

Schools “*Ecological Sanitation*” Programme

FACT SHEET

1. Demonstrating the effects of urine and toilet compost on maize plants in buckets containing road sand



- * Buckets A and B contain road sand
- * Buckets C and D contain a 50/50 mix of road sand and toilet compost
- * All buckets have been planted with maize seedling
- * Buckets A and C have been watered only
- * Buckets B and D have been fed with a 3:1 mix of water and urine twice a week

WHAT DOES IT SHOW US

1. Maize does not grow well on road sand
2. Adding urine to road sand does not help much
3. Mixing road sand with toilet compost helps a lot
4. Adding urine to a mix of road sand and toilet compost is best

WHY?

- 1. Road sand is very sterile and contains almost no plant food like nitrogen.**
- 2. Urine contains a lot of nitrogen**
- 3. Maize plants like lots of nitrogen**
- 3. But even adding urine to road sand does not make the plants grow much faster**
- 4. This is because although urine contains nitrogen it is a type of nitrogen that cannot be used by maize**
- 5. The nitrogen in urine must be converted into a form of nitrogen that can be used by plants**
- 6. This change takes place in soil which contains soil bacteria which changes the urine nitrogen into plant nitrogen**
- 7. The soil bacteria are contained in good soil and toilet compost but not in sterile road sand**
- 8. So the urine we add to road sand is of little use to the plants**
- 9. To release plant nitrogen from urine so it can be used by plants it must be converted first by the soil bacteria found in good soil or toilet compost.**

CONCLUSION

To get the best effect of urine which contains much nitrogen very poor sandy soil is best mixed with good soil or toilet compost.

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2. Demonstrating the effects of urine and toilet compost on maize plants in buckets containing poor sandy soil.



- *Bucket A contains poor sandy soil (from Chisungu school garden)**
- *Bucket B contains poor sandy soil (from Chisungu school garden)**
- *Both buckets have been planted with a single maize seedling**
- *Bucket A has been watered only**
- *Bucket B has been fed with a 3:1 mix of water and urine twice a week (100mls urine + 400mls water)**

WHAT DOES IT SHOW US?

- 1. Maize does not grow well on poor sandy soil**
- 2. Adding diluted urine to poor sandy soil helps the growth of maize considerably.**

WHY?

- 1. Both road sand and poor sandy soil contain very few nutrients for plant growth.**
- 2. Unlike road sand poor sandy soil does contain some soil bacteria which helps change the urine nitrogen into plant nitrogen**
- 3. The effect would be even better if the poor sand was mixed with toilet compost or fertile soil**

Notes

**Poor sandy soil is very common in many parts of Africa.
Crops do not grow well on it.**

However there are sufficient soil bacteria in poor sandy soil to convert urine nitrogen into plant nitrogen

Plants grow much better if the poor sandy soil is also mixed with fertile soil or compost.

The compost can be made in the garden or can be taken from toilets that make compost.

For many plants like maize and green vegetables, the growth of plants can be increased even further if the mixture of poor soil and fertile soil or compost is treated with diluted urine.

The urine contains much nitrogen but this urine nitrogen must be converted into plant nitrogen by soil bacteria before it can be taken up and used by the plants.

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3. Demonstrating the effects of urine on maize plants in basins containing poor sandy soil.



- * Each basin has been filled with poor sandy soil
- * Each basin has been planted with a single maize seedling
- * The basin on the left has been watered only
- * The other basins have been fed with 400mls of a mix of urine and water (300mls water + 100mls urine) twice a week.

WHAT DOES IT SHOW US?

1. Maize does not grow well on poor sandy soil
2. Adding diluted urine to poor sandy soil helps the growth of maize considerably.
3. Maize can use up any nutrients in poor soil quickly
4. The nutrients in urine contain all the food that is required for complete growth of maize including full maize cob production. The more urine the bigger the cobs!

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4. Demonstrating the effects of urine and toilet compost on maize plants in small pots containing garden topsoil.



- *All four small pots were filled with garden topsoil**
- *All four pots were planted with a single maize seedling**
- * The two pots on the left have been fed with 20mls (bottle cap full) a 3:1 mix of water and urine every other day.**
- * The two pots on the right have been fed with water only.**

WHAT DOES IT SHOW US?

- 1. Even good soil can benefit from the use of diluted urine.**
- 2. A maize plant can use up the food (nutrients) in a small volume of soil quite quickly.**
- 3. Urine appears to provide the maize plant with all the food it needs.**

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5. Urine trials in basins and buckets

The effects of diluted urine on plants can be shown by testing the growth of plants in small containers. In each case shown below 400mls of a 3:1 mix of water and urine was added to the basin 3X per week together with normal watering (left side) and watering only (right side).



Effect of urine treatment on Tsunga and Onion



Effect of urine treatment on cabbage and tomato



Effect of urine treatment on spinach and mulberry tree

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6. Urine trials in ring beams

The effects of diluted urine on plants can be shown by testing the growth of plants in small “ring beam gardens.” In each case shown below about 3 litres of a 3:1 mix of water and urine was added to the ring beam garden 3X per week together with normal watering. The result is abundant growth.



Effect of urine treatment on Spinach and Cabbage



Effect of urine treatment on Tsunga and Rape



Effect of urine treatment on Covo and Maize

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7. Growing mulberry from cuttings



- *Many trees can be grown on “Arborloo pits”**
 - *The can be fruit trees, trees for fuel, trees for medicine, indigenous trees, shade and ornamental trees**
 - *Trees can grow from seed, fruit, tubers or cuttings**
 - *One of the easiest trees to grow and one of the most valuable is the Mulberry.**
- Mulberry trees can be grown from cuttings taken from older trees.**
- *The mulberry fruit is a wonderful source of vitamins**
 - *The mulberry will grow large and provide fruit for many generations once it is established.**

Growing the mulberry tree from cuttings



cuttings taken from tree



Cuttings grow roots and leaves in the seed trays or small bags.



They are then transferred into buckets or direct into the soil.

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8. Comfrey – a magic plant



***Comfrey is a very valuable plant and a source of many important plant nutrients.**

***Comfrey is the best source of non-chemical potassium so far known to organic gardeners.**

***Potassium is valuable for growing many important crops like tomato, potato, onion and others.**

*** Comfrey is able to effectively remove nutrients from the soil and make them available in the leaves.**

***Comfrey can be used as leaf mulch (leaf layer over soil around plants) on vegetables. ***

Comfrey can also be converted into liquid fertiliser.

***The nitrogen content of this liquid comfrey can also be enhanced by the addition of urine.**

***Comfrey is also an excellent food for rabbits and chickens. Comfrey also has medicinal properties.**

***Comfrey is an excellent addition to the compost heap.**

***Many plants benefit from a generous supply of potassium. It is essential for the best yields of fruit. The tomato is an example. If there is too much nitrogen, the plant will grow with luxuriant green vegetative growth, but the fruiting may be poor.**



Comfrey can be grown in vegetable gardens, buckets and ring beams



Comfrey can be grown together with other plants. It is a good all round food for chickens and rabbits as it contains minerals and is quite rich in protein.

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9. Growing tomatoes using urine and comfrey



- *Tomatoes are an important crop in our diet**
- * Tomatoes respond well to urine treatment as the plants can grow large because urine contains much nitrogen.**
- *But tomatoes also need potassium and other minerals in their food to make good fruit. Nitrogen is not enough**
 - *Tomatoes need extra potassium to fruit well.**
- *This potassium can come from comfrey leaves which have been made into liquid food.**

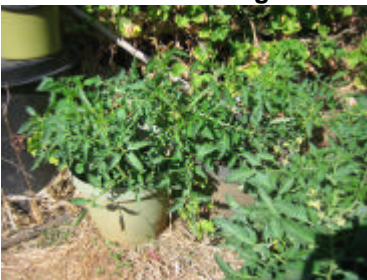
Preparing Comfrey Liquor

Comfrey is a remarkable plant which sucks up nutrients (food) from the soil and places it in the leaves. It has lots of potassium which is good for fruiting plants like tomatoes. Onions and potatoes also like potassium as well as fruiting trees.

Comfrey can be made into a liquid food for plants. Take a large bucket or container (about 35 litres). Fill with water and add comfrey leaves (you must grow them first). Add up to 2 kg of comfrey leaves cut up and 2 litres urine. Let the brew stew for about 2 weeks – stir from time to time. The leaves will break down. After 2 weeks add another 2 litres of urine. Stir and the mix is ready. Dilute with water.



The cut comfrey leaves have been added to the 35li water followed by 2litres urine. This is allowed to ferment for 2 weeks with stirring. Another 2 litres urine is added before using.



Two healthy tomato seedlings are then planted in a bucket (or more in a bed) containing toilet compost or good soil. In this case Roma tomato (plum tomato) which is resistant to disease). They are watered without urine for a week or more. Then a water urine mix (400mls of 3:1) is applied 3x a week for several weeks + watering. This makes the plant grow larger. But they need extra potassium to fruit well!



As soon as flowers start to show (or even before) the special comfrey mix is applied also using a 3:1 mix of comfrey liquor and water (about 400mls 3X per week per container). The plants are also watered daily.

This provides the extra potassium as well as nitrogen for good fruiting. Large numbers of fruits result from this treatment.