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ORIGINAL ARTICLE

A Study On Correlation Between Different Chemicals Parameter After Composting

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ABSTRACT:

The main objectives of this work to study the characteristic of microbe that can enhance the uptake of macronutrient which is N, K, Na, Ca, Mg, P and estimation of inorganic like TOC, C/N ratio and heavy metals Cr, Mn, Zn, Ni and Pb which are reduced continuously. In this study observed correlation between different chemical parameter which are reduced when time interval are increased. The study indicate that Aspergillus sp., Aspergillus glaeucus, Aspergillus ustus and Unidentified sp. (1) play major role in unlock the useful nutrients and made ecofriendly environment.

Key word:

composting, macronutrient, heavy metal, correlation

1. INTRODUCTION

Today many developed and developing country are released large amount of waste those are create the large ecological treble. One possibility for utilizing waste is to compost it and then use it for increase land fertility (Maruwka et al., 2009). Microorganisms are indispensable components of our ecosystem. They make possible the carbon, oxygen, nitrogen, and sulfur cycles that take place in terrestrial and aquatic system and are a source of nutrients at the base of all ecological food chains and webs with the help of degradation (Han et al., 2005). In composting process various microorganisms, including bacteria and fungi break down organic matter into simpler substances. The effectiveness of the composting process is dependent upon the environmental conditions present within the composting system i.e. oxygen, temperature, moisture, material disturbance, organic matter, size and activity of microbial populations. Composting replicates nature's natural system of breaking down materials on the earth floor (Effendi et al., 2009). Composting is a mature technology for converting organic waste, such as municipal solid waste, sewage sludge; cattle dung into a usable fertilizer or land reclamation material and are an environmentally friendly and an economically alternative technology. The diversity and activity of microorganism in

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composted material are affected by many parameters but also by presence of nutritive compound.

2. MATERIAL AND METHOD

2.1 Sample collection

Jabalpur is a one of most big city of big city of Madhya Pradesh with population above 10 lack's. Generated waste was dumped in open area in city and major dumping site is Ranital dumping area. The study of municipal solid waste was collected from the different garbage center of Jabalpur city.

2.2 Test of Micronutrient of Municipal Solid Waste

2.2.1 Preparation of organic solid waste for bioconversion

Municipal organic wastes were collected and cut into 2-3 mm small pieces and 25gm of each was aliquotted into a 250 ml conical flask, which was then sealed with a cotton plug. The bottles containing Municipal organic waste were then autoclaved at 121°C and 15lbps pressure for 15 min (Rahman et al., 2009).

2.2.2 Preparation and application of culture discs

Aspergillus flavus, Aspergillus sp., Mucor sp., Aspergillus glaeucus, Aspergillus ustus and Unidentified sp. (1) which are isolated from municipal waste and screen out by enzymatic action of fungi. Strains were cultured on potato dextrose agar (PDA) medium at 27±2°C for 7 days. Then a culture disc (5 mm diam.) was cut with a cork borer and 6 culture discs were inoculated with autoclaved Municipal organic waste. Control treatments were performed with no inoculation. The bottles were then sealed with Para film and labelled. The entire process was completed inside a laminar flow (Rahman et al., 2009). Then give 0, 5, 10, 15 and 20 days incubation at 28 ±2 ºC.

2.2.3 Analysis of Physicochemical properties

2.2.3.1 Chemical parameters

Total organic carbon (TOC) was determined by TOC analyzer, Total kjeldahl Nitrogen (TKN) was observed by micro kjeldhal method, C/N ratio, Phosphorous (P) was measured by using Inductively Coupled Plasma Emission Spectrophotometer (ICAP). Sodium(Na), Potassium(K), Calcium(Ca), Magnesium(Mg) was determined using Flame photometer.

2.2.3.2 Heavy metal

Estimation of heavy metals Chromium (Cr), Manganese (Mn), Zinc (Zn), Nickel (Ni) and Lead (Pb) was analyzed by the Inductive Coupler Plasma Analyzer (APHA, 2005).

3. RESULT AND DISCUSSION

The measurement of composting were used in the study, correlation with these measures i.e,. TOC, TKN, C/N ratio, P, Na, K, Ca, Mg was observed. In correlation value will be lying between +1 and -1 called positive and negative correlation respectively. The value of correlation not more than 1. The changes in chemical paremeters C:N ratio is the main important parameter that determine the quality of compost and degree of compost maturity. In this process of C: N ratio is decrease in final product as the nitrogen remain in the system while some of carbon is released as carbon dioxide (Zorpas, 2003; Gautam et al., 2010). Further nitrogen fixing microbes indirectly help in decreasing C:N ratio by making more nitrogen available from added organic matter (Hang, 1991). After 20 days mature substrates the reduction in C:N ratio was significant in all the treatment compared to initial substrate of 5 days incubation and only Aspergillus sp. play major role. The concentration of TOC was increased when time interval was increased because carbon is main sole source for growth, which is highly abundant in MSW. When fungi was grown release chemical

and break into each small component. These processes are attempted by all examined fungi. The concentration of calcium started to decrease when time interval was increased due to formation of precipitate like CaCO3 (Erses et al., 2008) and uptake of calcium by the microbes whose concentration started to increase (Rout et al., 2010) In this uptake process Aspergillus flavus and Aspergillus glaeucus was highly affected. The TKN value was increased into the initial periods due to synthesis and conversion of organic nitrogen compound to NH4N by nitrification (Metcalf and Eddy, 1991), after that it should be automatically decreased. Inorganic nitrogen is usually affected by the action of proteolytics fungi which is partly incorporated into stable organic forms such as amide and hetrolytic nitrogen and in these process Aspergillus glaeucus, Aspergillus sp., Aspergillus ustus, and Mucor sp. perform important role. Organic matter decomposed and transformed to stable humic compounds (Soumare, 2002). In the maximum concentration of phosphate was decreased, increased or then decreased. The decline in phosphate concentration may have been the results of phosphate assimilation by Fungi Aspergillus ustus and Unidentified (1) utilize its maximum. The concentrations of magnesium were change and Aspergillus ustus was highly dominated. After reaching the maximum value the concentration of magnesium started to decrease. The decrease in concentration is due to the formation of precipitant like Mg(OH)2 (Erses and Onay, 2003).

MSW is commonly consist heterogeneous material in its geometry, particle size and chemical composition (Flyhammar, 1997). It may, moreover, contain high concentrations of Ni, Mn, Cr, Fe, Pb, Cu, Cd, and Zn (Flyhammar, 1998). Consequently, subsequent application of MSW compost rich in heavy metals to agricultural soils may cause heavy metals accumulation to toxic levels (King et al., 1990). After the incubation period the heavy metal concentration was decreased in the process of composting (Castaldi et al., 2005; Gautam et al., 2010) and the conc. of heavy metal in the MSW compost showed values significantly lower than standard value CPCB limits.

Table1: Correlation between different chemical parameters with different fungi

Fungus	TOC	TKN	C:N	K	Na	Ca	Mg	P
Aspergillus sp.	0.9981	-0.4165	-0.966	-0.9704	-0.9908	-0.9827	-0.3234	0.3162
Aspergillus flavus	0.9998	0.7965	0.7442	-0.9609	-0.9805	-0.9908	0.4917	0.7501
Aspergillus ustus	0.9649	0.5046	-0.4045	-0.9701	-0.9943	0.9832	-0.7549	-.02828
Aspergillus glaeucus	0.9463	0.5111	0	-0.9843	-0.8914	-0.9626	-0.3234	0.2581
Mucor sp.	0.9785	0.3928	0	-0.9449	-0.996	-0.9877	0.8466	0.6381
Unidentified sp. (1)	0.9977	0.7841	-0.6324	-0.9288	-0.9421	-0.5962	-0.116	-0.2822

Fig 1: TOC after incubation

Fig 2: TKN after incubation

Fig 3: C:N after incubation

Fig 4: K after incubation

Fig 5: Na after incubation

Fig 6: Ca after incubation

Fig 7: Mg after incubation

Fig 8: P after incubation

4. CONCLUSION

In the above objective concluded that in field of agriculture, microbe that have a function as a decomposers will Break down the organic material, form humus and unlock the useful nutrients (N, P, K, S, trace elements etc) and made them available to plants. The processes are highly safe and useful for decrease in level of pollution.

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