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Short Communication

Effect of different C:N on the compost maturity

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Abstract

C: N is an important factor to determine the stability of compost. This study was designed to check the effect of different C:N on the maturity of compost. The organic waste treated with different C:N give different results at the end of composting. The four windrows of organic waste were treated with C:N of 35:1, 35:1, 33:1 and 30:1. The substrate used was same in all the windrows. It was concluded that the more mature compost was given by the windrow one and two with optimized C:N of 35:1.

Keywords: C:N, Composting, Bioremediation.

Introduction

Composting is the best way of bioremediation. Compost has many benefits to environment and soil. The particular organic waste can be degraded easily by composting process. The traditional method consists of most speedy bio oxidation of waste. The composting process is greatly relying on the microorganisms.

The conversion of organic matter in to useful product also eliminate the risk of toxicity[1]. The high temperature during thermophilic phase destroy pathogens. Antimicrobial compounds are also produced and destroy pathogens. The physical and chemical nature of substrate is also very important for rapid degradation because the decomposition depend on substrate.

The C:N is an important factor throughout composting process. The C:N affects the speed of the composting process also on the volume reduction of the windrow. The C:N should be optimized at the start of composting. The speed of composting process id mainly dependent on the carbon to nitrogen ratio and the nature of the material that is composted. Nitrogen is the major component of cell structure and carbon is utilized by microbes as a major energy source. When the carbon is less the microbes start to convert N into proteins and other nitrogenous structures. The microbes can also use all the carbon and loss of nitrogen take place by volatilization[2].

Material and methods

The four windrows of organic waste were prepared. Each windrow was composed of screening matter, cow dung, saw dust and green waste. Each windrow was consisting of 550 tons of organic waste. The C:N of cow dung, screening matter, green waste and saw dust was individually determined and collectively calculated and optimized by using C:N calculator.

Determination of C:N : The sample of compost was taken in digestion tube. The digestion mixture was prepared and added in the compost sample. 10ml of sulphuric acid was also added in digestion tube containing compost sample. The digestion tube was left for 2 hours at 40°C after fitting properly in to digestion block. The sample changed color from blackish to green or light yellow. The solution was then distillated on distillation apparatus with NAOH and boric acid. The reading of carbon was divided with N[3].

Each windrow was sprayed with BST commercial inoculum to speed up the composting process.

Results and discussion

The C: N of all the experimental windrows was tend to decrease by increase in time interval. The windrow one and two shows best results in compost maturity because C:N of these two windrow was 15.6:1 and 14:1.

The results are in the line of earlier findings that the initial C: N ranging 25 to 30 produced the more mature compost, we optimize d the C:N between 30-35%. The C:N below 12 shows that the C content is not high[4]. The preferred C:N should be between the ranges of 14-16 [5] as our two windrows results show.

The higher C: N cannot be reached to the optimum values[6]. The larger stability in compost was observed in the waste having initial C/N ratio of below 30 [7]. The germination index of compost must be large in the compost having C:N 20-28 as compared to the compost that has C:N of 12 [8].

Table-1: Shows the Optimized C: N of four windrows.

Ingredients	Quantity used to optimize C:N (Tons)	Optimized C:N	Total Weight (MT)	Inoculum
S.M+C.D+S.D+G.W	16.5+165+17+352	35:1	550.50 Tons	BST
S.M+C.D+S.D+G.W	16.5+165+17+352	35:1	550.50 Tons	BST commercial
S.M+C.D+W.C+G.W	16.7+168.4+21+273.32	33:1	550.50 Tons	BST commercial
S.M+C.D+W.C+G.W	16.7+168.4+21+273.32	30:1	550.50 Tons	BST commercial

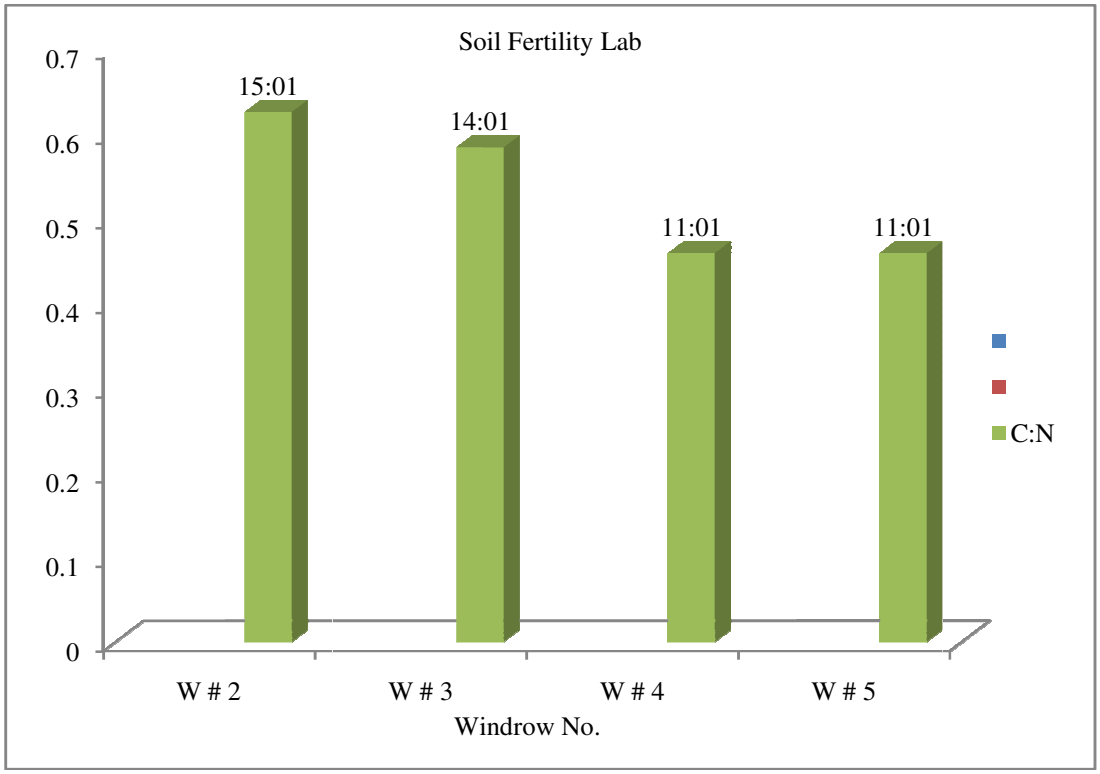

Figure-1: Shows the comparison of C:N of four windrows.

Conclusion

It was concluded from this study that the optimized C:N of 35:1 at the start of composting process gives good quality of compost. The Carbon content of the prepared compost is enough to give nourishment to the plant. The compost is most stable and mature with final C:N of 14:1 and 15:1.

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