HEAVY METAL POLLUTANTS IN SOME NIGERIAN LEAFY VEGETABLES

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Abstract

The levels of contamination of some Nigerian leafy vegetables grown around river Oyun in Oyun Local Government Area of Kwara State, Nigeria, have been studied. The toxic minerals (Fe,Pb,Zn, Hg Cd and V) arising from industrial wastes were in appreciable quantity in all the samples while the vegetables planted in other locations were relatively lower in the toxicant level. Mercury in the samples ranges from traces to 0.07 ppm while lead was not detected in water-leaf and Jews mallow. Fluted pumpkin and Jews mallow lacked cadmium contamination. Zinc was the most abundant with the highest of 5.71 ppm in water-leaf and least in Eggplant with 4.07 ppm. The consequences of these contamination to man were determined.

Key words: Vegetables, Toxic Metals, River Oyun and Contamination

Introduction

The increasing industrialization and environmental pollution of the biosphere have stimulated a worldwide study of metal contamination of both aquatic and terrestrial life in order to assess both safety and the adequacy in human life. In spite of the efforts of government in establishing Environment Protection Agencies, the problems of aquatic pollution as reported by Nwaedozie (1998), Hemmandez and Diaz (1986), Singh and Sahai (1986) and terrestrial pollution remain on the increase.

Vegetables have the characteristics of soft edible plants which because of their relatively high moisture content are perishable in freshly harvested slate. This peculiar nature makes them most susceptible to toxicants and are more vulnerable to contamination.

Different varieties of fresh vegetables are used for the preparation of soup, salad and drugs and in feeding the livestock such as cattle, goats and sheep. River Oyun, which stretches from Oyun area of Kwara State to the North Eastern part of the state, supplies the irrigation water requirement for the growth of these vegetables. The river is dammed along its course creating Oyun Dam and satisfies the ever-growing industries along its bank. Many small drains flow into this river from various industrial points like Okin Breweries, Okin Foams, Okin Biscuits, Global Soap, Resinoplasts, United Matches and Tate and Lyle which discharge their untreated water products into it, thereby contaminating the river with some heavy metal waste (Oladimeji, 1986).

With irrigation, the heavy metal gets to man through direct eating of the vegetables or food chain. These toxic metals like Pb, rig, Cd, V, Fe and Zn produce unhealthy effects in small doses and intoxicating at the threshold doses to various aquatic and terrestrial animals including human beings. This study therefore, examines the levels of this elemental contamination in six Nigerian leafy vegetables.

Materials and Methods

The Test Vegetable Samples (TVS) collected from various locations along the bank of River Oyun were spinach (Amaranthus Chlorostarchy), water leaf (Talinum Triangulae), egg plant leaf (Solanumgi rasioli), bitter leaf (Veronia amygalina), fluted pumpkin (Telfalra occidentalis), Jew mallow (Colosia argentea), while the control vegetables seeds (CVS) purchased from the Kwara State Department of Horticulture were planted separately as control experiment.

The minerals were analysed from the solution obtained by first dry-ashing the samples at 525°C using the methods described by AOAC (1975) and dissolving the ash in volumetric flasks using distilled, deionised water with a few drops of concentrated hydrochloric acid. Lead, Cadmium, vanadium, and Mercury were determined by spectra photometric (Dilhizone) method of Ajayi O.S. (1986). The iron and Zinc were determined by means of an Atomic Absorption Spectro photometer (PYE), Unicon, UK Model SP9) using the following salts: $FeS0_4$. $(NH4)_2S04.6H_20$ and Zn $(N03)_2$ for the preparation of standards.

Table 1: Some Heavy s in Vegetables Samples Around Oyu Rive (PPM)

Local Name	English Name	Botanical Names	Nature	Fe	*Vb*	Zn	Cd	Hg	V
Tete	Spinach	Amaranthus chlorostachy	TVS CVS	4.30 0.04	0.96 0.03	4.56 2.04	0.70 0.10	0.04 **ND**	0.06 0.14
Abu re	Water leaf	Talinium triangulae	TVS CVS	1.90 0.06	0.25 **ND**	5.71 2.33	0.39 0.20	0.05 **ND**	1.20 0.01
Abagba	Egg planted leaf	Solamumgillo rasioli	TVS CVS	3.49 0.14	0.70 0.01	4.07 3.42	0.75 0.20	0.02 **ND**	0.45 0.07
Ewuro	Bitter leaf	Yeronia amygaliba	TVS CVS	5.02 0.32	0.10 0.04	5.00 3.20	0.73 0.12	0.07 **ND**	0.56 0.19
Ugu	Fluted pumpkin	Telfalra occidentalis	TVS CVS	0.02 0.15	0.26 0.01	5.41 2.50	0.01 **ND**	0.06 **ND**	0.57 0.13
Soloyokoto	Jews mallow	Colosia argentea	TVS CVS	3.09 0.17	0.85 **ND**	4.27 2.30	0.36 **ND**	0.06 **ND**	0.29 0.21

PPM = Part per million (AAS).
ND = Not detectable.
TVS = Test vegetables samples.
CVS = Control vegetables samples.
Values are means of triplicate determination.

Results and Discussions

Table 1 shows the level of heavy metals present in six different species of Nigeria leafy vegetables grown around River Oyun, where the irrigation scheme is practiced. Most of these Test Vegetables Samples (TVS) showed appreciable level of contamination while the Control Vegetables Samples (CVS) showed traces. These have revealed the high possibility of the health hazards that can manifest in humans.

Iron was identified in all the samples with bitter leaf having the highest (5.02ppm) while waterleaf had the least (1.90ppm) in small quantity.

Nwaedozie, 1998) was observed in most of the TVS but lead concentrations were not detected in the waterleaf and Jews mallow CVS. Hence, the possibility of contamination via water with metal wastes in high, aside from soil nature. The spinach and Jews had fairly high concentrations of 0.96 and 0.85 respectively. Zinc was most predominant. Cadmium was identified in the samples. There were appreciable concentrations of Vanadium but the effect of Vanadium metal is unknown. Mercury contaminations were only indicated in bitter leaf and eggplant. Blackwood and Mamencncy (1998) reported the poisonous nature of the metal as it interferes with functions of the liver, brain and kidney, but the exact mode of action is not known.

Conclusion

To save the environment and public health from metal poisoning, strict methods of waste effluent control must be adopted by all chemical industries. Since metals are toxic to man at some levels of intake. With the increase in the activities of industries, these toxicants could pose potential health hazards to the increasing inhabitants of Oyun and the consumers of these vegetables.

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