COMPOSTING OF MUNICIPAL SOLID WASTE A REMEDY FOR WATER POLLUTION AND SOIL FERTILITY DECLINE IN UGANDA

By; Mugambe Christopher

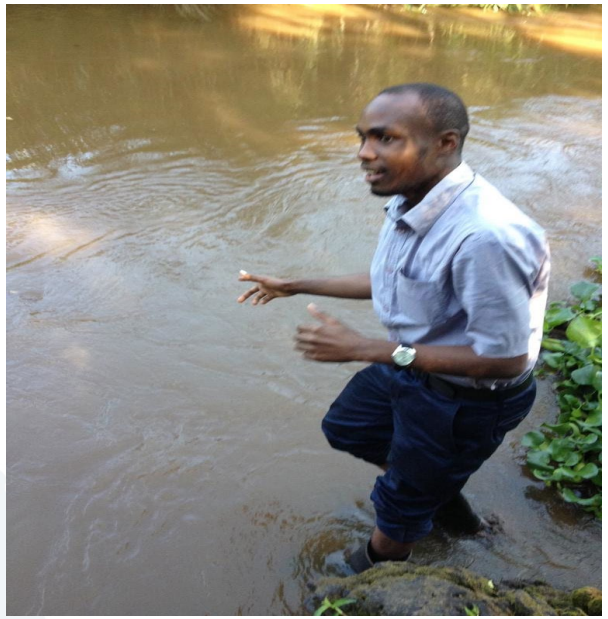
SOILS: WHERE FOOD BEGINS

Global Symposium on Soils for Nutrition | 26-29 July 2022

GLOBAL SOIL PARTNERSHIP

Background

- Food insecurity enigma is currently much associated with soil fertility decline and water pollution in Africa
- One of the efforts made was to increase fertilizer use in Africa to at least 50kg ha-1 year-1 (Fertilizer Summit, 2006).
- However, its not successful;
    - Not affordable by farmers
    - Not environmentally friendly
    - Not available



Background…

- Several efforts to curb the declining soil fertility in Africa have been undertaken
- Some of the endeavors have been aimed at increasing fertilizer use in the continent (Fertilizer summit, 2006)
- Compost of municipal solid wastes is a promising deal (1.3 billion tonnes -2.2 billion tonnes by 2025)
- However, at present there exists no industry wide sampling and testing protocols and quality of compost products.

Background

- Compost is a dark, crumbly earthy-smelling material produced by the natural decomposition of organic materials.
- It plays a very big role in the soil and generally the environment
- Improving plant growth, conservation of water
- Sequestration of carbon in the soil
- Reduction of reliance on chemical pesticides and inorganic fertilizers. (Cambardella *et al.,* 2003).

Objectives

Main objective

Assess whether municipal solid waste can be used beneficially as a resource after composting without damaging human and environmental health

Specific objectives

- To investigate compliance of municipal compost with national and international standards for good quality compost
- To examine the impact of maturity on compost quality

Materials and Methods

Study area – South Western Uganda – Mbarara Municipal Composting Plant

Treatments,

Main factor - time of composting (8 levels)

F1	W1-1	W2-1	W3-1	W4-1	W5-1	SF1	FP1
F2	W1-2	W2-2	W3-2	W4-2	W5-2	SF2	FP2
F3	W1-3	W2-3	W3-3	W4-3	W5-3	SF3	FP3
F4	W1-4	W2-4	W3-4	W4-4	W5-4	SF4	FP4

Experimental design – RCBD, four replications(8*4)

Data analysis

- Data compilation: Microsoft excel
- Genstat 14th Edition - Data subjected to two way ANOVA to generate means, F values for comparison.
- Significant difference between means - separated using Fisher's protected LSD at 5% level

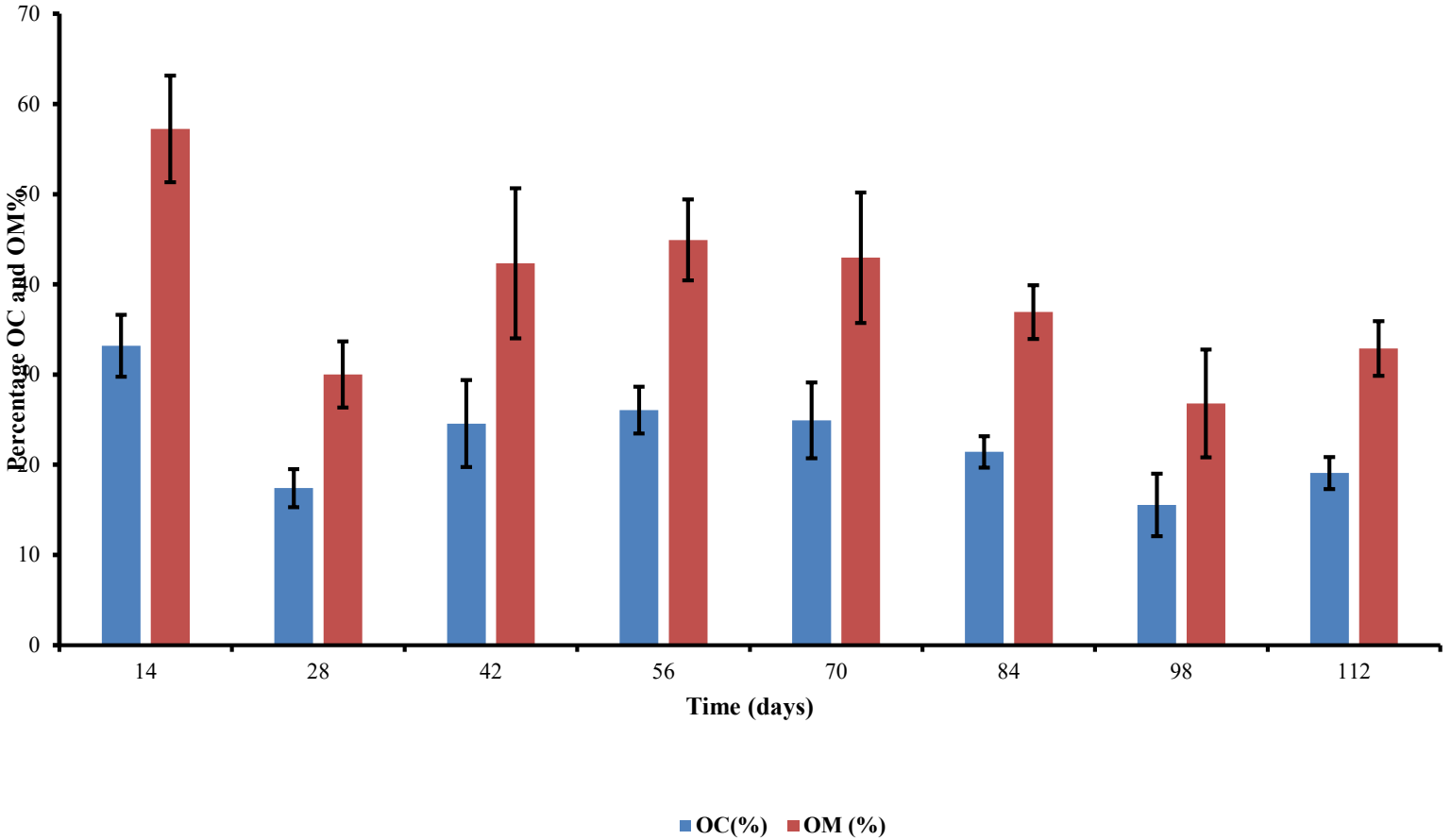
RESULTS

Means of chemical parameters measured in Municipal Solid Waste at various stages of composting as a factor of age at MMCP

Days	Parameters analysed for compost								
	pH (H_2O)	% OC	% OM	TN (%)	TP (%)	TK (%)	% Ca	Cu (ppm)	C/N Ratio
14	9.9 ± 0.02^{b}	33.2 ± 3.43^{b}	57.25 ± 5.91^{b}	0.84 ± 0.08^{ab}	0.44 ± 0.07^{a}	2.05 ± 0.3^{ab}	0.29 ± 0.09^{a}	32.01 ± 1.46^{a}	40.72 ± 6.16^{b}
28	10 ± 0.01^{bc}	17.4 ± 2.12^{a}	30.01 ± 3.66^{a}	0.82 ± 0.03^{a}	0.46 ± 0.05^{a}	1.92 ± 0.20^{a}	0.4 ± 0.02^{b}	30.94 ± 1.24^{a}	21.18 ± 2.37^{a}
42	9.6 ± 0.15^{a}	24.56 ± 4.83^{ab}	42.34 ± 8.33^{ab}	0.91 ± 0.05^{abc}	0.47 ± 0.01^{a}	1.89 ± 0.02^{a}	0.41 ± 0.02^{b}	45.87 ± 2.58	27.05 ± 4.92^{a}
56	9.8 ± 0.06^{ab}	26.06 ± 2.60^{ab}	44.92 ± 4.48^{ab}	1.08 ± 0.02^{d}	0.51 ± 0.02^{a}	2.52 ± 0.13^{bcd}	0.42 ± 0.01^{b}	71.87 ± 5.25^{c}	24.17 ± 2.2^{a}
70	9.9 ± 0.07^{b}	24.92 ± 4.20^{ab}	42.96 ± 7.24^{ab}	1 ± 0.07^{bcd}	0.51 ± 0.05^{a}	2.33 ± 0.01^{abc}	0.45 ± 0.03^{b}	69.69 ± 2.81^{bc}	26.16 ± 6.53^{a}
84	10 ± 0.10^{bc}	21.42 ± 1.73^{a}	36.94 ± 2.98^{a}	1.07 ± 0.05^{cd}	0.51 ± 0.03^{a}	2.96 ± 0.20^{d}	0.48 ± 0.03^{b}	60.55 ± 2.02^{b}	19.94 ± 1.01^{a}
98	10.2 ± 0.02^{c}	15.54 ± 3.47^{a}	26.79 ± 5.98^{a}	0.86 ± 0.05^{ab}	0.48 ± 0.02^{a}	2.58 ± 0.13^{cd}	0.41 ± 0.01^{b}	66.52 ± 3.87^{bc}	18.05 ± 3.91^{a}
112	9.8 ± 0.01^{ab}	19.08 ± 1.77^{a}	32.89 ± 3.04^{a}	0.79 ± 0.04^{a}	0.46 ± 0.01^{a}	2.14 ± 0.08^{abc}	0.4 ± 0.01^{b}	86.49 ± 3.41	23.94 ± 1.52^{a}
P-value	0.006	0.034	0.034	0.006	0.82	0.002	0.063	<.001	0.041
LSD (5%)	0.22	10.01	17.259	0.163	0.112	0.485	0.107	8.055	12.708
Standards	8.4*	12*	>20*	>1.00**	-	-	-	-	-
S.e.d	0.1	4.814	8.299	0.079	0.054	0.33	0.052	3.873	6.111

Key: ** represents MSW compost International Standards as by Seema (2007), * represents UNBS compost standards.

OC in relation to OM of MMCP at different stages of decomposition



Conclusion

- **Age** has an impact on compost quality of compost produced
- **Texture of compost** was found to be sandy loam for all compost substrates and final compost product at different stages of decomposition
- **The composting technology** can be a great deal if adapted in all districts of Uganda & beyond.

Recommendations

- Encouraging and enhancing strictness on source separation
- The source of high sand content at MMCP should be investigated.
- A well-equipped laboratory for testing compost


Thank you !
Global Symposium on Soils for Nutrition | 26-29 July 2022
GLOBAL SOIL PARTNERSHIP