Humanure fits into the cyclical process

Author: Theo Grent – Berlin, March 15th, 2021

We are slowly losing the earth's phosphate supply because we do not recycle it properly. When we shit and piss, most phosphate now ends up in the sea or in sewage sludge. Moreover, although it perfectly fits into many agricultural systems, current standards don't allow humanure in organic farming practices.

In the Netherlands, the livestock sector produces more animal manure than allowed to use on the total acreage of Dutch agricultural land (about 1.8 million hectares). For the element phosphate this means that the mineral balance is strongly positive. Much more phosphorus enters the Netherlands (in 2018: 105 million tons), while only slightly more than half of this quantity (65 million tons) is re-exported. The largest source is animal feed (70 million tons). Most of it is converted into manure by livestock, which therefore creates a huge manure surplus in the Netherlands. Approximately 75% of the nutritional value in feed consumed by livestock returns into the manure as plant nutrients and raw materials for husbandry.

Yet, that is only half of the story; there are not only many farm animals in the Netherlands, there are also many people. Citizens convert their food into "human manure" and other waste products, which are hardly ever recycled. Together with industrial waste, this "humanure" accounts for roughly one-fifth (20 million tons) of the phosphorus that enters the Netherlands annually and that disappears entirely from the cyclical process. This is unsustainable: phosphate is a finite raw material and we are literally flushing it down the toilet like poop.

Therefore, the task must be to prevent this almost irreversible loss. However, this will increase the phosphate surplus in Dutch agriculture. A society wanting to balance phosphorus, must import less animal feed and instead replace the decline in animal manure with humanure. The livestock sector doesn't shrink, however, if processes will be developed to process and export the phosphorus from both humanure and agriculture's surplus.

Until the mid-19th century, people habitually returned the gathered feces to agricultural land. Back then, most citizens used a cesspool that was regularly emptied. Todays, the process of processing people's excrements need to be adapted: improved hygiene, composting, and disposal of wastes. A number of eco-villages has already brought this into practice: the poop is disposed of on a small scale to a plant where biogas and phosphate are extracted.

Although according to current international regulations of organic farming practices, the use of humanure is not (yet) allowed, one can hardly discuss long-term sustainable soil fertility without considering the waste products of our own bodies. If we consume the products of our soil and fail to return our urine and feces to that soil, then 'we' become a form of erosion, a vehicle for the unsustainable removal of vital nutrients from our agriculture and food system.

The loss might seem less significant because the volume of humanure is very small compared to the huge amounts of other organic materials used to build the soil. However, we mustn't overlook that its fertility is very dense, like any other manure. Humans eat a rich and varied diet, far more so than any livestock, and our digestive systems are comparatively inefficient at absorbing and utilizing all that goodness. This is reflected in the intense richness and smell of our wastes. The more our offal smells awful, the more fertility it contains.

If we aspire to a sustainable agriculture and food system, we must recognize that poop is not a four-letter word, but that our filth is a resource. All feces should go back onto the land and stay there. Yet we must acknowledge that there is a very good reason for feeling disgust at our bodily wastes. Not only are they nasty, they are hazardous. Do not simply spread feces on the land and plant crops there; that is a sure recipe for disease. If a stray of *E. coli* bacterium finds its way into our upper digestive tracts (say, if we eat contaminated food), it can really wreak havoc, even to the point of death. Therefore, the poop must first be properly composted and proper hygiene must be practiced by the compost maker. Besides, it's critical to keep the humanure composting system completely separate from the regular compost system.

A commonly used humanure system begins with the privy. In its simplest form, the excreted materials simply fall into a fly-proof catchment chamber below the poop box. Throw a dot of shredded leaves down the hole after each shit, but hardwood sawdust, cocoa shells and other organic materials at hand also do a good job muffling the stench. However, shredded leaves are more effective odor quenchers and produce higher-quality fertilizer. Next to the buffering materials being valuable soil amendments, this ensures not only that no odors will be emitted, but also that there will be no seepage out the back side of the catchment chamber.

Twice a year, spring and fall, shovel out the chamber and transport the contents to a nearby double-bin compost system used exclusively for humanure compost and empty it onto a base layer of more organic material. When the pile is finished, cover it thoroughly with yet another layer, so that none of the humanure is exposed to view or, more important, to flies. After six months, turn that pile into the adjoining bin to make space for the next privy cleaning; cover it again with shredded leaves or the like. At the end of the process – 12 months after emptying the privy – this twice-turned material is hardly recognizable as having any fecal origin. Notwithstanding all the leaves it is a very rich material, richer than the best livestock manure and, thanks partly to the leaves, having a highly diverse mineral content. It is ready to use.

While properly composted humanure is safe to use on anything, don't assume you've done everything perfectly, and therefore apply it only to appropriate crops. This makes sense anyway, because a relatively small amount of humanure doesn't go far in the general garden. Besides, many crops don't need it and indeed would be better without anything so rich. A few crops, however, such corn and squash, will welcome all they can get and make good use of it. Furthermore, the amount of humanure compost generated yearly is just about right to satisfy the needs of those particular crops. It helps that they are both large-seeded crops, for which you can make a wide, deep furrow, fill it with the compost, and drop on the seed on that before covering with soil. It may leave a slight ridge, but the humanure is well buried, so even if any parts are less than perfectly cured, it will not pose a health hazard. When the crop is hilled up, it will be further buried, and when the land is next tilled, it will be totally part of the soil and any remaining *E. coli* will have been completely neutralized by the soil community.

Someone once suggested that humanure fits into a perpetual-energy system. That is ludicrous. In fact, humanure, like any animal manure, is a relatively insignificant piece of the overall fertility picture; a drop in the bucket. On the other hand, it is far too valuable, far too rich a resource to waste, especially since wasting involves robbing one part of the world while polluting another. Although recovering phosphorus from humanure only increases the surplus in the Netherlands, it is necessary to introduce a cyclical process in its agricultural and food system. After all, phosphate is a finite raw material that needs to be handled much more carefully. What is certain, however, is that if we don't recycle this precious element, the phosphorus is lost forever from the land that produced it in the first place.