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THE EFFECT OF ADDITIVE ORGANIC MATTERS ON PLANE TREE LEAVES COMPOSTING

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ABSTRACT

Plane (*Plantanus Spp*) is one of the annually deciduous tree that the procedure of it's leaves composting takes long time. In order to study the effect of additive organic materials on quality and rate of plane tree leaves composting, a green house experiment were conducted using complete randomized design block with 3 replications. The treatments included 0, 25, 50, 75 percent of additive materials (manure, eagle fern(*Pteridium aquilinium*) and elder(*Sambucus eblulus*) leaves on volume base. The control was 100% plane tree leaves. This materials were composted in 6 month, and were monthly sampeled and C/N , C/P, pH and Ec parameter were measured. The results showed that the chenges of C/N ratio in plane tree leaves was too low; however the C/N ratio of the additive materials had decreased significantly ($P<0.01$). Different volume percents of additive materials decreased C/P ratio significantly ($P<0.01$).The greatest decline of C/P ratio observed in manure treatments.The value of pH in all treatments ranged from 5.5 to 8 in 6 month. All treatments showed increasing in Ec significantly ($P<0.01$) at the end of experiment.

Key word: composting, plane tree leaves pH, Ec, C/N,C/P

INTRODUCTION

Chemical contamination of soil and water, has led to greater use of natural products. Composting is an aerobic decomposition of organic materials under controlled conditions. During the composting proccess, microorganisms convert raw organic materials into a stable, humus-like product called compost. Compost is used as an organic amendment to improve the physical, chemical, and biological properties of soils. The benefits of compost inluding enhancing plant growth and increasing stability and fertility of soils, are well demonstrated .The compost caused increasing the soil prosity, moisture holding capacity of sandy soils and reducing drought damage effects to the plants. compost improves drainage and aeration of heavy clay soils(Maynard & Hill, 1994). Plant residuals can be recycled and applied as fertilizer or compost in soils and stimulate plant growth. Composting of different materials, requires different amount of time. High nitrogen materials, like grass, will break down very quickly while wood chips may take up to two years or more(Composting Council of Canada, 1999). Much research in a variety of mixing and blending of different organic materials has been done to make compost in a shorter time with better quality. For example, Azolla was used for better and faster decomposition of rice hull and sawdust. Due to their high carbon content, leaves may take 5 to 24 months to compost by themselves. However, leaves will compost and turn out a good finished product if moisture is adequate and if the pile is turned frequently, ensuring a good supply of oxygen. Mixing other organic wastes with leaves is an important step in optimizing the decomposition proccess. High nitrogen materials, such as grass clippings or other plant wastes, animal manures, food scraps etc. can speed up the decomposition process and increase the nitrogen content of the end product, making it more

suitable for use as a soil amendment(Mahboub Khomami & Padasht ,2010). Plane tree(*Plantanus Spp*) is one of the annually deciduous tree that the procedure of it,s leaves composting takes long time. Peteridium aquilinum from family Polypodiaceae and Sambucus ebulus from Caprifoliaceae family are two types of forest species. The purpose of this study is the best use of plant residual and organic material to reduce the time taken to compost the plane tree leaves for and introduction the compost with better quality.

MATERIALS AND METHODS

The present investigation was carried out in the College of Agriculture, Guilan University in order to study the effect of additive organic materials on quality and the rate of plane tree leaves composting. A pot experiment was conducted using complete randomized desine block with 3 replications. Treatments included 0, 25, 50, 75 percent of additive organic material (manure, eagle fern(*Pteridium aquilinium*) and elder(*Sambucus eblulus*) leaves) on volume base. The control was 100% plane tree leaves. This materials were composted in 6 month, and were monthly sampled and some parameters like C:N, C:P, pH and Ec were measured.

RESULTS AND DISCUSSION

C: N ratio- The C:N ratio is an indicator of compost stability and N availability. It is the ratio of total carbon to total nitrogen in the sample. Composts with a high C: N ratio (>25) will tie up the available nitrogen, making it unavailable. Composts with a low C: N ratio (<20) will release organic N making it available to the plant. Microorganisms use carbon for both energy and growth, while nitrogen is essential for protein production and reproduction. The results showed that C:N ratio in plane tree leaves have the little changes, While the addition of different amounts of additives decreased C: N ratio significantly (P< 1%). The effect of addition of different amounts of volume of the fern leaves on plane leaves C: N ratio is shown in figure 1. Elder leaves and sheep manure, showed the same results.

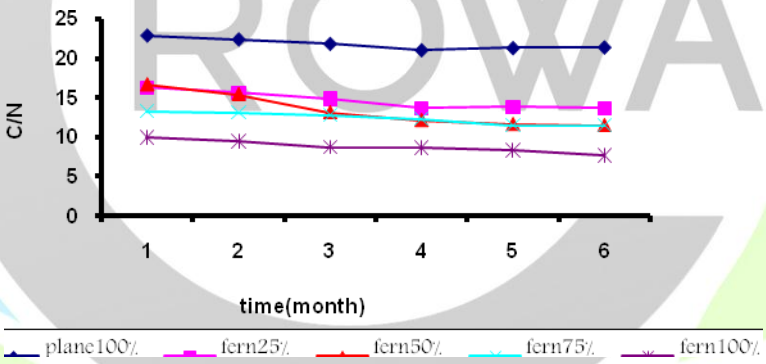

Fig 1- The effect of addition of different amounts of fern on plane leaves C: N

C: P ratio- Another criterion for evaluation of compost is C: P ratio. The amount of this parameter varies from 400 to 1000 in different organic matter and reduced during composting and its appropriate amount is about 100 in mature compost (Thun et al**,** 1991). Different volume quantities of additive materials had statistically significant effect on the C: P ratio reduction, Which the effect of sheep manure, was higher than the others(Figure 2).

pH- pH is the other important criterion for compost evaluation. Levels of pH should fall between 6.0 and 8.0 during composting, and this conclusion agrees with universal standards in mature compost. Generally pH increases during composting because of the release of ammonia. The additives have a significant effect on the acidity of the plane leaves samples. Addition of different levels of fern leaves caused to acidity reduction during composting

(Figure 3). Addition of different amount of manure and elder leaves caused increasing acidity of treatments and raised up to 8 at the end of composting period.

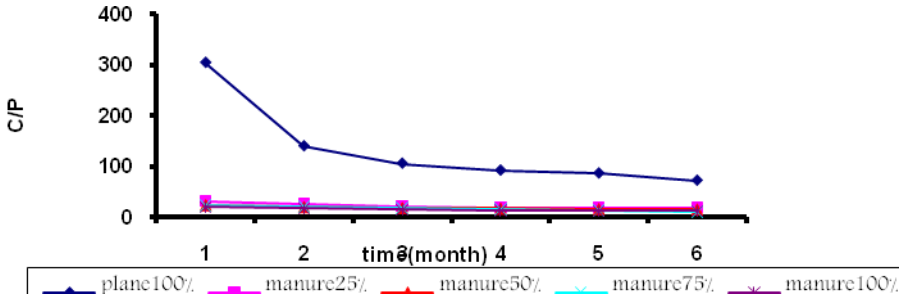

Fig 2- The effect of addition of different amounts of manure on plane leaves C: P

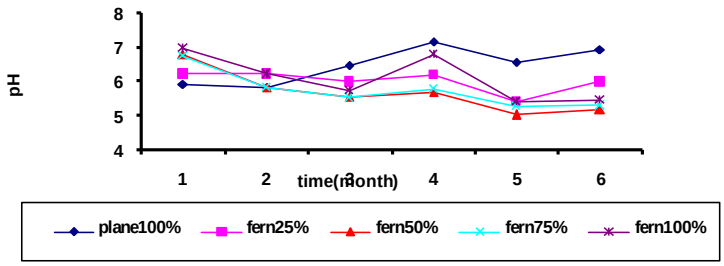

Fig 3- The effect of addition of different amounts of fern on plane leaves pH

Ec- Electrical conductivity is an important criteria for evaluation of compost. High salinity levels can be toxic to plants. Soluble salt levels should be between 4.0 and 6.0 dS/m (Sullivan & Miller, 2001). Use levels closer to 4.0 dS/m in areas where horticultural planting will occur. Addition of different levels of additives caused a significant increase in Ec during composting. Figure 5 shows the effect of adding different amounts of fern leaves on plane leaves Ec and the other treatments showed the similar effect.

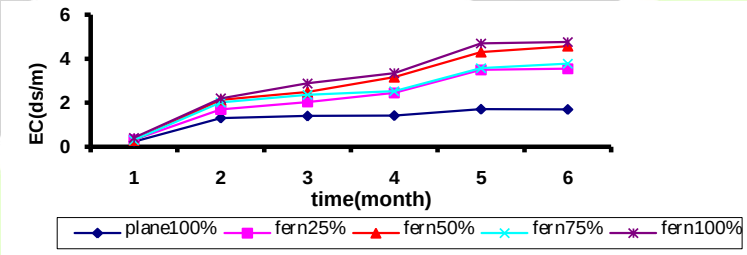

Fig 3- The effect of addition of different amounts of fern on plane leaves Ec

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