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QUALITATIVE DETECTION OF SOME SELECTED HEAVY METALS ON BITTER LEAF (*vernonia anygdalina*) AND PUMPKIN LEAF (*Telfairia accidentales*)

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Abstract: The leaves of (*vernonia anygdalina*) known as Bitter leaf (sample A) and (*Telfairia accidentales*) as Ugwu leaf (Sample B) are edible and nutritious vegetables commonly found in west-Africa specifically in the rain and guinea savannah. The both plants samples were subjeted to test for the presence of some selected heavy metals which includes; Iron (Fe), Cadmium (Cd) and Aluminum (Al). After carrying-out a qualitative test for the samples, A and B, it resulted to a conclusion that both samples contained Aluminum (Al^{3+}). For Iron, sample A had (Fe^{3+}) while sample B had (Fe^{2+}). Then for Cadmium, only sample A, responded to the presence of Cadmium (Cd^{2+}) while sample B shows the absence of Cadmium (Cd^{2+}).

IndexTerms **- Component, formatting,style,styling,insert.**

INTRODUCTION

The plant (vernonia anygdalina and Telfairia accidentale) are widely used in West Africa as delicacy in making local dishes. Africa is among the richest continent with large Phyto diversity. Consumption of these plants' material has contributed to improvement of health in human (Yedjou *et al.* 2008).
Jane *et al.* (2017) claims that, there is acute risks in the wide use the plants (vernonia anygdalina and Telfairia accidentale) for therapeutic and environmental purpose. As such the consumption of these plants' materials in large quantity and on regular bases may posse threat to health due to it acute toxicity.
Minerals are essential to human growth and health, micro elements inbalance in human can result to onset clinical symptoms affecting human health. Plant materials are of great concern for the hormonal, metabolic and other biochemical processes. There is need for the optimum balance in these elements in human system. Amongst these elements are; Calcium (Ca), Iron (Fe), Copper (Cu), Chromium (Cr), Iodine (I) etc. (Sidonova *et al*, 2020).
Heavy Metals are members of ill-defined subsets of elements that posess metallic properties, this mainly include the transition Elements (metals), and some essential metalloids, lanthanides and actinides. Various definitions had been proposed in respect to Heavy metals, which may be based on density, some based on atomic numbers or atomic weight and their chemical properties (Purseglove, 1977)
The distribution of heavy metals which includes iron, manganese, copper, chromium, lead and zinc) in leaf, stems and roots of fluted pumpkin (*Telfeiria occidentalis*) were investigated at three different street roads in Cross River State of Nigeria the streets were Afokang, Anantigha and Eneobong. The results show that, the concentrations of Fe, Mn and Cr and Pb were highest in the leaves (Edem *et al.*, 2009).

Generally, vegetables appear to have the highest and lowest number of heavy metals accumulated in their leaves and seed respectively e.g. beans, peppers, tomatoes, melons and peas show very low intake of heavy metals in their seed. Plant intake of heavy metals varies with soil pH.
A study by Echem (2010) on cassava cultivated on oil polluted soil showed that soil contaminated with heavy metals cause contamination of foodstuffs.
Heavy metals are associated with myriad adverse health effects, including allergic reaction, nephrotoxicity, and cancer. Humans are often exposed to heavy metals in various ways - mainly through the inhalation of metals in the workplace or polluted neighborhoods, or through the ingestion of food that contains high levels of heavy metals or paint chips that contain lead (Ifon, 1977).
This research is aimed at assessing the presence of some selected heavy metals (Fe, Cd and Al) in the leave extracts of bitter leaves (*vernonia anygdalina*) and Ugwu leaves (*Telfairia accidentale*).

RESEARCH METHODOLOGY

Experimental, Samples collection, identification and pretreatment

The bitter leaf sample was collected at a neighboring house in Maru town, Maru Local Government of Zamfara state, while Ugwu leaves were purchased from Tudun wada market of Zamfara State. Both samples were identified at biological science unit of ZSCOE Maru. Samples freshly selected, washed, pounded and filtered. The filtrates were lebelled sample A and sample B respectively.

2.1 Test analysis for Fe^{2+} Fe^{3+}, Al^{3+} and Cd^{2+} in both samples

The test analysis was conducted in Chemistry laboratory, Science complex, Zamfara State College of Education Maru, Maru Local Government Area, Zamfara State.

2.1.1 Test for Iron (II) Fe^{2+} or Iron (III) Fe^{3+}

About 2ml of the original solutions of sample A and B was poured in two clean test-tubes. Few drops of Ammonia (NH_3) solution were added to both samples and then in excess. Then it became a pale green solution for sample A showing the presence of Fe^{2+} (Iron II) while a reddish-brown precipitate appeared in sample B signifying the presence of Fe^{3+} (Iron III).

2.1.2 Test for Cadmium (Cd^{2+})

About 2ml of the original samples A and B was poured in a clean test-tube and was acidified with few drops of dilute Hydrochloric (HCl) acid. Then H_2S gas was passed to the mixture for a while through gas generator and yellow precipitate was observed that gives the sulphate of Cd^{2+} or Sn^{2+}. To small amount of the precipitate in both samples, dilute Nitric acid (HNO_3) was added and warmed, the precipitate dissolved completely to a clear solution, which also indicate the suspect of Cd^{2+} or Pb^{2+} which gives the nitrates of (Lead) Pb or (Copper) Cu. Ammonia solution is added in drops to the resulting solution white precipitate appeared and soluble in excess, indicating the presence of Cd^{2+} in sample Awhile insoluble for sample B. Confirmatory test was done by passing Hydrogen Sulphate (H_2S) gas to the resulting solution by the gas generator apparatus and a bright yellow precipitate appeared which confirmed the presence of Cd^{2+} for sample A

2.1.3 Test for Aluminium (Al^{3+})

To test for the presence of Aluminum in samples A and B,2ml of the original samples A solution and B was acidified with concentrated. Nitric acid (HNO_3) acid and 1ml of ammonia solution to each. To the resulting mixtures, Sodiun hydoxide (NaOH) solution was added and followed with 1ml Hydrogen peroxide (H_2O_2) giving a colorless solution. The colorless solutions were treated with 1ml of Ethanoic acid and few drops of aluminum reagent, followed with ammonium carbonate, a red precipitate appeared in the solutions of both sample A and sample B confirming the presence of All (III).

RESULTS AND DISCUSSION

3.1 Results

The results show the test conducted, mainly to detect the presence of these selected heavy metals that includes; Iron (Fe), Cadmium (Cd) and Aluminum (Al). Due to the scope of this research, we are only concerned with the qualitative test for the presence of the above elements.

Samples	Observation of test done on sample	Inference
Sample A	Reddish-brown precipitate	Fe^{3+} present
	A bright yellow precipitate	Cd^{2+} present
	A red precipitate	Al^{3+} present
Sample B	A pale-green precipitate	Fe^{2+} present
	A very light-green solution	Cd^{2+} absent
	A red precipitate	Al^{3+} present

3.2 Discussion

The qualitative Test for heavy metals in organic compounds is a wide scope of research that involved the detection of elements, composition, properties and quantity of elements involved. The vegetables involved in our research were sample A and sample B.

From result table above, we will be discussing the heavy metals of interest which are Iron (Fe), Cadmium (Cd) and Aluminum (Al).

3.2.1 Test for Iron (Fe) for both samples

After vigorous test conducted for both samples, the result showed both samples contained Iron (Fe) in them. But along the test we came to observed that sample A contained Iron III (Fe^{3+}) while sample B contained Iron II (Fe^{2+}) .

3.2.2 Test for Cadmium (Cd) for both samples

Though the test for Cadmium (Cd^{2+}) had the same materials, reagents and procedures with Copper (Cu^{2+}) to some extent. Nearly the final stage for the test only the characteristics of Cadmium (Cd^{2+}) prevailed and finally confirmed its presence in sample A. Thus, the same procedure and steps were followed for sample B, showed the same characteristics of sample A to some extend for the presence of Cadmium but failed to confirm its presence. This means, no Cadmium present in sample B.

3.2.3 Test for Aluminum (Al) for both samples

The test for Aluminum was relatively similar to that of Zinc (Zn), Lead (Pb), andCalcium (Ca) which gives white precipitate on the action of Ammonia. Both sample A and sample B responded to the presence of Aluminum (Al^{3+}) ion and the confirmatory test was done to both samples using the reagents and procedures. They both showed the presence of Aluminum.

Conclusion

Although all effort was made to the experimental condition constant and irrespective of the quality of analytical procedures, error could be made due to some uncontrolled factors and unknown influences. From the experimental view, I came to conclude that both sample A and sample B contained Aluminum ion (Al^{3+}). For Iron (Fe), sample A contained Iron III ions (Fe^{3+}) while sample B contained Iron II ions (Fe^{2+}). There is Cadmium ion (Cd^{2+}) in sample A while sample B shows no presence of Cadmium ion.

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