

## Bioslurry: a supreme fertiliser

### Positive effects of bioslurry on crops

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#### Abstract

Bioslurry is a good fertiliser for crops and improves the soil fertility, soil structure and yields of crops. It is often even better than regular Farmyard Manure (FYM) and may also reduce the use of chemical fertilisers. With the right rate of 10 to 20 tons/ha in irrigated areas and 5 tons/ha in dry farming, crops can show significant increase in yields. Indeed, bioslurry increases crop revenues by 25 percent on average.

#### Introduction / Summary

Bioslurry is used to improve soil fertility, soil structure, and crop productivity, and it can be an excellent fertiliser. However, not many farmers are familiar with the advantages of bioslurry. This article brings together the main findings of available research on bioslurry as well as information from the field in Hivos' and SNV's biodigester programmes.

#### Background: biogas

Biogas produced from cattle, pig, and buffalo dung (and/or human excreta and kitchen waste), together with the by-product bioslurry, can offer a solution to poor access to modern energy services and help mitigate poverty, climate change and soil fertility problems. It is a simple, affordable, uncomplicated method of maintaining energy supply. The potential of biogas is significant in developed as well as developing countries. Biogas consists of methane and carbon dioxide, and the flame is smokeless and non-toxic. It creates employment, saves the use of traditional cooking fuels and increases the availability of clean fuels. It reduces indoor smoke and related problems such as eye infections, respiratory diseases and burns. Biogas installations also reduce methane emissions since this gas is captured in the biodigester. CO<sub>2</sub>, CH<sub>4</sub>, and nitrous oxide reductions are related to the fuel switch from wood to gas, while CH<sub>4</sub> is also reduced due to the process of oxidization to CO<sub>2</sub> and water. This is significant since CH<sub>4</sub> is 25 times higher in global warming potential than CO<sub>2</sub> (Warnars, 2013).

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### Main chapter: bioslurry

A biogas installation can be filled with locally available raw materials, kitchen refuse, crop residues, animal waste (pigs, poultry, and cattle) and human waste. Bioslurry can be used for fertilisation of crops directly or added to composting of other organic materials. Bioslurry is an already digested source of animal waste, and if urine (animal and/or human) is added, more nitrogen is added to the bioslurry, which can speed up the compost-making process. But this also depends on the kind of digester. With the right amounts of materials, the composition of the bioslurry can consist of 93 percent water and 7 percent of dry matter, of which 4.5 percent is organic matter and 2.5 percent is non-organic matter. Furthermore, bioslurry contains phosphorus, potassium, zinc, iron, manganese and copper, of which the latter has become a limited factor in many soils. Bioslurry can be used to build healthy fertile soils for crop production. Indeed, bioslurry form and content stabilises with double nitrogen content, which is different from Farmyard Manure (FYM). Furthermore, the quantity of the bioslurry is also higher than regular FYM. Bioslurry contains readily available plant nutrients and higher amounts of nutrients, micronutrients than FYM and composted manure. The effects of bioslurry application are comparable to the effects of the application of chemical fertilisers. As such, bioslurry can be a serious alternative to chemical fertilisers (Warnars, 2013).

The bioslurry can be applied: (1) as a foliar fertiliser, being sprayed onto the crops; (2) in liquid form (diluted) onto the roots or; (3) in dry and composted form (combined with irrigation techniques so that crops have sufficient water). Bioslurry is an easily available form of compost compared to traditional compost. It is also attractive to mix with vegetative waste compost. A family owning a biogas plant will have the additional advantage, next to clean and cheap biogas, of a continuous and readily available supply of high quality fertiliser for crops. *'[...] bio-slurry increases crop revenues by an average of 25 percent [..]'* (Warnars, 2012). Seeds treated with bioslurry have given better germination rates (Gurung, 1998). With regards to tillage, note that immediate incorporation of pig bioslurry through tillage would increase the N value and favour greater N/P fertiliser value. From experience, it is generally suggested to apply the bioslurry at a rate of **10 to 20 tons/ha in irrigated areas and 5 tons/ha in dry farming** to have a significant increase in yields (Warnars, 2012).

In summary, bioslurry can be used for the following: (1) as a basal manure and as a foliar application or spray; (2) as a plague repellent; (3) to increase soil fertility (cation exchange capacity), and improve the soil structure and water retaining capacity; (4) to prevent soil erosion; (5) to treat seeds for higher germination, disease resistance, better yields, improved coloration of fruits and vegetables, and tenderness and taste of leafy vegetables; (6) to increase the feed value of fodder with low protein content; (7) for concentrated feed for cattle, pig, and fish and the production of earth worms and algae; (8) for the production of vitamin B12 and amino acids for animal growth. In addition, it contains enzymes which stimulate hunger for more food intake and better nourishment of animals; (9) as a means to increase quality and quantity of organic fertiliser production at the farm levels; (10) as manure for pot grown flowers and vegetables; (11) to increase the availability of nutrients for soil micro-flora like nitrogen fixing and phosphorus solubilising organisms; (12) to reduce and recycle the use of phosphate, a non-renewable source which is being depleted globally; (13) to reduce wastewater, water pollution, greenhouse gas emissions and noxious odours; (14) to reduce weed growth and to reduce attractiveness to insects or flies; (15) bioslurry reduces the number of pathogens through sanitation and as such, it is almost pathogen free. Although it does not always kill

all pathogens, nematodes or viruses, they remain much lower than compared to FYM. Therefore, if applied to fruits and vegetables that are consumed fresh, those should be carefully washed and cleaned before consumption (see Table 1 and Table 2) (Warnars, 2013).

### Conclusion and discussion

A biogas digester not only provides clean and cheap energy, but also produces a good organic fertiliser for crops. Indeed, bioslurry is an excellent organic fertiliser and substitute for farmyard manure, complementary to regular compost, and often also to chemical fertilisers due to its high nutrient content. As such, biogas digesters and bioslurry contribute to building organic bridges between culture, geography, and (existing/traditional) farming practices.

### Suggestions for tackling future challenges of organic animal husbandry

Bioslurry can be a solution to the challenges the organic animal husbandry is facing with regards to (organic) waste, fertilisers and composting. Especially for smallholder farmers, this is an interesting solution to not only farming challenges (fertiliser) but also energy challenges and access (renewable energy from biogas). Therefore, the use of biogas and bioslurry should be stimulated as much as possible.

**Table 1 Comparison of effects of various fertilisers on cabbage, mustard and potato in yield**

S.no	Treatment	cabbage %	mustard %	potato %
		Increase	increase	increase
1.	Control	-	-	-
2.	Farm yard manure (FYM)	18.67	25.8	25.33
3.	Slurry	20.63	45.75	34.75
4.	Slurry - Single super phosphate	20.7	49.75	
5.	Slurry + Rock phosphate	15.9	35.25	
6.	Slurry + Potash	24.9	-	-
7.	Farm yard manure + Phosphate	-	33.98	-

Source: Gurung (1998, p. 32)

**Table 2 Crop increase in yields compared to control plot**

<b>Crop</b>	<b>% increase in yield over control plot</b>
Rice	46%
Tomato	108% and 33%
Chillies	0%
Brinjal	74%
Rice	40%, 23% and 14%
Eggplant	33%
Maize	92%
Cabbage	20%
Potato	34%

Source: Gurung (1998, p. 32 – 33).

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