



Influence of Coconut Husk on Poultry Excreta in Organic Manure Formulation

S. Anbuselvi*, Guddu Kumar

Department of Industrial Biotechnology, Bharath University, Chennai-73, India.

*Corresponding author's E-mail: anbuselvichennai@yahoo.com

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ABSTRACT

Bio-fertilizer can be obtained from agricultural waste, animal excreta and plant decomposed sector. The poultry waste (bird excreta) had high C: N ratio when compared with other animal excreta. The composting of poultry waste in soil showed good manuring property. The different concentration of manure mixed with soil yield better growth of plants. This also supported that translocation of nutrients from manures to the root of the plant. Composting also enhances the N, P and K contents in the poultry coconut husk manure as compared to that in uncomposted material.

Keywords: Poultry waste, carbon, nitrogen, animal excreta.

INTRODUCTION

Organic manures enhanced life into this inert mixture and promote biological activities. The beneficial influence of organic matter on the physical, chemical and biological properties of the soil is widely altered the nutrients present in the soil. The regular recycling and reuse of organic wastes in the soil most efficient methods of maintaining the levels of nitrogen phosphorus and potassium in soil and maximum yield is achieved through shortest period. In India the use of plant and animal waste is used as a source of plant nutrient was the accepted practice¹.

Continuous cultivation of crops in the soils often results in the deterioration of soil structure which leads to reduced crop yield. Dhar (1962) cautioned that by adding large doses of N-fertilizers in modern agriculture always the danger of humus depletion and fall in crop production, which can be avoided only by adding additional amounts of organic residues and manures^{2,3}.

Poultry manure is an excellent source of nutrients and minerals can be incorporated into fertilizer programs. The soil fertility management helps to prevent nutrient imbalance and associated contamination. The key of successful management is to match the nutritional requirement of varies not only with its nutrients available in the manure the value of poultry manure various not only with its nutrient composition and availability but also with management and handing costs⁴.

Poultry excreta contain all essential nutrients including micronutrients and it has been a best valuable source of plant nutrients⁵ especially for organic growers⁶.

Addition of poultry manure to soils not only helps to overcome the waste management but also stimulates the physical, chemical and biological fertility of soils^{7,8,9}.

Poultry excreta has maximum amount of nitrogen, phosphorus and potassium. The variability in composition is due to dietary, physiological status and age of excreta¹⁰. Organic residues of poultry excreta are piled up, moistened, turned occasionally to aerate and allowed to decompose partially and bring down the carbon nitrogen ratio to about 30:1. In general composting is carried out in open pit by filling alternate layers of organic wastes and other materials rock phosphate and other amendments .if the organic wastes are largely high-carbohydrate materials some fertilizer nitrogen is needed.

The mixing of poultry waste and coconut husk is composting to speed up decomposition and helps to improve the texture of the product. Aeration in the compost pile is essential. It is good to mix succulent organic materials with the mixture¹¹. This study deals with composting of coconut husk and poultry waste in different proportions and its efficiency was analyzed.

MATERIALS AND METHODS

Poultry excreta was collected from chicken farms and dried. The dried powder of poultry excreta mixed with dried form of coconut husk in different properties. The compost wells were created with a depth of 3m×6m×3m size. The coconut husk and poultry waste were mixed with different proportion (1kg:100g, 1 kg:150g, 1kg:200g, 1kg:250g). The slight aeration and water sprinkling were done at regular intervals for there for three months.

The fertile nature of soil and manure helped to determine the growth of plant .The nature of natural and slightly alkaline soils were suitable for plantation. The physical parameters of pH, moisture, bulk density, water holding capacity and specific gravity of soil were analyzed. The nitrogen content of soil and manure were determined by K. jeldhal method. The available phosphorus was determined by Micro-Vanadate Molybdate method. The



potassium content was analyzed using ammonium acetate method.

RESULTS AND DISCUSSION

Poultry waste contains many essential nutrients needed for growth of plants. The poultry excreta powder mixed with different proportions for composting to make organic manure formulations. The physical and chemical constituents of soil and poultry excreta were summarized in Table 1.

The poultry excreta showed slightly acidic range of 6.5 the control soil showed alkaline pH8. The pH of soil was gradually attained neutral pH after treatment of soil with composting manures. Organic manure helps to maintain the pH which suitable for plantation. The turbidity was observed in coconut husk of 68.5 NTU. The soil showed very little turbidity of 0.55 NTU. The maximum turbidity was observed in 250g of coconut husk treated samples. The high moisture was found to be higher in coconut husk (86%) when compared with other samples. This was due to the presence of water holding capability of coconut husk. The minimum moisture content were found to be in control (10%), 500g treated sample (19%) and 150g treated sample (18.3%).

The poultry waste showed specific gravity (1.20). The specific gravity of normal soil and coconut husk were 9.28 mg/ m³ and 9.529.28 mg/ m³. The coconut husk treated poultry waste were rapidly decreased its specific gravity

from the range of 9 to 0.018 mg/ m³ up to 150g treated samples. But the specific gravity of sample was gradually increased in 250g and 500g treated samples. The bulk density of normal fertile soil was about 1.0g/cm³. The raw coconut husk and poultry excreta showed high amount of specific gravity in terms of 0.62 g/cm³ and 0.45 g/cm³. During organic manure formulation and interaction with soil specific gravity of coconut husk and poultry excreta were gradually declined to 0.10 g/cm³ and slightly raised to 1.02 g/cm³. The poultry excreta showed only 10% of water holding capacity even when compared with normal soil (54%). The coconut husk is a good water adsorbent and found to be 93% of water holding capacity. The water holding capacity of combined waste formulations were found to be gradually increased from 27% to 65%. This physical features of coconut husk showed high moisture content, specific gravity and water holding capacity properties¹². This helps to trans located the growth of plants. In olden days cow dung, goat excreta and poultry waste were used as for growth of plants by farmers.

The coconut husk and poultry excreta contains high amount of nitrogen (0.19 and 0.28 mg). The level of nitrogen is gradually increased from 0.18 to 0.36 mg in 500g treated sample. Hachicha *et al.* (2009) also represented that total N was increased between 1.8-2.2 mg kg⁻¹ in initially composted raw poultry litter and vegetables waste¹³.

Table 1: Physical changes in composting of coconut husk and poultry waste

Samples	pH	Turbidity(NTU)	Moisture content (%)	Bulk density(g/cm ³)	Specific gravity (mg/m ³)	Water holding capacity (%)
Control Soil	8.0	0.55	10	1.0	9.28	54
p.w	6.5	46.7	63	0.45	1.20	10
P.w+S	7.5	62.4	22	0.10	0.26	78
Ch	7.0	68.5	86	0.62	9.52	93
P.W+S+ch100g	7.5	64.0	52	0.10	0.080	27
P.w+s+ch150g	7.5	101	18	0.10	0.018	43
p.w+s+ch250g	7.5	121.1	41	0.11	1.194	61
p.w+s+ch500g	7.5	65.3	19	1.02	1.631	65

Note: p.w- poultry waste; S-soil: ch- coconut husk

Composting provides environmentally sustainable solution of waste recycling and control of NH₃ emissions¹⁴.

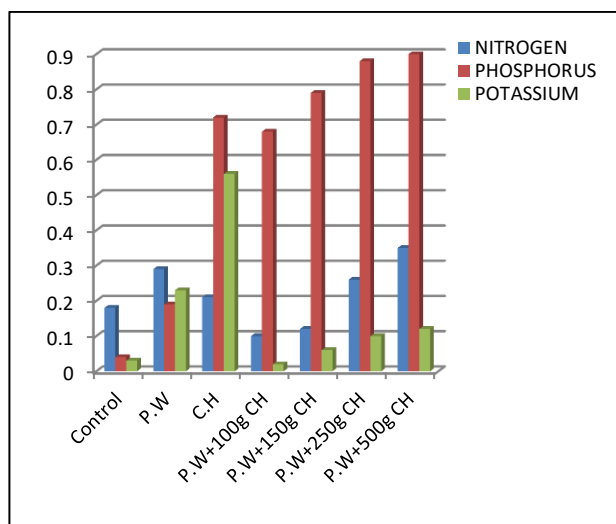
The normal soil contains 0.04 mg Of phosphorus. The high concentration of phosphorus was found in coconut husk (0.73mg). The phosphorus level of combined treatments were gradually increased from 0.68 mg to 0.90 mg in the range if 100-500g samples. Composting resulted in to significantly higher in level of phosphorus contents over un-composting from 60 days. The findings in the current study are also similar to the results of Cooper bandet *al.* (2002) who found higher P values in

the poultry litter after composting process as compared to its mixtures with other wastes¹⁵.

Coconut husk showed higher amount of 0.54 mg of potassium when compared with raw poultry excreta (0.22mg). The potassium concentration was rapidly declined at the initial mixing of coconut husk and poultry waste. During manure formulation the potassium levels were gradually raised to 0.12 mg. The compost hadless moisture content, improved handling properties, and less odor than raw manure. The composted product containing poultry litter was found

to have higher levels of plant nutrients such as N, P, K, than the product without poultry litter¹⁶.

Figure 1: Nitrogen Phosphorus and Potassium levels in combination of coconut husk and poultry waste



CONCLUSION

Composting of poultry wastes mixed with coconut husk lead to less in weight, less odour, high NPK, water holding capacity and easier to transport for land application. Composting narrows down the C: N ratio earlier than in uncomposted poultry coconut manure, making it ready for soil application in shorter time. Thus coconut husk mixed poultry manure helps to the agricultural farms and completely reduce the risk of pollution. .

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