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Comparative analysis of different feeding stock for the production of vermicompost by *Eisenia foetida*

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Modern agricultural practices are resulting in an increasing impact on environment, causing a serious decline in natural resources. The modern society has become increasingly dependent on the use of chemicals that are harmful to the environment and agriculture. Soil bio-resources have been recognized as the foundation for sustainable livelihood, food security and environmental safety. With the advent of chemical agriculture and entry of green evaluation to substantiate food production, use of chemical inorganic fertilizers and pesticides took over the age old practice of application of compost. Indiscriminate use of chemical fertilizer badly declined soil organic carbon and soil beneficial microbes in the productive land. The input is showing an increasing trend and there is decline in the return. This is directly linked to the imbalance created in the nutrient status of the soil and the biological activity in the soil. Therefore it is inevitable that the biological methods in land reclamation provide good possibilities for upgradation of conservation of soil fertility on a sustainable basis. Among different alternatives for improving soil health and so as to plant health, vermicompost is one of the most important manure because of its microbial activity, plant growth regulating and pest repellant property. As this golden manure is very easily produced so the promotion of this activity could be done easily. In the present investigation the quality parameters of vermicompost with respect to macro and micro-nutrients content (Chaudhuri *et al.,* 2000) and microbial population was estimated in the vermicompost produced from different feeding stock. Different feeding stocks were used to evaluate the effect of feeding material in the qualitative improvement of vermicompost. Similar works were carried out by many worker like Kale (1998) and Sharma and Madan (1983)

Four feeding stocks *i.e.* straw (T_1), water hyacinth (T_2), hybrid napier (T_3) and green gram (T_4) of 60 kg each were taken and vermicompost was prepared following standard procedure using red worm, *Eisenia foetida* (Jadrijevic *et al.,* 1991). Each treatment was experimented in earthen pots in three replications. The vermicompost sample were digested with triacid mixture and estimated by Kjeldahl method for N_2 and colorimetric method for phosphate (Olsen *et al.* 1954). For potassium, digested sample was estimated by flame photometer method (Hald, 1946). All micro nutrients are estimated by atomic absorption. The total count of micro-organisms was done in nutrient agar media following pour plate technique (Cappuccino and Sherman, 2009). EC and OC were measured following Soil Survey Staff (2004) and Walkley and Black (1934) respectively.

Different feeding stock were used for the production of vermicompost and their biochemical properties were analyzed in order to select better feeding stock which could be fruitfully utilized for the qualitative improvement of vermicompost. From table 1 it was clear that time taken for the production of compost by *Eisenia foetida* was least (24 days) in case of water hyacinth and that was highest (46 days) in straw.

Table 1: Time requirement for composting of different feeding stock

Feeding Stock	Straw	Green gram	Water hyacinth	Hybrid napier
Time in days	46	36	24	30
Total microbial count (cfu $g^{-1}\times10^7$)	65	108	141	48

The variation in respect of all macro and micro elements under study were statistically significant *i.e.* vermicompost produced using all four feeding stock are qualitatively different (Table 2). The range of pH among different vermicompost were 6.7 to 7.8 (with over all mean 7.33±0.11) indicating neutral pH. Lower variability in EC was recorded. Overall organic carbon % was found 16.92±0.39, and lesser variation was estimated. Higher range with respect to total N_2 (%), total K_2O (%) and total P_2O_5 (%) indicates the higher variability in different treatment. Macro-elements content were found maximum in green gram (1.33% N2; 1.06% P_2O_5 and 0.9% K_2O) where as they were minimum in straw (0.33% N2; 0.16% P_2O_5) except total K_2O (%) which was lowest in napier (0.15%). The same results were obtained by Talashilkar *et al.*, 1999.

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Table 2: Mean of different nutrients in vermicompost of different feeding stock

Treatment	pH	EC	Organic C (%)	Total N_2 (%)	Total P as P_2O_5 (%)	Total K as K_2O_5 (%)	Zn (ppm)	Cu (ppm)	Mn (ppm)	Fe (ppm)
Water hyacinth	6.8	3.1	17.10	0.50	0.58	0.38	485.32	34.00	719.17	2851.33
Green gram	7.3	3.4	18.57	1.33	1.06	0.90	108.35	16.00	192.10	1380.00
Straw	7.5	2.8	16.83	0.30	0.16	0.33	203.48	9.00	546.33	1766.46
Napier	7.7	2.6	15.17	0.43	0.53	0.15	245.26	30.66	400.84	2704.60
Grand mean	7.33	3.0	16.92	0.64	0.58	0.44	185.60	22.43	464.61	2175.60
SEm (±)	**0.11**	**0.03**	**0.38**	**0.12**	**0.10**	**0.08**	**14.96**	**3.11**	**58.44**	**187.11**
LSD (0.05)	**0.62**	**0.09**	**0.04**	**0.08**	**0.16**	**0.07**	**2.29**	**1.55**	**25.11**	**70.03**

Four micronutrients namely Zn, Cu, Mn and Fe exhibited greater variation among different treatment. Mean Fe concentration (range: 1324-2898 ppm) was found maximum followed by Mn (range: 190-720 ppm), Zn (range: 107-204 ppm) and Cu (range: 8-34.5 ppm) showed lowest mean (Table 2). Each micronutrient was recorded maximum in case water hyacinth (485 ppm Zn; 34 ppm Cu; 719 ppm Mn and 2851 ppm Fe) and they were found minimum in green gram except in Cu which was least in Straw (9 ppm) (Table 3). Venkatesh *et. al.,* (1997) also experimented but the findings were the same as that of the present findings. With respect to microbial count water hyacinth was recorded highest count of what? (bacteria/fungi/actinomycetes) followed by green gram (Table 4). Again water hyacinth was found as the best feeding stock out the other materials under study.

Water hyacinth with respect to time requirement for composting, macro-element content and microbial population was found as the best material. For the improvement of quality of vermicompost with respect to its micronutrient count green gram exhibited the best result. Considering both macro and micro nutrient content it could be concluded that co-composting of green gram and water hyacinth could be ideal for getting better quality vermicompost.

REFERENCES

Cappuccino, J. G and Sherman, N. 2009. *Microbiology – A Laboratory Manual* (Seventh Ed). Dorling Kindersley (India) Pvt. Ltd, Delhi, pp. 130-32.

Chaudhuri, P. S., Pal, T. K.., Bhattacharjee, G. and Dey, S. K. 2000.Chemical characterization of Kitchen Waste Vermicompost processed. *Env. Ecol.* **18**: 902-04.

Hald, P. 1946. The Flame photometer for the measurement of sodium and potassium in biological materials. *J Biol Chem.*, **162**: 499-10.

Jadrijevic, D., Varnero, M. T., Carrasco, A. and Lopezaliaga, R. 1991. Use of earthworm *Eisenia foetida* for the decomposition of animal manure II cattle and goat manures. *Adv. Animal Prod.*, **16** :189-01.

Kale, R. D. 1998. Earthworm: Nature's gift for utilization of organic wastes. *In: Earthworm Ecology (*Ed. Edwards, C. A.), CRC Press. The Netherlands. pp. 355-76.

Olsen, S. R., Cole, C. V. Watanabe, F. S. and Dean, L. A. 1954. Estimation of Available Phosphorus in Soils by Extraction with Sodium Bicarbonate. U. S. Department of Agriculture Circular No. 939. Banderis, A. D., D. H. Barter and K. Anderson. Agricultural and Advisor.

Sharma, N. and Madan, M. 1983. Earthworms for soil heath and population control. *J. Sci. Indian Res.,* **42:** 575-83.

Soil Survey Staff. 2004. Soil survey laboratory methods manual (version 4.0). USDA-NRCS. US Gov. Print. Off. Washington, DC.

Talashilkar, S. C., Bhangrath, P. P. and Menta, V. B. 1999. Changes in chemical properties during composting of organic residues as influenced by earthworm activity. *J. Indian Soc. Soil Sci.*, **47**: 50-53

Venkatesh, B. P.; Kumar, K. S., Patil, C. V. and Giraddi, R. S. 1997. Influence of in situ vermiculture and vermicompost on availability of micronutrients. *Adv. Agric. Res.,* **7**: 179-83.

Walkley, A. and Black, I. A. 1934. An examination of the Degtjareff method for determining organic carbon in soils: Effect of variations in digestion conditions and of inorganic soil constituents. *Soil Sci.*, **63**:251-63.