

ANALYSIS OF CARBON: NITROGEN RATIO OF THE COMPOST PRODUCED USING MARKET WASTE

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INTRODUCTION

Solid waste management can be done in many ways. Among these methods composting is one way of recycling solid wastes which minimizes environmental pollution. Composting is a win-win solution in solid waste management. During this process, no environmental pollution occurs and at the same time the compost improves soil fertility. Vavuniya district is an agricultural area where nearly 65% of the families are engaged in farming. Thus they will be benefited by using this compost on their farm land. Good quality compost improves soil fertility and thereby increases the yield of the crops which eventually contributes to food security.

The Carbon: Nitrogen (C/N) ratio of compost is an important factor that determines whether the soil fertility has improved or deteriorated. Overall carbon/ nitrogen ratio between 25:1 and 30:1 was considered ideal for starting materials. If the ratio is below this range, N losses from the pile might be excessive; if the C/N ratio is too high, the relative decomposition slows down when the nitrogen is used up and some organisms die (Horan, 1995). The quality is determined by the waste materials that are added to the compost pit. Compost production and sales have been done at Vepankulamby UC (Urban Council) on a limited scale using solid wastes such as waste from vegetable market, and broken branches of trees found on the roads within the Urban Council limits. The objective of this study was to analyze the carbon/ nitrogen ratio of compost produced using vegetable market waste and the broken branches of trees to improve the quality of compost by adding other solid wastes.

METHODOLOGY

The investigation was conducted at the composting site at Vepankulam, Vavuniya every month. The organic waste materials were mainly vegetables and fruits as green material and broken branches of trees were the brown materials used for composting. The samples for analysis were collected from four different spots in each of eight pits from August to November, 2011. A representative compost sample was taken from the homogenized compost heap prepared during the period from May to August, 2011 for the chemical analysis. Sub-samples (250g) were taken from 4 different points of the compost heap (bottom, surface, side and centre). Organic carbon was determined by the Walkley and Black method, total nitrogen was estimated by the Kjeldahl procedure. Altogether 32 samples of compost at the Vepankulam site produced with different combinations of waste material were taken and analyzed for organic carbon and total nitrogen in the laboratory using Walkley and Black method and Kjeldahl process respectively.

RESULTS AND DISCUSSION

Carbon/ Nitrogen ratio of the compost produced at Vepankulam site is given in Table 1. The results reveal that the compost produced at this site was of high nitrogen content since they used organic waste materials such as vegetables and fruits as green material and broken branches of trees as brown materials for composting. BoMyeong and Rosales (1982) reported that green materials like green leaves and green vegetables used for composting were rich in nitrogen content. The high amount of nitrogen leads to unnecessary loss of nitrogen from the soil while this compost is added to the soil as soil amendment. The optimum C/N ratio of good quality compost is considered as 10-20:1 since compost within this range is unlikely to immobilize or deplete plant available nitrogen (Radovich, *et al.*, 1988). As the compost produced at this site is 7-8:1, the C/N ratio should be increased by adding the waste

material which is of high carbon content. In this district the solid waste of rice husk produced at rice mills and straw from paddy fields contain a high amount of carbon.

Table1: C,N and C/N ratio of the samples taken in different months.

Month	Carbon (%) by weight	Nitrogen (%) by weight	C/N ratio
August	8.59±0.17	1.1±0.53	8:1
September	9.12±0.11	1.34±0.061	7:1
October	8.76±0.14	1.08±0.56	7:1
November	7.83±0.11	0.98±0.46	8:1

Average of eight replicates ± standard error

Past studies (Seran, *et al.*, 2010) and the discussion had with the Research Officers at the adaptive research stations revealed that the yield of crop had been increased by 50% when good quality compost was added combining with inorganic fertilizer that was 50% of the inorganic fertilizer was substituted with compost.

CONCLUSIONS/RECOMMENDATIONS

Based on the study it can be concluded that the compost produced at Vepankulam site using market waste was of low C/N ratio as they were green vegetables and fruits which may be rich in nitrogen content. Hence, further studies to find out the correct proportion of different waste materials are an urgent need in order to produce good quality compost with appropriate Carbon/ Nitrogen ratio.

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