

LIQUID MANURE : TRAINING GUIDELINES

For field officers and coordinators (Agro Chadza 2011)

A. INTRODUCTION : WHY USING LIQUID MANURE ?

Remind the farmers on disadvantages of chemical fertilizers (price, non sustainability, soil erosion, focus on N-P-K but lack of other elements,...) that you've already discussed during the compost manure making training.

Despite those disadvantages and the use of compost, a lot of farmers rely so far on chemical fertilizers. Why ? (Facilitate the answer)

Answer: Farmers are often cultivating on poor or impoverished soils and cannot afford waiting for several years to have a good harvest. Indeed, it takes time to soil to reach a good level of fertility with organic methods like compost or green manure (but it's very important to do so, so that farmers will benefit from it year after year and will rely less and less on chemical fertilizers).

Liquid manure can help farmers to add direct elements at a rapid availability and therefore to boost the plants as chemical fertilizers do.

Moreover, liquid manure does have some other advantages:

- As a liquid fertilizer, its high nutrient value and rapid availability makes it a great tonic for plants;
- Because it is rich in the microorganisms that recycle organic matter, it also boosts the plant and the soil enhancing activity of soil life. These work on soil material to make nutrients more available to plants, resulting in a stronger, healthier soil;
- Helps to provide other elements than N-P-K to the soil and plants;
- Good for insect control if farmers add some insect repellent leaves like deliya (Tinthonia diversifolia), nimu (Azadirachta indica), indya (Melia azedarach), tephrosia vegellii, French Marigold, ...

Liquid fertilizer is not all that complicated. Farmers can use locally available materials to come up with this. Chicken droppings are most recommended for this however, the amount can be difficult to find for farmers. The ash is added as neutralizer of the acidic and alkaline levels and it adds Potassium (K) and other minerals.

Precaution:

Liquid manure can burn the root system of the plants if not use carefully, at a too much concentrated rate. If farmers are using more pails of dung or leaving the mixture for more time than advised, they will have to dilute it before any application. If farmers want to increase the ratio of dung in the liquid manure, the best way is to experiment carefully little by little by testing different dilution ratio on small-sized experimental plots.

B. METHOD 1 : THE COMPLETE METHOD (LEAVES, DUNG, MAIZE HUSKS)

1) Materials

1. *A container* (pot, bucket or drum)
2. *Animal dung* : **2 pails**
3. *Green nitrogenous leaves* (tephrosia, deliya, sesbania, binu, gliricidia, Sienna ssp., acacia ssp., ...) : **3 pails**
4. *Ash* : **1 pail (not full)**
5. *Maize husks* : **1 pail (if not available farmers can still do without)**
6. *Local beer* (masese or masika) or **1 teaspoon yeast** diluted in 500 ml water bottle
7. *Lid , plastic sheet or Hessian sack* to cover the pot
8. *Water* (without chlorine or waterguard !)

2) Instructions

Day 1 :

- Put 3 pails of leaves and 1 pail of animal dung in the container.
- Dilute the yeast in a 500 ml bottle of water, and apply in the maize husk, or else apply half a pail of local beer in the mixture.

Note : *If farmers don't have yeast or local beer, they can just skip this step and add 7 more days to the process (without forgetting stirring once a week). Proceed even if maize bran is not available*

- Add 1 pail of ashes and mix while pouring water little by little.
- The solid materials have to represent roughly half the volume of the container. Then after applying water, the total volume should reach 2/3 to 3/4 of the container's volume.
Mix and stir the mixture until all components are well mixed.
- Cover the container. Do not close hermetically, so that the air can circulate. If you cover it with a plastic sheet, make a few very small holes so that the insects can not come in.

From day 2 to day 7 :

- **Stir with a strong stick each and every day during 2 to 10 minutes** (depending on the volume to stir) so that the air can circulate into the mixture.

Day 14 : Repeat the same operation a week later (day 14) and **once a week** if you leave it for a longer time.

Day 21 : The liquid manure is ready to use if you've applied yeast or equivalent material. If not, stir it again and leave the mixture one more week (one month minimum in total).

Note : *It is very important to do the stirring each day during the first week and at least once a week.*

3) Storage

Keep the liquid manure under the shade of a tree, away from the animals and the children. If you want to store the liquid manure for several weeks before using, you've 2 choices : you can keep it like this until 2 months without forgetting to dilute it enough before use, or else you can sieve the mixture and keep the remaining liquid for one month under the shade (no need to dilute).

Note: If farmers want to increase the concentration in nutrients in liquid manure and then therefore apply in a larger plot, there are 2 solutions:

- Farmers can increase the number of pails of animal dung to 4 or 5 pails, or either use chicken droppings (2 to 3 pails)
- Farmers can also leave the liquid manure for 3 more weeks in the container, without forgetting to stir during 5 minutes once a week.

In those 2 last options, farmers will have to dilute the liquid manure in water before application in the field in order to avoid burning the plants. A dilution rate of 1:1 (10 liters of liquid manure in 10 liters of water) is a minimum. They can dilute up to 1:4 (10 liters in 40 liters of water) if they've used a lot of dung (especially chicken droppings) or whenever they assess the solution to be too much concentrated.

Trick: The more farmers put some dung and the more they leave liquid manure before using it, the largest will be the acreage of application. But they have to keep in mind that it's good to keep a balance with other elements (ashes, leaves,...).

Farmers have to be advised to make some experiments on their own in order to assess what is the best method and dilution rate for them. It can be interesting for them to do a more concentrate mixture, but in that case they don't have to forget to dilute before use.

4) Application

- Use without dilution, except if farmers have put more dung or chicken droppings, then dilute at least 1:1 or 1:2 (more careful) and more if necessary as explained above.
- Before applying, dig a hole of 10 cm away from the plant base.
- Apply one small tea cup (150-200 ml maximum) per planting station or in the middle of the planting station for crops planted close (25-30cm).
- Best use for top-dressing but can be applied after germination (then dilute 1:2 at least)
- It is advised to apply liquid manure 2 to 3 times during the plant's growth (3 times if no other basal dressing was used), but it can also be applied anytime depending on the crop stand, especially if the leaves are starting yellowing.
- For one acre, farmers need to prepare apply 400 liters of liquid manure (after dilution). If the liquid manure is more concentrated or if they want to leave it for a longer time, farmers will have to prepare less liquid for the same acreage but with a higher dilution.

This method has the **advantage to contain more different nutrients** and some botanical pesticides if using *Tithonia* (deliya) and *Tephrosia* leaves. The remaining parts of the leaves act also as a mulch and will benefit to the plants for a longer period.

Note: Liquid manure can be applied on **maize** as well as **vegetables in dimbas**, especially cabbages, tomatoes, rape, mustard, chinese, and pumpkins. In dimbas farmers can also use it a higher rate of dilution and water the vegetables with it to have an insect repellent effect if they have used botanical pesticides plants.

Reminder : Liquid manure can burn the root system of the plants if applied at a too much concentrated rate. If farmers want to use more pails of dung than advised in the method, they have to dilute before application and make they own experiments.

C. METHOD 2 : DUNG IN A SACK

a) Materials

1. *A container* (pot, bucket or drum)
2. *Animal dung (and ash in small quantity to neutralize acidic)*
3. *A empty sack*
4. *Lid , plastic sheet or Hessian sack* to cover the pot
5. Water

b) Instructions

Use 1 kg of animal dung for 4 liters of water (or equivalent volume for easier understanding by farmers)

If chicken droppings, use 50 kg for 200 l., 30 kgs for 60 l., or 10 kgs for 20 l. pail.

Day 1:

- Put the animal dung in the sack with a half-pail of ash (for 200 l.), tie it and submerge in water. Ash is not compulsory but even in small quantity it helps to neutralize acidic.
- Cover the sack with a stone to make sure it's underwater, and cover the container.
- Do not close hermetically, so that the air can circulate.

From day 2 to day 7:

- Stir and hit the sack with a strong stick each and every day (from 2 to 10 minutes – depending on the volume to stir) so that the air can circulate into the mixture.

Day 14: Repeat the stirring a week later (day 14) and once a week if you leave it for a longer time

Day 21: The liquid manure is ready to use

c) Storage: Same than METHOD 1

d) Application: Same than METHOD 1

D. METHOD 3 : DUNG AND WATER MIX METHOD

a) Materials

1. *A container*
2. *Animal dung (half of the container) and ash in small quantity to neutralize acidic*
3. *Lid , plastic sheet or Hessian sack* to cover the pot
4. Water

b) Instructions

Day 1:

- Fill half of the container with dung and a half-pail of ash (for 200 l.), and add water until it's almost full.
- Cover the container.
- Do not close hermetically, so that the air can circulate.

From day 2 to day 7:

- Stir with a strong stick each and every day (during 2 to 10 minutes – depending on the volume to stir) so that the air can circulate into the mixture.

Day 14: Repeat the stirring a week later (day 14) and once a week if you leave it for a longer time

Day 21: The liquid manure is ready to use

c) Storage: Same than METHOD 1

d) Application: Same than METHOD 1

E. PLANT TEA

Farmers who don't have enough livestock have not to be left out. This plant liquid fertilizer has the advantage not use animal manure but different types of leaves according to the availability.

Tithonia diversifolia (*Deliya* in chichewa) as main component and wood ash as a sub component.

Note : The same method can be use with *Lantana camara* (in Chichewa : *Bibi*, or *hedge wa maluwa*, or *hedge wa tizipatso*, or *hedge wa minga*) leaves

a) Materials

1. *A container*
2. *Green leaves of different plants (it is a must to mix leaves from 3 different plants)*
3. *Ash (1/2 pail)*
4. *Water*

Farmers can be advised to use these following type of leaves :

- ▲ *Tithonia (Deliya)*
- ▲ *Lantana Camara (in Chichewa : Bibi, or hedge wa maluwa, or hedge wa tizipatso, or hedge wa minga)*
- ▲ *Pumkin leaves*
- ▲ *Leguminous trees (Acacia, Senna, Albizia, Tephrosia,...)*
- ▲ *Pennisetum purpureum / Napier Grass (Nsenjere)*
- ▲ *Cassava leaves*

Note: If farmers don't have access to many trees they should prioritize *Tithonia*, *Lantana Camara* and leguminous trees.

b) Instructions

Day 1:

- Chop the leaves and pit them in a container a bit more than half-way.
- Add half pail wood ash
- Add water into the container until it's filled, and stir the container as you add the water

From day 2 to day 14:

- Stir twice to thrice a week during 5 minutes

Day 14 :

- After 2 weeks, dilute the liquid in 1:1 ratio with water. Then the plant tea is ready to use

c) Storage: Same than METHOD 1 **d) Application:** Same than METHOD 1

DELIYA LEAVES TRICK

Deliya (Tithonia diversifolia) is a very useful plant: the leaves are very rich in nitrogen, phosphorus, and have also a strong repellent property. The advantage of using *deliya* is that this plant can be found very easily in the rural environment, especially near *dombos*. It grows everywhere, along roadsides and riverbanks, in marginal lands and even gardens.

Farmers can use as a plant tea, in the liquid fertilizer but also as fertilizer mulch. They have to apply a double-hand full at the bottom of the plant (maize or vegetable). They can use it fresh or dried. The nutrients will benefit to the soil and the plant during rainfall or after watering during dry-season.