“Before I thought using fertiliser would cost me too much money. Now I make money out of selling all the extra vegetables I have grown using my free fertiliser and from selling my homemade liquid fertiliser to neighbouring villages!”

Farmer in Niger

Photo: 2020 © S. Truelove

Homemade Liquid Fertilisers

Simple ideas and recipes for how to make free organic fertiliser from locally available materials such as crop residues, animal bedding, dung, urine and other waste materials mixed with water. Organic liquid fertiliser improves the soil resulting in healthier plants and crop yields and does not harm the environment.

What does the activity look like?

This activity involves encouraging people to produce homemade liquid fertilisers by collecting and mixing organic waste materials with water and then using the liquid to improve the nutrients in the soil of their farms, gardens and compost piles.

Photo: 2020 © S. Truelove

Photo: 2018 © N-Sky/iStock.com

What are the main benefits?

More fertile soil produces better yielding crops that can help feed people and their livestock and generate more income for families.

Liquid fertiliser is quick to make. By releasing nutrients, they improve the structure of the soil and increase its ability to hold water and nutrients. Over time, organic fertilisers will make your soil and plants healthy and strong.

Organic fertilisers release their goodness to the soil slowly over the growing season, unlike chemical fertilisers which need regular expensive applications to be effective and which are easily washed out by rainfall.

Good for insect control if farmers add some insect repellent leaves like deliya (Tinthonia diversifolia), nimu (Azadirachta indica), indya (Melia azedarach), tephrosia vegelii, French Marigold.

> *"I taught all my family and neighbours how to make the liquid fertiliser, so everyone is using it and the beans and vegetable harvest is much bigger now and we are selling more."*

Farmer in Niger

Key messages

Animal and poultry urine are very rich in the nutrients that soil, compost, crops and plants need. Here are some simple messages to encourage people to make homemade fertilisers:

01. **Don't let urine go to waste! Its free and rich in essential nutrients needed by soil and plants. Don't worry - urine is clean and sterile, and if kept well covered, does not smell.**

02. **Be clear that both animal and human urine is safe to use, but if people prefer not to use human urine, then animal or poultry urine is just as good. Both are free and easy to make, so don't let urine and dung go to waste!**

03. **Like any fertiliser or strong chemicals - always store in a safe place away from children.**

Photo: 2020 © S. Truelove

Label and keep fertiliser safely stored.

Photo: © ECHO West Africa

Using organic liquid fertilizer produces better crops.

Preparations

This activity requires very little preparation other than what you can read in the Essential Guidance section of the Introduction.

Timing tips

The activity can be achieved at any time of year, but people may prefer to start during a time of year when they are less busy and have access to lots of the materials they need. The volunteer should encourage any people that want to take part to start gathering materials in advance.

Photo: 2020 © S. Truelove

There are two main types of liquid fertilisers:

- **Liquid urine fertiliser**
- **Liquid mixed fertiliser made from urine, dung and crop residenues (leaves, stalks, seed pods, etc.)**

Both liquid urine or mixed fertilisers can be used directly onto the soil or added to a compost pile (where it 'feeds' the compost so that materials break down much more quickly).

Step 1	**Collect poultry or animal bedding waste, dung and urine**
Step 2	**Make homemade liquid urine fertiliser**
Step 3	**Make homemade liquid mixed fertiliser from mixing urine, dung, vegetation materials and crop residues**
Step 4	**Strain, dilute and apply the liquid fertiliser to the soil of plants**

Step 1: Collect poultry or animal bedding waste, dung and urine

Collecting animal and poultry bedding waste, urine and dung is easier if poultry and livestock housing is adjusted. This usually involves keeping animals or poultry in a fenced off area or 'kraal', so that the dung accumulates where it can be gathered more easily. By adding waste crop residues, straw and other dry leafy materials to the animal compound either to feed the animals or as bedding, these soak up the urine from the animals and can be gathered for use in the fertiliser mixture. If the fenced off 'kraal' area contains lots of clay in the soil it can become compacted and a hard surface means that the urine runs off. When this occurs, some people dig small channels to direct the surface urine and rain run off down the slope towards a pit or container buried into the ground or even towards a compost pit (see Section 2 on 'Compost').

Raising animal and poultry housing also makes gathering dung and urine easier and has lots of other advantages including reducing common animal and poultry diseases.

Try to encourage people to think of their own ideas for easy ways to collect urine and animal waste.

Photo: Uganda, 2014 © S. Truelove/apt.org.uk

Raising animal and poultry housing makes collecting dung and urine easier and had many other advantages such as reducing common diseases.

Step 2: Make homemade liquid urine fertiliser

There are two types of liquid fertiliser. Simple fertiliser made from water with urine, or mixed fertiliser made from water with urine as well as dung and crop residues

How to make homemade urine fertiliser

Mix 5:1 which is five parts water to one part urine. The mix can be used straight away, or it can be stored and used later. If you use household wastewater that has strong soap or cleaning chemicals in it, then it is best to keep the mixture covered for a few days before using it.

Always store homemade fertilisers covered (to reduce smells and insects) and in a safe place away from children.

How much urine fertiliser to use and how often?

Apply:

- Up to 1.5 litres of the urine & water mix fertiliser per a 1 metre by 1 metre square plot.
- If crops are planted very close together or multiple harvests are taken, then up to 6 litres or more of urine per year can be applied (per 1 metre by 1 metre square plot) without causing any damage.
- If the soil is poor, a higher dose may even be beneficial for feeding the plants.

Step 3: Make homemade liquid mixed fertiliser from mixing urine, dung, vegetation materials and crop residues

Photo: Haiti, 2013 @ IFRC Livelihood Resource Centre

Chop up any dry material before adding to the mixture.

Add any of these materials into old containers or drums to make mixed liquid fertiliser:

- ✓ **Poultry or animal dung** (from any animals but not from cats, dogs or humans which can carry disease),
- ✓ **Ash** from fires or charcoal making
- ✓ **Vegetation materials and crop residues** – Any leaves, grasses, wood shavings, stalks, stems, leaves, seed pods, etc. can be used. You can even use weeds but avoid using weeds that grow quickly and spread. If people have a lot of vegetation materials, especially if it is dry, this can be low in nutrients and more difficult to break down quickly, so if people are able to, encourage them to chop up the materials before adding. Not essential, but it helps break down the materials more quickly.
- ✓ **Water and urine** - Follow the same 5 parts water to 1-part urine recipe for the urine fertiliser and pour enough of the mixture to fully cover the dung and crop residues. If you don't have much urine, don't worry, just add as much urine as you can find.
- ✓ **Cover the containers with a lid that allows air in and out**
- ✓ **Mix or stir regularly and leave the mixture to brew** for at least one month or as long as possible. Mixing or stirring regularly will increase the speed of decomposition. It takes different amounts of time to break down the different materials used at different temperatures, so it is not possible to say exactly how long it will take until the mixture is ready.

A typical recipe for mixed liquid fertiliser

There are no fixed rules about how much of the general materials listed above you should use, but here is a typical recipe:

Take any container (pot, bucket or drum) and add:

- 1 bucket of animal dung
- 3 buckets of leaves (preferably leguminous or nitrogenous leaves such as Tephrosia, Deliya, Sesbania, Binu, Gliricidia, Sienna, Acacia etc).
- 1 bucket of ash from fire or charcoal making (if you have it)
- 1 bucket of maize husks or other dry crop residues (if you have it)
- A small amount of local beer (like masese or masika) or 1 teaspoon yeast diluted in a 500 ml water bottle (all optional)
- Cover all of this with water or wastewater that has been added to urine mixed 5:1 (five parts water to one-part urine). If the water has chlorine or waterguard treatment or any strong shop-bought detergents in it, it is best to store the water in a covered container before using.
- **Always use a lid**, plastic sheet or sack to cover the fertiliser container. Make sure any lid allows the fertiliser to breathe! It needs air to flow in and the fertiliser will produce gases that will need to escape.

Step 4: Strain, dilute and apply the liquid fertiliser

Once the mixture is ready, **strain the liquid.** You can use the materials that have not yet broken down to start your next brew, or you could mix the materials into your compost pile (see Section 2 on 'Compost').

The liquid fertiliser is now a concentrated and very rich fertiliser so it **must be diluted by adding water to it before it is used**. The amount of water added is different depending on what people want to use the mixed liquid fertiliser for. Follow these guidelines;

- **For soil around mature crops** dilute 3 parts fertiliser to 7 parts water.
- **For adding to the soil for up to 2 weeks before planting** you can use stronger doses (such as half and half or one part fertiliser to one part water). Explain to people that seeds and seedlings have tender roots that strong fertilisers can damage.
- **For soil around seeds or young seedlings** dilute one part liquid fertiliser to 10 parts water.
- **For adding to compost** you can use urine or mixed fertilisers undiluted, but half and half water to fertiliser is recommended.

Follow these simple messages for applying the urine and mixed fertiliser;

✗ **Apply fertiliser to the soil, not directly onto plant leaves or roots.**

✗ **Importantly, you must not apply fertiliser for two weeks before crops are harvested for people to eat.**

How often to apply?

It is advised to apply liquid fertiliser 2 to 3 times when plants are growing, but it can also be applied to the soil at other times, especially if the plant leaves are starting to yellow or the plants are showing signs of needing feeding. If the soil is poor, applying fertiliser more often may be beneficial for feeding the plants. If crops are planted very close together or multiple harvests are taken, then up to 6 litres or more of urine or mixed liquid fertiliser per year can be applied (per 1 metre by 1 metre square plot) without causing damage.

Photo: 2018 © N-Sky/iStock.com

Add water to the fertiliser before applying to the soil around seeds or young plants. Do not apply directly to the leaves or roots of plants.

Things to watch out for

Be careful when using urine or mixed fertilisers. Keep repeating these messages:

- **Do not used directly on tender seeds or seedlings or their roots as it can be too rich and 'burn them'. Ensure that the mixture is diluted with water before any application. Wait until the seedlings have grown strong and apply to the soil surface as much as possible rather than onto the seedling. It is probably easier to improve the conditions for seedlings by adding compost that has already been treated with the urine mix in advance.**
- **Apply homemade liquid fertilisers directly onto the soil, rather than onto the leaves of the plants.**
- **Avoid using homemade liquid fertilisers directly on the edible parts of plants, such as lettuce or cabbage leaves, tomato, cucumber etc.**
- **Do not apply for 2 weeks before harvesting any crops that people will eat.**
- **Never use dung or faeces from cats, dogs or humans which can carry disease.**
- **Remember to mix and stir the mixture regularly.**
- **Always use a lid, plastic sheet or sack to cover the container. Make sure any lid allows the fertiliser to breathe! It needs air to flow in and the fertiliser will produce gases that will need to escape.**
- **Like any fertiliser or strong chemicals - always store in a safe place away from children.**

Photo: India © S. Truelove/innocent foundation

Store fertiliser safely, cover and label well.

Links to other sections in this handbook

This activity links well to the other activities in this handbook:

Section 1

Gardens

Section 2

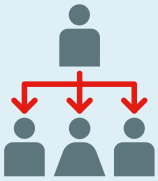
Compost

Section 3

Shaded Seedling Nurseries

Section 5

Improving Farming Practices



Section 6

Lead Farmers and Demonstration Farming

Section 7

Water Harvesting and Conservation

Section 8

Safe Water, Sanitation & Hygiene

Resources and skills needed

What resources are needed to run the activity?

- Any container (pot, bucket or old drums of any shape or size).
- Any lid, plastic sheet or sack to cover the container that allows air in and gas out!

What skills or knowledge do volunteers need?

Enthusiasm and ability to mobilise people and spread clear messages as described in the 'Essential Guidance' in the Introduction.

What skills do participants need?

People do not need any special skills.

What needs to be monitored or followed-up?

Volunteers should simply make sure people are following all the tips and the 'things to watch out for' in this section.