DETERMINATION OF HEAVY METALS IN COBS OF MAIZE (*ZEA MAYS*) FROM CALABAR SOUTH LOCAL GOVERNMENT AREA OF CROSS RIVER STATE NIGERIA

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ABSTRACT

The concentrations of Arsenic (As), Cobalt (Co), Copper (Cu), Cadmium (Cd), Chromium (Cr), Mercury (Hg) ,Iron (Fe), Lead (Pb) and Manganese (Mn) were estimated in the Cobs of maize obtained from three farmlands located along Abitu Avenue, Effanga Mkpa and Anantigha streets all in Calabar South local government area ., using Atomic Absorption spectrophotometer .The results of the analysis showed the following sequence. Fe (1.27µg/g) > Cr(0.22µg/g) >Mn (0.02µg/g) > Cd (0.01 µg/g) and Pb (0.01 µg/g) in samples at Abitu Avenue, Fe (0.91µg/g) > Cr(0.17µg/g) > Cd (0.01 µg/g) and Mn (0.01 µg/g) in samples at effanga mkpa street and Fe (0.61µg/g) > Cr(0.08 µg/g) > Cd (0.01 µg/g) in samples at anantigha street.The result revealed that the concentrations of Fe, Cr, Mn and Cd were highest in samples from Abitu avenue followed by those from Efanga Mkpa street while those from Anantigha street had the least concentrations of the metals. .As,Co,Cu and Hg were not detected in samples from all the locations. Mn were not detected in samples from Anantigha street,while Pb was only detected in samples from Abitu Avenue.

Key Words: Maize, *Zea mays*, Cobs, Heavy metals.

1. INTRODUCTION

Heavy metals such as Arsenic, Cadium ,Chromium, Lead , Mercury etc in crops are studied because they are related to environmental problems and also have accumulative properties (1).Traces of these metals can be found naturally in the environment ,but because of anthropogenic activities there have been increases in their concentrations which can lead to the pollution of the environment (2).The increase in anthropogenic activities has brought about adverse environmental and ecological changes because of its inputs ,which have also become more tangible and menacing (3).There has been growing concerns and questions about the state of the soils and quality of food crops ,fruits and vegetables cultivated and grown in areas with high levels of anthropogenic activities. High levels of heavy metals in the soil could be indicative of similar concentration of these metals in plants or crops due to accumulation at concentrations that could cause serious risk to the health of the consumers of these crops or plants (4).Maize *(Zae mays*) is one of the oldest and widely cultivated cereals and it serves as food for humans and livestock in many parts of Africa. In Nigeria, maize can be found in all the cities and villages where it is consumed as a staple food. Calabar south local government area of Cross River state in Nigeria is one of the local government areas where maize is highly consumed in different forms by the inhabitants. It is our believe that with the high level of anthropogenic activities going on in this local government area, there may be the possibility of the maize cultivated and consumed here being polluted with high levels of heavy metals. And this may result in a serious health risk to the consumers. To the best of our knowledge we have not seen any reported work on the levels of heavy metals in cobs of maize cultivated in this area. We therefore consider it necessary to determine the levels of heavy metals in the cobs of maize grown in the study area knowing the health hazard associated with consumption of crops with high concentrations of heavy metals(1,5-12), This work is therefore aimed at assessing the heavy metals content of the cobs of maize (Zea mays) cultivated in three locations in Calabar South Local Government area of Cross River state of Nigeria to ascertain the health effect association with their consumption.

2. MATERIALS AND METHODS

Sample collection:

The maize samples used for the study were obtained randomly from three different farmlands located along Effanga mkpa street, Abitu avenue and Anantigha street all in Calabar South Local Government area of Cross River state in the month of July 20010.Thirty (30) cobs of maize (fruits) were collected from each farmland and the samples were taken to the laboratory in different polythene bags within an hour of harvesting.

Sample preparation

The samples were dehusked into grains and washed with deionised distilled water.5.0g of the samples from each locations were measured into different containers .The samples from each of the containers were dried in a hot air circulating oven (Gallenkemp DV 330) at 65^{o}C to constant weight for 18-24h .The dried samples from the different containers were mixed together and homogenized with a mixer grinded to powder and stored in screw capped containers at 4^{o}-6^{o} C.

Analysis

1.0g of the ground samples were homogenized and digested with 20mls of 1:1(v/v) concentrated HNO_3 and HCl acids (Analar grade) in 100ml beaker. The flask was swirled gently and heated in an electrothermal heater until evolution of white fumes marking the end of the digestion process. The digest was then cooled and filtered through whatman No 1 filter paper into 50ml volumetric flask and diluted to 50ml mark with distilled water according to procedure reported by (1).The heavy metals content of the samples were determined using the atomic absorption spectrophotometer (Pye Unicam 2900) according to the procedure of (13) on dry sample weight.

RESULTS AND DISCUSSION

The result of the analysis (Table I.0) shows the concentrations of the heavy metals to be, Fe (1.27 µg/g), Cr (0.22 µg/g, Mn (0.02 µg/g), Cd (0.01µg/g), and Pb (0.01µg/g) in samples at Abitu Avenue. And, Fe (0.91µg/g), Cr (0.17µg/g), Cd (0.01µg/g) and Mn (0.01µg/g) in samples at Effanga Mkpa street.While,Fe (0.61µg/g), Cr (0.08 µg/g), Cd (0.01µg/g) in samples at Anantigha street. The result revealed that the concentrations of Fe, Cr, Mn and Cd were highest in samples from Abitu Avenue followed by those from Efanga Mkpa street, while those from Anantigha street had the least concentrations of the heavy metals. .As, Co, Cu and Hg were not detected in samples from all the locations. Mn was not detected in samples from Anantigha street, while Pb was only detected in samples from Abitu Avenue. This is believed to come from emission from the vehicular traffic on this road, This is because the farmland in this location was the closest to the main road out of the three. The results of the analysis show that Fe has the highest concentration in samples from the three locations in the range (1.27µg/g) at Abitu Avenue, followed by (0.91µg/g) at Effanga Mkpa street and (0.61µg/g) at Anantigha street. This same trend was shown by the concentrations of chromium (0.22µg/g) in samples from Abitu Avenue (0.17µg/g) in the samples from Effanga Mkpa Street and (0.08 µg/g) in samples from Anantigha street. Manganese concentration of (0.02µg/g) was highest in samples at Abitu Avenue with least value of (0.01µg/g) in samples at Effanga Mkpa street. The concentrations of Cadmium in samples from all the locations were shown to be (0.01µg/g) while the concentration of lead was (0.01µg/g).at Abitu Avenue .The results also revealed that the concentration of the metals in all the samples from all the locations were very low and within the safe values for the investigated metals (14), which indicates that the cobs of maize from these farmlands were safe for human consumption.

CONCLUSION

This study has revealed the various concentrations of heavy metals, Iron (Fe), Chromium (Cr) Cadmium (Cd) Manganese (Mn) and Lead (Pb) in Cobs of maize cultivated at three different farmlands in Calabar South Local Government Area of Cross River State. The concentrations of the metals in all the samples from all the locations were seen to be very low and within the safe values for the investigated metals, therefore fit for human consumption.

Table 1.0 Showing the heavy metals concentration in Cobs of Maize (µg/g **) Dry weight.**

SAMPLE LOCATION	Fe	Cr	Cd	Pb	Mn	As	Cu	Hg	Co
Abitu Aveune	1.27	0.22	0.01	0.01	0.02	ND	ND	ND	ND
Effanga makpa	0. 91	0.17	0.01	ND	0.01	ND	ND	ND	ND
Anantigha Street	0.61	0.08	0.01	ND	ND	ND	ND	ND	ND

ND= **Not detected**

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