

Introducing Urine as an Alternative Fertiliser Source for Urban Agriculture: Case studies from Nigeria and Ghana

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If human urine is properly collected and used for agriculture, it contributes to improved environmental sanitation in cities and reduces the costs of crop production. The innovation lies in the integration of agriculture, environment and sanitation sectors.

Although there is as yet no record of urine collection for commercial agricultural use in Ghana and Nigeria, on-station experiments in some universities show promising results. Factors such as transport logistics, financial feasibility as well as farmers' and consumers' perception of and willingness to use urine for food production influence the adoption of urine as a fertiliser in agriculture.

In Ibadan, Nigeria, RUAF partners implemented a project on urine use among a group of young urban vegetable farmers. Likewise through the EU-funded SWITCH programme, a similar demonstration and research study was implemented in Accra, Ghana. In both cases, the objective was to introduce urine use to urban vegetable producers through participatory action research, training and demonstration, and to investigate the farmers' perceptions about and the feasibility of using urine in their farm locations.

Ibadan

With a population of about 2.5 million people, Ibadan is one of the largest cities in Nigeria. About 200 farmers are active in the periurban and urban areas of Ibadan, producing mostly vegetables, such as green amaranths (*Amaranthus caudatus*), jute melo (*Corchorus olitorus*) and sometimes fluted pumpkin (*Telfaria*).

This study was carried out at the vegetable production site in the army barracks of Ibadan North West Local Government Area, Mokola. Temperatures at this site range from 21°C to 31°C and average, bimodal, annual rainfall is 1,280 mm.

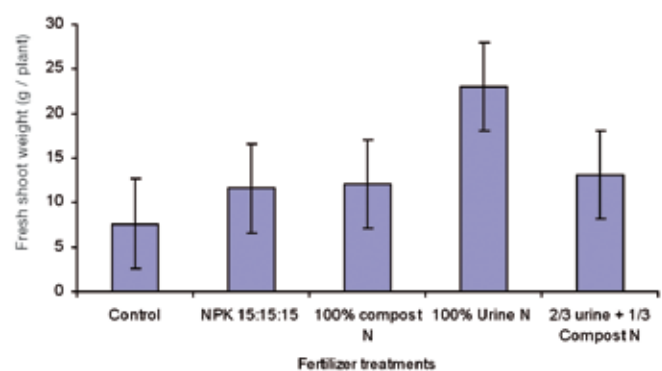
Individual interviews were carried out with 161 people in the community (60 farmers and 101 marketers), who were asked about their views on urine use for crop production. The participants were shown planting demonstrations involving the production of green amaranths using fertiliser treat-

ments at the rate of 100 kg N / ha. The various treatments and the results are given in the figure). The required amount of fertiliser was based on nitrogen composition of the fertiliser materials.

Urine was collected in plastic containers from the male hostel of the University of Ibadan, which is about three kilometres from the farm location. The collected urine was stored airtight for a month before being used (more information: AdeOluwa et al., 2009).

Most respondents were not aware of the possibility of using urine as a fertiliser, and many of them perceived urine use as a good agricultural innovation, 20 per cent of the farmers and 26 per cent of consumers cited cultural norms as a constraint to urine use. Another 26 per cent of the farmers and 38 per cent of the consumers had specific religious objections to urine usage. Nevertheless, many responded that they would use urine for vegetable production if it gave a better yield than other forms of fertiliser, and most consumers would buy vegetable crops grown with urine if it did not pose any health threat.

Using urine rather than conventional mineral fertilisers significantly increases the yield of *Amaranthus caudatus*, and could thereby also increase farmers' income. Microbial analysis of harvested vegetables did not show any significant difference in microbial contamination between the differently treated produce.



Effects of fertiliser treatments on fresh weight yield of green amaranths at 4 weeks after main planting

Accra

Accra, like Ibadan, is experiencing rapid population growth and agriculture is becoming a clear feature in the urban fringes. It is one of ten demonstration cities under the EU funded Project "Sustainable Urban Water Management Improves Tomorrow's City's Health (SWITCH)", one component of which is developing options to effect improvements in agricultural production and other livelihood activities using freshwater, storm and wastewater (see also UA-Magazine no. 20 or www.switchurbanwater.eu).



Testing of urine application and co-composting products in Accra
Photo's: René van Veenhuizen

It is estimated that up to 90 per cent of fresh vegetable consumption in Accra comes from intensive production within and around the city. To maintain soil fertility the farmers often use poultry manure and chemical fertilisers. The high cost of these fertilisers is becoming a constraint to farming activities in the city. Hence alternative sources of nutrients are welcome and could enhance productivity.

Meanwhile, 95 per cent of the city's populace uses on-site sanitation facilities (public toilet, bucket latrines, septic tanks) as the main means of sanitation, making these places potential sources of nutrients and organic matter production for urban agriculture in Accra. Many public urinals are located within some of the most densely populated residential areas and public places, and are not subject to proper collection and management. Consequently urine from the urinals is discharged directly into the drains flowing into the lagoon, resulting in pollution. A study carried out (Cofie et al., 2007) on 14 urinals located within the Central Business District revealed that 7.3 m³ of urine is generated per day. This is approximately 2,200 m³ of urine per year. In terms of nitrogen content this volume represents 6.6 tonnes of plant available nitrogen. As part of the SWITCH project IWMI collaborates with Safisana, a private entrepreneur, to introduce urine as a fertiliser to farmers. The entrepreneur manages the transport of urine from the urinals to the farm, while IWMI conducts the necessary research investigation.

Like in Ibadan field trials were set up at Dzorwulu vegetable production site in Accra to determine the effect of urine and other fertilisers on the yield of cabbage. In addition, training and sensitisation was undertaken with urban farmers, extension staff of the Ministry of Food and Agriculture (MoFA), Ghana, and other key stakeholders, about the possible benefits and risks of using human urine as an alternative source of fertilisation. As part of this programme, a seminar

was organised for the extension staff of the Ministry of Food and Agriculture (MoFA) at La in Accra, followed by a meeting with about 42 farmers from Dzorwulu, Plant Pool and Ridge, in Accra. Two presentations were made for the farmers and extension staff. To encourage a better understanding of the issues discussed, coloured photographs (showing farmers from other parts of the world, crops fertilised with urine and without urine, crops treated with urine and other forms of fertiliser, etc.) were shown to the farmers. On both occasions question and answer sessions followed the presentations.

The field trials at Dzorwulu area showed similar results (Adamtey *et al*, forthcoming) as in Ibadan. The farmers and the extension staff of the Ministry of Food and Agriculture expressed different concerns on the use of urine in crop production. Among the issues raised by farmers were: how urine can be supplied on a regular basis, how to get storage facilities for the volume of urine to be supplied, the mode and rates of application for various crops and for different soil types (especially sandy soil), the effect of urine on soil characteristics, e.g. soil salinity. The extension staff on the other hand were concerned about the possibility of collecting urine, how to reduce the potential risk associated with urine before use, guidelines on the use of urine, willingness of farmers to use urine as an alternative source of fertiliser, the hygienic quality of crops produced with urine and consumers' readiness to accept and consume such products. In spite of the numerous concerns raised by both farmers and the extension staff of the Ministry of Food and Agriculture, the idea of using urine in crop production was highly welcomed. Participants from both groups expressed an interest in seeing how urine is used and its effect on crops.

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Urine storage tanks at the testing site in Accra
Photo: René van Veenhuizen

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