Assessment of Decomposition of Feacal Sludge in Single Vault Composting Toilet

(Decomposition of Feacal Materials and Pathogens Die-off in Single Pit Latrines - the Laboratory Results)

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Introduction

- Composting latrines are commonly used in rural areas in Vietnam,
- **MOH recommended that fecal sludge in dry pit latrine need to be stored in the pit at least for 6 months,**
- For the safely reuse, the 2006 **WHO guidelines indicate that human feces should be stored for 1 to 2 years**.
- 66% of respondents stored feces under 6 months and 33% of households using fresh feces directly.

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Aims of the study

- To verify the user manual of the MOH,
- To assess the decomposition process and pathogens die-off happening in single dry pit latrines considering influencing storage time factor,
- To determine the need and improved decomposition process taking place in pit latrine.
- To verify the role of bio-additives in decomposition process

Materials and Methods

- 5 kg of material from the upper layer.
- 5 kg of material from the bottom layer and packed in separate bags.
- In Laboratory: 6 liters of a bag with bottom layer material is fed to the cylinder, followed by 6 liters of upper layer material from the same pit.

Materials and Methods

- Materials from 10 pits are mixed up by mechanical mixer for 20 minutes.
- Well mixed material is fed into 5 cylinders per 10 liters.
- 5 other cylinders are fed by 10 liters of the same well mixed material and bio-additives.

Bio-additive characteristics

Microbial community:

- *Lactobacillus* for reducing of odor
- *Actino-bacteria* for decomposition of protein and cellulose
- Active in the high pH condition

Materials and Methods (cont.)

Physical parameters:

- Height of compost pile
- Water contenr/TS
- Volatile solids

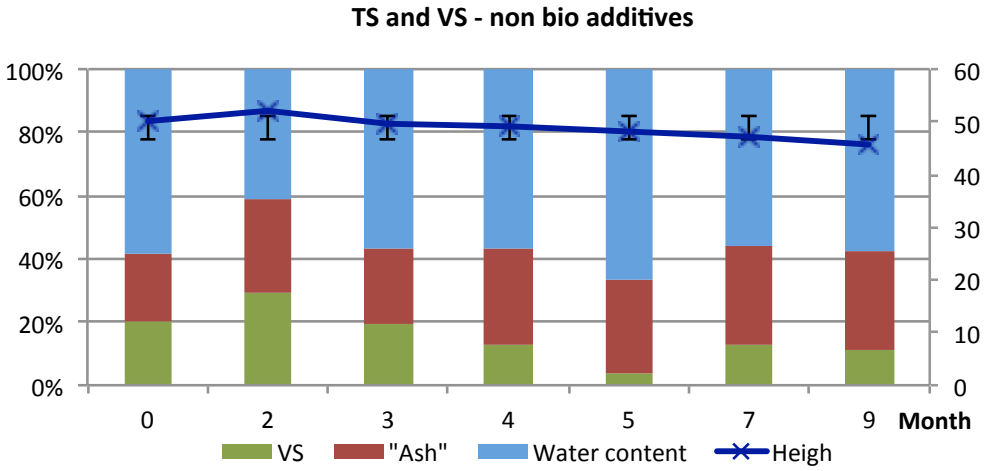
Biochemistry analysis:

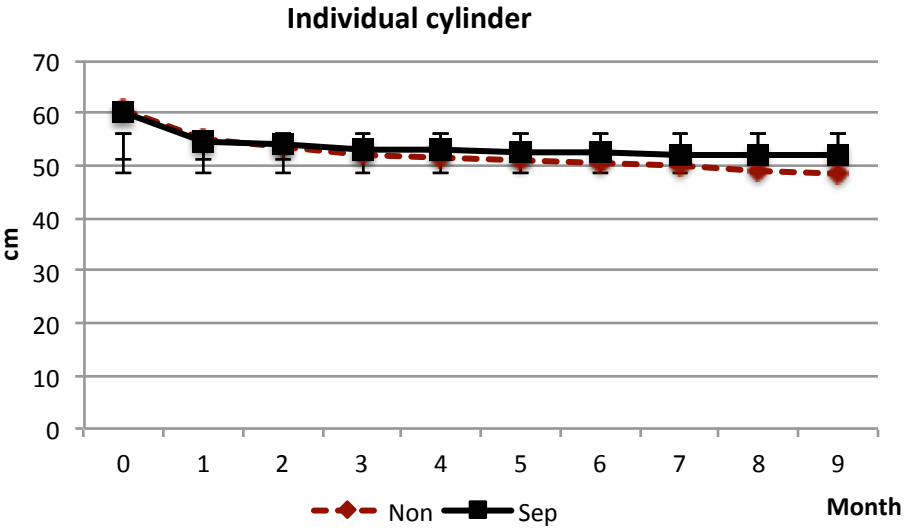
- NH4-N
- PO4-P
- T- N
- CODtot/CODsol)

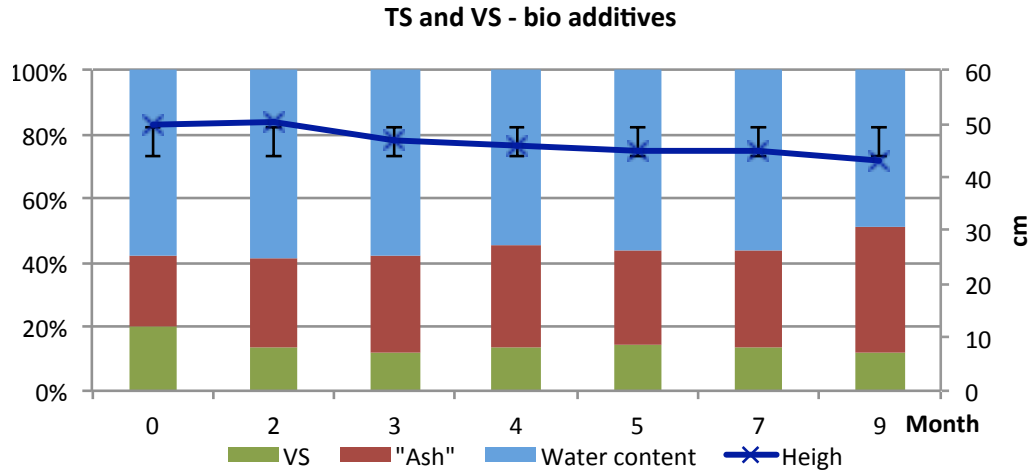
Helminth egg and Pathogen

- E.coli
- Helminth ova

Results and Discussions







- Height change in urine separation toilet samples is less than in non-separation toilet samples,
- The volume reduction of mixed sample with bio-additives was more than sample without bio-additives,

- VS/TS decreases were observed with 50% of reduction after 9 months
- The volumes of mixed cylinders decrease around 10%

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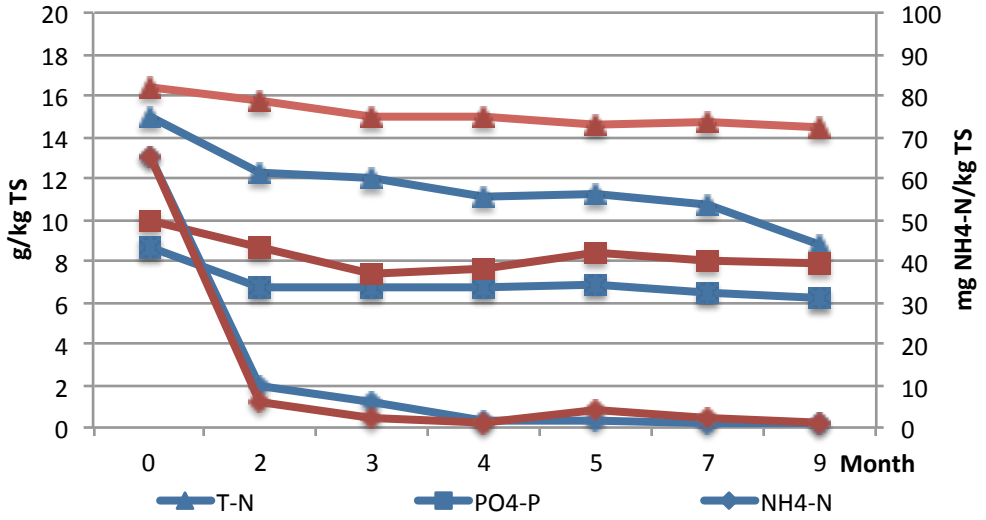
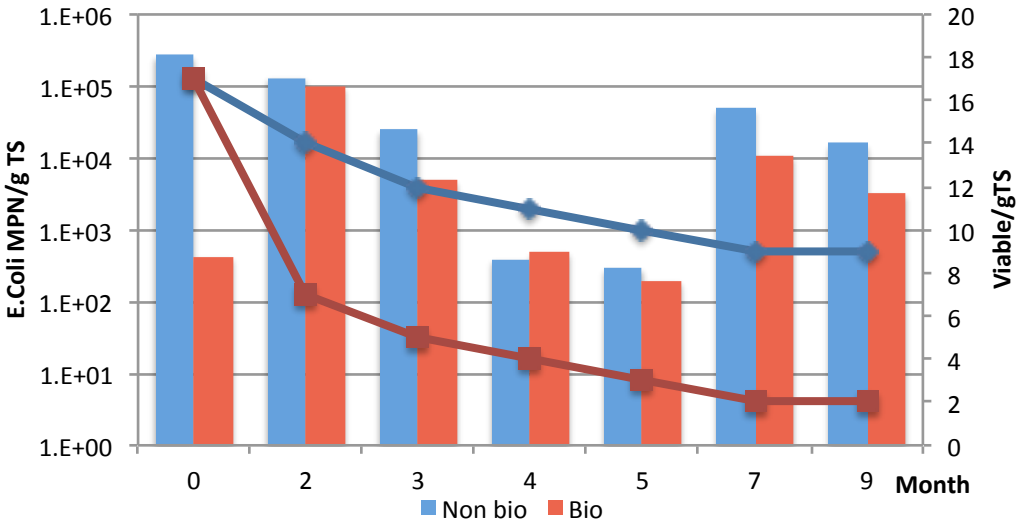
Results and Discussions

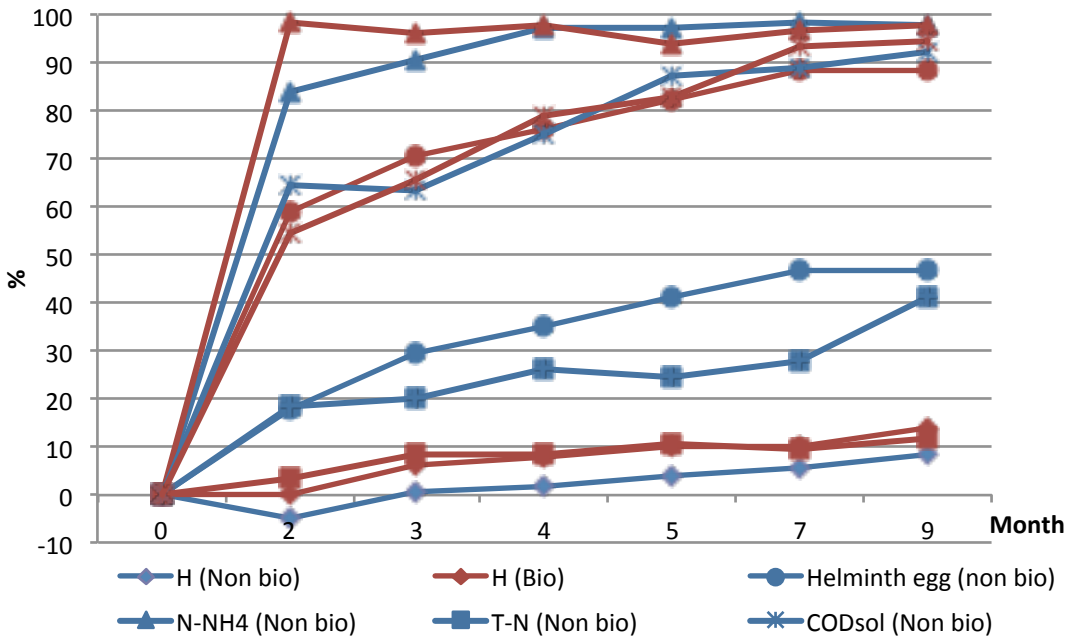




- NH_4-N value has reduced significantly (more than 90%),
- There was no change of PO_4-P over the decomposition period,
- Helminthes eggs and pathogens were found in both types of samples after 9 months storage,
- Decrease of helminthes eggs in sample with bio-additive was more than in sample without bio–additive.

Conclusions and Recommendations

- Limited decomposition in passive treatment (no mixing, in-situ, anaerobic condition),
- Unpleasant environment (too much lime and ash added) contributes to slow decomposition process due to poor microbial community.
- Nitrogen reduction is very high (due to high pH value).



Conclusions and Recommendations

- Pathogen die-off in cylinders took place slowly, even after 9 months of storage. Standard set by MOH for safe reuse has not been met
- For improvement of decomposition process of excreta: more active interventions , in-situ or outside of the pit, are needed.
- Examples:
  - Giving aerobic conditions to the composting process
  - Using suitable bio-additives
  - Having further treatment out side of the pit
  - Using other adding materials instead of traditional ash and lime

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Thanks for your attention

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