of India: Acase study of the North Karanpura coalfield. *Human and Ecological Risk Assessment*, 24(8), 2011-2023.

6. Jaishankar M., Tseten T., Anbalagan N., Mathew B.B. and Beeregowda K.N. (2014). Toxicity, mechanism and health effects of some heavy metals. *Interdisciplinary toxicology*, 7(2), 60-72.

7. Yadav K.K., Gupta N., Kumar V. and Singh J.K. (2017). Bioremediation of Heavy Metals From Contaminated Sites Using Potential Species: A Review. *International Journal of Environment and Pollution,* 37, 65-84.

8. Yadav A., Yadav P.K. and Shukla D.N. (2013). Investigation of heavy metal status in soil and vegetables grown in urban area of Allahabad, Uttar Pradesh, India. *International Journal of Scientific and Research Publications*, 3(9), 1-7.

9. George Jessen, Lakshminarayanan Divya, Severeni Ashili and Sarvajayakesavalu Suriyanarayanan (2018). Urban wastewater treatment systems: Assessment of removal efficiency based on microbial pathogens-A case study in Mysore, India. *Innovations in Agricultural and Biological Engineering, Sustainable Biological Systems for Agriculture, Emerging Issues in Nanotechnology, Biofertilizers, Wastewater, and Farm Machines, Apple Academic Press*, USA (AAP), 269-279.

10. Divya L., Jessen G., Suriyanarayanan S. and Karthikeyan K. (2014). Studies on pathogenic bacterial strains from selected Sewage Treatment Plants (STPs) of Mysore, Karnataka, India during different seasons: A comparative appraisal. *Journal of Environmental Research and Development*, 9(1), 24-30.

11. Divya L., George J., Midhun G., Magesh S.B. and Suriyanarayanan S. (2015). Impacts of treated sewage effluent on seed germination and vigour index of monocots and dicot seeds. *Russian agricultural sciences*, 41(4), 252-257.

12. Midhun G., Divya L., George J., Jayakumar P. and Suriyanarayanan S. (2016). Wastewater treatment studies on free water surface constructed wetland system. *In Integrated Waste Management in India,* Springer, Cham., 97-109.

13. Suriyanarayanan S., Jessen G., Divya L. and Balasubramanian S. (2012). Effect of waste paper based paper industry effluents on the growth of tree seedlings. *Journal of Environmental Research and Development*, 7(2A), 1117-1126.