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Waste Stabilization and Treatment of MSW by using Gomutra

[1]Debashree Majumder

[1]P.G Student at D. Y. Patil Collage of Engineering Akurdi, Pune, India

Abstract: **This paper examined the variability which occurs in key parameters like pH, temperature, moisture content, organic carbon, nitrogen, phosphorous, odour, color etc. during the 30 days regular monitoring of composting process. 5 kg of municipal solid waste, old compost, straw and soil, was mixed with 5%, 10%, 15% of gomutra of 3 kg municipal solid waste for composting. Composting was done by using 16th buckets model composter made up with proper aeration and drainage facility and was kept in semi sun rays condition. pH ranging 7.6 to 8.9 in the first phase, Temperature rise from the first day of process and become 55°C on 18 day. Moisture content in compost was unstable throughout the process due to changing microbial population. The NPK content of final compost are find out .After finding the results of NPK obtained from composting treatment given to MSW and Gomutra are indicate that combined composting are an attractive method for management of municipal solid waste.**

Keyword: **Municipal solid waste, Gomutra, Composting, Key parameters.**

I. INTRODUCTION

Due to increasing population as well as industrial and economic development, the output of the municipal solid wastes (MSW) has been increasing in India**.** On the other hand, sanitation landfill would occupy a lot of lands and lead to two-step solution by less developed technology. Solid waste management is considered to be one of the most serious environmental problems confronting urban areas in developing countries.

Composting of MSW reduces the volume of the wastes, germination of weeds in agricultural fields and destroys malodorous compounds .In adequate collection and uncontrolled disposal of solid wastes results in a serious threat to the inhabitants as well as an environment. Municipal solid waste and its management is a big concern for India these days. Municipal Solid waste management is taken as one of the burning issue. Among solid waste, more than 80% is organic. Hence effective Composting can be the best option for its management. Cow urine (Gomutra) has high nitrogenous fertilizer value than cow dung. Nutrient value of urine can be trapped through organic composting. Urine applied compost accelerated the composting process as well as enhance the quality of the compost. Despite the fertilizer value of cow urine, it has several challenges to replace chemical fertilizer in the farmland. Urea in cow urine degrade rapidly to the gases NH_3 and CO_2 .Cow urine is too strong to apply directly in the field and should be diluted in order to apply directly in the plants. Cow urine is in liquid form and thus is not easy to transport it as of chemical fertilizer. Waste recovery such as recycling and composting is an option of reducing the waste amount to be disposed**.** Composting MSW is seen as a method of diverting organic waste materials from landfills, while creating a product, at relatively low-cost, that is suitable for agricultural purposes. Many studies have been carried out on assessing the effect of Gomutra in composting of Municipal solid waste. Composting satisfies the health and aesthetic aspects of waste disposal by destroying almost all pathogens. In addition, the product becomes having agricultural and horticultural benefits as a soil conditioner and fertilizer.

Objective: To assess the effect of gomutra in composting process. To test the quality of compost with and without gomutra application. Determination of effects of different experimental parameters like Potassium, Nitrogen, Phosphorous, Moisture, pH, Total Carbon, C: N ratio on Compost after using Gomutra. Determination of thermodynamic parameters to establish the effect of temperature on Compost.

II. MATERIALS AND METHODS

Experiments on combined composting were conducted at a campus of D. Y. Patil Educational Complex, situated at Sector 29, Nigdi, Pradhikaran, Pune, Maharashtra India, to study the effectiveness of municipal solid waste and cow urine. The amount of generation and composition of solid waste varies from place to place within the study. For the present study, sample of municipal solid waste was collected from The Moshi depot, which was earlier outside the jurisdiction of PCMC, is spread over 80 acre along Pune-Nashik highway Pune Maharashtra. Collection of cow urine was done from Tathawade village, situated in the Pimpri-Chinchwad south of Pune city, Maharashtra. Cow urine sample was in liquid form and collected in air tight plastic bins to enclose it from surrounding. 1.5 kg segregated vegetable waste, 1.5 old compost, 0.5 kg soils; 1.5 kg straw was mixed with 5%, 10%, and 15% of gomutra of 3 kg municipal solid waste for composting. The chemical parameters were determined at Aavanira Biotech (P) Ltd., Kinetic Innovation Park, D-1 Block, Plot No.-18/1 Part, MIDC Chinchwad, Pune, Maharashtra, Pune, Maharashtra. To know the trends which occur in the composting process a regular monitoring of key role parameters, pH, temperature, moisture content, organic carbon nitrogen, phosphorous, odour, color etc. was done for 30 days period. Physicochemical analysis of finished compost will do for pH, conductivity, total nitrogen, organic carbon. Total Phosphorous will determined colorimetrically Potassium will determine by flame emission spectrophotometry, while heavy metal concentrations.

III. RESULTS AND DISCUSSION

The present study proved that limited dose of gomutra accelerates the composting process in combination with municipal solid waste. Table 1, 2, 3, 4, 5, 6 shows the physiochemical characteristics of compost obtained. During monitoring of composting 1st day without gomutra and with gomutra pH, temperature, moisture contain, organic carbon, nitrogen, phosphorus, color, odour is respectively nil, 33 and 30, nil, nil, nil, nil, yellow, nil. After 30 days without gomutra pH, temperature, moisture contain, organic carbon, nitrogen, phosphorus, potassium, color, odour of the bucket no 16 is respectively 5.9(acidic), 35^{o}c, 53.07, 23.24%, 11824.92, 155.9mg/kg, 11340.0mg/kg , ash, nil.

Table 1: Temperature Of Compost Obtained From Municipal Solid Waste And By Using 5%, 10%, 15% Gomutra Of 3 Kg Municipal Solid Waste

Day	Temperature(^{o}C)			
	0 ml	150 ml	300 ml	450 ml
1	37	34	32	32
3	40	36	35	35
6	41	40	40	40
9	41	42	42	44
12	45	44	44	45
15	46	48	49	49
18	50	51	53	55
21	46	49	47	50
24	42	43	42	45
27	37	39	39	40
30	35	35	35	38

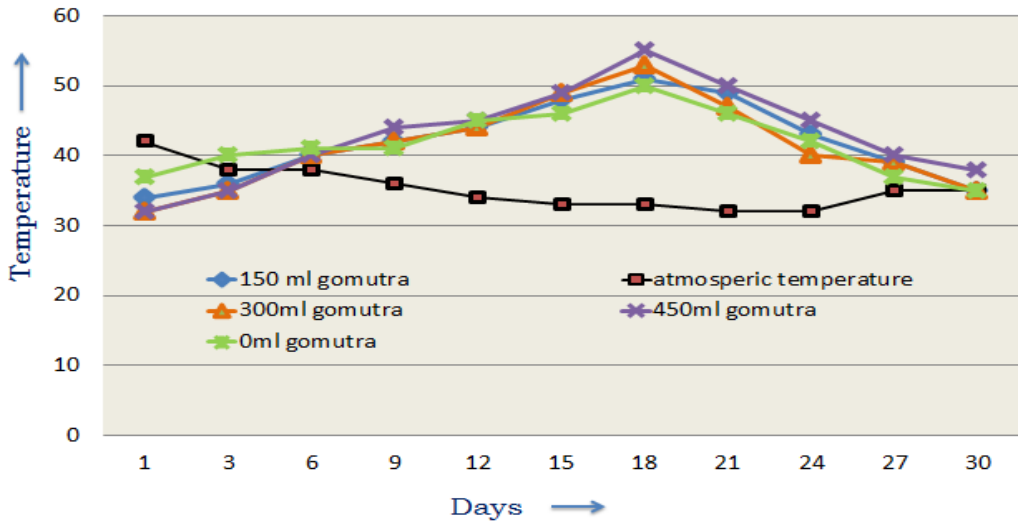

Figure 1: Temperature of Compost Obtained From Municipal Solid Waste and By Using 5%, 10%, 15% Gomutra of 3 Kg Municipal Solid Waste

Table 2: Moisture Of Compost Obtained From Municipal Solid Waste And By Using 5%, 10%, 15% Gomutra Of 3 Kg Municipal Solid Waste

Days	MOISTURE (%)			
	0 ml	150 ml	300ml	450 ml
1	59.45	59.80	59.80	59.85
3	59.25	59.10	59.60	59.25
6	59.00	58.25	59.00	59.00
9	59.00	57.00	59.00	58.63
12	58.62	55.00	58.70	58.41
15	58.01	52.90	58.65	58.02
18	56.50	52.00	58.00	56.50
21	56.17	50.75	57.00	56.17
24	56.02	50.72	56.90	56.02
27	54.00	49.10	55.00	54.00
30	53.07	48.50	54.81	53.07

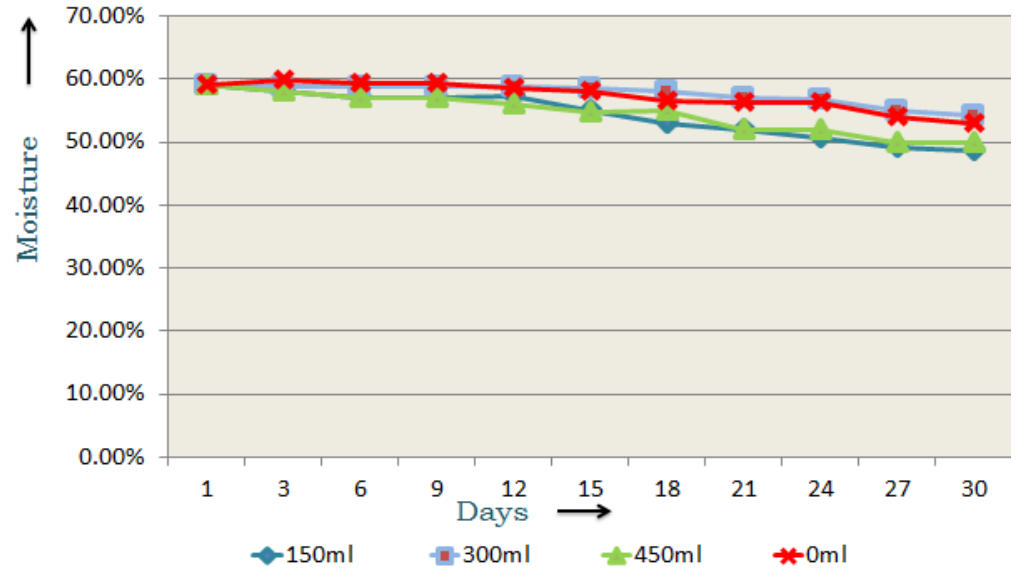

Figure 2: Moisture of Compost Obtained From Municipal Solid Waste and By Using 5%, 10%, 15% Gomutra of 3 Kg Municipal Solid Waste

Table 3: pH Of Compost Obtained From Municipal Solid Waste And By Using 5%, 10%, 15% Gomutra Of 3 Kg Municipal Solid Waste

Days	pH			
	0 ml	150 ml	300 ml	450 ml
6	7.9	8.2	8	8.2
12	7.5	8	7.8	7.9
18	7.3	7.6	7.7	6.81
24	6.25	7.2	7.90	6.25
30	5.99	6.41	7.34	5.73

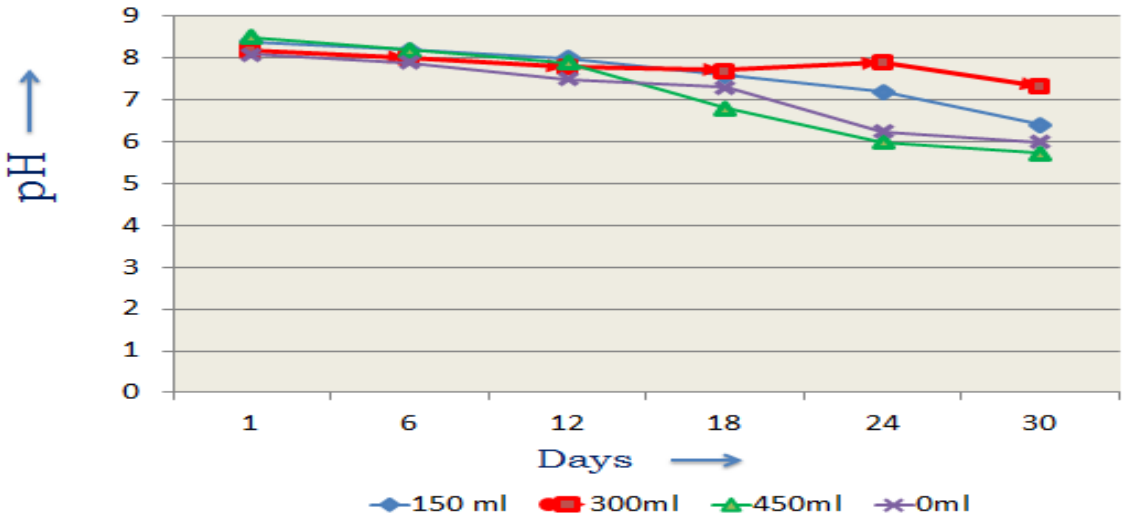

Figure 3: pH of Compost Obtained from Municipal Solid Waste and By Using 5%, 10%, 15% Gomutra of 3 Kg Municipal Solid Waste

Table 4: Total Carbon Of Compost Obtained From Municipal Solid Waste And By Using 5%, 10%, 15% Gomutra Of 3 Kg Municipal Solid Waste After 30 Days

Day	Total Carbon (%)			
	0 ml	150 ml	300 ml	450 ml
30	14.42	18.03	20.89	23.24

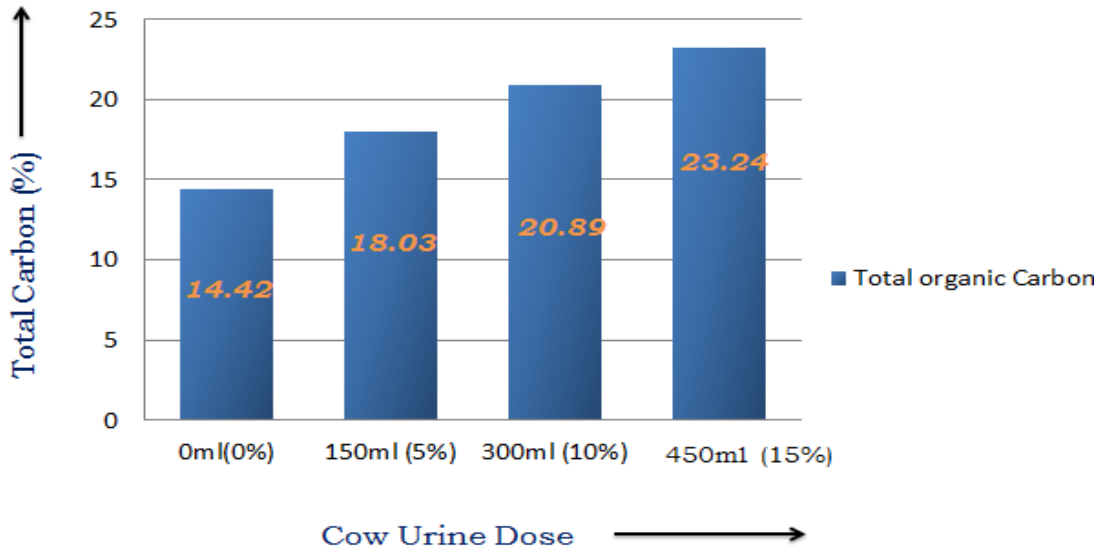

Figure 4: Total organic carbon of Compost Obtained from Municipal Solid Waste and By Using 5%, 10%, 15% Gomutra of 3 Kg Municipal Solid Waste after 30 days.

Table 5: Phosphorus Of Compost Obtained From Municipal Solid Waste And By Using 5%, 10%, 15% Gomutra Of 3 Kg Municipal Solid Waste After 30 Days

Days	Phosphorus (mg/kg)			
	0 ml	150 ml	300ml	450 ml
30	155.9	39.47	37.23	41.3

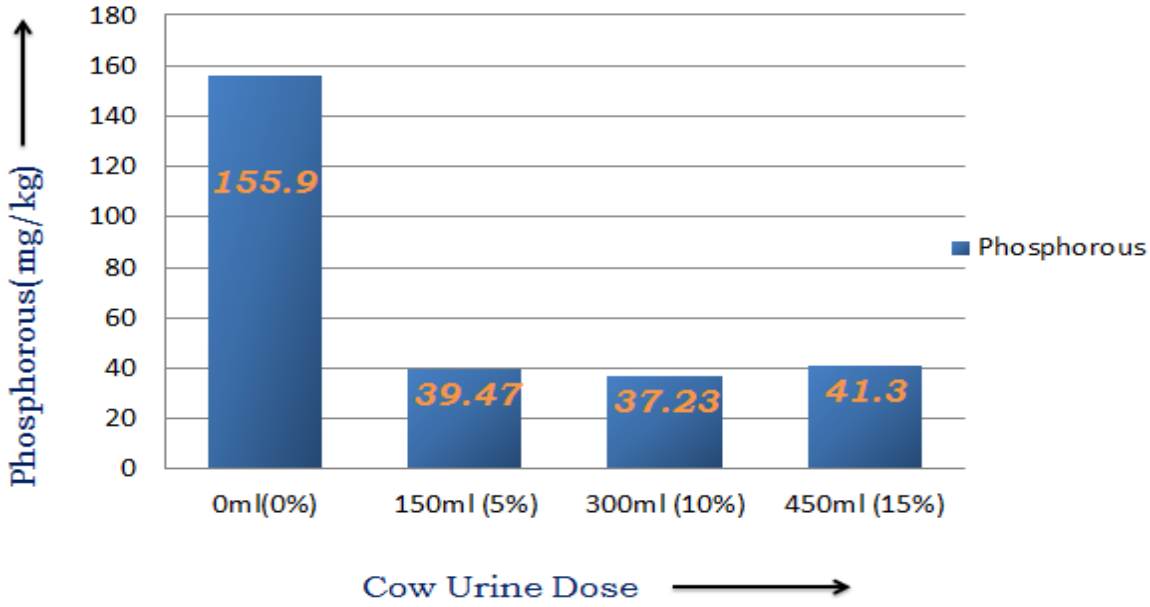

Figure 5: Phosphorous of Compost Obtained from Municipal Solid Waste and By Using 5%, 10%, 15% Gomutra of 3 Kg Municipal Solid Waste after 30 days

Table 6: Potassium of Compost Obtained From Municipal Solid Waste and By Using 5%, 10%, 15% Gomutra of 3 Kg Municipal Solid Waste after 30 Days

Day	Potassium (mg/kg)			
	0 ml	150 ml	300 ml	450 ml
30	11340	9377	9360	6939

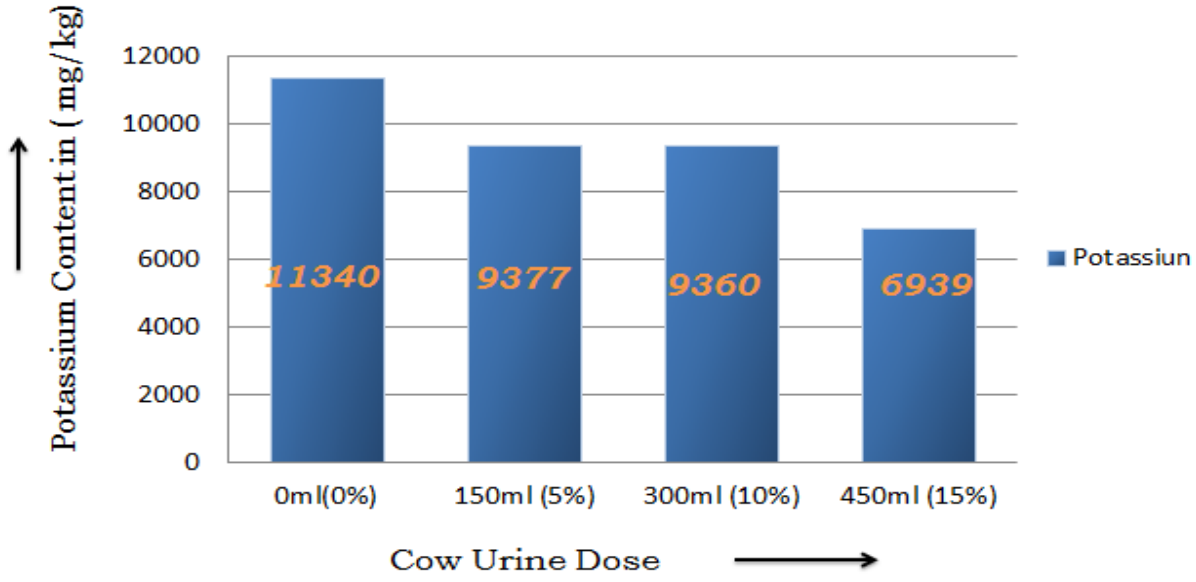

Figure 6: Potassium of Compost Obtained from Municipal Solid Waste and By Using 5%, 10%, 15% Gomutra of 3 Kg Municipal Solid Waste after 30 days.

Table 7: Nitrogen Of Compost Obtained From Municipal Solid Waste And By Using 5%, 10%, 15% Gomutra Of 3 Kg Municipal Solid Waste After 30 Days

Day	Nitrogen (mg/kg)			
	0 ml	150 ml	300 ml	450 ml
30	11824.92	6539.64	8767.24	9358.29

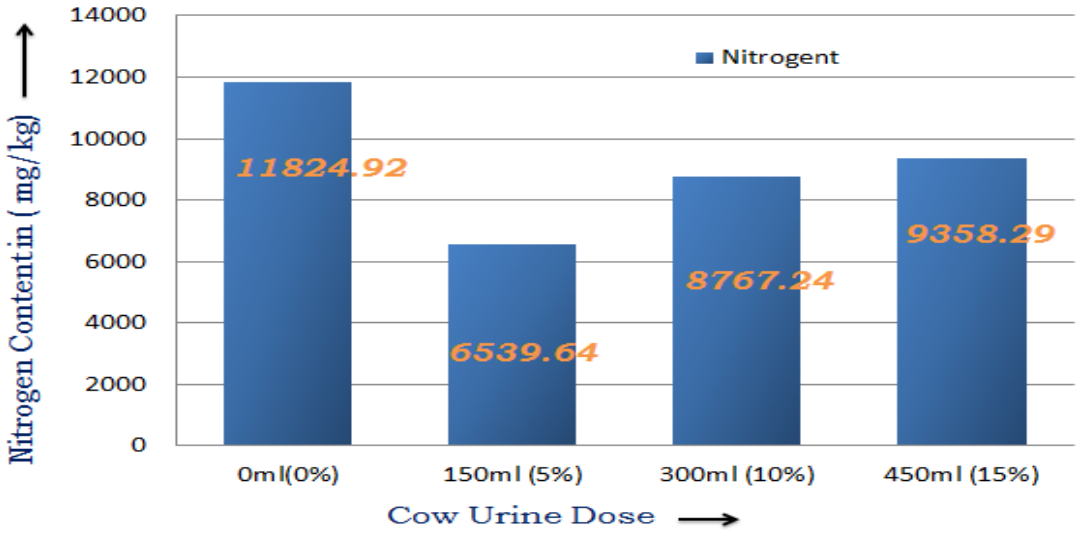

Figure 7: Nitrogen of Compost Obtained from Municipal Solid Waste and By Using 5%, 10%, 15% Gomutra of 3 Kg Municipal Solid Waste after 30 days

Table 8: C:N Ratio Of Compost Obtained From Municipal Solid Waste And By Using 5%, 10%, 15% Gomutra Of 3 Kg Municipal Solid Waste After 30 Days

Day	C:N ratio (mg/kg)			
	0 ml	150 ml	300 ml	450 ml
30	19.64	22.4	20.56	22.32

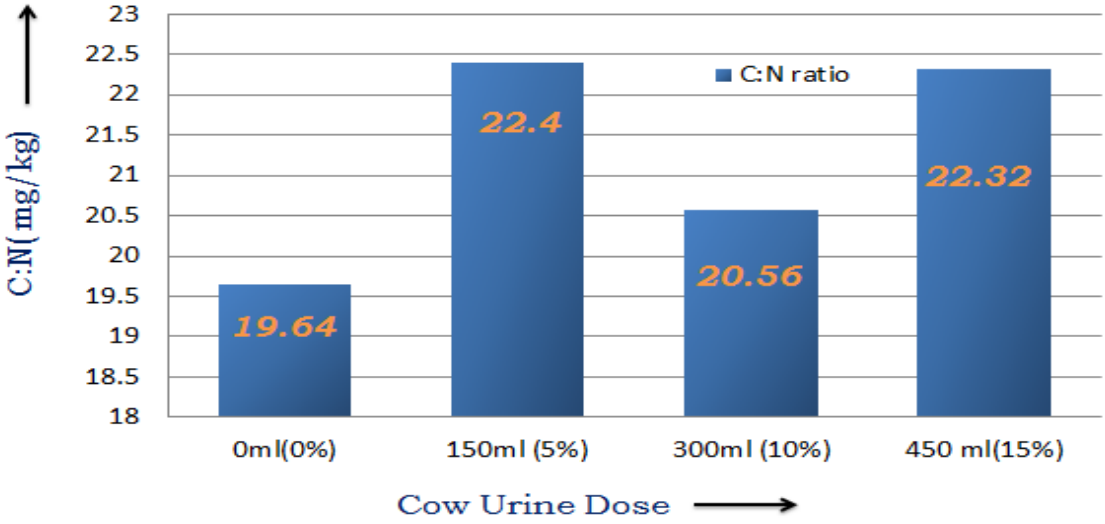

Figure 8: C:N ratio of Compost Obtained from Municipal Solid Waste and By Using 5%, 10%, 15% Gomutra of 3 Kg Municipal Solid Waste after 30 days

Temperature rises from the initial day and it rises to maximum after 18 days. After 18 days' notice that the temperature began to fall and at 30th days temperature come near to ambient temperature. Moisture content in compost was 59.85 by using gomutra and 59.45 was without using gomutra throughout the process due to changing microbial population. As their population increases, degradation process become rapid and breakdown of waste organic matter leads into residue in

the form of carbon source material, after 30th days test the total organic carbon, Phosphorous, Potassium, Nitrogen, and C: N ration of compost. .

IV. CONCLUSION

In Conclusion showed that the combination of municipal solid waste and 10% of gomutra was effective and gomutra tends to accelerate the composting process. Reduction of waste by recycling at an affordable cost with locally available resources was a practical approach for waste management and environmental protection.

V. ACKNOWLEDGMENT

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