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INFLUENCE OF FRESH WATER, 75% OF SILK DYEING EFFLUENT AND BIOTREATED EFFLUENT ON THE MINERAL CONTENTS OF THE SELECTED GLVS (GREEN LEAFY VEGETABLES)

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ABSTRACT

The Green Leafy Vegetables (GLVs) such as *Brassica juncea* (mustard), *Trigonella foenum* (fenugreek), *Amaranthus polygonoides* (sirukeerai), *Amaranthus tristis* (araikeerai) and *Sesbania grandiflora* (agati) were grown to study their mineral contents in fresh water, 75% of silk dyeing effluent and biotreated effluent conditions as pot study. The parameters namely iron, phosphorus, calcium and magnesium with different treatments as mentioned previously were analysed on its 45th day of its growth. Among the GLVs, the iron content of the biotreated plants was found to be maximum in *T.foenum* and *A.tristis*. The phosphorus level was maximally reduced in *A.polygonoides* and *T.foenum* grown in the effluent. *Brassica juncea*, *Trigonella foenum*, *Amaranthus tristis* was found to be high in phosphorus, calcium and magnesium contents of biotreated plants.

KEYWORDS: *Brassica juncea*, *Trigonella foenum*, *Amaranthus polygonoides*, *Amaranthus tristis*, Iron, Phosphorus, Calcium and Magnesium.

INTRODUCTION

Green leafy vegetables (GLVs) are rich in micronutrients and are nature's gift to mankind (Gupta and Prakash, 2009). Essential minerals can be divided into two groups, major minerals (Na, K, Mg, Ca, P, S) which are required in amounts greater than100 mg per day and they represents 1% or less of body weight while the other are considered as trace minerals (Fe, Zn, Cu, I, Si, Mn, F, I, Cr) which are required in an amount less than 100 mg per day and they represent less than 0.01 % of body weight (Ozcan, 2004). GLVs have known as the cheapest and the most abundant potential sources of minerals (Ramesh and Satakopan, 2010).The vegetables grown in the agricultural fields irrigated by dyeing effluent are adversely affected qualitatively and quantitatively (Panda and Choudhury, 2005). When these plants are consumed, it causes a serious health risk to human health (Demirezen and Ahmed, 2006). So an attempt was experimentally made to analyse the effect of fresh water, 75% of silk dyeing effluent and biotreated effluent on the mineral contents of the selected GLVs.

MATERIALS AND METHOD

Collection of silk dyeing effluent: The silk dyeing effluent was collected from the effluent disposal site of small scale silk dyeing industry in airtight plastic containers, located at Seelanaickenpatti in Salem district.

Collection of Biofertilizers: The biofertilizer *Pseudomonas fluorescens* was collected from the Tamil Nadu Agricultural University, Coimbatore.

Soil preparation for the study

The red soil and the sand were mixed at the ratio of 3:1. Each pot was filled with 7 kg of soil. The five GLVs were grown with four replicates in fresh water, 75% of silk dyeing effluent and the biofertilizer treated effluent (The biofertilizer *Pseudomonas fluorescens* was mixed at the rate of 5 tonnes ha-1 in 75% of crude effluent. The bacterial concentration of the biofertilizer was 10^8 Colony forming units (CFU) ml^{-1}.

Collection of Seeds

Seeds of mustard (*Brassica juncea*), fenugreek (*Trigonella foenum*), sirukeerai (*Amaranthus polygonoides*), araikeerai (*Amaranthus tristis)* and agati (*Sesbania grandiflora*) were collected from Superseeds Nursery, Coimbatore.

Seed sowing and maintenance of plants

About 20 seeds were sown in each pot and were allowed to germinate. Neem cake was mixed with water and poured around the pots as pest control. Fresh water, 75% of silk dyeing effluent and biotreated effluent with *Pseudomonas fluorescens* have been used as different treatments to the selected GLVs and plants were harvested on the 45th day.

MINERAL ANALYSIS

The mineral contents namely iron, phosphorus, calcium and magnesium were analyzed in the samples on the 45th day of the GLVs grown in fresh water, silk dyeing effluent (75%) and biotreated effluent.

Estimation of Iron: The Iron content was determined by method of Wong, 1928.

Estimation of Phosphorus: The Phosphorus content was analysed by the procedure given in Fiske and Subbarow, 1925.

Estimation of Calcium and Magnesium: The Calcium and Magnesium contents were determined by the protocol given in A.O.A.C, 1990.

RESULTS AND DISCUSSION

Influence of fresh water, silk dyeing effluent and biotreated effluent on the mineral contents of the selected GLVs

Figure 1 represents the comparison of the iron, phosphorus, calcium and magnesium content of the selected GLVs exposed to different treatments.

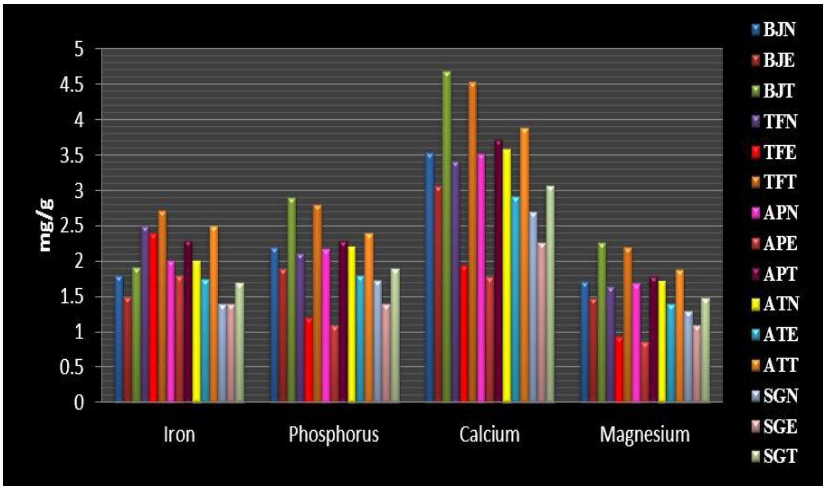

Figure 1: Mineral contents of the selected GLVs in different treatments

BJN: *Brassica juncea*, TFN: *Trigonella foenum*, APN: *Amaranthus polygonoides*, ATN: *Amaranthus tristis*,

SGN: *Sesbania grandiflora* were grown in fresh water.

BJE: *Brassica juncea*, TFE: *Trigonella foenum*, APE: *Amaranthus polygonoides*, ATE: *Amaranthus tristis*,

SGE: *Sesbania grandiflora* were grown in 75% effluent water.

BJT: *Brassica juncea*, TFT: *Trigonella foenum*, APT: *Amaranthus polygonoides*, ATT: *Amaranthus tristis*,

SGT: *Sesbania grandiflora* were grown in biotreated effluent.

The minerals are the important constituents that are required in minimum levels for plants. There was a significant change in the mineral composition of the GLVs grown in various treatments. The iron content of the biotreated plants was found to be maximum in *T.foenum* and *A.tristis*. The effluent decreases the iron level of the GLVs when compared to fresh water.The iron content of *B.juncea* was decreasedto a greater extent when compared to other GLVs. Nevertheless the iron level of *S.grandiflora* grown in effluent doesn't get affected. Enhanced iron nutrition resulting in increased plant growth can also be achieved due to the ability of some plants to bind and release iron from bacterial iron-siderophore complexes and utilizing the iron for growth (Bashan and de-bashan, 2005).

The phosphorus level was increased in biotreated plants in the order of *B.juncea*>*T.foenum*>*A.tristis*>*A.polygonoides*>*S.grandiflora*.The phosphorus level was maximally reduced in *A.polygonoides* and *T.foenum* grown in the effluent. The calcium and magnesium were highly affected in the *T.foenum* and *A.polygonoides* compared to the other GLVs grown in effluent. The calcium and magnesium of the GLVs grown in biotreated effluent were found to be maximum when compared to both the untreated and effluent treated plants.

CONCLUSION

Thus it was clear that the GLVs grown in biotreated effluent (*Pseudomonas fluorescens*) were found to be a good source of minerals and also biotreated effluent was found to encounter the risk effects to the GLVs. So the biotreated effluent can be recommended for the GLVs growth compared to these GLVs grown in the effluent.

REFERENCES

1. Gupta, S. and Prakash, J., Studies on Indian Green leafy vegetables for their Antioxidant activity, Plant Foods and Human Nutrition, 2009; 64: 39-45.
2. Ozcan, M., Food Chem, 2004; 84, 437- 440.

3. Ramesh, B. and Satakopan, V.N., In vitro antioxidant activities of Ocimum Species: Ocimum Basilicum and Ocimum Sanctum, Journal of Cell and Tissue Research, 2010; 10: 2145-2150.
4. Demirezen, D. and Ahmed, A., Heavy metal levels in vegetables in turkey are within safe limits for Cu, Zn, Ni and exceeded for Cd and Pb, Journal of Food Quality, 2006; 29: 252-265.
5. Wong, Colorimetric determination of iron, Journal of Biological Chemistry, 1928; 77: 409.
6. Fiske, C.H. and Subbarow, Y., Estimation of phosphorus, Journal of Biological Chemistry, 1925; 66: 375.
7. Association of Official Analytical Chemists, A.O.A.C. (1990), Official Methods of Analysis of the AOAC, 15th Edn., Washington, D.C., 1094.
8. Bashan, Y. and de-Bashan, L. E., Bacteria-Plant growth promoting, In: Encyclopaedia of soils in the environment, (Eds. D, Hillel), 2005; 1: 103-115.