

Original Research Article

## Comparative study of vermi-cast generated from flower waste and leaf waste

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### ABSTRACT

This study evaluates concentration of essential elements (Mg, N, S, P, Ca, Zn, Fe, K, Organic carbon, C:N ratio) for plant growth present in the vermi-cast generated from flower waste and leaf waste. The flower waste from holy places and leaf waste from college yard was collected separately and cast generated from these waste analysed for the comparative study of different trace elements in cast generated from flower and leaf waste using IS and APHA method. Out of all the detected element N, the essential element for plants was found in high concentration in cast generated from flower waste(134.6mg/L) than in leaf waste cast (86.16 mg/L) while potassium(108.30mg/L)and zinc(415mg/L) is in higher concentration in leaf waste cast than the flower waste cast (potassium94.33mg/L, Zinc2.805mg/L).This implies cast generated from flower waste and leaves waste separately will be beneficial in overcoming deficiencies of particular essential element in plants.

### KEYWORDS

Vermi-cast | Essential elements | Flower waste | Leaf waste | Deficiencies

### CITATION

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## Introduction

Earthworms are important component of soil and boon for us that helps in converting solid waste into nutrient rich soil. Earthworms play an important role in solid waste management and are the major component of soil fauna communities in most of ecosystems. Earthworms are not only the intestine of earth but their cast serves as an important source of minerals and trace elements. (Ayoola and Olayiwola, 2014). Generation of compost from solid waste is eco-friendly and cost effective method of solid waste management (Manohar *et al.*, 2016). The concentration of trace elements was found to be same as that of concentration of trace elements in medicinal plants used to treat various human ailments. Earthworm cast has the potential to treat human ailments also. (Bhosale and Mokashe, 2017). Large quantities of essential nutrients (N, P, and K) present in fresh cast are easily absorbed by plants.

India is agriculture dominated country and blessed with cultural heritage. Indians follow customs and celebrate various festivals. Flowers are used for decoration as well as for worship in holy places later these flowers are thrown as a waste material. Most of the time these waste flowers are mixed with municipal solid waste and allowed to decay naturally. Waste flowers are disposed of in the rivers or other water bodies that pollutes the environment and causes harmful effect on human health and aquatic life. Flowers and leaves are rich in nutrients and easily converted into compost (Sharma and Kumar, 2018). Leaves are also major part of solid waste which are full of nutrients and essential minerals. Up to 80% of a tree's nutrients and minerals end up in its leaves. Leaf waste is

also a valuable soil constituent which helps to increase soil moisture retention and provide additional nutrient (Sharma *et al.*, 2017). To find out concentration of different elements essential for plant growth and development is the main aim of this study.

## Material and Method

Leaf waste collected from Dharampeth Science College yard at Nagpur (M.S.) and flower waste from nearby holy places were collected and kept in two different tanks of same size for decomposition. Layers of dry cow dung mixed with soil and decayed leaf waste and flower waste are made in respective tanks. Culture of earthworm *Eiseniafoetida* of same quantity was inserted and keep it for biological decomposition to produce organic fertilizer. The action of earthworms in the vermi-composting process are both physical and biochemical When vermi-cast is ready in both the tanks, cast was collected and dried naturally. The cast was ground in fine powder using mortar and pestle. Exactly 12gm of powdered casts were weighed into the beaker. Freshly prepared mixture of 180 ml of HNO<sub>3</sub> and H<sub>2</sub>O<sub>2</sub>(1:1v/v) was added to the beaker. Solution was allowed to subside for 1 hr. and then the mixture was heated on hot plate at 80<sup>0</sup>C till the sample was reduced to approximately 55ml. The sample was allowed to cool and filtered through a Whatmann No.1 filter paper. The sample was diluted to 300 ml with distilled water. The sample is analyzed using Kjeldal assembly, AAS (atomic absorption spectrophotometry) and flame photometer.

## Result and Discussion

The concentration of nitrogen (134.6mg/L) was found to be highest in earthworm cast

generated from flower waste than in cast generated from leaf waste (86.16mg/L). The concentration of potassium was found to be more in leaf waste (108.30 mg/L) than the flower waste (94.33 mg/L) The concentration of Zinc (9.415 mg/L) was found to be highest in leaf waste while concentration of Zinc in flower is (2.805 mg/L). The concentration of remaining elements sulphur, copper, iron, boron and carbon nitrogen ratio was found to be nearly same or no significant change. Nitrogen which is an essential nutrient for plant growth and is the major component of chlorophyll, the compound that is used in photosynthesis (Josef Mas, 2013) Healthy plants often contain 3-4 %in N their above ground tissue and this is much higher concentration than any other element. All the plants utilize Nitrogen the form of NO<sub>3</sub>and NH<sub>4</sub> It is most important element for proper growth and development of plants which significantly increases and enhances the yield and quality by playing vital role in biochemical and physiology of plant (Leghari, *et al.*, 2016). Potassium is considered second essential plant nutrient required in large amount for proper growth and reproduction. Deficiency of potassium causes scorching of plant leaves, slower or stunted growth uneven ripening of fruits and yellowing of leaf. Potassium activates at least 60 different enzymes involved in plant growth potassium is also responsible for opening and closing of stomata also through which exchange of CO<sub>2</sub> and O<sub>2</sub> (Prajapati and Modi, 2012). Potassium concentration found more in cast generated from leaf than the flower cast will help to overcome this problem. Zinc is an essential micronutrient involved in a wide variety of physiological

processes (Van Assche and Clijsters, 1986a; Ali *et al.* 1999; Cakmak 2000; Broadley *et al.*, 2007) found more in concentration in cast generated from leaf. Zinc plays a fundamental role in the functioning of plants *i.e.* in maintenance of the integrity of cellular membranes, protein synthesis and regulation of auxin. The metal plays a key role in both flower and normal fruit development (Hafeez *et al.*, 2013). Casts generated from flowers and leaves separately will be beneficial in overcoming deficiencies of particular essential element in plants.

S. No.	Element	Leaf Waste Cast	Flower Waste Cast
1	Mg	0.00mg/L	0.00mg/L
2	Organic C	0.16%	0.25%
3	N	86.16 mg/L	134.6mg/L
4	S	43.66mg/L	42.33mg/L
5	P	0.00mg/L	0.00mg/L
6	K	108.30mg/L	94.33mg/L
7	Cu	1.557mg/L	1.327mg/L
8	Fe	245.1mg/L	227.2mg/L
9	Zn	9.415mg/L	2.805mg/L
10	Br	0.865 mg/L	0.951mg/L
11	C:N ratio	18.6	18.7
12	Ca	0.00mg/L	0.00mg/L
Table 1: Showing the observed value			

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