

Traditional night-soil composting continues to bring benefits

Night-soil (human waste) has been considered a valuable agricultural resource since ancient times. When handled safely, its use can contribute to reducing soil degradation and water scarcity in the areas like the Lahaul valley. Despite such known benefits its use is now decreasing with modernisation.

Recognising this, the G.B. Pant Institute in India has been taking steps to promote the use of night-soil as one of the organic farming practices promoted in the region.

Santaram S. Oinam

The Lahaul valley of the northwestern Indian Himalaya mountains is cut off from the rest of the world during winter due to heavy snowfall. The harsh and inhospitable climatic conditions prevailing in this region mean that farmers have developed unique agricultural management practices. In recent years, the G.B. Pant Institute of Himalayan Environment & Development has initiated documentation of some of these practices, especially traditional and innovative soil nutrient management practices that help in sustaining agro-ecosystems with few external inputs. As part of this documentation initiative, a survey was conducted in four selected villages to assess the status of the indigenous system of night-soil composting. Heads of households were interviewed between November 2003 and January 2004. The information recorded was also verified through personal observation of various field operations. All available past records, published research papers and other detailed information pertaining to the indigenous practice were also collected.

Poor soil fertility is a big hurdle to sustainable agriculture in these areas, as topsoil is removed and the rate of nutrient leaching is high, due to the abundance of snowfall, avalanches, landslides and erosion. In the cold and harsh climatic conditions of the region, with grass and vegetation cover being scanty, it is not possible to maintain enough cattle to produce adequate amounts of farmyard manure. Faced with this situation, the locals have traditionally relied heavily on obtaining organic manure derived from composting human excreta. In earlier times, sheer necessity meant that farmers were able to overcome the revulsion associated with the practice of handling human excreta. Now, with the advent of modernisation and the easy availability of chemical fertilizers, people are distancing themselves from this age-old practice. Moreover, because of the large-scale adoption of modern septic toilets nowadays, farmers are forced to use chemical fertilizers to raise the yields of recently introduced cash crops like pea, potato and hop (*Humulus lupulus*).

Present scenario and future implications

Farmers do not want to use chemicals on crops, and they clearly know the consequences of continuous use of inorganic fertilizer in the same agricultural fields. They prefer to use organic inputs, however, supplies are limited, and subsidised chemical fertilizer is easily available. Despite the perceived benefits of night-soil compost, its use in the Lahaul valley is gradually decreasing. The main reasons for this decline are: the unhygienic conditions

of traditional toilets, the introduction of modern toilets, lack of workforce for the task, the increasing influence of outside culture/society, educational improvement and concerns of social status, and the easy availability of subsidised chemical fertilizer. In addition, the use of the traditional dry toilets which facilitated the conversion of night-soil into compost, is decreasing. The practice of night-soil composting has completely vanished from some villages, while many other villages have gradually started discarding this traditional system since the 1980s. The production of night-soil compost is therefore under a severe threat of modernisation and is most likely to disappear in the near future if steps are not taken to save it.

Preparing night-soil compost

Villagers in Lahaul build traditional toilets on the first floor of the house attached to their living rooms. Through a rectangular hole (12" x 6") in the toilet floor, the night-soil drops down to the ground floor, where the composting takes place. To avoid extra moisture content during composting, the use of water in these toilets is strictly disallowed. After defecating, villagers cover the faeces with other materials, locally known as *fort* (dry cattle dung, kitchen ash, dry grass or leaves). This *fort* serves two main purposes: it makes the compost rich in nutrients, while it also prevents bad odours and keeps flies away. For best results during the composting process the night-soil must be stored in

World Health Organization Guidelines for the safe use of wastewater, excreta and greywater

- Where faecal matter and other organic materials are composted at ambient temperature, the end-product of such an aerobic composting process does not smell and has good properties as a soils conditioner and slow-release phosphorus fertilizer.
- To minimize the health risks from using night-soil as a fertilizer, WHO makes various statements and recommendations. Where it is difficult to increase the temperature of the compost heap, WHO recommends "prolonged storage" to ensure safety. With ambient temperatures of 2-20°C, they note that storage times of one and a half to two years will "eliminate bacterial pathogens; will reduce viruses and parasitic protozoa below risk levels."
- In addition, WHO recommends various precautions to "control exposure" to risk. Precautions for those handling night-soil include wearing personal protection such as boots, gloves and a facemask, and using tools or equipment not used for other purposes.
- At the time of applying the night-soil compost to the field, if the quality cannot be guaranteed, it is recommended to use "close to the ground application", working the material in to the soil, and covering it. In addition, children should be kept away from all areas where night-soil is prepared, treated or has been applied.
- Finally, WHO notes that domestic and personal hygiene is very important. Technology alone cannot stop transmission of diseases, and communities must be aware of good hygiene practices. If treatment recommendations are followed, coupled with good general community hygiene, the risks to people who collect and use night-soil (as well as those consuming fertilized products) will be reduced to acceptable levels.

Source

- World Health Organization, 2006. **Guidelines for the safe use of wastewater, excreta and greywater**. Volume IV: Excreta and greywater use in agriculture. Geneva, Switzerland

two different chambers or vaults for a minimum period of six months. The first vault can be left to compost for six months while the other vault is being used. By alternately using the two vaults, proper compost can be obtained twice a year and night-soil compost can be made continuously by shifting from one vault to another. Night-soil compost from the composting room is normally emptied in October/November and March/April. The composting room has a special door for the removal of the compost. It is carried to the fields and dumped in a series of piles. The heaps of compost remain in the fields for four or five months. Soon after the melting of the snow and before the beginning of the crop season, it is scattered all over the fields. This allows sufficient time for composting of the material, and the night-soil compost is then safe and fit for use. Due to the social stigma, this task is generally conducted during night time, particularly when there is a full moon. To avoid nutrient losses, compost heaps should be protected against rainwater in the fields. Night-soil compost should be mixed with the soil before sowing the seeds, and the dosage has to be appropriate.

Associated health risks

The mixture of urine and faeces should never be used as it not only smells foul but also the slurry produced by this mixture has a high number of enteric micro-organisms. Urine can be treated by storing it separately for a period of six months; this makes it free of bacteria and safe for use in the fields. By consistently following these procedures, the presence of enteric bacteria,



Photo: Author

It is important to wear the right protective clothing when removing the night-soil compost from the composting room.

viruses, protozoa and helminth eggs in faeces can be fully controlled. Some possible diseases due to partial treatment and unsafe use of night-soil compost are amoebic dysentery, human tapeworm, cholera or viral hepatitis. Safe and hygienic use of night-soil compost is important for protecting the health of the users, as well as the environment. In order to prevent diseases,

Changing attitudes to night-soil in

Farmers in Ileje district rarely used night-soil, believing it to be unsafe. One farmer's efforts started a change in thinking and now night-soil is a valued commodity. As benefits have been realised, changes in practice and attitudes, as well as improvements to soils, have been seen.

Patrick Mwalukisa

Cereal production has been declining in many parts of Tanzania since the late 1970s, when input subsidies were removed. In the late 1980s a study was conducted in Ileje district in the southern highlands, which revealed high rates of malnutrition and mortality of the under 5s due to insufficient food intake per day. The major reason for this was judged to be low agricultural production, caused by poor soil fertility in the area. In response, COOPIBO (a Belgian NGO), CDTF (a Tanzanian NGO) and the Ileje District Council signed a tripartite agreement to form the Ileje Food Crop Production Project (IFCPP) in 1988. IFCPP started to train smallholder farmers to practise resource efficient agriculture, through Participatory Research and Extension groups. The main objective of the new techniques was to use the naturally available resources for soil fertility improvement. This would be a way of reclaiming land that has become exhausted due the intensive agriculture practised when there were enough industrial inputs subsidised by the government.

Mbebe is one of the villages where resource efficient agriculture techniques were introduced, but with great difficulties in changing people's mindsets. Farmers were trained to decompose

farmyard manure prior to application as basal fertilizer for maize production. This practice was possible for farmers with livestock. Farmers who had no animals started improving their farms by using other techniques such as burying crop residues, use of sunn hemp (*Crotalaria juncea*) and crotalaria (*Crotalaria ochroleuca*), crop rotation and compost.

Night-soil was introduced as another technique. When farmers were first introduced to it, they found it difficult to accept due to the fact that human waste was commonly regarded as unsafe, unhealthy and useless. However, one farmer, called Bahati Simbeye, secretly emptied his toilet which was about three years old, and used the materials for maize production. Some people saw what Bahati was doing, and found it interesting that the maize he planted was growing very well and looking healthier than in previous years. Bahati came to the office to report on what he had tried and asked us to go and look at his maize plot. We went and were impressed by his efforts. We asked him if we could bring some more farmers to his plot and he agreed. We then organised a farmers' field day, inviting farmers from the surrounding villages. We showed them the different technologies practised, of which Bahati's plot was a main attraction. All farmers who attended the field day appreciated what they saw and decided to try using night-soil. This happened in 2004.

In the following year, the number of farmers applying night-soil increased. The notion that human waste was useless declined with time. Farmers began buying the contents of old toilets for between 800 and 1000 Tanzanian shillings (US\$ 1) per pit, which have now become a commodity in Ileje. Farmers who have been applying night-soil and other organic fertilizers have

proper management of night-soil and its treatment are essential. So for proper conversion of night-soil into compost, a series of control measures need to be followed. The World Health Organization has also produced guidelines relating to the safe use of wastewater, excreta and greywater (see Box, p.25).

Highly beneficial

The G.B. Pant Institute promotes night-soil as one of the organic farming practices in the region. Enhancement of soil nutrients through night-soil compost in the Lahaul valley is highly beneficial to the local inhabitants. The survey found that after proper treatment of night-soil through the double vault toilet system, the night-soil compost is free of pathogens, reducing health risks to the users. The survey also revealed that the use of night-soil compost can play a vital role in maintaining soil fertility and increasing the crop yield in a region that has a limited growth period (mid April-mid August). This model of sustainable traditional soil management can be scientifically validated and may be replicated in many regions of the world, which could contribute to more efficient and chemical-free cropping systems.

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References

- Drangert, J.O., 1998. **Urine blindness and the use of nutrients from human excreta in urban agriculture.** *GeoJournal*, 45: 201-208.
- Jonsson, H., A.R. Stinzing, B. Vinneras, and E. Salomon, 2004. **Guidelines on the Use of Urine and faeces in Crop Production.** *EcoSanRes.*, 1-35.
- Kuniyal, J.C., S.C.R. Vishvakarma and G.S. Singh, 2004. **Changing crop biodiversity and resource use efficiency of traditional versus introduced crops in the cold desert of the northwestern Indian Himalaya: a case of Lahaul valley.** *Biodiversity and Conservation* 13 (7): 1271-1304.
- Mashauri, D.A., M.A Senzia, 2002. **Reuse of nutrients from ecological sanitation toilets as a source of fertiliser.** Water Resources Engineering Department, Dar es Salaam, Tanzania.
- Oinam, S.S., Y.S. Rawat, R.S. Khoiyangbam, K. Gajananda, J.C. Kuniyal, and S.C.R. Vishvakarma, 2005. **Land use and land cover changes in Jahlma watershed of the Lahaul valley, cold desert region of the northwestern Himalaya, India.** *Journal of Mountain Science*, 2 (2): 129-136.

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Photo: Author

Mr Admin Lungwe in his maize plot fertilized with night-soil.

While night-soil is ranked as one of the better organic fertilizers in the area, the major difficulty is availability. In addition, some farmers still query whether it is hygienic and safe to handle with bare hands.

The application of organic fertilizer in Ileje district has reclaimed farmers' land. The nature of the soil has improved in comparison to previous years. Crops are growing as well as they did before the introduction of chemical inputs.

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Tanzania

realised an average increase from two to fifteen 100 kg bags of maize per acre. This has attracted many farmers to apply night-soil as basal and top dressing fertilizer. Because night soil was previously regarded as useless, latrine pits were constructed far away from homesteads, and were dug up to 15 feet deep. Nowadays, toilets are constructed closer to the homestead and not to that depth. This has been done purposely to reduce the workload of emptying the pits. Other improvements have been made, such as putting crop residue and other organic material in the pits, to increase the volume of fertilizer.

Collection of night-soil

When the toilets are full of human waste, farmers cover them with soil, and leave them for at least two years for the decomposition process to take place. After this, the cover layer of soil is scraped off and the pits are emptied using spades and hand hoes. As protection, farmers wear gloves and gumboots. Before using night-soil as fertilizer, people used to throw dangerous materials like broken glass and nails in latrines. Now, family members are aware of the danger of such material, and dispose of them elsewhere.

Night-soil has been found to be the best fertilizer, compared to other organic fertilizers, as it tends to give a quick response, especially when used as top dressing. Farmers have noted that night-soil should be applied in small quantities as it may lead to crop burn (scorch) if applied in large amounts. They also mention that it is worth paying for this organic input, as yields are so much better than when no fertilizer at all is used. Fields planted with night-soil are fertile for more than two years. It is possible to get good harvests on the same plot for three years consecutively without applying other fertilizers.