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Feasibility Studies on Treatment of Press mud by Vermicomposting using Earthworm Eudrilus eugeniae with Organic Substrate

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Abstract - *India is the second largest producer of the sugar in the world. One tonne of sugar cane crushed produce 100 Kg of sugar, 300 Kg of bagasse, 45 Kg of molasses and 40 Kg of press mud. The present paper deals Vermicomposting as an effective method of composting the sugar press mud into nutrient rich organic manure using earthworm Eudrilus eugeniae. The following Physico-chemical parameters such as Organic carbon, C/N ratio, nitrogen, phosphorus, potassium, pH, Electrical conductivity and iron value were analyzed during 60 days vermicomposting period.*

Key Words: **Sugar press mud, Eudrilus Eugeniae, Vermicomposting.**

1. INTRODUCTION

India is basically subject to the agrarian segment, which is the principle pay and work producing area of the country. In India Andrapradesh, Kerala, Tamilnadu, Bihar, Punjab, Uttar Pradesh, Karnataka and Maharashtra states are the primarily growing sugarcane.

The sugar industries play an important role in India's economy. Sugar cane is the main source for manufacture of sugar. Main by products from sugar mills are bagasse, press mud, molasses along with waste water and spent wash. One tonne of sugarcane crushed produces 40 Kg of press mud. The sugar industry wastes are most valuable by-products.

Vast measures of press mud are discharged by the sugarcane industry and the disposal of this by-product is major issue. Press mud like other natural materials influences the physical, synthetic and organic properties of soil. If press mud is directly applied to soil, the wax present in deteriorates the physical properties such as permeability, aeration, soil structure and composition etc. If press mud is naturally connected to the dirt straightforwardly from the processing plant; it tends to consume the plants. The composition of press mud is varying depending upon quality of sugar cane and process involved in the clarification of sugar cane juice.

2. MATERIAL AND METHADOLOGY

The vermibeds were prepared using press mud in plastic reactors. In all 5 reactors R1, R2, R3, R4 and R5 were used. The various ingredients used for vermicomposting were arranged layer by layer as shown in below figure 1.

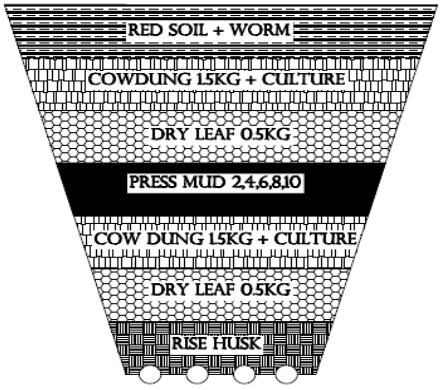

Fig-1: Composition of materials used in Reactor

At the bottom of the each reactor R1, R2, R3, R4, and R5 Rice husk was used to prevent water seepage, Dry leaves, Composted cow dung, Press mud and Soil were arranged above the cushion bed in layers. The earthworms Eudrilus eugeniae 30 numbers were introduced in top soil layer of each reactor. The microorganism cultures were mixed in every layer of the waste mixture. All the vermicompost reactors and culture reactors were operated in shaded shed. The temperature was maintained at 26±1°C. Moisture content was maintained by periodical sprinkling of distilled water. During the experimental period no extra waste mixture was added at any stage in any vermicompost reactors. The top of the reactors were covered with cloth to prevent entry of ants and termites into the reactor.

3. RESULTS AND DISCUSSION

The following physio-chemical parameters were analysed.

pH:

pH is the important parameter in the vermicomposting process. In the present study raw press mud was acidic in nature and its value was 6.25. In all the 5 reactors R1, R2, R3, R4 and R5 of vermicomposting pH values were in the range of 7.47, 7.53, 7.47, 7.03, and 6.20 respectively after 30 days of vermicomposting period. After 60 day the pH values were 7.49, 7.42, 7.39, 7.66 and 7.12. The change in the pH is due to mineralization of nitrogen and phosphorous.

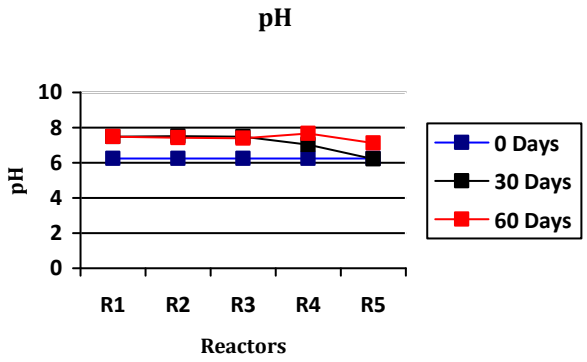

Fig-2: Change in pH in vermicomposting process

Total Kjeldhal Nitrogen:

Total nitrogen is another parameter in vermicomposting process. Initially raw press mud contains 0.48% of nitrogen. After 30 days of vermicomposting period the values in the reactors R1, R2, R3, R4 and R5 were 2.52, 2.49, 2.06, 1.06 and 2.94. The increase in values due to high rate of decomposition. And it will gradually decreases at 60 days of vermicomposting. After 60 days of vermicomposting period values were 0.41, 0.52, 1.31, 0.58 and 1.24 respectively.

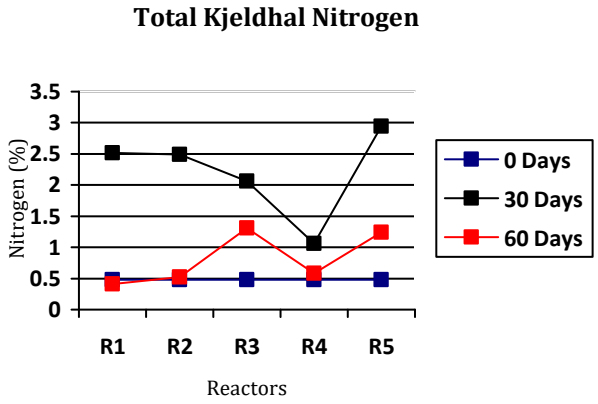

Fig-3: Change in TKN in vermicomposting process

Total Phosphorous (as P2O5):

It is another parameter in the vermicomposting process. Phosphate is an important macro nutrient. Increase in the phosphorous content through mineralization. Initially raw press mud contains 0.40% of phosphorous. After 30 days of vermicomposting period the values in the reactors R1, R2, R3, R4 and R5 were 2.16, 1.34, 3.19, 2.52 and 1.48 respectively. After 60 days of vermicomposting values were 2.36, 1.70, 1.34, 1.35 and 1.53 respectively. It is expressed in terms of percentage. It is good for plant growth.

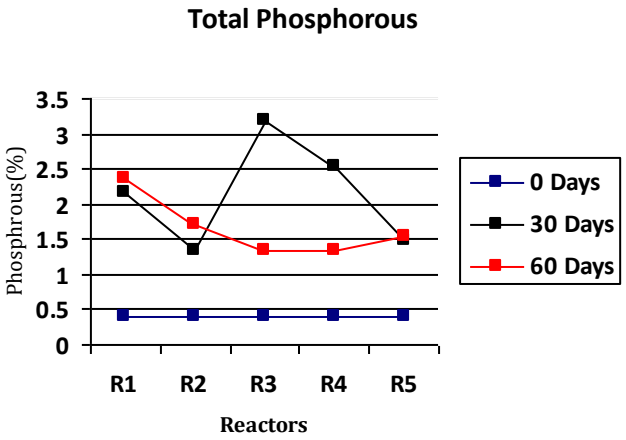

Fig-4: Change in TP in Vermicomposting Process

Total Potassium (as K2O):

Potassium is major nutrient for plant growth. The raw press mud contains 1.09% of total potassium. After 30 days of vermicomposting period the values were increased due to higher mineralization rate. The values in the reactors R1, R2, R3, R4 and R5 were 1.06, 0.75, 1.50, 0.82 and 0.54 respectively. After 60 days vermicomposting values were 1.80, 2.38, 1.10, 0.70 and 1.0 respectively.

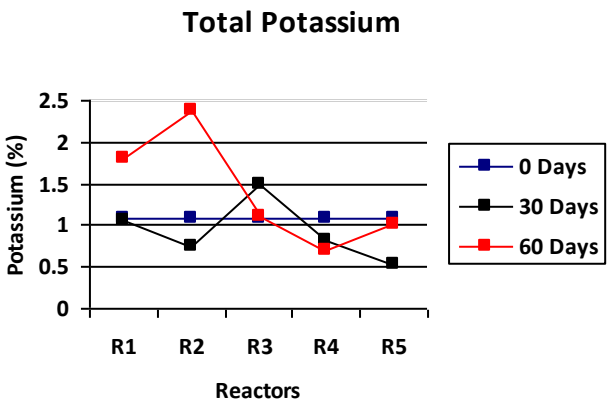

Fig-5: Change in Potassium in vermicomposting process

C/N Ratio:

C/N ratio depends on decomposition of press mud. Initially raw press mud contains 25.95%. After 30 days of vermicomposting values in the reactors R1, R2, R3, R4 and R5 were 11.34, 8.03, 9.42, 17.38 and 3.30 respectively. After 60 days of vermicomposting period the values were 51.86, 27.14, 19.34, 25.82 and 9.89 respectively. C/N ratio below 20 it indicates an acceptable maturity and below 15 or less it indicates preferable. It mainly depends on decomposition of organic matter and growth of earthworm and reproduction activity.

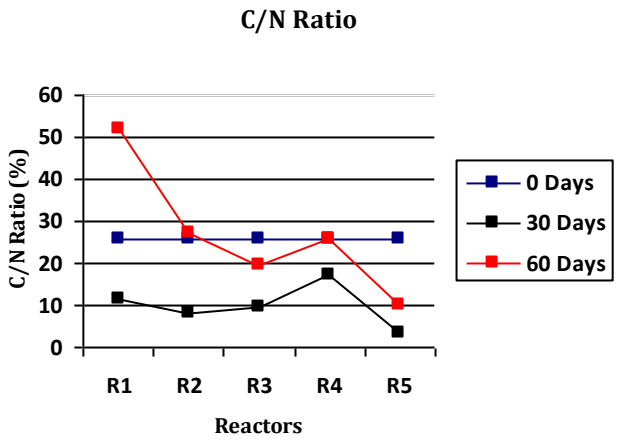

Fig-6: Change in C/N Ratio in vermicomposting process

4. CONCLUSIONS

The present study suggests use of organic substrate and earthworm convert the press mud into highly valuable vermicomposting. Press mud vermicomposting can be used for plant growth and also as a soil conditioner.

REFERENCES

[1] Amar S. Byakodi and Noorahmed A. H, (2016), "A Review on Different Composting Techniques using Waste Sugar Cane & Press mud Mixtures", International Journal of Scientific Development and Research. Vol. 1, pp. 154-158.

[2] Sartaj Ahmad Bhat, Jaswinder Singh, Adarsh Pal Vig (2016), "Management of Sugar Industrial Wastes through Vermitechnology" International Letters of Natural Sciences .Vol. 55, pp. 35-43.

[3] Deepali Munde and Snehal Sutar, (2015), "Vermicomposting of Press mud from Sugar Industry", International Journal of Innovations Engineering Research and Technology. Vol. 2, pp. 1-10.

[4] Umamaheswari Sepperumal and Suresh Selvanayagam, (2015), "Vermirediation of Sugar Industry Waste using Earthworm Eudrilus eugeniae, Perionyx excavates and Eisenia fetida", European Journal of Zoological Research. Vol. 4, pp. 28-36.

[5] Mohamed Omer, et al, (2015), "Management of Kitchen Waste by Vermicomposting using Earthworm Eudrilus eugeniae", International Conference on Advances in Agricultural, Biological & Environmental Sciences. Vol. 1, pp. 81-84.

[6] Rajesh B, J. Arockia John Paul and N. Karmegam, (2014), "Composting of press mud using microbial inoculants isolated from earthworm guts", International journal of Current Research in Bioscience and Plant Biology. Vol. 4, pp. 52-60.

[7] T. Shivakumar, (2014), "Review on Panchagavya", International Journal of Advanced Research in Biological Science. Vol. 8, pp. 130-154.

[8] Nagesh Patil, Sumit Jadhav, Sachin S. Ghorpade and Abhijeetkumar B. Sharma (2013), "Isolation and Enrichment of Sugar Press Mud Adapted Microorganism for Production of Biofertilizer by using Sugar Press Mud", International Journal of Advanced Biotechnology and Research. Vol. 4, pp. 96-104.

[9] Muddasir Basheer and O. P. Agrawal, (2013), "Management of paper waste by vermicomposting using epigeic earthworm, Eudrilus engenine in Gwalior", International Journal of Current Microbiology and Applied Sciences. Vol. 2, pp. 42-47.

[10] Vasanthi K, (2013), "Sugar factory waste (vermicomposting with and Epigeic Earthworm, Endrilus eugeniae (Kinberg))", American Journal of Drug Discovery and Development. pp. 1-10.

[11] Nitin Prakash Pandit, Nabeel Ahmad and Sanjiv Kumar Maheshwari, (2012), "Vermicomposting Bio-technology (An eco- loving approach for recycling of solid organic waste into valuable Bio-fertilizer". Journal of Biofertilizer & Biopesticides. Vol. 3, pp. 1-8.