

Effect of vermicompost substrates on amount of organic carbon, total nitrogen and carbon to nitrogen ratio

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ABSTRACT

This study was performed to evaluation of vermicompost substrates on amount of organic carbon, total nitrogen and carbon to nitrogen ratio. in training and consulting center of the Flower and plant in the Tehran municipality, District 4. CRD design was selected for our study and treatments included: cattle manure (control), manure + leaves, manure + sawdust and paper with three replications. *Eisenia Foetida* was selected for study and to analyze the vermicompost, it was placed in semi-shade environment. At the end of vermicomposting process some chemical properties and nutrients were measured such as organic carbon, nitrogen, carbon than nitrogen, phosphorus, potassium, iron, and initial moisture content, pH, Ec. All treatments had significant effects on studied properties and according to result it was founded that best treatment is manure + leave in compare to control and manure + sawdust and paper and according to Duncan test, there were significant differences between treatments in compare to control.

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Introduction

Fertilizers are the major sources of nutrients for crops, also organic matter in soil influences almost all the components of soil linked with crop production (Bhatt et al., 2012). Vermicomposting is one such viable technique for augmentation of organic source in soil, also, Application of vermicompost influences the physical, chemical and biological properties of soil, It improves the water holding capacity of the soil and it possesses vitamins and growth hormones which have a direct role on plant growth. Integrated use of organic N through vermicompost and fertilizer N enhanced the growth and yield attributes of crops (Thirunavukkarasu and Vinoth, 2013). Scientific investigations have established the viability of using earthworms as a treatment technique for numerous waste streams (Ndwa et al., 2000). The action of earthworms in this process is both physical/mechanical and biochemical. The physical or the mechanical processes include: substrate aeration, mixing, as well as actual grinding. The biochemical process is affected by microbial decomposition of the substrate in the intestines of the earthworms. These physical/mechanical unit processes usually represent the largest cost associated with traditional microbial composting process. Vermicomposting saves on all these unit operations. Hand et al. (1988) thus define vermicomposting as a low cost technology system for the processing or treatment of organic wastes. Among the sources of available organic manures vermicompost is a potential source due to the presence of readily available plant nutrients, growth enhancing substances, and a number of beneficial microorganisms like nitrogen fixing, P solubilising and cellulose decomposing organisms (Kumari and Ushakumari., 2002).

So, The aim of this study was evaluation of vermicompost substrates on amount of organic carbon, total nitrogen and carbon to nitrogen ratio.

Material and methods

This study was performed in training and consulting center of the Flower and plant in the Tehran municipality, District 4. CRD design was selected for our study and treatments included: cattle manure (control), manure + leaves, manure + sawdust and paper with three replications. *Eisenia Foetida* was selected for study and to analyze the vermicompost, it was placed in semi-shade environment. At the end of vermicomposting process some chemical properties and nutrients were measured such as organic carbon, nitrogen, carbon than nitrogen, phosphorus, potassium, iron, and initial moisture content, pH, Ec.

Result and discussion

According to results it founded that Ec was reduced 56 and 38% by manure + leaves and manure + sawdust and paper application in compare to control, respectively. These results are similar to those of studies conducted by Datar et al. (1997), on vermicomposting of Municipal Solid Waste (MSW). Also, According to results it founded that pH was reduced 2% by sawdust and paper application in compare to control. According to results it founded that moisture was increased 4% by manure + leaves application but sawdust and paper application led to 3% reduction of moisture in compare to control. Parthasarathi et al (1999) evaluated Longevity of microbial and enzyme activity and their influence on NPK content in pressmud vermicasts and them result showed there was a reduction in the moisture level leading to reduction in microbial population and activity.

Consequently reduced microbial activity leads to reduced enzyme activity and NPK contents. SHANG and ZHANG (2006) evaluated vermicompost Substrate in Raising Pepper Plug Seedlings, The results showed that vermicompost had greater volume weight, smaller water retention, higher concentration phosphate and potassium and lower rate of nitrogen compared with peat; vermicompost compound substrates promoted growth and development of pepper plug seedlings, their application effect was closely related to ratio of vermicompost and vermiculite, the optimum ratio was 3V/1V. According to results it founded that organic carbon was increased 2.38 fold by manure + leaves application in compare to control, but sawdust and paper application led to 23% increasing of organic carbon in compare to control. Pramanik et al (2007) evaluated the effect of different organic wastes, viz. cow dung, grass, aquatic weeds and municipal solid waste with lime and microbial inoculants on chemical and biochemical properties of vermicompost. Cow dung was the best substrate for vermicomposting. Application of lime (5 g/kg) and inoculation of microorganisms increased the nutrient content in vermicompost and also phosphatases and urease activities. *Bacillus polymyxa*, the free-living N-fixer, increased N-content of vermicompost significantly ($p \leq 0.01$) as compared to other inoculants. According to results it founded that N% was increased .75 and 2 fold by manure + leaves and manure + sawdust and paper application in compare to control, respectively. Ansari and Kumar (2010) mentioned combination of organic fertilizers (vermicompost + vermiwash) had great influence on the nutritional value of the soil. Also, According to results it founded that C/N were reduced 5 and 35% by manure + leaves and manure + sawdust and paper application in compare to control. Totally, according to result it was founded that best treatment is manure + leaves in compare to control and manure + sawdust and paper.

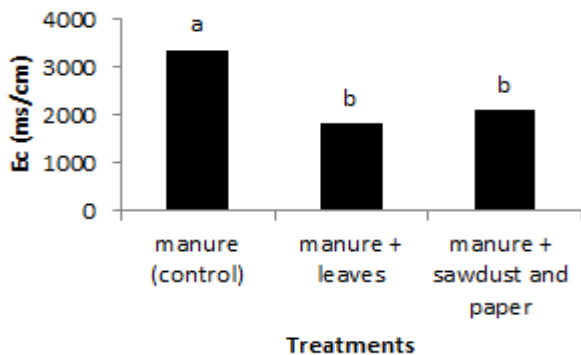


Fig1. Effect of treatments on Ec.

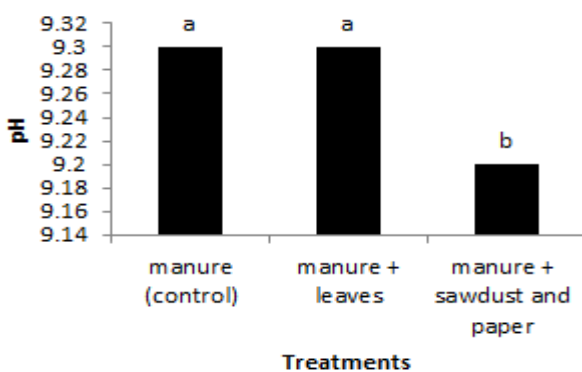


Fig 2. Effect of treatments on pH.

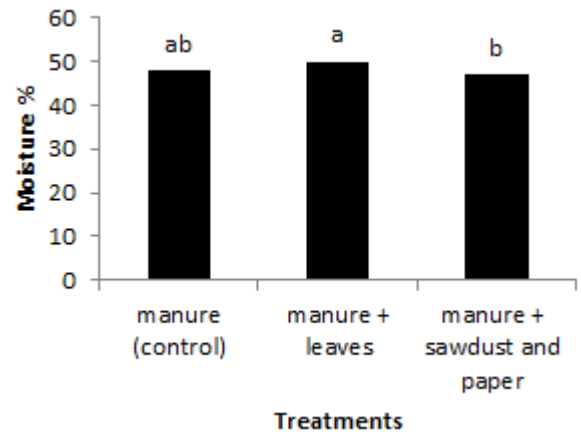


Fig 3. Effect of treatments on moisture %.

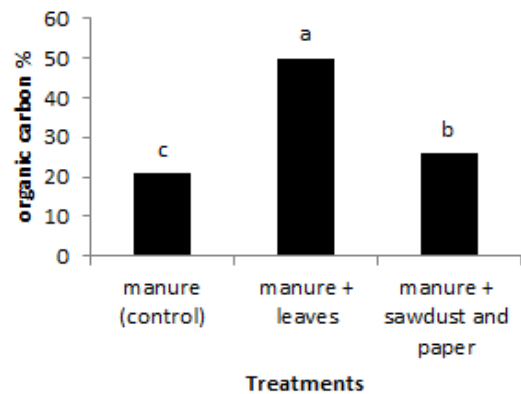


Fig 4. Effect of treatments on organic carbon.

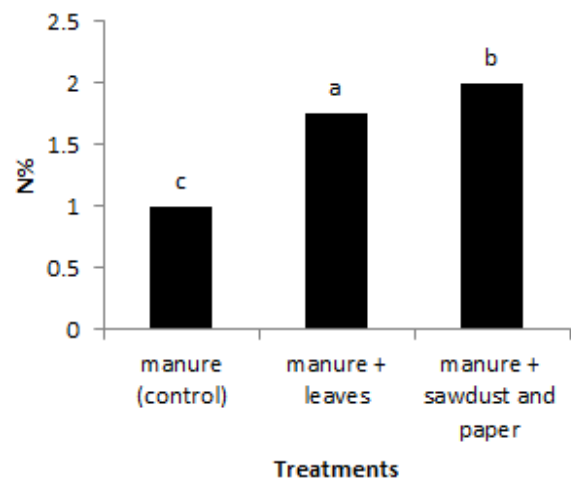


Fig 5. Effect of treatments on N%.

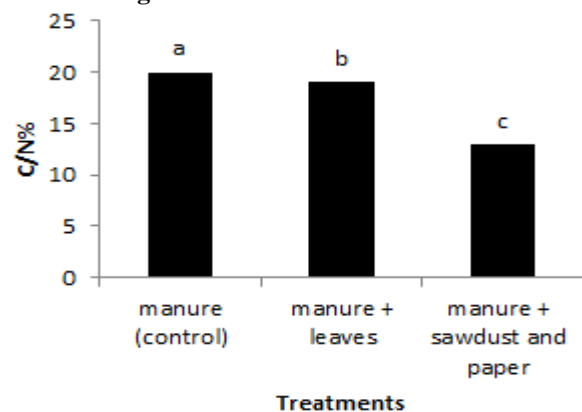


Fig 6. Effect of treatments on C/N.

Resources

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