

Survey of sanitation conditions in Burkina Faso for design of toilet

Ryusei Ito,
International Institute for Water and Environmental
Engineering (2iE), Burkina Faso
Ken Ushijima, Nowaki Hijikata, Naoyuki Funamizu
Hokkaido University, Japan

Introduction

- **low cost facility (toilet) for sanitation**
 - Only 3% of people has improved sanitation facilities in BF.
 - More than 60% of people still have practice of open defecation.
 - BF government doesn't have budget for implementation of sanitation facilities in rural area.
- **recycle of human excreta as fertilizers**
 - Prices of fertilizers increase every year.
 - People in rural area doesn't have enough money for fertilizers.
 - Human excreta has same amount of nutrients which s/he took.
- **approach of technologies (less adaptation by people)**
 - It is hard to change the custom of people.
- Objectives
 - To investigate the situation in rural area of BF to design toilet
 - To install low cost toilet for recycling human excreta in agricultural purpose
 - To summarize impressions from population and problems for next model

Design criteria of sanitation facility

- **Starting point**
 - Composting toilet of Japan model
 - Producing compost as fertilizer
 - Small reactor size
 - Simple mechanisms: ventilation, mixing, heating
 - Electricity as power source
 - Tough work for replacement of compost
- **Interface design**
 - To consider culture, taboo, current practices
- Engineering points
 - Reactor size, ventilation air flow rate, mixing frequency
- **Maintenance**
 - Spare parts (local available materials)
 - Replacement of produced compost

Japan model composting toilet



Common model for interface
Composting reactor under the toilet bowl
Electricity for mixing and heating
Hard work for replacement of compost

Sitting model



- Sitting on the reactor
- Hand mixing
- Urine diversion
- Ventilation with small fan
- Continuous collection of overflowed compost
- Stainless steel for reactor

Primitive survey

- Objective of the survey
 - To make clear situation in rural area of BF for design of the sanitation system
 - Items of the survey
 - Ethnic and religion
 - Composition of family members
 - Current toilet type
 - Size of the toilet
 - Direction of defecation
 - Distance of the toilet from their house
 - Practice to reuse night soil
 - Commercial electricity
 - Water resource
- The survey was carried out on 6 families
- The result was reported by Mr. K. Yabui in previous session.

Result of survey

	A	B	C	D	E	F
Ethnic	Peul	Peul	Mossi	Mossi	Mossi	Mossi
Religion	Muslim	Muslim	Christian	Christian	Muslim	Muslim
Composition of family members (adults)	24 (12)	9 (2)	24 (8)	8 (2)	10 (4)	11 (4)
Current toilet type	Pit (squatting)	Pit (squatting)	Open defecation	Pit (squatting)	Pit (squatting)	Pit (Squatting)
Body cleaning	water	water	paper	paper	water	water
Size of the toilet	2m x 1.8m	2.3 x 1.9	-	1.6 x 1.5	3 x 2	1.5 x 1.5
Direction of defecation	South	South	-	East	South	South
Distance between toilet & their house	Near concession	Near concession	-	200m far	Inside concession	Inside concession
Practice to reuse night soil	Yes	No	-	Yes	No	Yes
Commercial electricity	No	No	No	No	No	No
Water resource	Community well	Community well	Community well	Community well	Water stand	Water stand

Current toilet in rural area



Available materials in BF

- Multi purpose materials
 - Iron tubes, plates
 - Wood bar, plates
 - PVC pipes for water supply
 - Screw, pin
 - Hinge etc.
- Repair parts
 - for car, motorbikes, bicycles
- Other tools
 - Hand drill, grinder, hand saw, screw driver, welder etc.
 - No automated machines

Model family

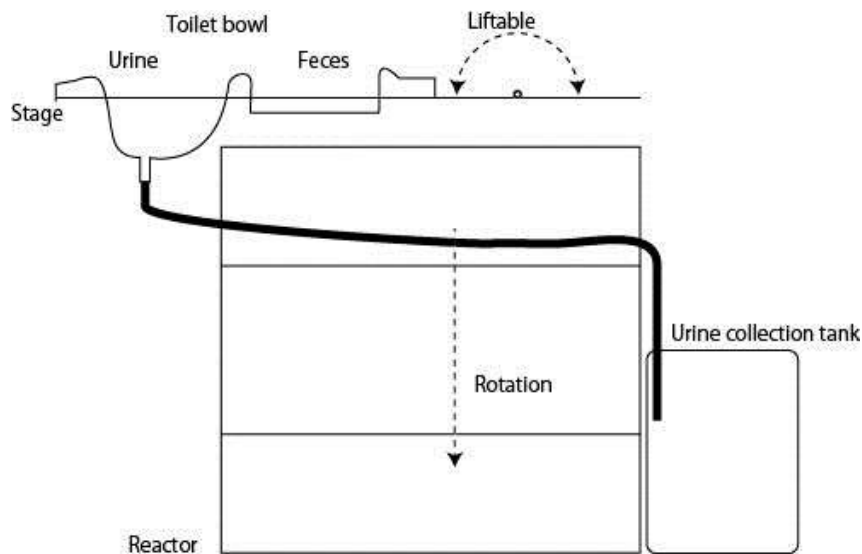
- Members: 8 person (2 adults (130gx2) and 6 children (65gx6), 650 g feces load)
- Religion: Christian and Muslim
- No electricity available
- No water for flushing

Model facility

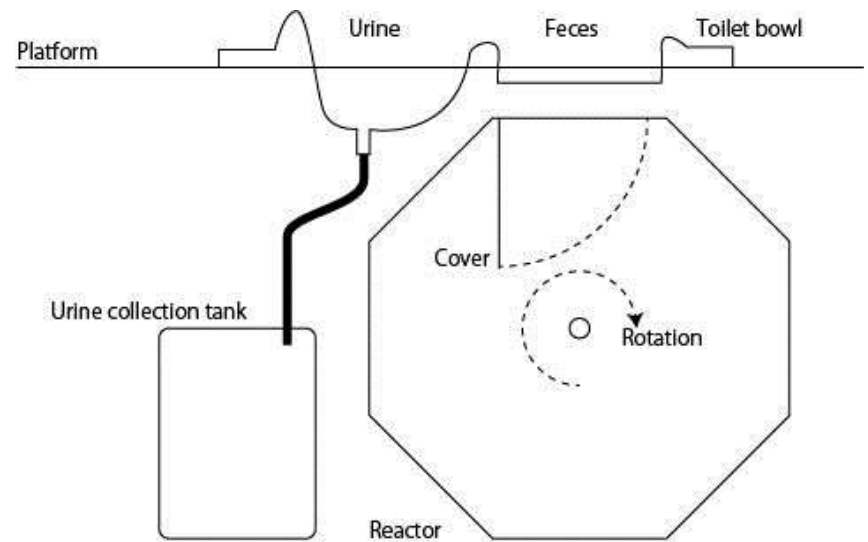
- Composting toilet
 - Reactor size: 100 L
 - Mixing device: hand mixing
 - Ventilation: natural
 - Urine diversion (to avoid much water load)
 - Rotating reactor
- Interface
 - Body washing water collection for Muslim (squatting type)
 - Minimum area: 1.5 m x 2 m
 - Squatting type and sitting type
- Maintenance
 - Detachable reactor for easy replacement of contents
 - Usage available materials in BF

Model facility for BF

Sitting type



Squatting type



Manufacturing toilet facilities



Construction of toilet



Squatting toilet



Sitting toilet



Impressions by population

- Sitting type toilet
 - The reactor must be covered. (People doesn't want to have possibility to see their feces.)
 - Handle is required. (They don't want to touch the reactor for mixing.)
 - The seating surface is too high, because of reactor height.
 - There is no space for body washing.
- Squatting type toilet
 - The rotation of the reactor is tough work.
 - It is difficult to adjust relative position between reactor and toilet bowl.
 - Children will break some equipments.
 - They almost satisfy.

Cleaning toilet



Cost for installing sanitation facilities

- Building: 400,000FCFA (EUR 760)
- Reactor for sitting style toilet: 350,000 FCFA (EUR 530)
- Reactor for squatting style toilet: 300,000 FCFA (EUR 460)
- Tank for collection urine and body washing water: 2,000 FCFA (EUR 3) each
- Tube: 2,000 FCFA
- Total:
 - Squatting: 750,000 FCFA (EUR 1,140)
 - Sitting: 800,000 FCFA (EUR 1,220)

Difficulties for manufacturing in BF

- Logistics of materials
 - Problem on stable supply
 - Lack of multipurpose materials
 - High ratio of defective product
- Artisanal industry
 - No standard for manufacture
 - Limited tools for manufacturing
 - No automated machines

Factory



Summary

- Model family for design of sanitation facilities
 - 8 person (2 adults and 6 children)
 - Religion: Christian and Muslim
- Design & manufacture of composting toilet
 - Sitting style: rejected
 - Squatting type: satisfied
- Father consideration for toilet model
 - Space for washing, mixing device for sitting type
 - Improved mixing device
 - Cleaning of inside
 - Cost reduction
 - Logistics of parts



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Dry toilet conference
University

Thank you for your attention!!

Barka!!

ありがとうございます。

Kiitos