Converting Faecal Sludge to Fertilizer Pellets: the case of *Fortifer*

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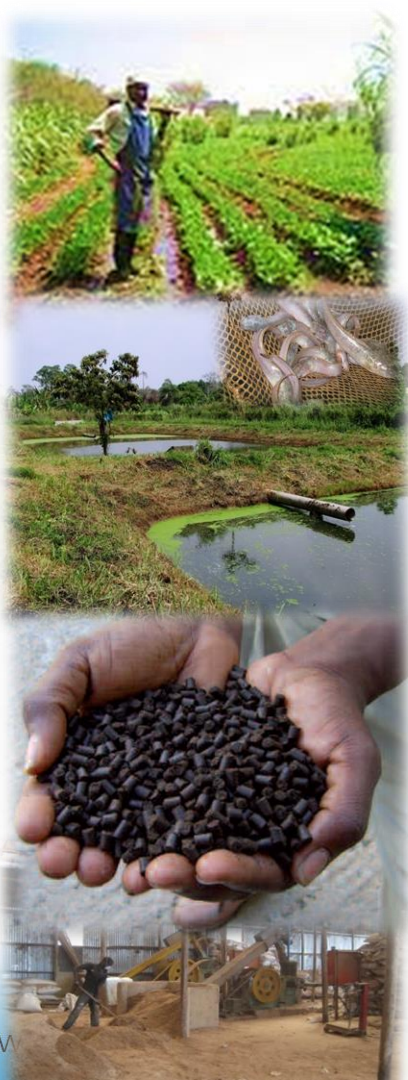
OUTLINE

- Background
- Process
  - FS dewatering & Composting
  - Enrichment
  - Pelletization
- Field application
- From pilot to commercialization



BACKGROUND

- Main motivation:
  - Land and water pollution due to poor FS management
  - Poor soil fertility and resulting low agricultural productivity in SSA

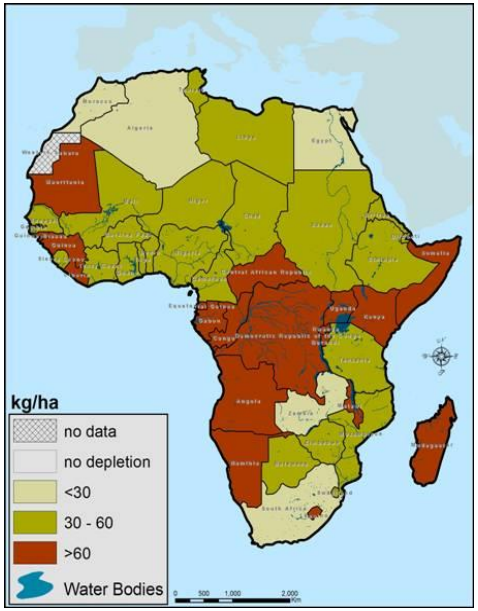
FS generation in SSA

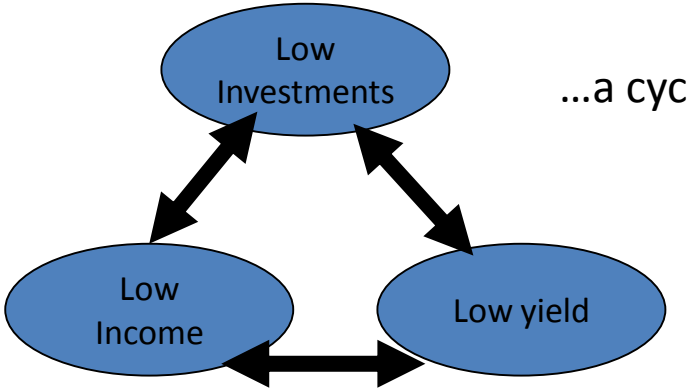
- Unsewered sanitation facilities
- Open defecation
- Problem of disposal
- Lack of functional treatment facilitie
- Financing

<1% of FS generated in SSA is actually treated leading to water and land pollution

Agriculture in SSA

- Mainstay of African economy; Employs about 70% of population.
- Low inherent fertility (OM), nutrient depletion
- Low per capital fertilizer use - *9 kg/ha (world av. 90kg/yr)*
- Low yield



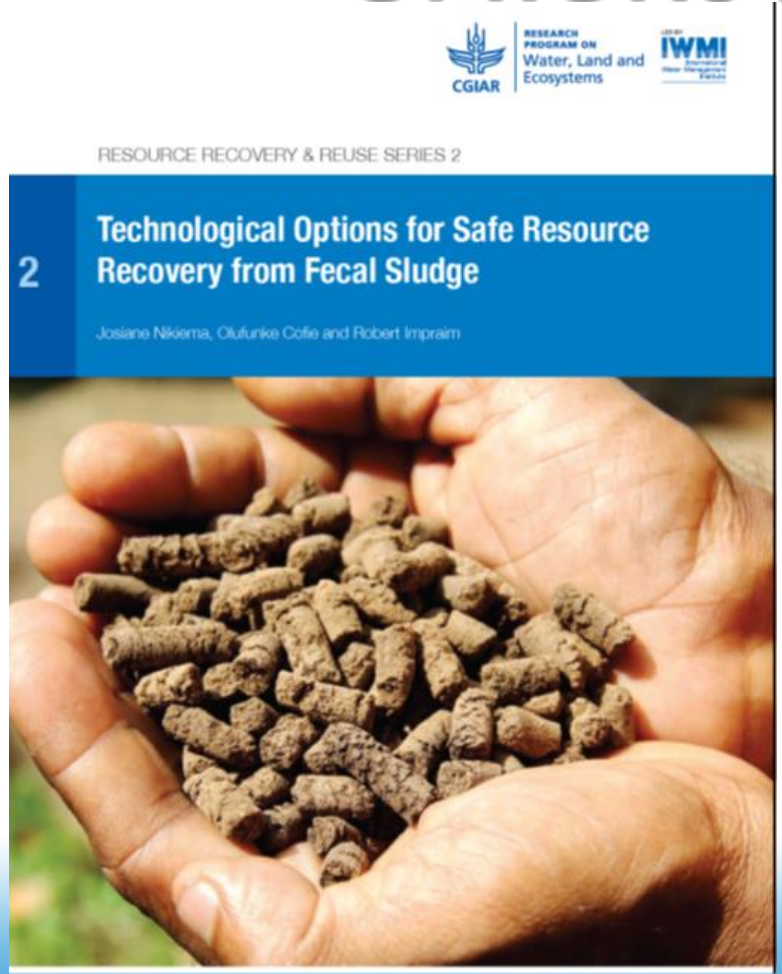


…a cycle

Africa loses $4billion/yr in soil nutrients

2002-2004: IFDC

OPTIONS FOR RECOVERY



Co-composting of FS & organic waste

- Sawdust
- Organic municipal solid waste
- Empty fruit bunches from oil palm
- Cocoa pod husk
- Rice husk

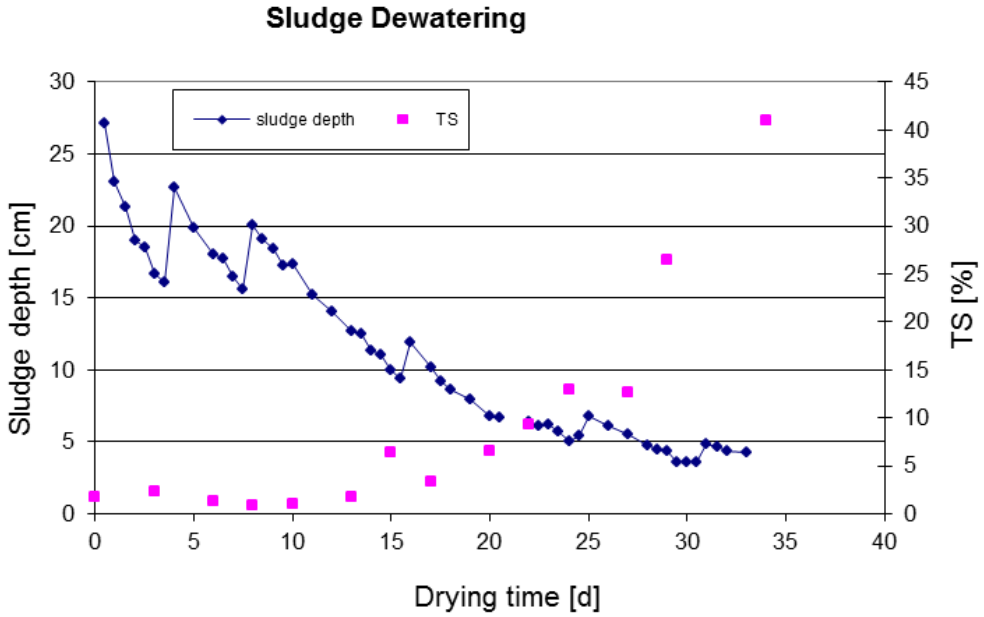
CO-COMPOSTING OF FS

Pros & Cons

+ high recovery of nutrient and organic matter for a range of uses; good quality product
+ minimal health risk

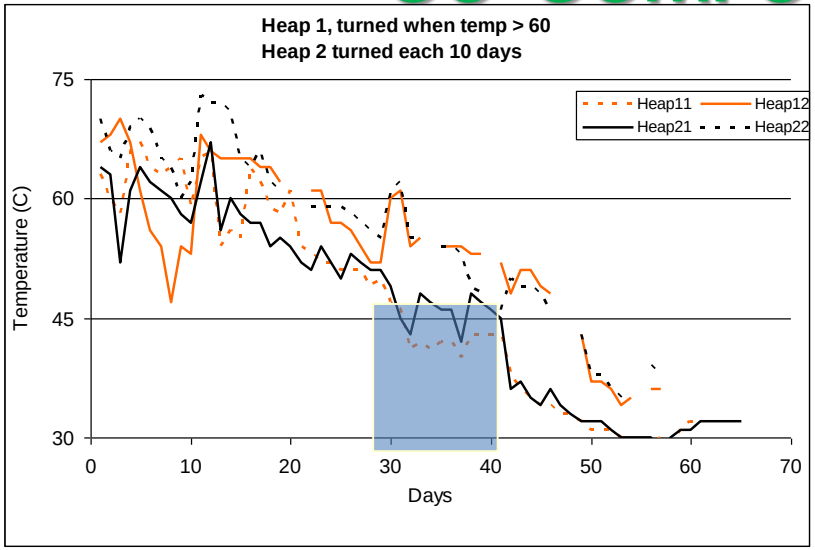
– Capital investment required; – Time required

FS DEWATERING



Decrease in sludge depth and increase in total solid content as measured in sludge drying beds

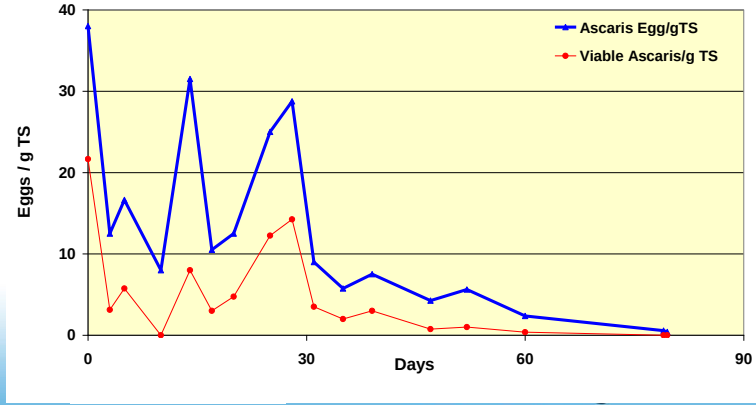
CO-COMPOSTING



Co-composting process allowed to maintain temperature at > 45°C for more than 30 days

- **HE viability in raw FS = 30-50 %**
- **Number of HE < 5/g TS in the end product ☞ viable HE < 0.5 HE/g TS**

Helminth Eggs (Ascaris and Trichuris) die off during co-composting : results from Buobai Co-composting plant/Ghana



ENRICHMENT

- Allows to align the composition to the needs for different crops and soil
  - Compost and inorganic N fertilizer to give better yields …
  - Lower amounts of each is required




PELLETIZATION

Increases bulk density of co-compost

Allows steady release of nutrient

Reduces dust during handling

Quality

Sanitation Product	N (%)	P (%)	K (%)	Carbon (%)
SW Compost	1.22±0.09	1.80 ± 0.17	0.79 ± 0.10	8.50 ± 0.87
Co-compost	1.35 ± 0.02	1.60 ± 0.10	1.90 ± 0.12	10.23 ±0.50
Comlizer (Excreta based)	3.10 ± 0.07	1.14 ± 0.02	1.40 ± 0.06	9.70 ± 0.01
Comlizer (Solid Waste based)	2.92 ± 0.21	0.42 ± 0.04	2.66 ± 0.18	6.38 ± 0.92
FS	2.06 ± 0.24	2.44 ± 0.09	0.47 ± 0.01	7.09 ± 0.29

Products*	Total C %	Total N %	Total P mg/kg	Avail. P mg/kg	Total K mg/kg
DFS					
I-DFS	76.9	1.78	2541	1569	4600
C-DFS	65.1	1.77	10848	232	4350
C-SDFS	71.3	1.20	3333	71	2533
EC- DFS	36.7	3.00	10693	224	4300

FIELD APPLICATION

- Greenhouse and on-farm

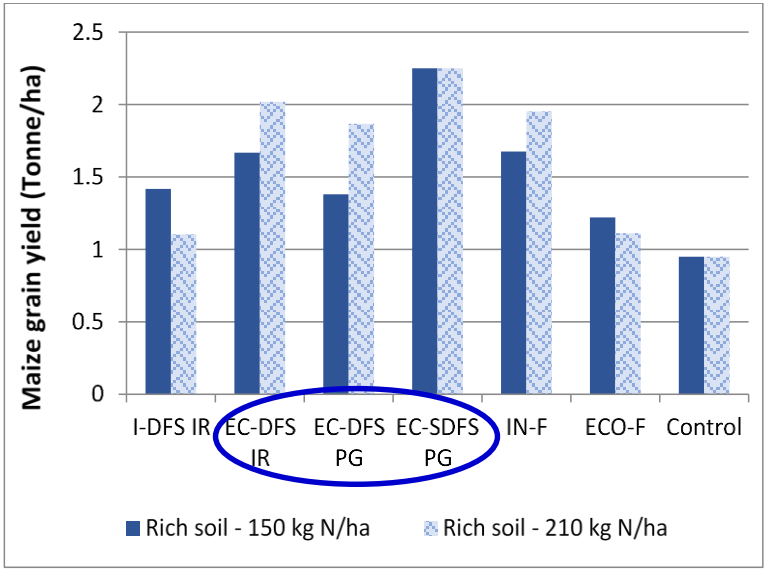
Rice field (conventional Farmer's practice)

200 kg of NPK 15-15-15 and 100 kg of AS. Top dressed with 50 kg of urea

Rice field with Fortifer.

1,000 kg of enriched compost. Top dressed with 30 kg of ammonium sulfate (AS)

FIELD APPLICATION



Fortifer pellets

Site	Dawhenya irrigation project	Kpong irrigation project at Asutsuare	Okyereko irrigation project site
Year of trial	2011	2010	2012
Yield difference	+50% with Fortifer powder	+24% with Fortifer powder	• +32% on salt affected soils • +38% on normal soils With Fortifer powder

- Fortifer was comparable or better than the inorganic fertilizer
- Fortifer performed better than the commercial compost (Eco-F)

SCALING UP

- Towards commercialization
  - Business model
  - PPP
  - Marketing
  - Product & Process certification

ACKNOWLEDGEMENT

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http://www.iwmi.cgiar.org/issues/resource-recovery-and-reuse/related-projects/