

Preparation and Physico-chemical analysis of compost prepared from poultry litter

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Abstract

Four different combinations of raw material i.e. agro waste and poultry waste were used in preparation of compost. Physicochemical properties of compost like porosity, moisture content, water holding capacity Nitrogen concentration, phosphorus concentration, K concentration, % Carbon and organic matter content were determined. Addition of the poultry litter enriches the compost physico-chemically. Set C shows highest quality parameters and this combination may be the most suitable combination in the preparation of compost from poultry litter.

Keywords: Physico-chemical analysis, compost, poultry litter

1. Introduction

In India there are lot of waste accumulate every year in the form of urban waste field waste which is agro waste such as crop residue from *rice, maize, jowar, soybean*. These all type of waste are utilized for increasing soil fertility and crop production through recycling. Indian economy is based on agriculture as 80 % of Indians are farmer and green revolution is necessary to feed growing population in the country. Chemical Fertilizers are useful to increase the crop yield but are not balanced plant foods. It is not supplier of all nutrients to plant and causes the soil pollution. It disturbs the soil health leading to acidification, micronutrient depletion, poor crop health and lower crop yield and quality. Chemical fertilizer may contribute environmental risk.

Composting is a process of exothermic biological oxidation of various organic wastes in the presence of air and involving microorganism. Though microbial decomposition, the organic matter is stabilized, matured and deodorized in to a rich in humic substances that can be used as organic soil conditioner, easy to store and distribute [1, 2].

An adequate supply of nitrogen (N), phosphorus (P), potassium and other fundamental nutrients are essential to sustain crop productivity. Composted manure has been recognized as an effective way to partially solve the growing concern of solid waste management⁴ by reducing the volume and weight of the organic waste, as well as controlling the soil pathogens [3].

New and innovative methods of utilizing litter continue to evolve, but land application remains the most suitable option. The poultry industry is one of the largest and fastest growing agro-based industries in the world. There is an increasing demand for poultry meat mainly due to its acceptance by most societies and its relatively low cholesterol content. The poultry industry is currently facing a number of environmental problems. One of the major problems is the accumulation of large amount of wastes, especially manure and litter, generated by intensive production. is voided by a

layer as po Large-scale accumulation of these wastes may pose disposal and pollution problems unless environmentally and economically sustainable management technologies are evolved [4-6].

2. Material and Methods

Different types of agro waste were collected from nearby fields. Poultry waste was collected from the nearby Boney Poultry Farm, Sawargaon (Barde) District Washim. Standard compost was brought from local market of Washim.



Fig 1: Boney poultry farm, Sawargaon (Barde)

Compost was prepared by following four combinations using agro waste and poultry waste.

Table 1: Combinations used for preparation of compost

Set	Agro-waste	Poultry –waste
A (Control)	300 g	000 g
B	300 g	100 g
C	300 g	150 g
D	300 g	200 g
E	Compost from market	

Physicochemical properties of representative sample of compost like porosity, moisture content, water holding capacity Nitrogen concentration (Kjeldahls Method), phosphorus concentration, K concentration, % Carbon and organic matter content (Walkley and Black's rapid titration method) were checked.

3. Result and Discussion

The physico-chemical properties of the different sets of compost are depicted in Table 2. The data indicated that the moisture content of sets B, C and D the compost sets having poultry waste high and in the range of 39%- 42%.

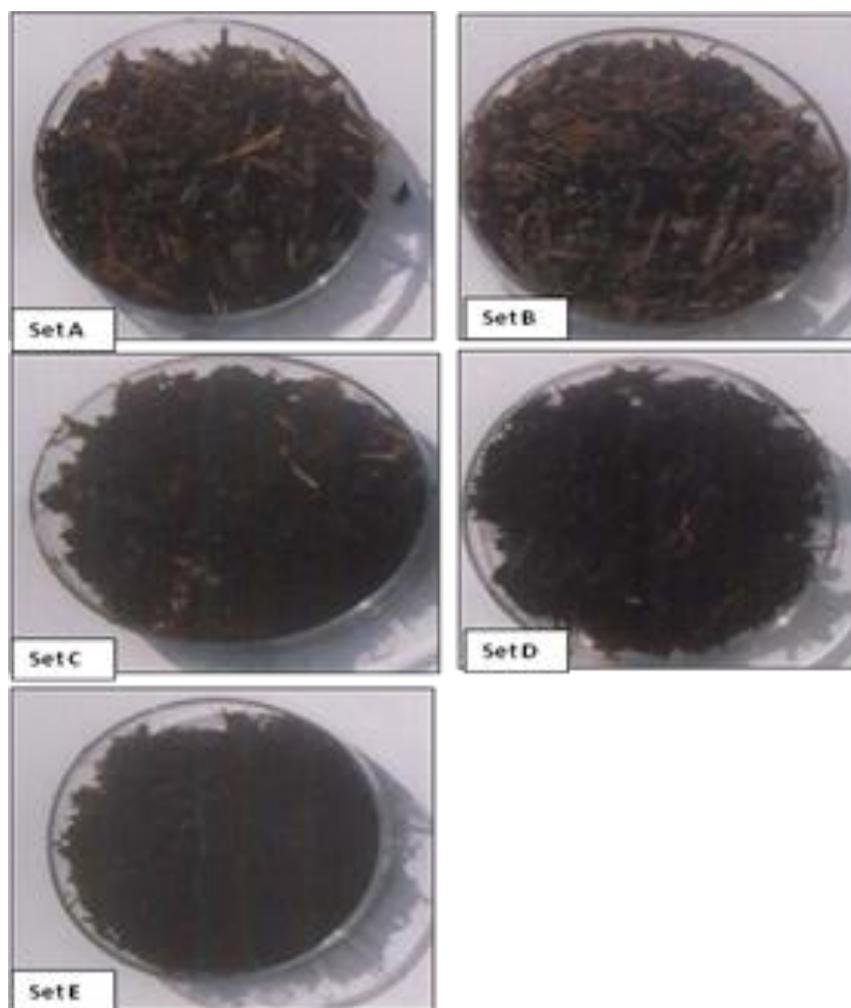


Fig 2: Experimental sets compost

The C: N ratio of these sets is also quite high that is 16-18, The highest porosity is of the C set (poultry waste 150 gm)

that is 84.90%, which has the highest water holding capacity that is the 78.52%.

Table 2: Physico-chemical properties of different sets of compost

Set	Moisture content %	Porosity %	Water holding capacity%	pH	C%	Organic matter %	N %	C:N	P (PPM)	K (PPM)
A	16.64	76.60	84.21	6.7	43.81	75.13	2.94	14.19	7536	1190
B	39.30	80.71	70.57	6.9	50.77	87.53	2.87	17.68	9459	2065
C	41.30	84.90	78.52	6.1	51.07	88.04	3.08	16.58	10959	2265
D	42.45	82.70	58.32	6.1	52.70	90.85	3.22	16.20	11569	2358
E	24.75	81.70	72.96	7.1	44.10	76.08	2.45	18.00	8807	1954

The percentage of carbon and organic matter is responsible for improvement of the soil structure, the set D have the highest value of the % C (52.70%) and organic matter (90.85%). The nitrogen content of compost sets (from B-D) having Poultry waste are also high, which increases with the quantity poultry waste added in compost. The nitrogen content value of set B is 2.87%, set C is 3.08% and set D is 3.22% are higher as compare to other sets, which indicates the ready nitrogen availability to soil and the plant. The C:N ratio is high in set B (17.68), with high fly ash content and set C (16.58) with poultry waste. The K is the most useful ions for the physiology of plants, which is helpful for the water

and mineral absorption. The compost sets B, C and D shows a high value of these ions. The compost sets prepared from Poultry waste that is Set B, C and D, are having suitable moisture content than the other prepared composts sets, which are in the range of 40-50% of moisture. The highest porosity is of the C set (Poultry Waste 150 gm) that is 84.90%, which has the highest water holding capacity that is the 78.52%. The chemistry of compost is highly dependent on the chemistry of the ingredients used in the initial mix. During composting dry mass is lost through release of carbon dioxide, ammonia and other compounds to the atmosphere. Other elements that are not part of these gaseous products are retained and their

concentrations increased in the finished compost^[7]. The other sets prepared from have comparatively less porosity and water holding capacity. The percentage of carbon and organic matter is responsible for improvement of the soil structure the set D have the highest value of the % C (52.70%) and organic matter (90.85%). The presence of % C and organic matter improves the soil structure and improves soil water holding capacity. The C: N ratio is high in set B (17.68), with high fly ash content and set C (16.58) with poultry waste. The C: N ratio is used to measure the stability. A ratio less than 25 likely indicates a compost (the composting process is finished) from which nitrogen will be more available as mineral nitrogen (nitrate and ammonium). The K is the most useful ions for the physiology of plants, which is helpful for the water and mineral absorption. The compost sets B, C and D shows a high value of these ions.

4. References

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