

## **The Use of Human Urine as Crop Fertilizer in Mali, West Africa**

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People have used animal and human feces to fertilize crops for centuries because manure contains many vitamins that plants need. What most people do not know is that the majority of beneficial nutrients leave human and animal bodies through urine rather than through feces, and the majority of urine is pathogen-free. People in the developed and developing world are beginning to use this untapped nutrient potential to fertilize crops with great success.

Waste collection systems in the developed world are often centralized and are difficult and costly to upgrade to a urine separation system, but most sanitation systems in the developing world are on site.

Moreover, while many development organizations are focusing on expensive composting toilets to replace existing latrines, these organizations are missing the intermediate step of urine fertilizer use to ease communities into nutrient recycling ideas in a sustainable way. Small adjustments in behavior can be made and inexpensive systems can be designed to collect urine, which can then effectively fertilize most crops. This can lead to increased food production and simultaneously increase the overall effectiveness of on-site sanitation systems.

This report explores current research on urine fertilizer and several aspects of urine fertilizer projects done by Peace Corps volunteers in Mali, West Africa. Peace Corps volunteers in Mali, West Africa are using a pilot project approach (based on the development philosophy outlined in *Two Ears of Corn* by Roland Bunch) to propagate the use of small urine collection systems in a sustainable way. The urine fertilizer trials teach people about small-scale experimentation. Trials also teach people about the value of urine as a fertilizer and the value of closed-loop sanitation. These urine fertilizer projects can easily be adapted to other communities and have the same effect. As communities accept the urine fraction of their waste as a valuable resource, they can begin to embrace the more complex and expensive aspects of closed-loop sanitation.

For Peace Corps Mali urine fertilizer projects, volunteers work with a small group of participants who try urine fertilizer on a small portion of their fields or gardens. Urine is collected in a jug and funnel system made of locally available materials. The urine is collected and diluted in a safe manner to avoid pathogen transfer and nitrogen losses as ammonia. Urine is applied at doses based on locally recommended nitrogen needs for specific crops and estimated nutrient values. Strong nitrogen doses are applied to increase the visible effect that urine fertilizer has on crops.

Participants join projects through a series of mutual agreements decided on by community leaders, project leaders, and by the participants themselves. Participants are encouraged and aided throughout the trials. Each participant is encouraged to work closely with and encourage others to build a support system. Success with urine fertilizer has been high, and participants are encouraged to show

other community members and leaders the successes they find. The participants then become the teachers and project assistants and the use of urine fertilizer slowly begins to spread throughout the community.

Participants also gain confidence in their ability to work with new technologies, experimentation, and community development with less and less outside help. In this way, the urine fertilizer projects lead to capacity building and to improved sanitation.