

Findings from Co-Composting Operations at a Fecal Sludge Treatment Plant (FSTP), Devanahalli, India

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Federal Ministry
for Economic Cooperation
and Development



Consortium for
DEWATS
Dissemination
Society

BACKGROUND

TOWN PROFILE

Devanahalli
30000
Population

Need for FSM

FSM INTERVENTION

6 KLD FSTP

ANAEROBIC
DIGESTION +
DEWATERING

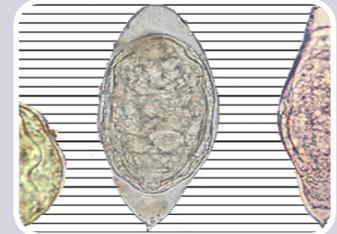
END PRODUCTS

Treated Water

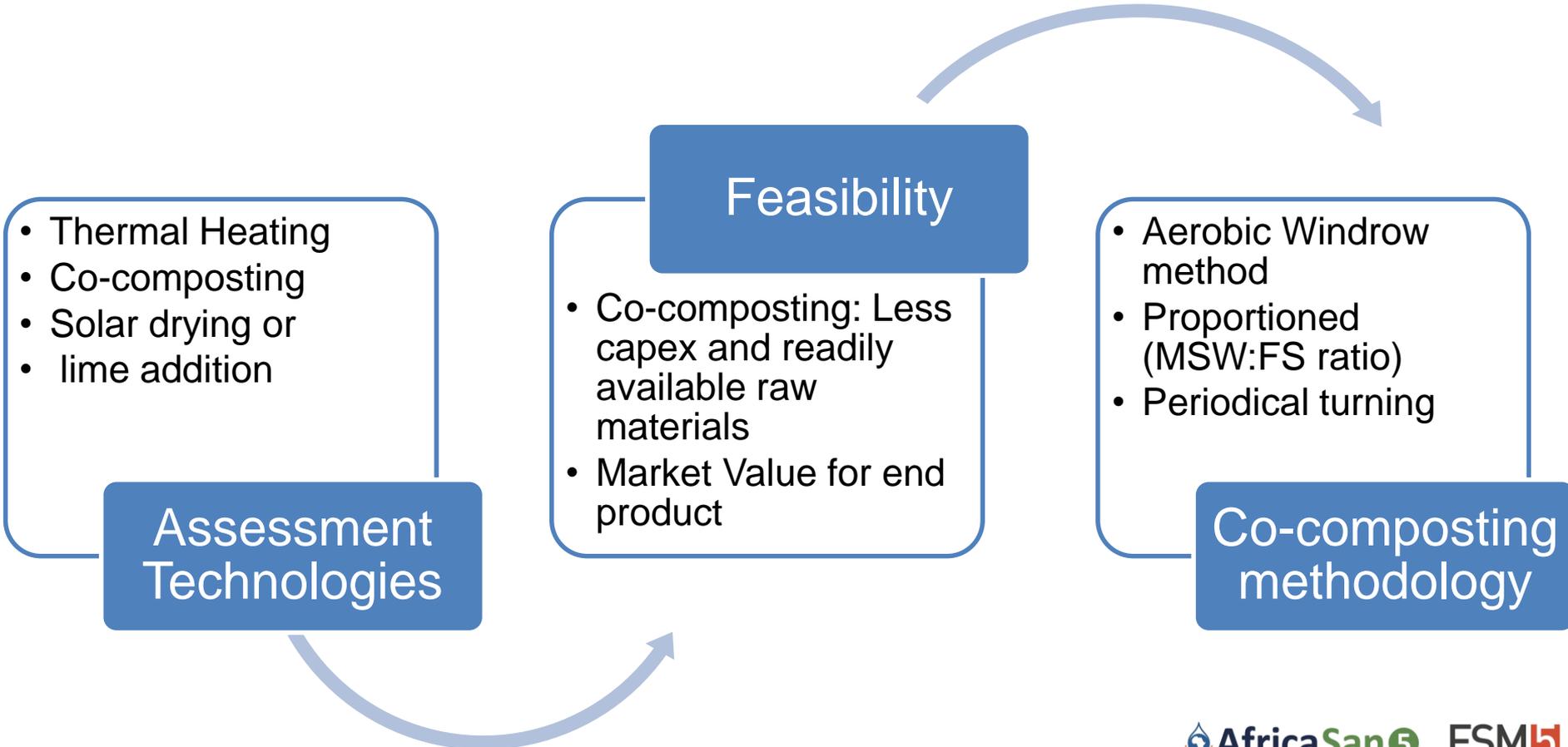
Dried Sludge

CHALLENGES

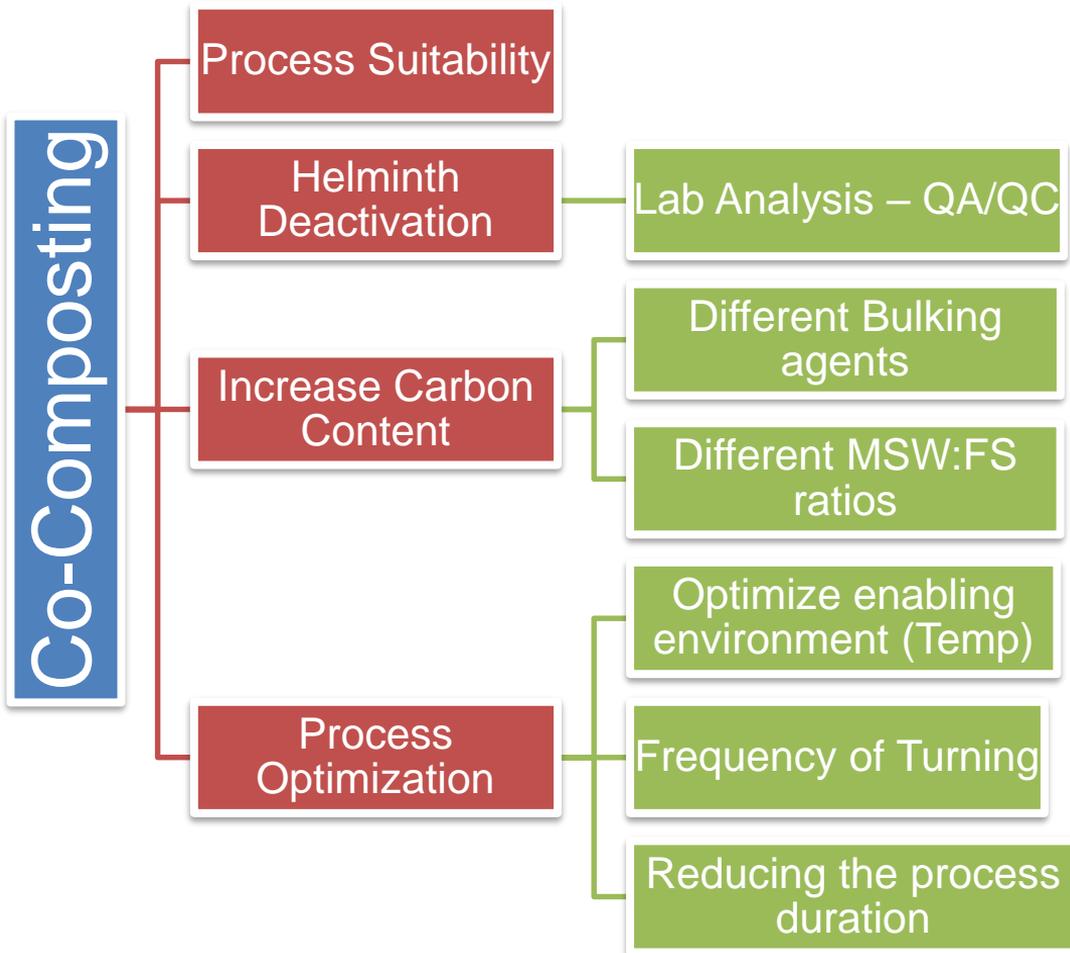
Helminths in
dried sludge



METHODOLOGY / PROCESS



OBJECTIVE OF THE STUDY



CO-COMPOSTING PROCESS

FEED STOCKS USED

1. Municipal Solid waste (Segregated)
2. Coconut Coir
3. Paddy Straw
4. Faecal Sludge
5. Leaf Litters



Fecal sludge

PARAMETER CONTROLLED:

1. Temperature
2. Moisture content
3. FS:MSW ratio
4. Turning frequency



Organic waste layer



Windrow of 6 feet

TURNING PROCESS

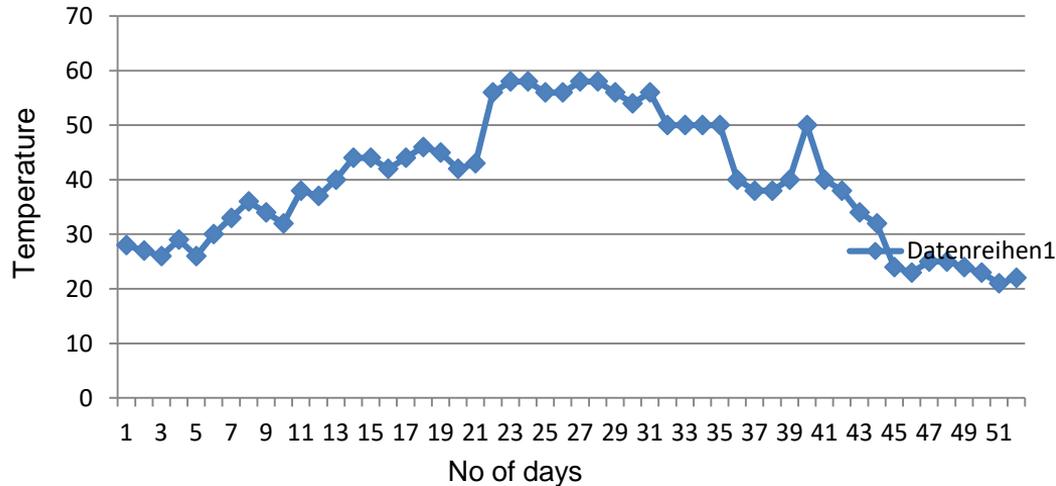
Key Observations

1. Due increase in temperature, heat was released as fumes while turning
2. Frequent turning: 7-10 days interval
3. Faster Reduction of volume



RESULTS

Variation in Temperature



Key observations

Temperature above 60°C helps in deactivation of Helminth eggs

MICRO-ORGANISMS	DURATION For the Thermal Inactivation
Escherichia coli	Dead within 1 hour at 55°C and within 15-20 minutes at 60 C
Salmonella Sp.	Growth ends at 46° C, death within 30 minutes at 55-60° C and within 20 minutes at 60° C
Entamoeba histolytica Cysts	Death within a few minutes at 45° C and within a few seconds at 55° C
Taenia saginata	Death within few minutes at 55 °C
Ascaris Lumbricoides Eggs	Death is less than 1 hour at temperature over 50° C

FINAL PRODUCT QUALITY ANALYSIS

Parameters	Organic compost (FCO, 2009)	Results of 88 days
pH	6.5 – 7.5	7.07
Conductivity (as dsm-1), not more than	4	1.24
Moisture %by weight, max	15 – 25	30.2
Bulk density (g/cm3)	Less than 1.0	0.77
Total Organic Carbon, % by weight, minimum	12	18.2
Total N % by weight, minimum	0.8	0.23
Total P205 % by weight, minimum	0.4	0.2

Parameters	Organic compost (FCO, 2009)	Results of 88 days
Total K20 % by weight, min	0.4	0.98
C:N ratio	<20	12.1
Lead(mg/kg)	100	84.9
Chromium (mg/kg))	50	31.1
Cadmium	5	0.37
Nickel(mg/kg)	50	23

Key observations

All the parameters are meeting the FCO standards

DURATION OF THE PROCESS = 80-90 days

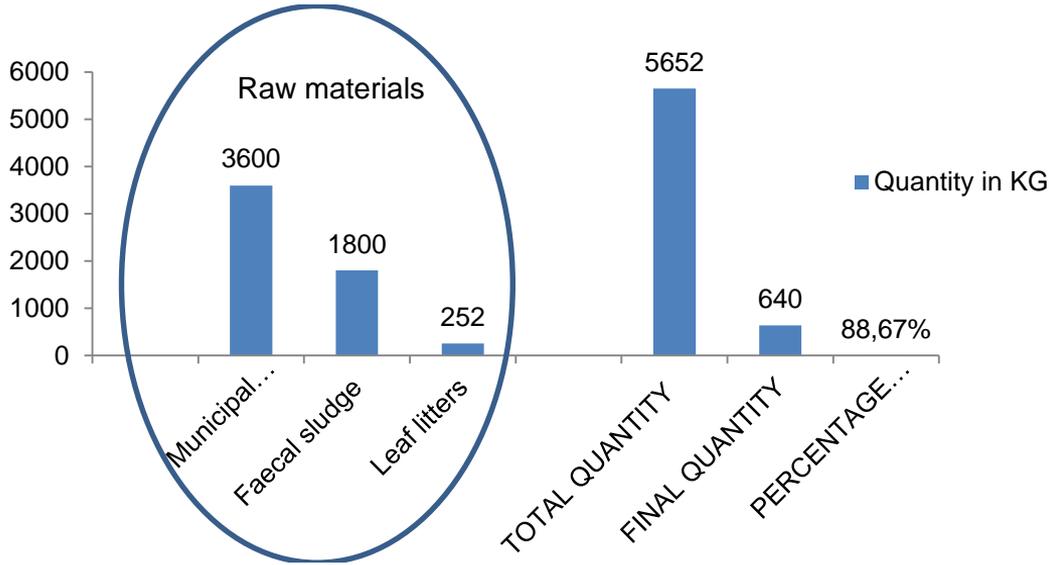
ANALYSIS VALUES OF MICROBES

Microbial parameters			
Parameters	Treated faecal sludge	15 days of compost sample	60 days of compost sample
Fecal coil in CFU/ml	60×10^5	12000	70×10^5
E.coil in CFU/ml	29×10^5	Absent	10×10^5
Helminth Eggs in EPG	100	Absent	Absent

Key observations

Due to increase in the moisture content E.coil and Fecal coil forms count has increased

MASS REDUCTION



Key observations

Percentage of feedstock recovery lies between 30-33%

CONCLUSION

- Maintaining optimum moisture content (50-60%) and turning frequencies of 7 days achieved maximum deactivation of pathogens.
- FS : MSW Ratio of 1:1.5 & 1:2 was found to be the optimal C:N of 1:20.
- On application of EM and cow dung slurry, windrow with EM has high composting rate than cow dung.
- Seeding of EM in windrows has met the pathogen reduction within the permissible limits than cow dung.

KEY CHALLENGES

- Availability of the segregated waste from TMC
- There is no specific standards for co-composted sludge for reuse
- Ensuring the quality of the manure for FCO standards was difficult: E.Coli
- Need a 'Policy Brief' to consider Faecal sludge byproducts as organic manure by providing evidences through study findings

THANK YOU

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