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CARBON NITROGEN EVALUATION OF VARIOUS VERMICAST BY NUTRITIONAL WASTE MANAGEMENT

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ABSTRACT:
Earthworms are the major component of soil in most ecosystem that helps in converting nutritional waste into nutrient rich soil. Their activities beneficial for enhancing soil nutrient cycling. Especially concentration of organic carbon and Nitrogen are the indicator of soil fertility. The Marigold (Zendu) and Chrysanthemums (Shevanti) flower waste from holy places and Cabbage leaf waste from vegetable seller was collected separately and cast generated from these waste analysed for the comparative study for the evaluation of organic carbon, Nitrogen and carbon nitrogen ratio an essential elements in cast generated from these wastes separately using IS and APHA method. Carbon and Nitrogen, the essential element for plants was found in high concentration in Merigold flower waste (9.18%) when compared with control sample and other waste while carbon nitrogen ratio found to be more in cast generated from cabbage leaf waste.
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Keywords: - Cast, APHA, IS, Organic

INTRODUCTION :

Soil is the largest storehouse of the organic carbon Soil organic carbon plays an important role in soil fertility and water conservation SOC is also known to increase soil nutrient cycling capacity .The higher SOC content results in an improvement of the soil's condition has been discussed widely within the soil quality concept (Andrews et. Al.2004). Zvomuya et.al. 2008 identified total SOC content as one of the key soil quality indicator associated with differing yield. Numerous studies focused on the role of earthworm play in soil carbon mineralization and stabilization. Earthworms are known to modify the soil structure and alter the physicochemical parameters. Earthworms occurring globally in almost every ecosystem are biochemical reactors that transforms unstable carbon components into more stable forms. Earthworm feeding and casting behavior serves as a mechanism for physical stabilization of carbon trapped within(Elvin Thomas,V. Shanthi Prabha) Humification of organic matter by earthworms render a biochemical stabilization mechanism for soil carbon. . Several studies highlighted the presence of earthworms to have a positive impact on the soil organic carbon (SOC) content (Gilot 1997; Bossuyt et al. 2005) Utilization of nutritional waste to restore important nutrient in soil is utmost important in urbon areas.

India shows a variety of cultural heritage and uses flower for decoration as well as for worship in holy places later these flowers are thrown as a waste material. The organic waste generated from vegetable market has no proper disposal and hence dumped in open ground which result in environmental pollution and nutritive elements present in such waste is wasted . These waste mixed with municipal solid waste and allowed to decay naturally. Sometimes this waste is also dumped into nearby water bodies like wells, rivers and lakes which leads to pollution of water as well as environment , it also affects aquatic life. Solid

waste management is a big problem for municipal corporation .Study is carried out for recycling , reusing of such a waste Current study focuses on evaluation of organic carbon, nitrogen and carbon nitrogen ratio concentration present in specific waste. Earthworm mediated composting is well known and widely used environment friendly activity for converting organic waste into nutrient rich soil product. Deficiency carbon nitrogen responsible to cause structural and physiological condition of soil.

MATERIALS AND METHODS

Three different wastes collected from nearby area from our institute Dharampeth M. P. Deo Memorial Science College, Nagpur Maharashtra State . Flower waste from nearby holy places and cabbage leaves collected from vegetable seller. Four pits of same size is used for composting above said wastes separately .First of all for bedding Layer of dry cow dung(10kg) mixed with soil (20kg) prepared and then flower waste and waste cabbage leaves (12Kg) each put into separate tanks . Then 1/2kg of vermi-culture of (Easnia foetida) poured and keep it for biological decomposition to produce organic fertilizer. The action of earthworms in the vermicomposting process are both physical and biochemical When vemicast is ready in all the tanks. cast was collected and dried naturally.The collected 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 HNO3and H2O2 (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 800C till the sample was reduced to approximately 55ml.The sample was allowed to cool and filtered through a Whatmann No.1filter paper. The sample was diluted to 300 ml with distilled water. The sample is analyzed using Kjeldal assembly, AAS (atomic absorption pectrophotometry) and flame photometer.

RESULT AND DISCUSSION

Organic carbon concentration increases significantly nearabout three times more in cast generated by marigold flower than cast generated by Shevanti and cabbage leaves waste. The concentration of carbon and nitrogen(C= 9.18, N=0.41) was found to be highest from cast generated from marigold flower waste than in cast generated from Chrysanthemums (Shevanti) (C=8.05,N=0.38) and Cabbage leaves waste (C=8.93 N=0.37). Carbon and nitrogen concentration was found to be nearly same in Chrysanthemums (Shevanti) and Cabbage leaves waste. Carbon nitrogen ratio was found to be increased in cast generated by using cabbage leaves waste and it slightly decreases in Chrysanthemums (Shevanti) waste when compared with control sample. Nitrogen is an essential nutrient for plant growth and is the major component of chlorophyll, the compound that is used in photosynthesis. All the plants utilize Nitrogen the form of NO3and NH4 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).Plant residue decomposition and the nutrient release to the soil play a major role in carbon and other nutrient cycling. Decomposition rates vary strongly with climate, reduced motion of nitrogen into waste and its release in mineral forms are mainly controlled by the initial chemical composition of the residues. Soil organic C is known to be protected by chemical, physical and biochemical processes in soil. C/N is show great influence on its decomposition rate.*(Manzoni et.al. The global Stoichiometry of Litter nitrogen mineralization, SCIENCE 2008)* C/N ratio is dependent upon the chemical

composition of natural organic matter. In particular, the larger the N amount due to presence of hydrophilic amino acids or oligopeptides, the lower is the C/N ratio, thereby leading to faster mineralization. It will also enhance microbial activity and decomposition of natural organic matter. As natural organic matter is decomposed, nutrients become available for plant nutrition. However, according to Juan Gallardo Lancho, if the C/N ratio is affected by N-containing pollutants undesirable effects may occur. Very low C/N ratio values may lead to organic matter soil losses.The carbon to nitrogen (C/N) ratio is significant in composting because microorganisms need a good balance of carbon and nitrogen in order to remain active. High C/N ratios can lead to lengthen the composting time period and low C/N ratios increases nitrogen loss. The C/N ratio can be regulated by selecting the most suitable combination of compost materials and added bulking agents to ensure a final ratio within the optimum range.(Christos S. Akratos, ... Dimitrios V. Vayenas, in Olive Mill Waste, 2017 Decomposition rates are also controlled by a variety of factors including soil temperature and moisture, drainage and pH. Soil physical characteristics such as texture and clay mineralogy also impact the longevity and persistence of soil C, by affecting organic matter stabilization processes, i.e., the extent to which organic matter is protected from decomposition through mineral-organic matter associations *(Schmidt et al., 2011). Soil C Sequestration as a Biological Negative Emission Strategy Front. Clim., 16 October 2019 These specific vermicasts may be beneficial to cope with soil carbon nitrogen deficiency.*

Conflict of Interests: - The authors declare that there is no conflict of interests regarding the publication of this paper.

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(Schmidt et al., 2011). Soil C Sequestration as a Biological Negative Emission Strategy Front. Clim., 16 October 2019 Sec. Negative Emission Technologies https://doi.org/10.3389/fclim.2019.00008

Sr. No.	Element	Soil + Cow-dung (Control)	Marigold flower waste (Zendu)	Chrysanthemums (Shevanti)	Cabbage leaves waste
1	Carbon C	2.77	9.18	8.05	8.93
2	Nitrogen N	0.12	0.41	0.38	0.37
3	C:N ratio	22:1	22.1	21.1	24.1