Scotland Chikwawa Health Initiative

Ecological sanitation (Ecosan) latrines
Management training

Ecosan latrines

• Ecosan is an environmentally friendly sanitation technology that allows economic use of human excreta (urine and faeces) after decomposition.

• Human excreta contain: Nitrogen, Urea, Potassium and Phosphorous.

• 7.5 kg nitrate, phosphorous and potassium from excreta can produce 250 kg of grain to feed one person in a year
The basic principle of ECOSAN is to close the loop between sanitation and agriculture.
Ecosan principle...

- It is based on the following three fundamental principles
  - Preventing pollution rather than attempting to control it after we pollute
  - Sanitizing the urine and faeces
  - Using the safe products for agricultural purposes
Types of Ecosan Latrines

• Lets list the types we know....

• What type of Ecosan latrine do we have at this school?
Sky loo Ecosan

Activity 1:

- May all participants leave the room and view the skyloo Ecosan latrine

- From your observation how can you describe skyloo Ecosan latrines?

- What are the advantages and disadvantages of Sky loo Ecosan latrines?
Using the Ecosan latrine

- Soil and ash are added after every visit to the latrine
- Ash kill off pathogens within 6-12 months
- Soil reduces moisture content
- It is wise to pre mix the soil and the ash at a ratio of 2 parts soil to 1 part ash.
- **Activity 2:** Premix soil and ash to be used by 5 people who uses the latrine once a day for 5 days.
Using the Ecosan latrine

1. Lift the lid with the handle
   Funua kufumiko

2. Squat on top of big hole
   Kwa haja kubwana tumia shimo kubwana

3. Dispose used tissue in big hole
   Tupatikana kwenye shimo kubwana

4. After use pour ashes into big hole ONLY
   Mwaga yani kwenye shimo kubwana PEKEE

5. Replace lid after use
   Funika beada ya kutumia

6. Wash hands before leaving toilet
   Nawa mikono kabla ya kutoka msalani
Cleaning Ecosan latrine

- **Warning:** do not dispose or use water in Ecosan latrine faeces drop hole.

- Ecosan latrines can be cleaned in the following ways:
  - Sweep the room first with a dry broom
  - Mop the room using a moist mop
  - In case there is faecal matter around the drop hole spread some ash or soil and sweep off.
Do’s and Don'ts of Ecosan latrine

**Do’s**
- Sweep and mop regularly
- Pour hot water once in a while in the urine hole to prevent blockage
- Pour ash in the faecal drop hole after use

**Don'ts**
- Don’t urinate in the drop hole
- Don’t pour water in the drop hole
- Don’t pour ash on the urine hole
How to harvest and use urine?

• Urine is sterile with few exceptions.

• It can be harvested using plastic containers of different sizes (20-100 litres).

• Once collected the urine can either:
  – be used directly in the garden
  – infiltrated into an evapo-transpiration bed
  – Or stored on site for later collection either as liquid fertilizer or further processed into a dry powder fertilizer.
Facts findings about urine application

• Human urine could act as effective as chemical fertilizer

• Urine should be applied preferably in three split at different crop growth stage
  – Before planting
  – 25-30 days
  – 45-50 days

• Urine can be applied in 2 split for short duration crop like potato

• conduct long term (3-4 years) experiment to see the effect of urine on soil properties and plant health
Facts findings about urine application

- Urine should be supplemented with compost
- Urine dosage depends on the type of crop
- Recommended Urine Dosage
  - Heavy feeder crop/Infertile soil: 1500 lit. (e.g. Maize, trees etc)
  - Low feeder crops/fertile soil: 750 lit. (e.g. tomatoes, vegetables etc)
- Urine can be collected in bottles or from urine-diverting toilets.
Crop trials using urine as a fertilizer

Rape crop trials

Rape crop yields
Crop trials using urine as a fertilizer

Procedure of application

- Upper three basins of rape were fed 0.5 litres of a 3:1 water and urine mix, twice a week.

- The rest received only water.

- Effect became noticeable between 10 - 28 days.

Rape crop trials
Crop trials using urine as a fertilizer

- Overall, rape yield was increased about 5 times by urine treatment.
Crop trials using urine as a fertilizer

Procedure of urine application

- The two columns of basins of spinach on the left fed 0.5 litres of a 3:1 water and urine mix twice a week

- Two columns of basins on the right were fed only water.

Spinach crop trials
Crop trials using urine as a fertilizer

Spinach

- Overall, the spinach plants fed with diluted urine weighed 3.4 times more than spinach fed with only water.
Crop trials using urine as a fertilizer

Procedure of urine application

• Onion seeds are best planted early in the year

• This onion was harvested after six months of water and urine treatment

• 0.5 litres of a 5:1 mix of water to urine was applied once a week during the six-month period

Onion crop yield
Crop trials using urine as a fertilizer

Procedure of urine application

- Urine can be applied straight to soil before planting in beds.

- It can also be applied straight in hollows made near the growing plant.

- The application of a 3:1 mix of water and urine, once or twice or even three times a week on maize grown in 10 litre containers is particularly effective.

- Picture shows the striking difference between a maize plant fed with a 3:1 mix of water and urine (0.5 litres) three times per week and maize irrigated with water only.
Crop trials using urine as a fertilizer

Procedure of urine application

• A small hole should be dug near to the plant.

• 125ml of urine is applied then covered with soil.

• The total amount of urine added to each plant was 1000ml - eight doses of 125ml.

• After the initial dose, a dose was given weekly for five weeks followed by a dose every other week for the final two doses.
Crop trials using urine as a fertilizer

Measuring urine

Maize seeds planted on
11 November 2004
Crop trials using urine as a fertilizer

Application of urine to a young maize plant

Applying urine to the hole of an old maize plant
Crop trials using urine as a fertilizer

Different rates of urine dilution used
- Maize is a heavy feeder crop
- The more the urine applied on maize the more the crop yield

Maize yields from different rates
Crop trials using urine as a fertilizer

Effect of urine treatment on trees

- Trees like banana, mulberry, mango and avocado are good examples.

- Urine can be applied to trees directly from a urine-diverting toilet or slowly through a hole in a bucket.
Crop trials using urine as a fertilizer

Urine applied to a banana tree directly from the toilet

Urine applied to a banana tree through a bucket
Crop trials using urine as a fertilizer

• Alternatively a hole can be dug next to the tree for water and urine application.

• In this case 2 litres of urine is added first, followed by 10 litres of water. The technique works well on banana plants.
How can we harvest compost from sky loo Ecosan latrine?
Materials needed when harvesting?

- Shovel
- Gloves
- Wheelbarrow
- Cement to fix the cover back
How to Use EcoSan Compost in the Garden?

- Harvested after 6-12 months

- Toilet compost varies in texture and colour depending on the amount and type of soil added.

- Where sandy soil has been added, the toilet compost is sandy and almost humus-free.

- When fully composted, toilet compost is pleasant to handle and safe to use.
How to Use Ecosan Compost in the Garden?

Sandy latrine compost

Humus latrine compost
Testing crops in Ecosan compost

Lettuce
• After 30 days of growth the harvest was increased 7 times.

Bucket on the right has soil enhanced with compost
Testing crops in Ecosan compost

The harvest on the right was grown in soil with compost.
Testing crops in Ecosan compost

- Tomatoes placed in a container and watered
- Young plants removed leaving the strongest two
Testing crops in Ecosan compost

Tomato plants

Growing of young tomatoes
Growing trees in toilet compost

- It is also possible to plant trees in toilet compost which has been excavated from a compost toilet pit and transferred to a hole dug specifically for a tree.
The tree pit dug was 60cm X 60cm and 60cm deep. Toilet compost was dug out.
The tree pit was filled with the toilet compost to ground level. Bricks were laid around the tree pit and the pit filled again with good topsoil.
A hole was dug in the middle and topsoil added to the base of the hole. A young mulberry tree was planted in the hole and the soil leveled. Leaf mulch was then added and the tree watered.

After four months, the mulberry tree showed excellent growth and was in good health. As the tree grew extra mulch and compost was added. Manure and other fertilizers can also be dug into the soil as the tree grows and requires extra feeding.
Hand washing facilities

• Hand washing facilities are vital if any hygienic value can be expected out of a toilet system.

• All eco-toilets (and any other toilet) should be fitted with a simple hand washing device as a matter of priority.
Hand washing facilities

If there are a few users it can be 1

If there are more users there should be more
Menstrual Hygiene Facility (MHF)

- Helps eliminate possibility of sanitary pads and other materials in the manure
- Gives enough privacy to users during their menses
- Water should always be available in the MHF
- Soap should always be available
- The room should always be cleaned
- It should be accessible
Menstrual Hygiene Facility (MHF)…

• Girls can use the room to:
  – Change their sanitary materials
  – Wash their used sanitary materials
  – Clean themselves
Mismanagement of Ecosan

• If Ecosan latrines are poorly managed flies and odour erupts.

• It is therefore necessary that ash and soil are always put.

• And also water entry should be prevented.
Mismanagement of Ecosan

Larvae and flies

Bad smell
Mismanagement of Ecosan

• What do you think would happen?

Any experiences?

• Would health be affected?

• Can it affect education?
How are we going to manage our latrines?

COMMENTS AND QUESTIONS?