TRANSFORMATION SYSTEM GREEN ORGANIC WASTE OF LIVESTOCK INDUSTRY FOR AGRICULTURAL USE

Juárez J.A.
Proyectohumus, Buenos Aires 373-CP 4500 San Pedro de Jujuy, Jujuy, Argentina. Tel: 0054-3884-421325. proyectohumus@hotmail.com

1 INTRODUCTION

Farming and associated agricultural industries generate a significant amount of residual organic matter, which is often discharged to watercourses or accumulated in urban areas creating serious environmental problems. However, it is possible to transform this waste into material with great potential for use within agriculture. Composting and worm breeding can become effective tools to recycle nutrients in a production cycle. Composting is a process that has been receiving increasing attention as an economically viable and environmentally safe alternative, for the stabilization of sewage sludge and agricultural use (Bitton, 1999)

1.1 Antecedents

Red worm breeding as a tool for resource optimization requires constant structural and cultural innovations, especially in the places where waste is generated continuously. The creation of unit producing worm compost from organic waste transforms this problem into a project of economic and environmental interest.

1.2 Objectives

In this paper we describe a system which provides to farms and slaughterhouses a system to transform organic wastes into bio fertilizer, recovering nutrients and generating a marketable product.

2 MATERIAL AND METHODS

1st Stage

A field is selected for the treatment of the organic waste. The field can be different sizes, depending on the volumes of material to be treated, but in this case we used a field of 40 by 60 meters, after weeding and leveling.

Organic waste is put into piles, of variables dimensions, depending on available space. For this experiment, the dimensions used were 50 x 3 m and 1.5 m high Periodic movements are made for ventilation of the organic matter piles. For this work we used a bulldozer, repeating the operation a total of six times. The first movement was to complete the piles and then a further five movements, one every 7 days. The movements promote oxygenation, initiating the composting processes. This is monitored regularly to ensure proper sanitation. To obtain a sanitary quality compost suitable for reuse in agriculture, the process requires proper design and operation, including an experimental verification of the design parameters (C:N ratio and initial mixing moisture) and operating factors (pH, humidity, temperature, aeration) (Castillo et al., 2002). The duration of this process was 90 days.

2nd Stage

Once the composting process was finished, compost samples were taken for a phytotoxicity test using radish seeds. Samples were extracted for laboratory analysis.

Then, the piles were changed into “humus production beds” by placing long boards in their lateral margins, preventing the disintegration of the "bed", caused by the activity of red worms.

Once created, the beds were seeded with red worms (Eisenia foetidae), at five thousand (5000) worms per cubic meter of compost. The process known as vermiculture, involving earthworms and microorganisms, can transform organic waste into a compost, called vermicompost or worm compost (Quintero et al., 2000). During this second stage, the process was monitored periodically to encourage natural conditions. This stage lasted for 60 days.

3rd Stage

When the vermicomposting process was finished, the process of extracting the worms from the production bed was started. Food bags "traps" were used to attract worms, repeatedly until there were no worms in the production bed. These worms are reused in other production beds.

3 RESULTS AND DISCUSSION

The composting process ensures the sanitation of the wastes and transforms them into compost, the food of red worms.

The use of wood for the production beds prevents the dispersion of the material and helps to keep the beds in optimal environmental conditions, which favours the activity of earthworms.

Composting and vermicomposting are performed in the same place, which lowers the cost of material transfer during stages of transformation.

The transformation of the organic wastes provides a safe end product of optimum quality that can be marketed or used in other sectors of the same chain of production, reducing fertilizer costs.

FIGURE 1 **a) Prepared compost piles, b) Aeration, c) Prepared humus production beds d) Inoculation with red worms**

4 CONCLUSIONS

The problem of accumulation of organic waste can be transformed into an opportunity to develop treatment systems that minimize negative environmental impacts generated by the accumulation of these bio wastes and simultaneously, improve energy recovery system, by encouraging valuable feedback of nutrient cycling to the agricultural production sector.

REFERENCES

Bitton G 1999. Wastewater Microbiology. 2nd ed. J. Wiley-Lyss, NY.

Castillo G, Mena MP, Alcota C 2002. Experiencias sobre compostaje de lodos de digestión aeróbica y anaeróbica. XXVIII Congreso Iberoamericano de Ingeniería Sanitaria y Ambiental. Cancún, Mexico.

Quintero LR, Ferrera-Cerrato R, Etchevers JDB, García NEC, Rodríguez Kabana R; Alcantar G, Aguilar A S 2000. Vermicomposteo, Composteo y su Dinámica Microbiana. In: *La Edafología y sus Perspectivas al Siglo XXI.Tomo I*. UNAM, CP y UACH. México. 417-418