# Producing a Grow Bag (Growing Medium) with a Mixture of Spent Mushroom Compost and Coir Dust

E.G.D.M.A.B Disanayake, Dayani Gunathilake
*Uva Wellassa University, Sri Lanka*
*and*

J. Samaratunga
*Coco Green (Pvt) Ltd, Dangaspitiya Industrial park, Kurunegala, Sri Lanka*

## Introduction

Farmers of coconut cultivation areas use coir dust as a mulching material. The water holding capacity of the soil could be increased by 40% and the rate of losing moisture will also be slower when coir dust is incorporated in the soil (Joachim, 1929). Although, some attempts had been made to use coir dust as a fertilizer, its value as a fertilizer is reduced due to low Nitrogen, Calcium and Phosphorous value in the coir dust. Many experiments are continuing to find alternative uses for coir dust. Exhaustive trials had proved that coir dust is an excellent rooting medium and their water retention property favours root growth (Agbo, 1997). Required nutrients for plant growth are absent in coco peat. Therefore, required nutrients are supplied artificially when coir dust is used as a growing medium causing a high cost for the farmers. Hence increment of the artificial fertilizer utility of the plant is very important.

Physical properties and some chemical properties (Electrical Conductivity and pH) of the coir dust growing media are adjusted by blending coir dust, fiber and coconut husk chips. Using the coir dust and husk chips Bales, Grow bags, Planter bags, Discs and Briquettes are produced industrially in Sri Lanka to export as a rooting medium.

Mushroom compost is a viable and useful by-product of mushroom farming. This growth media is a mixture of agricultural materials, such as straw, hay, poultry litter, guinea grass, gypsum, prawn meal, peat moss, and other natural organic substances. These products are formed into a rich organic media that serves as the nutrient source for mushroom.

The integrated use of organic nutrients sources with inorganic fertilizer was shown to increase the potential of organic fertilizer (Heluf, 2002) and to improve the efficiency of inorganic fertilizer. Incorporation of chemical fertilizers in composted materials improves its efficiency and reduces losses (Guar and Geeta, 1993). After the mushroom crop is harvested, this organic material is removed from the production house, where it is processed into a consistent homogeneous by-product called "spent mushroom compost."

This study was carried out to enhance the artificial fertilizer utility of cultivated grow bags (coir dust growing medium) by incorporating Spent Mushroom Compost (SMC).

## Methodology

This study was carried out at the Coco Green (Pvt) Ltd, Kurunegala. Field trials were conducted in Nuwaraeliya green house, which belongs to Absgrow (Pvt) Ltd.

In this study, different concentrations of coir dust and spent compost mushroom (SMC) were mixed with a constant amount of coconut husk chips (20%) to produce grow bags (Table 1).

Table 1: Compositions of different treatments (grow bags)

| **Treatment** | **Coconut husk chips %** | **Coir dust %** | **SMC %** |
|---|---|---|---|
| T1 | 20 | 80 | – |
| T2 | 20 | 60 | 20 |
| T3 | 20 | 40 | 40 |
| T4 | 20 | 20 | 60 |

Bulk Density (BD), Total Porosity (TP), Aeration Porosity (AP), Water Holding Capacity (WHC) and Expansion Volume (EV) of the grow bags and Electrical Conductivity (EC) was measured as physical properties.

Lettuce seedlings were cultivated in the grow bags under the semi controlled conditions and dosage of recommended fertilizer for lettuce was applied to grow bags (T1, T2, T3 and T4). The experiment was designed according to Complete Randomized Design (CRD) with six replicates. Number of leaves per plant was counted weekly and economical yield and Girth of the neck at the harvesting stage were recorded.

**Results and discussion**

The differences in physical properties between the control and treatments were tested at the level of 5% confidence and is given in Table 2.

Table 2: Comparison of physical properties among control and treatments

| Character | F value | P value |
|---|---|---|
| Bulk density | 206.60 | 0.000 |
| Total porosity | 150.81 | 0.000 |
| Aeration porosity | 138.38 | 0.000 |
| Water holding Capacity | 66.56 | 0.000 |
| Expansion | 128.71 | 0.000 |
| EC | 854.05 | 0.000 |

There was a significant difference among the treatments. Highest bulk density was observed in T4 while T1 was the lowest.

Total porosity is significantly different among the treatments. Highest porosity is observed in T2, followed by T3 and T4, respectively. There was no significant difference between T3 and T4.

Aeration porosity was significantly different among the treatments. Treatment 1 has significantly higher aeration porosity followed by T2. T3 and T4 had same level of aeration porosity.

There was a significant difference among the treatments for water holding capacity. Highest water holding capacity was observed in T1 followed by T2, T3 and T4. Difference among T3 and T4 are negligible.

Expansion is significantly different among treatments. Highest expansion is from T1 and following that T2. The expansion of T3 and T4 is comparatively lower than to that of T1 and T2. But there is no significant difference among them.

Four treatments have a significant difference in EC. EC become low from T4, T3, T2, T1, respectively.

Number of leaves per plant, economical yield and girth of the neck in the control against treatments are at the level of 5% confidence.

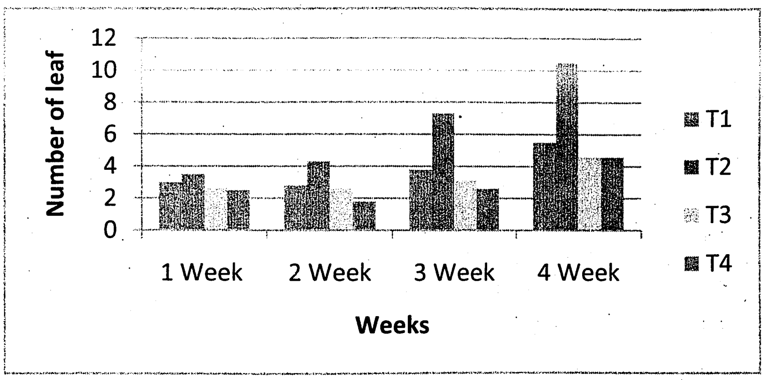


Figure 1: Number of leaves per plant/week

The average number of leaves produced by T2 was higher than control and other treatments (Figure 1).

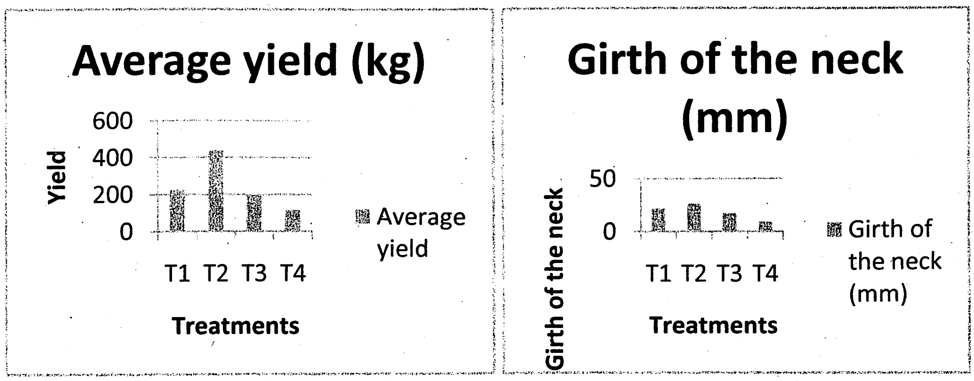


Figure 2: Economic yield and the growth of the neck for different treatments

Economic yield was significantly different among treatments. T2 showed the highest economic yield (Figure 2) followed by T1 and T3 and T4, respectively. Girth of the neck is significantly different among treatments, highest is from T2 while lowest is from T4. T1 and T3 have higher girths respectively (Figure 2).

## Conclusions

Physical properties (BD, TP, AP, WHC, Expansion volume) and EC level of the grow bags were affected negatively with the increment of SMC. Mixing of husk chips, coir dust and SMC in 20%, 60% and 20% ratios are suitable for high growth and high economical yield of lettuce and the best results can be obtained using 20%.

## References

AGBO. 1997. coco info international. 4(1).

Guar, A.C. and Geeta 1993. Role of Integrated Plant Nutrient Systems in sustainable and Environmentally sound Agricultural Development.110-30, RAPA publication;1993/13, FAQ, Bangkok

Heluf, G. 2002. Soil and Water Management Research program. Summary Report of 2000/2001 Research Activities, Alemaya Research center, Alemaya University. 95.