Advances in Environmental Research, *Vol. 12, No. 1 (2023) 51-64*
https://doi.org/10.12989/aer.2023.12.1.051

Effect of neem leaves and stock density of earthworm (Eisenia fetida) on quality of rice straw vermicompost

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(Received July 21, 2022, Revised March 11, 2023, Accepted March 22, 2023)

Abstract. The sustainable management of rice straw is essential for protection of human health and environment. This study assesses the impact of stock density of earthworm (*Eisenia fetida*) and Neem leaves (*Azadirachta indica*) on the quality of the final vermicompost. The vermicompost is produced using different combinations of rice straw, Neem leaves, and cow dung (bulking agent) by varying stock density of earthworms. The vermicomposting experiments are performed in plastic containers (32 cm × 28 cm × 28 cm) in open for 90 days under laboratory conditions. The stock density of the earthworm is found to be an important factor to influence nutritional quality of the final vermicompost. There is observed significant improvement in the total nitrogen (91.8%), phosphate (73.4%), potassium (38.8%), and calcium (59.05%) content of the vermicompost produced with the highest stock density of the earthworms. All the treatments showed decrease in TOC and C:N content after 90 days of vermicomposting. The treatment with Neem leaves showed maximum growth of earthworms (2.65 fold). Neem leaves brought positive changes in the quality of final vermicompost by enhancing the growth and reproduction of the earthworms. The calcium content increased by 39% in the final vermicompost with the addition of Neem leaves at the same stock density of the earthworms. The stock density of the earthworms and Neem leaves are found to significantly improve quality of the final vermicompost as compared with the compost (control). The surface morphology in SEM images showed high degree of fragmentation in the vermicompost as compared with the compost. The combined action of microbes and earthworms resulted in high degree of disintegration in the vermicompost.

Keywords: C/N ratio; *Eisenia fetida*; neem leaves; rice straw; vermicomposting

1. Introduction

India produces large quantity of food grains to fulfill domestic and global food demand. It stands second in terms of production of rice and wheat globally. The production of rice and wheat has increased to 122.27 and 109.52 million tonnes, respectively, in 2020-21 (The Economic Times 2021). A bumper crop leaves huge amount of residue particularly after the mechanized harvesting.

The rice and wheat represent about 70% of the total crop residue (500 Million tons) produced

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http://www.techno-press.org/?journal=aer&subpage=7 ISSN: 2234-1722 (Print), 2234-1730 (Online)

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