



Short Communication

Effect of different substrate on moisture percentage of compost

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Abstract

The maintenance of moisture is very important in composting process. Moisture content is a dominant parameter in composting as it is necessary for the activity of microbes. It enhances the metabolic rate of microbes and hence increases the rate of degradation. This study was designed to observe the effect of substrate on moisture percentage. The 50% moisture was optimized in all windrows containing different substrate. It was concluded from this research that the greater moisture showed by substrate composed of cow dung+ screening matter + green waste + paper and lowest was shown by waste composed of cow dung+ screening matter + green waste + saw dust. The decrease in moisture % in all treatments was observed. The decrease in moisture from 50% is a sign of compost maturity and high activity of microorganisms and better degradation.

Keywords: Substrate, Moisture, Percentage, Compost.

Introduction

Many studies on composting process is continuously developing with revising various aspects. These aspects include different chemical and physical parameters, the nature of substrate, the population of microorganisms, addition of different types of inoculum and enzymatic reactions¹. The most widely studied topic by scientists is the addition of different inoculants. The moisture content is an important parameter during composting process and it affects many features of composting. The kinetics of bio decomposition are pretentious by moisture percentage by changes in the potential of water, activity of water, diffusion of oxygen and growth rate of microorganisms. These relationships of decomposition kinetics made more complicated by the active nature of the composting process. The optimum value of moisture content for bio decomposition is varied in different compost windrows because it depends mainly on the nature of substrate or organic waste that is decomposed. There is inverse relationship between the time of composting and moisture percentage of compost pile. The increase in time of composting decreases the amount of moisture. The initial moisture content of the compost windrow must be between 50 to 70 % on a wet basis. The reduction in the rate of decomposition can be observed in high moisture content windrows. The physical analysis of compost are enough to check the rate of degradation e.g. porosity and density².

Material and methods

The six windrows were prepared for the experiment at Lahore compost Pvt Ltd. The volume of three windrows was 60 with substrate composed of Cow Dung, Green waste, Screening

Material and Wheat Straw), (Cow Dung, Green Waste, Saw Dust and Screening Material) and (Screening Material, Cow Dung, Green Waste and paper). The other three windrows with the volume of 650 tons were prepared by using substrate composed of MSW, Cow dung, green waste and press mud), (MSW, green waste, cow dung and humic acid) and the control windrow was composed of only MSW, Green waste and cow dung was adjusted at 60 tons. The 50% of moisture was provided to each windrow with proper turning and temperature adjustment.

Table-1: Quantity of substrate used in composting process.

Windrow No.	Ingredients	Quantity	Total Weight (MT)
1	Cow dung, green waste, screening matter, wheat straw	24+21+14.7+0.3	60
2	Cow Dung+ Green Waste + Saw Dust+ Screening Material	21+21+0.3+17.7	60
3	Screening Material + Cow Dung + Green Waste +paper	14.7+24+21+0.3	60

Table-2: Quantity and composition of substrate used for composting process.

Windrow No.		Ingredients	Total Weight (MT)
4	Control	Cow Dung+ Green waste +MSW	650tons
5	Press Mud	Cow dung +Green Waste+ MSW+ Press Mud	650tons
6	Humic Acid	Cow Dung +Green Waste +MSW+ Humic Acid	650tons

Estimation of moisture content: The 15g of compost sample was taken and its weight was measured. The sample was placed in an oven at 60C for 8 hours. The dried sample was weight again. The moisture percentage was calculated by subtracting dried weight from fresh weight³.

Results and discussion

The percentage of moisture content was reduced with increase in time. The Highest moisture content was observed in windrows composed of cow dung+ screening matter + green waste + paper with the value of 40.3 and lowest 26.1 was recorded in the windrows composed of cow dung+ screening matter + green waste + saw dust. Moisture is a key factor in aerobic composting⁴. The highest moisture content of 75% is not beneficial for active composting as it decreases the temperature and activity of microbes⁵. The temperature and microbial activity is inversely proportional to moisture percentage. The reduction in the percentage of moisture

increases the temperature of the windrow. The moisture content at the start of composting process should be 50% and this is also suitable for the degradation of municipal solid waste because it provides the maintenance of temperature is for longer period of time⁶. The results concluded that the substrate which shows moisture below 30 indicated maturity of compost as it shows the high activity of microbes. The high values of moisture shows the less activity of microbe and less maturation of compost.

Table-3: Results of moisture content with different substrates.

Windrow No.	Ingredients	Moisture %
1	Cow dung, Green waste, Screening matter, Wheat straw	29.08
2	Cow Dung+ Green Waste + Saw Dust+ Screening Material	26.14
3	Screening Material + Cow Dung + Green Waste +paper	40.34

Table-4: Results of moisture content with different substrates.

Windrow No.		Ingredients	Moisture %
4	Control	Cow Dung+ Green waste +MSW	30.54
5	Press Mud	Cow dung +Green Waste+ MSW+ Press Mud	31.05
6	Humic Acid	Cow Dung +Green Waste +MSW+ Humic Acid	32.52

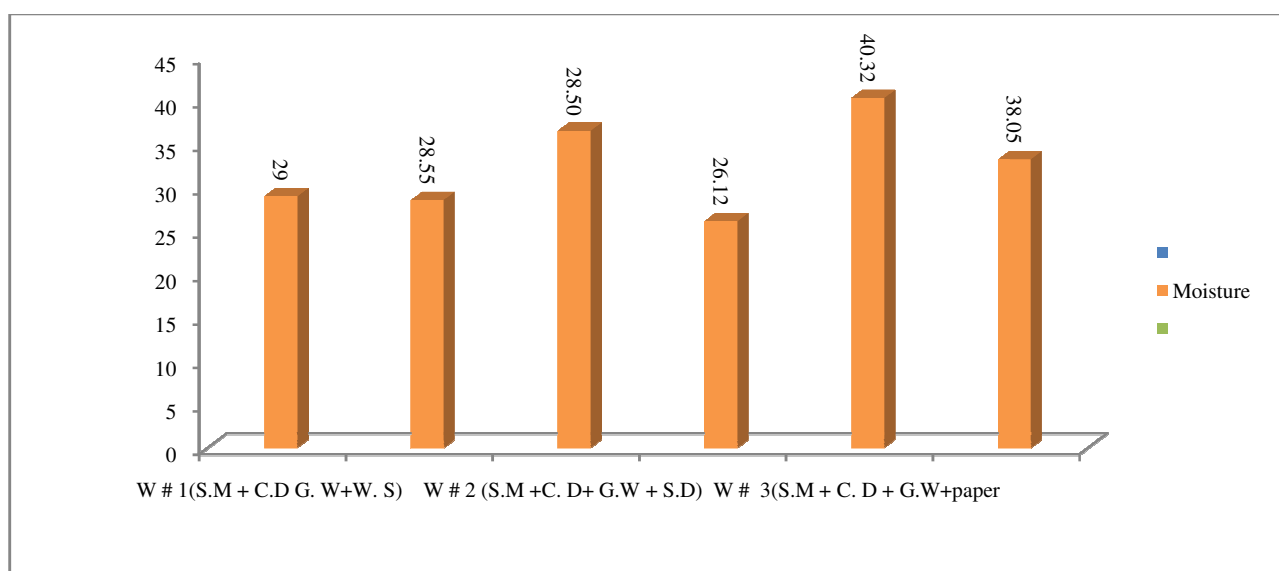


Figure-1: Results of moisture content with different substrates.

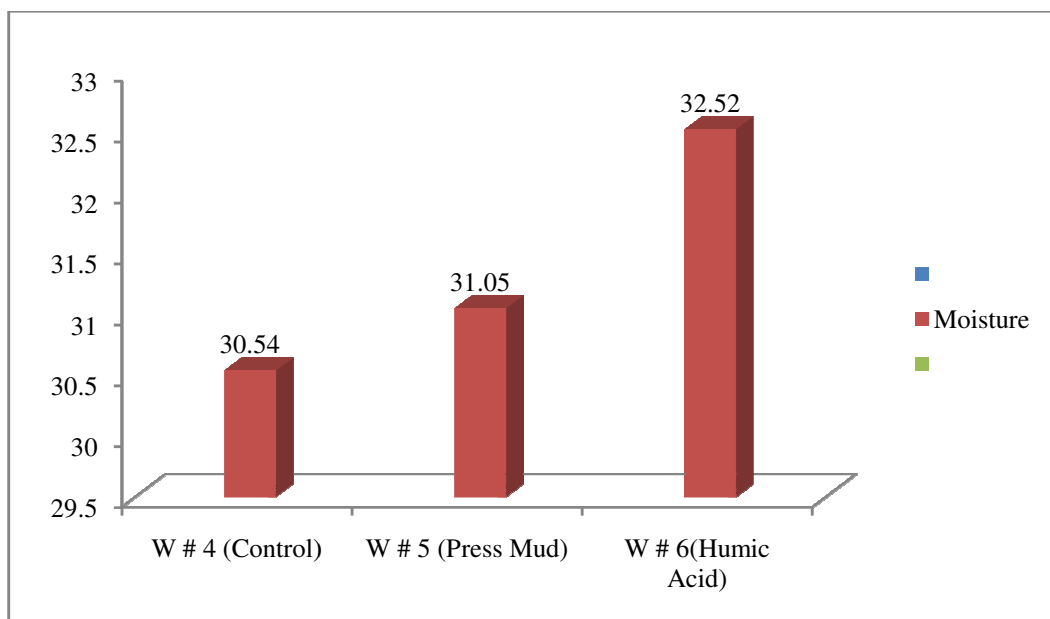


Figure-2: Results of moisture content with different substrates.

Conclusion

Moisture is the key element in aerobic composting. It was concluded from this study that the moisture content reduced with passage of time. Composting process usually takes 3-4 months and to initiate this process 50% moisture must be maintained. The percentage of moisture reduced up to 29% with increase in time.

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