

HUMANURE COMPOST TOILET SYSTEM

CONDENSED INSTRUCTION MANUAL

What is “humanure”?

Humanure (human manure) is human fecal material and urine. It is a major source of environmental pollution around the world. It is also a source of disease organisms. When discarded into the environment as a waste material, it creates pollution and threatens public health. When recycled, the pollution and health threats can be eliminated. Humanure also contains valuable soil nutrients that can enhance plant growth. For these reasons, humanure should be recycled whenever possible.

How can humanure be recycled?

Humanure can be recycled in two basic ways. First, it can be applied raw to agricultural land. In this case, humanure may be called “night soil.” Unfortunately, raw applications of human excrement to soil can still create pollution and spread disease, so this method of recycling is strongly discouraged.

The second method of recycling humanure is through a process called “composting.” This is the process used by the humanure compost toilet system described in this manual.

What is composting?

Composting is the feeding of organic material such as humanure to small organisms such as bacteria. Many compost organisms are too small to be seen, however, many of them can be seen. The larger ones include earthworms and many other tiny insects. Fungi also live in compost piles and they digest the tougher, woody plant materials.

What are organic materials?

Organic materials are those materials that came from recently living things such as plants and animals. Common organic materials include animal manures, including humanure, sawdust, food scraps, weeds, leaves, grasses, wool, hay, straw, agricultural byproducts such as wheat chaff or residues from beer-making or food production. A compostable organic material that is not from a recently living thing would be, for example, peat moss.

How does one feed these materials to compost organisms?

Organic materials are fed to compost organisms by creating a compost pile. A compost pile allows us to combine various organic materials above ground where air can reach the pile and provide oxygen to the aerobic microorganisms inside it. It also allows us to keep the organic materials quarantined inside an enclosed area away from people, dogs, goats, chickens and other creatures that should not be disturbing the compost pile.

Compost microorganisms will digest and convert humanure into a safe and pleasant soil-like material when the humanure is combined with other organic materials, especially ones that include materials such as grass, leaves, sawdust, hay, straw, and other animal manures. Compost organisms do not like raw humanure because it is too wet and too high in nitrogen. When combined with drier materials that are higher in carbon, such as the materials listed above, the compost organisms love to eat humanure.

Humanure Toilets

A humanure toilet is a collection device and not a waste disposal device. The purpose of a humanure toilet is to collect human fecal material and urine so that the toilet material can be composted. Also collected in the toilet are all toilet paper as well as paper tubes from the center of the toilet paper rolls (if any). All urine is collected in the humanure toilet and not diverted for collection elsewhere. Also collected in a humanure toilet are vomit (when sick), and baby diaper fecal material (scraped off the cloth diaper into the humanure toilet). Collect food scraps in a separate compost container and deposit them directly into the same outdoor compost bin. If you collect food scraps in the humanure toilet, you risk a fruit fly infestation.

The humanure toilet should be constructed to look like a normal toilet with a toilet seat. It should be located in a private, comfortable setting, indoors during cold weather or year-round. The collection container should have a

minimum 20 liter capacity. When properly used, the humanure toilet will create no unpleasant odors.

How can a humanure toilet not create bad odors?

When any foul smelling material is deposited into a humanure toilet, it is covered with a clean organic material in order to prevent odor, absorb moisture and prepare the material for composting. This is how humanure is mixed with the other organic materials that allow it to be composted — by covering it. No manual mixing, stirring or digging of the humanure is required, only covering. Therefore, the clean organic materials used in the toilet are called “cover materials.” The cover materials used in the toilet should have a somewhat dry and fine consistency. Sawdust from trees (rather than dry boards) is ideal, but other materials can be used depending on what is locally available. Some areas utilize rice hulls, others utilize coco coir, peat moss, rotted leaves, etc., even shredded junk mail. Proper cover materials are absolutely essential to the successful operation of a humanure toilet.

Can wood ashes be used as a cover material?

Wood ashes or coal ashes should not be used as a cover material in humanure toilets, nor should they be used for making compost. Compost organisms do not digest such materials. Clean wood ashes (wood ashes without plastic or other garbage burned in the fire) are good for the soil. They should be spread over a garden area or saved in an outdoor pile or in a fire-proof container for later garden use, but not added to a compost pile.

How much humanure can be collected in a 20 liter container?

A 20 liter container will collect about one week’s worth of human fecal material and urine, including cover material, produced by one adult. Human excrement is mostly liquid. The liquid will fill in the spaces between the cover material as the toilet container fills up. When using a humanure toilet, a clean layer of cover material should be kept over the toilet contents at all times. The simple rule to follow is this: if the toilet contents have an odor, add more cover material until there is no odor.

How is the humanure composted?

The collected toilet material is taken to a compost bin and added to the bin’s contents. If a single adult were using a humanure toilet with a proper cover material, he or she would produce one full toilet receptacle once a week. For an average family of four, four toilet receptacles would be filled per week. For every 20 liter container of toilet material produced, an equal container of organic cover material will be necessary. When the toilet user also composts the toilet material, under normal circumstances, it should take about 20 minutes to empty and clean four toilet containers. The job of humanure composting should be conducted by a single family member who is trained in the use of humanure toilets, although other family members can also assume this responsibility if they have also undergone proper training.

What can you use for a toilet receptacle?

A plastic receptacle with a handle, a lid and approximately a 20 liter capacity makes for a simple, inexpensive humanure toilet receptacle on an individual human scale. Presumably, any easily carried waterproof container with a lid can be used as a humanure receptacle.

Is one toilet receptacle enough?

Not really. For best results, the humanure toilet should be equipped with a minimum of four toilet receptacles, all of which have lids and all of which are exactly the same size and shape. When one receptacle is filled, it is removed from the toilet, covered with a lid, and set aside, preferably in a non-freezing location (it’s impossible to empty frozen containers). A clean, empty receptacle is then set inside the toilet to replace the one that has been removed. When the second receptacle is filled, it is also removed, covered and set aside. The third receptacle is then set into the toilet. Now the first two receptacles can be removed for composting. It is easier to carry two receptacles at a time when toilet containers with handles are being used. It is important to have the toilet ready and available for use at all times. For example, you do not want all of your toilet receptacles to be full when someone has to use the toilet. Also, when four receptacles are being used, they can all be emptied at the same time when the fourth one becomes full.

Won't the toilet containers smell bad after they are emptied?

Yes, the toilet containers will smell bad. That is why they must be cleaned every time they are emptied. They should be cleaned by using a long handled toilet brush and water. Graywater and rain water are both suitable for this purpose. The soap in the graywater will not hurt the compost. In fact, a little bit of soap is good to use when cleaning the compost container. It takes about 2 liters of water to clean one 20 liter toilet container. All water used to clean the compost receptacles should be deposited into the compost pile and never anywhere else. Furthermore, only biodegradable soaps should be used. Toxic liquids such as paints, solvents and petroleum products should never be allowed to contaminate graywater or compost. After emptying and cleaning toilet containers, the compost-maker should wash her or his hands.

What is the compost pile like?

Humanure can constitute a threat to public health because it can contain disease organisms. Therefore, it must be kept isolated from access to the public until it completes the composting process. There are three basic rules of human sanitation: 1) humanure should not come into contact with water; 2) humanure should not come into contact with soil; and 3) you should always wash your hands after using any toilet or after adding toilet materials to a compost bin.

Humanure is composted in a "compost bin." The purpose of the bin is to isolate and quarantine the humanure so that it does not come into contact with soil or water, nor can it be accessed by children or animals. Also, the bin elevates the humanure into a vertical pile, which helps the compost organisms have access to the oxygen they thrive on.

Why won't the humanure come into contact with the soil when it is put into the compost bin?

A humanure compost bin should be built on a soil base. This allows soil organisms to enter the compost from underneath. Such organisms can include earthworms and many other small creatures and insects, all of which are good for the compost pile. When building a new bin, some dirt should be removed from the bottom of the bin in order to shape the floor of the bin like a very shallow bowl. Before a humanure compost pile is started in the bin, the indented bottom of the compost bin is filled with organic materials in order to create a thick layer between the humanure and the soil. This layer will absorb liquids draining from the initial humanure deposits. This is called a "biological sponge." It can be made of grass, leaves, weeds, hay, straw, animal manures, etc., or a blend of such ingredients, and it should be approximately one half meter deep or more. Once the humanure begins to compost, which is indicated by internal heating of the compost pile and may begin in 48 hours or take 2 to 6 weeks, depending on how soon sufficient mass accumulates, the compost pile will then begin to absorb moisture and will even require watering in dry climates. Graywater can be used to keep the compost pile damp. The compost should always have the moisture consistency of a wrung-out sponge, and can even be wet, which is why we add all urine to a compost pile. If it is too dry, the microorganisms cannot thrive and the organic material will not compost.

Why would it take 2-6 weeks before the compost begins to work?

The compost pile requires sufficient mass before it will start to heat up. That's why composting will not occur in the 20-liter toilet receptacle, only in a larger compost bin. The amount of biological activity in the compost pile can be determined by monitoring the temperature of the compost using a compost thermometer, which should be about 50 cm long. Compost organisms generate heat during the composting process. Some compost piles will be so hot you cannot put your hand inside the pile. The heat, however, is internal. Compost piles do not radiate heat and cannot effectively be used as a heat source.

Will the compost bin smell bad?

When any toilet material is deposited into the compost bin, it must again be covered by a cover material to prevent odor. The cover materials used in the compost bin can be rough and coarse and can include such things as weeds, leaves, grasses, hay, straw, even scrap woolen or cotton materials, but should never include tree branches or other thick, woody materials, including wood chips. The cover materials should be used in such a manner as to keep a cushion of cover material around the outside edge of the bin in order to prevent toilet materials from leaking from the sides of the bin. The toilet materials should be deposited into the center of the bin into a depression dug there for that purpose, then covered over with the cover material. A tool should be kept

at the compost bin for use in making the compost and the tool (such as a shovel or hay fork) should not be used for any other purpose anywhere else. The same rule for cover material usage at the toilet is used at the compost bin: if it smells bad, cover it until there is no odor.

What about rain water? If humanure is not to come into contact with water, should we keep out the rain?

Rain water is good for compost because it helps keep the compost moist. Once the compost starts working, it can absorb a lot of moisture. In areas where rain is excessive such as monsoon areas, it may be advisable to cover the compost during heavy rains. If the compost is subjected to excessive rain, it can leach liquids from the bottom of the pile. This is unlikely to occur under normal circumstances. However, in severe rain conditions a simple water-proof cover over the compost, such as a large plastic bag or tarp, will prevent leaching. In dry climates, in addition to allowing rain to wet the compost, the compost may need to be watered. Graywater, for example, can be used for this purpose.

What about freezing?

If the compost pile gets too cold, it will lose its heat, stop working and go dormant. In very cold climates, it will freeze solid. When the compost pile is frozen, it can still be added to. Care should be taken to keep a cushion of cover material around the edges of the bin in the winter months. You may also need to keep more cover material on top of the pile in cold weather to help insulate it. Also, material added to a frozen pile should be spread out to keep it somewhat flat in order to prevent a frozen mountain from developing in the center of the pile. Furthermore, in very cold months, cover materials will also freeze. It is best to keep cover materials dry in the winter months so they don't freeze. A bale or two of straw or hay, per family of four, per month, will provide sufficient cover material for use on the compost pile during the winter. It should be noted that the compost will not emit unpleasant odors when frozen, so quantities of cover material used in frozen conditions can be minimal. In addition, the cover materials used in the toilet itself should be kept from freezing. If sawdust is used as a cover material in the toilet, for example, a container of sawdust should be kept indoors and unfrozen at all times.

What else should be put into the compost pile besides toilet materials?

All food scraps should also go into the compost bin. These can include meats, bones, fats, vegetable peels, liquids such as spoiled milk or stale beer, tea bags, egg shells, hair, and anything else that is organic and produced by the household during food production and consumption. Of course, bones and meat scraps can also go to a dog and food scraps to a pig, but these materials can also go into the compost pile. So can cotton sanitary napkins (although you will have to pick out pieces of plastic from the compost when it is finished). Small animal mortalities such as dead chickens, ducks or other creatures can be recycled through a compost pile as well. Other animal manures, such as chicken manure, sheep manure, horse manure, goat manure, etc., are also excellent for adding to a compost pile. If you have large amounts of animal manures, such as from a herd of animals, much of the animal manure can be composted separately so your household humanure compost bin does not fill too quickly. When adding foods or materials to a compost pile that may attract scavenger animals such as dogs, always dig a depression in the top center of the pile, drop the materials into the depression, and cover over with the compost and the cover materials. The top center of the compost pile is the most active part of the compost. This is where fresh material should be added, if possible. It may be necessary to keep a cover on top of the compost pile to prevent dogs and other animals from climbing on top of the pile and disturbing the compost.

When should a compost pile be started?

The best time to start a compost pile is in the mid-summer when the days are the longest. At this time, there is ample vegetation for creating a biological sponge and for fresh outdoor cover material. The compost will start working more quickly during this time of year. Compost prefers fresh, green vegetable matter over dried vegetable matter, so fresh leaves, weeds, grasses and sawdust are ideal for a compost pile. Later in the year, if the pile goes dormant and even freezes, there will be an adequate population of compost organisms already in the pile that will enable the pile to start working again after it thaws out in the spring. On the other hand, anytime a compost bin fills up and has no more capacity for additional organic material, a new bin can be started, even in the winter months.

How long does it take to fill a bin?

A standard humanure compost bin for a family of four is about 1.5 meters square by about 1.5 meters high. A bin of this size can hold the entire amount of organic materials collected by a family of four, or more, over a year, including humanure, cover materials, food scraps, garden and yard materials. The reason a small bin of this size can hold so much material is because the compost shrinks while it is working. The compost organisms are converting the organic materials into a dense humus — a process that involves constant shrinking of the organic materials that are added to the pile. When composting for groups larger than the average family of four, a single compost bin will fill more quickly. When this bin is full, a new bin must be put into use. In cold weather months when the compost is dormant or frozen, it will undergo no shrinkage and will fill more quickly. However, once it starts working again in the spring, it will again start to shrink.

Is this true that a compost pile should be turned periodically with a shovel?

No, it is not necessary to turn compost piles. Let the compost organisms do the work for you. Sufficient oxygen will be entrapped in the pile as you add compost materials. Digging and turning the pile will disturb the compost organisms that have established their own layered populations. Just build the pile, patiently allow it to age, then use the compost. It is a mistake to try to hurry the composting process. Composting requires patience. It also helps to have experience, intelligence and a sense of responsibility. Composting is like an art. The practice of composting can be improved through experience and observation. There is much misinformation being circulated about backyard composting, often, ironically, by compost educators. To learn more about “compost myths,” read the Humanure Handbook.

When is the compost ready to be used?

After the compost bin has been completely filled, it must be covered with clean cover materials and left to rest, undisturbed for approximately one year. This is the aging or curing stage of the compost and it is a very important stage. The amount of time the compost is allowed to age, undisturbed, is called the “retention time.” During this time, nothing whatsoever should be added to the compost bin. During the retention time, the final decomposition of the organic materials in the compost bin is taking place. This is often dominated by fungal organisms as well as larger organisms such as earthworms. The compost environment is an alien environment for human disease organisms and such “pathogens” are killed during the composting process. The retention time allows for an additional safety period for the destruction of any lingering human pathogens. The compost will continue to shrink during the retention time.

How should the finished compost be used?

The finished compost, after the retention time is complete, should look and smell like rich, dark, moist garden soil. It can be used to grow garden plants, trees, vines, shrubs and flowers. If the compost pile has undergone thermophilic (hot) composting, it can be used on top of the soil as a mulch. It can be dug into the soil for better root access for the plants. It can also be buried in holes where trees and shrubs are to be planted. Once the humanure compost toilet system is in use and the first batch of compost has been completed (which will require approximately a two year period), the average household of four people will produce approximately one cubic meter of compost annually. As a matter of control and in the interests of public health, all compost produced on a family plot should be used only on that plot.

How do we know the compost is safe to use?

Finished compost will never be sterile, but it should be sanitary. That means the compost should be teeming with microscopic life consisting of beneficial microorganisms that do not pose a threat to human health. Any human disease organisms that may have been in the original organic materials should have been eliminated, weakened, or greatly diminished by the time the compost has been finished. Ideally, when a humanure compost program is established in a community area, the program should be monitored by the local health department and the local agricultural department. Finished compost can be tested for both the existence of pathogens as well as for agricultural quality. If a humanure composter has doubts about the safety of his or her finished compost, the compost can be used for ornamental plants and flowers, for trees and bushes, or for food crops where the compost will not come into contact with the food and where the handling of the compost will be minimized.

Another alternative is to simply allow an additional year of retention time for the compost. Allowing additional retention time requires no energy and only a small amount of space. The additional retention time contributes to the overall safety of the finished compost when the compost quality is in question (such as when the humanure has been collected from a population that suffers from confirmed diseases). Therefore, if the compost does not seem “finished” after a year of collection and a year of retention, allow it to age another year. The additional year of retention time will allow it to complete the miraculous transformation from toxic waste to beneficial compost.

A healthy household that composts its own humanure does not need to be overly concerned about the safety of the finished compost if the instructions in this manual are carefully followed. On the contrary, by composting humanure rather than disposing of it into the environment, long-term public health and safety conditions should be improved, the environment should be protected, and the finished compost should provide a wealth of soil fertility for the composting family.

Building a Humanure Toilet

The humanure toilet is only one part of a three part compost toilet system. Those three parts include the toilet, the cover material and the compost bin(s). All three are necessary for the humanure compost toilet system to work properly.

The humanure toilet is a collection device. In order to prevent environmental pollution caused by humanure and in order to compost humanure, it must be collected before it comes into contact with the natural environment. It is therefore collected in a waterproof container for the purpose of depositing it into a contained composting environment. No composting occurs in the toilet itself.

The toilet collection receptacle should be a minimum 20 liters in capacity because this size container can be easily moved by one person when full. If a container of this size is too heavy for one person when full (for example, when moved by a small, elderly person), then the receptacle can be carried and emptied *before* it is full.

Some compost toilet systems locate the toilet directly above a compost pile to eliminate the need for a portable toilet receptacle. However, this is difficult to do indoors without a long-term odor problem and it is considerably more complicated and expensive than the humanure toilet discussed in these instructions. Therefore, such a system is not the subject of this manual.

The toilet receptacle can be enclosed in a moveable box-like structure, or it can be permanently built into a toilet cabinet for stability and aesthetics. As stated earlier, four receptacles should be used with the toilet and more if the population served by the toilet is greater than four people. Or, for every person who regularly uses the toilet, there should be a toilet receptacle available for use. For an average family of four people, this means four receptacles. The toilet box or cabinet is built to fit the toilet receptacle, which is why it is important to have the receptacles on hand when the toilet is built. Twenty liter (5 gallon) receptacles come in all sizes and shapes. If the toilet is built to fit one particular receptacle, that does not mean it will fit a different receptacle. If a replacement receptacle is two centimeters higher than the original receptacle, for example, then the toilet seat will not go down flat. So begin the toilet construction by first acquiring a minimum of four toilet receptacles, with lids, that are exactly the same size and shape.

Next, build the box or cabinet. A box creates a moveable toilet and a cabinet is permanently built into a wall. The most convenient form of box or cabinet is one with a hinged lid that allows for easy removal of the compost receptacle. There are a few simple rules to follow when building a toilet box or cabinet. First, the top of the toilet receptacle should nearly come in contact with the bottom of the toilet seat ring. Therefore, the height of the toilet box is critical and the box has to be built to fit the height of the particular container that you have acquired. Secondly, the front edge of the toilet seat ring should line up with the front edge of the toilet box. These two design elements are important because of human anatomy. If the toilet receptacle does not come nearly into contact with the underside of the toilet ring, then urine can be ejected above the toilet receptacle, especially by young boys while defecating. If the toilet seat ring is situated too far back from the front of the toilet

box, then urine can be inadvertently deposited on top of the front of the box, thereby causing it to deteriorate prematurely. For a good, solid, long-term toilet, the top board should be a single piece of wood, such as a piece of exterior plywood. This wood should be painted, varnished, or otherwise sealed for long-term performance and for easy cleaning. The side pieces can be wood, new or salvaged, of various sizes depending on availability and personal preference. The length of the legs is what determines the height of the box. Illustrated instructions on how to build a humanure compost toilet box are available on the internet at humanurehandbook.com. Examples of owner-built humanure compost toilets are also shown, as are video clips of humanure composting and humanure toilet construction.

Acquiring the Cover Materials

Without proper cover materials in adequate quantities, the humanure compost toilet will not work properly. An individual family can usually find such cover materials by locating local sawmills or sawdust piles, purchasing peat moss, hay or straw, or scavenging materials from the local environment such as leaves, grasses and weeds.

A community-wide humanure compost toilet program, however, may require the cooperation and participation of the local government and/or local businesses. When large quantities of cover materials are needed for large numbers of village composters, a survey of available compostable cover materials should be conducted before the compost toilet system is adopted on a large scale. This survey would include all local business, such as manufacturing operations where organic materials are used (wool, wood, paper, food, etc.), logging and lumber operations, and agricultural operations. It is likely that significant quantities of compostable materials are going to waste or are being landfilled that could instead be diverted into a compost recycling stream. These materials must be located, assessed for composting suitability, and transported to the village areas where humanure compost toilets are to be utilized. This approach would not only provide cover materials that would enable the use of safe and constructive biological toilets, but it would also help to eliminate waste in the local manufacturing community. Alternatively, toilet material from villages or other groups can be transported to a centralized compost facility where cover materials are stockpiled.

In areas of the world where composting has been underutilized or non-existent, pilot projects should be set up with prototype toilets that use different local cover materials or combinations of cover materials and the results scientifically monitored to determine which materials make the best compost. Furthermore, in drier climates where the compost may need to be watered, prototype toilet systems can be monitored that apply different amounts of graywater to the compost piles, and again data can be collected to help determine the amount of wetting that may or may not be required.

In any case, cover materials should not be too wet, such as a sludge, and they should have a basic carbon content such as cellulose materials from plant sources. Animal manures, if somewhat dry (as collected with animal bedding) can make excellent composting materials and can perhaps be suitable cover materials if odor is not a problem. Other materials from animal sources may also be suitable for composting.

Again, the simple rule when using cover materials is if the material that is covered smells bad, it needs more cover material. Cover until there is no unpleasant odor (providing the cover material itself does not have unpleasant odor).

How To Build a Compost Bin

The simplest compost bin would be a single bin of a maximum 1.5 meters square and 1 to 1.5 meters high with an open top and one side removable. The open side should be closed off to animal access. This can be achieved by using removable boards or even bales of hay or straw to close the open side. The open side covering can be raised as the level of the compost rises, in order to hold the compost into the bin. If the top of the compost is accessible to chickens, dogs, etc., it should also be covered. A simple wire mesh cover will prevent the compost from being disturbed by animals and it is easily removable when adding compost to the pile. The compost bin itself can be built from scrap wood boards, wire mesh, bales of hay or straw, other recycled materials, or even masonry materials.

A humanure compost toilet system can be used in the same location for generations. Therefore, the most serious composters will construct a permanent bin. A minimum three bin system is recommended. One bin is filled for a one year period, then it is left to age. Another bin is filled for one year as the first bin ages. The first bin is gradually emptied as the second bin nears filling. By the time the second bin is full, the first bin is empty again and the cycle starts all over. The third bin, which would be the center bin, is used to store cover materials. This bin should be covered in order to keep the cover material dry in the winter months so the material won't freeze. A roof over the center bin can also be used for rain water collection, with the water being conveniently used for cleaning compost toilet receptacles. A rain water collection system, however, must be drained during freezing weather.

The bins should be constructed on a slightly concave soil base so leachate, if any, will be contained. The soil base also acts as a conduit for soil organisms to enter the compost.

When scrap lumber is used for the sides of the compost bins, the lumber will eventually rot. When this happens, the lumber should simply be replaced. Do not use lumber that is treated with chemicals for the compost bins. The object of the bins is to provide a suitable home for compost microorganisms. Toxic chemicals do not suit that objective. Examples of compost bins are shown at humanurehandbook.com.

Compost Toilet Collection for Centralized Composting

An alternative to individual "backyard" humanure composting is centralized composting at a compost facility operated by either a government agency or by a private enterprise. In such a scenario, the humanure toilet receptacles are regularly collected from homes and even apartments and taken to a central composting facility. In return for the collected toilet material, which contains valuable soil nutrients, the home resident is provided with cover materials for use in their toilet and with clean toilet receptacles. This scenario would appeal to those people who want to use an indoor, environmentally friendly, biological toilet, but have no use for the compost, or no place for a compost bin.

Compost Monitoring by Government Agencies

When humanure compost toilet systems are employed on a large scale in villages, it may be advisable for the local health department, the local agricultural department and even local universities to provide assistance. This can be done by monitoring the compost-making process to determine best practices (which cover materials work best, how much gray water is required to water the compost, if any, etc.), to analyze finished compost samples for the existence of pathogens, and to conduct analyses of the finished compost to determine its agricultural value.

Compost Toilet Training Programs

When humanure toilet compost systems are being employed by individuals on a large scale in a village setting, it is important that the individuals undertake a training program prior to starting their composting systems. This training program should include being required to read and understand a manual such as this one, being required to watch an instructional video showing a successful existing humanure compost system in operation, and attending a toilet building workshop, a compost bin building workshop, or a compost usage workshop. These training programs could be conducted by local NGOs, local government agencies, or by local private enterprise.

Opportunity for Cottage Industries

When valuable materials are discarded as waste, they create a drain on the revenues of society. When valuable materials are recycled, they allow us to reclaim wealth. The recycling of humanure on a large scale can create small businesses. These could include toilet making businesses, compost bin construction and erection businesses, and compost-making businesses. The finished compost can enhance local agricultural production. The finished compost can also be a valuable saleable commodity. Therefore, humanure compost toilet systems can provide an opportunity for the creation of new, small businesses.

For more information: The Humanure Handbook, by Joseph Jenkins, or visit humanurehandbook.com.