



# Humic acid extraction from Landfill compost, composted human solid waste and agriculture residue conditioned with cowdung.



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## Introduction

Humic acid is one of two known natural acids. It is mainly extracted from various sources of humic substances, which are formed through the process called humification.

Humic acid enhances plant growth through increasing organic matter in soil with low organic content because of extensive use of conventional fertilizers, promotes high cation exchange capacity of the soil (these cations are micro and macro nutrients). Also, it avoids leaching of plant nutrients and increases water holding capacity of the soil.

## Objectives

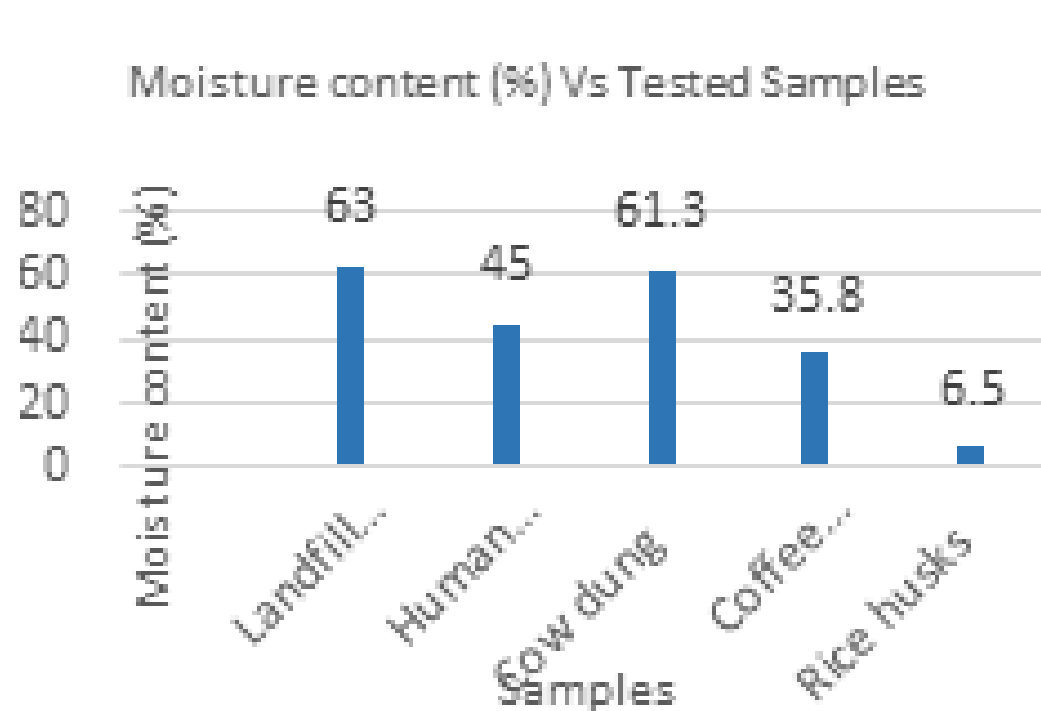
- To extract humic acid from all landfill compost, composted dried feces, agriculture residues conditioned with cowdung.
- To characterize extracted humic acid prior to being used by farmers to amend their soil.
- To find potential sources of humic acid among all tested samples.

## Methodology

- In this study we used humic substance samples from various sources, these include landfill compost, composted human waste, rice husks and coffee husks conditioned with cow dung.
- Extraction of humic acid for all samples was done using acid-base precipitation methods as IHSS has suggested (Mayhew, 2004). 0.1 M of sodium hydroxide and concentrated hydrochloric acid (35-38%) are two reagents used.
- In this study we did few analyses according to the availability of various analytical instruments. We used UV-Visible spectrophotometer for finding the concentration and calculating E4/E6 ratio, oven was used to calculate the moisture content and electrical balance was used to measure the obtained mass of humic acid powder.

## Results and Discussion

### a) Calculated moisture content (%) in all Samples

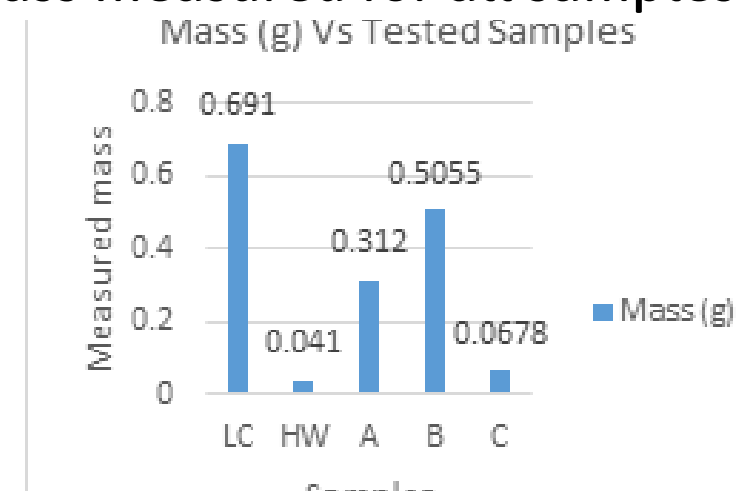


Moisture content measured for all samples shows that landfill compost has high moisture content. The reasons behind this are that during decomposition of various wastes collected there is formation of leachate which increases humidity in landfill compost.

### Acknowledgements

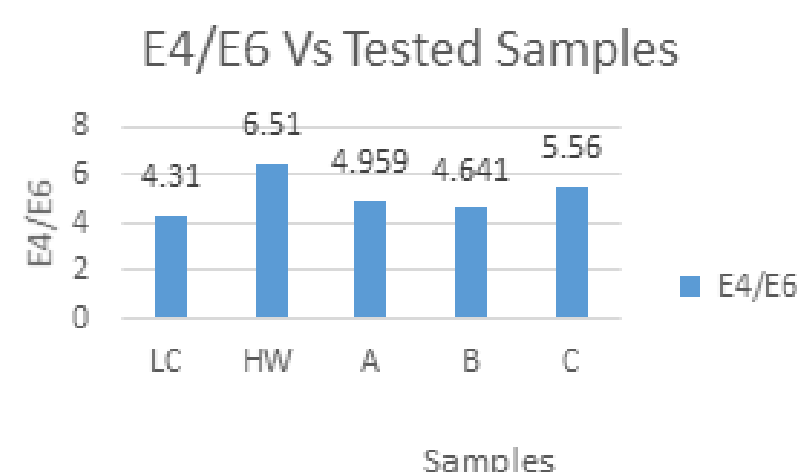
I would like to acknowledge Lord Laidlaw the founder of Laidlaw scholarship for his financial support, University of Rwanda, College of Science and Technology, Department of Chemistry and Department of Biology for their facilities in this project.

### b) Mass measured for all samples



In 10g taken for all tested samples. After extraction of humic acid powder landfill compost has revealed to have high amount of grams which is equal to 0.691g. As high amount of humic acid powder increases the more less amount of sample will be used (Vusie, 2006).

### c) Determined E4/E6 ratio for all sample



Landfill compost was found to have low E4/E6 ratio. Low E4/E6 refers to high molecular weight or size between 5,000 to 100,000 Dalton, high condensation of aromatic carbon network and high degree of humification (Kononova, 1966).

### d) Calculated Concentration for all samples

Samples	Absorbance (nm)	Concentration (ppm)
LC	1.782	770
HW	0.726	290
A	0.906	371.8
B	1.154	484.54
C	0.771	310.45

After drawing calibration curve of standard solution of humic acid solution we calculated corresponding concentration. After that we found that landfill compost to be more concentrated with 770ppm. This refers to that less amount of humic acid powder can be used for various purposes.

- LC** stands for Landfill compost
- HW** stand for Human waste
- A** stands for ratio of 30:70 coffee husks and cow dung
- B** stands for ratio of 30:70 cow dung and rice husks
- C** stands for ratio of 70:30 of coffee husks and cow dung

## Conclusion

This study aims at extracting humic acid, characterization of humic acid and testing the potential source of humic acid among other potential sources.

Extraction of humic acid was achieved successfully and in all analyses done has revealed that landfill compost to be potential in all tested potential sources in terms of weight, concentration and on degree of humification.