

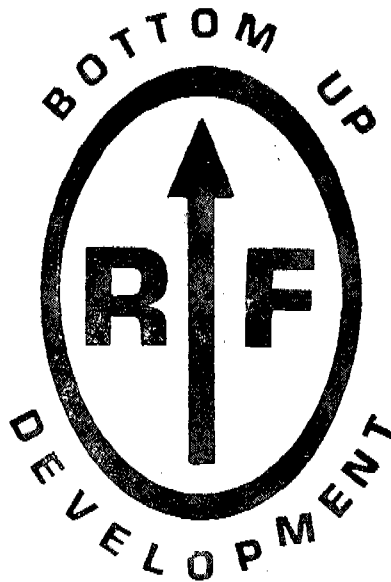
DO - IT - YOURSELF RURAL TOILETS

by

Dr. Felix A. Ryan. D. Sc.

Appropriate Technologist,

Environmentalist.



Avoid Government pipelines and help the poor
help themselves.

The bare-foot revolution has failed, self-help
revolution is the last resort.

The poor will remain poor if they depend on the
technology of the rich.

RURAL SELF-RELIANCE



GROW PLANTS AND
TREES AND KEEP
LIVESTOCK TO INCREASE
EMPLOYMENT
AND PRODUCE FOOD

-Basic objective of
RYAN FOUNDATION

R Y F O Do-It-Yourself

Rural Toilets

Explained with diagrams and

constructional details

By

Dr. Felix Ryan

UN (Advisor) Global 500 Laureate

(formerly, Director, Ministry of Industry,
Government of India)

In rural parts of Third World Countries construction and maintenance of water sources and sewerage disposal system is essentially a community responsibility. This responsibility should never be taken over by the Government system in which nobody is really responsible or concerned. Government servants caught up in a web of delays are corrupt, indifferent and non-cooperative. Our progress towards health for all by the year 2000 can be made possible only if rural people take over the responsibility of water supply and waste disposal.

Dr. Felix Ryan.

Published by

Ryan Foudation

Registered Public Charity

to commemorate World Environmental Day

June 5 1991

RYAN FOUNDATION

(Net Working Umbrella Organization)

Ryan Foundation registered as a Public Charity in 1982 in memory of J.C. Ryan exists to relieve poverty and hunger, disease and distress in poor countries and communities. The Foundation takes information and education to the poor and illiterate on better sense of values, better environment, better life-style, and self-help projects in particular. It does not give the poor fish to eat but teaches them to fish for themselves for a self-reliant, self-sustaining growth. The basic objective of the Foundation is human and not material development. Headed by a former United Nations Advisor on development and guided by a panel of professional experts drawn from several countries the Foundation has published hundreds of Appropriate Technology ideas (handouts) for income generation and rural development in Indian, foreign and United Nations journals and released ready-made project proposals, guide lines, books and pamphlets to help NGOs and service agencies working for Third World Development. Only actual costs on materials, services and literature are charged. For further information contact:
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RYAN Foundation thanks
Catherine Joseph
for editing the booklet.

P R E F A C E

In the late eighties the UNICEF supplied to a Village Community settlement some 100 Kms from Madras City about one hundred toilet pans through the Panchayat of that Village. Some of the pans were fixed without cement plastering in some selected homes were to be ready for the launching ceremony but after the ceremony was over the recipients removed the pans and sold them at half cost to the same contractor who installed them. He in turn made use of the pans in his other building works and government contracts and billed the concerned management the full cost of the pans. This is but one instance but a common practice.

Perhaps it is in view of this fraud that is prevalent in many Third World Countries that the Government of Tamil Nadu is not providing toilets in some houses built for low income groups eventhough the explanation given for their not building toilets is something different from the truth.

In the Periyar District of Tamil Nadu 1900 group houses were to be built during 1990 at an estimated cost of Rs.2070 crores. Each house costing Rs.14,200/- is provided with RCC roof and free electric lights. However, these houses are not to have latrines as people use latrines not to evacuate the stomach but to store utensils. Why pollute a well built room and then try to clean it with water which is scarce and fetched from far away places? Mr. P.W.C. Davidar, Project Officer, District Rural Development Agency, Periyar, said, "we will make the residents of the group houses realise the importance of latrines and then think of providing them one" (The Hindu dated Friday the 12th October 1990).

In the grand old Mohul City of Hyderabad no one ventures to use a public toilet because of poor and unhygienic maintenance. The Civic Corporation has sought the services of a Voluntary Body - Sulabh International, for the construction of low cost toilets. The Organisation constructs toilets, charges 20 percent more, but is obliged to maintain it for 30 years. One such toilet in Nampalli Sarai is reported to be in good shape so far. It is ridiculous but true that the Government or a local body under the control of the Government cannot even maintain a public toilet.

However, the changing hands in administration that is taking place in Hyderabad is in good direction. Sulabh International can certainly do it better. It is an ideal approach for Civic Corporations to reach utility services to the public satisfactorily. Bureaucracies as undynamic organisations short on initiative and long on procedures are most unsuited for rendering service to humanity. But Ryan Foundation goes a step further than the Hyderabad attempt and holds that a private lavatory must be a private property as it is the case in all civilised society, the world over and each family should build, use and maintain its own toilet especially in backward rural areas where civic amenities cannot be reached easily or economically. Therefore, the Ryan Foundation promotes Do-it-yourself rural toilets with local raw materials and negligible investment to be owned and maintained by each family. RYFO latrines prevent people from polluting the environment, ensure privacy for women, promote clean sanitary habits in the Community, protect children from contagious diseases and more than all prevent bureaucrats, politicians and field workers swindling public money or aid money sanctioned for building toilets. In other words, RYFO Latrines meet the purpose of a latrine and the Foundation appeals to NGOs everywhere to promote do-it-yourself latrines on ownership basis, for the rural poor as explained in this booklet.

Dr. Felix Ryan

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Book distributors, NGOs, PVOs or Church agencies that like to distribute this booklet will be given ten percent discount on the marked price. Registered NGOs in Third World Countries which network with the Ryan Foundation will be given a discount of twenty percent. Organizations outside India will have to bear registered sea mail postage. Foreign orders for 100 copies or more will be economical on postage. Apply to Ryan Foundation.

Governments and NGOs are requested to procure this booklet and have copies distributed to Third World Countries, NGOs and to poor communities. Depending on demand translations will be made available, or arranged for, by the Ryan Foundation.

C O N T E N T S

Sl No.		Page No.
1.	RYFO do-it-yourself toilet.....	1
2.	RYFO Flush toilet.....	2
3.	RYFO paint for glaze effect.....	3
4.	RYFO Rural sewer.....	4
5.	RYFO Bamboo pipes.....	5
6.	RYFO Mud pot latrine.....	6
7.	RYFO Mixture for Mortars.....	7
8.	Gandhian Lavatory.....	8
9.	Rural Latrines - 3 models.....	9
10.	Soil for Bricks.....	10
11.	Lavatory built out of poles.....	11
12.	Worms keep soak pits clean.....	12

"Human Development is a process of enlarging people's choices. In principle, these choices can be infinite and can change over time. The most critical are to lead a long and healthy life, to be educated, and to have access to resources needed for a decent standard of living. Additional choices include political freedom, guaranteed human rights and self respect."

Human Development Report 1990 (UNDP)

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Important:- In this booklet reference is made here and there to certain 'handouts' by their serial number. These handouts do not directly relate to the construction of do-it-yourself toilets but to the gum, fibre, materials, methods etc. to be used in the building process. These handouts are not included in this booklet as they are not really necessary. However, NGOs that wish to understand the involved appropriate technology better and to investigate possibilities of bringing about improvements and alternatives may ask the RYAN Foundation for the booklet. "Low Cost Housing for the Poor", which explains.

RYFO Do It Yourself toilet

RYFO Handout 473

The World Bank, UNICEF, WHO and several National, International Governments and NGOs are coming out with better and better, simpler and easier latrines for the rural poor. But all their models require glazed ceramic pans and cement, plastic or metal, pipes. These materials are not made in rural parts but by large-investment factories for a business. Ryan Foundation which discourages rural dependence on machine made raw materials, goods, and urban supplies recommends the simple do-it-yourself flush toilet which can be assembled with raw materials found entirely even in the poorest villages. The illiterate rural people can assemble and mount these toilets by looking at the diagrams in this booklet without any outside help in the form of money, materials or know-how.

1. A mud pot commonly available in villages is used as the water seal latrine pan. It is half blocked with mortar as shown in handout 278 (page 2). Preparation of mortar is explained in Handout 270 (page 7). After the mortar dries any plastic sheet, if available in the village (bags or packing material which has a smooth surface) may be pasted on the slanting mortar surface as shown in Handout 472. (page 6)
2. The bamboo to connect the receiving (soak) pit must be prepared as shown in Handout 175 (page 4) and 323 (page 5).
3. The soaking pit may be dug and prepared as shown in the Handout (page 4) and bamboo pipe outlets from the bottom of the pit may be provided as shown in Handout 175 (page 4).
4. If the inside of the bamboo poles are made smooth they may be used as pipes to connect the pan and the pit.
5. For the superstructure brick construction is not necessary. A Gandhian enclosure can serve the purpose well and it is shown in Handout 47. (page 8) The Gandhian Latrine stand may be permanently placed (planted) on the top of the pot pan as shown in Handout 475. Model One (page 9)
6. Most important. Before using the pot pan a spoon full of waste oil must be poured on the sliding portion in the pot pan and after use a can of water must be poured on it. The seeds of castor which grows wild in almost all third country villages may be boiled for oil.

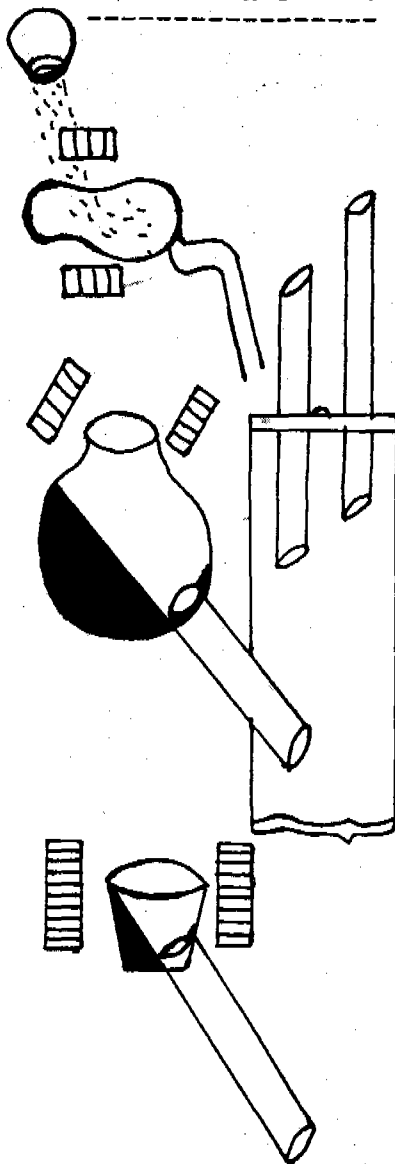
7. If broken glass sheet or mirror is available in the village it may be cut to size and used on the slant inside the pot.

8. Glazing the sloping surface inside the pot as explained in handout 474 (page 3) is better than lining the slope with plastic or glass.

9. To build an almost no cost rural toilet, simple, easy, clean and fine, follow last para in page 9.

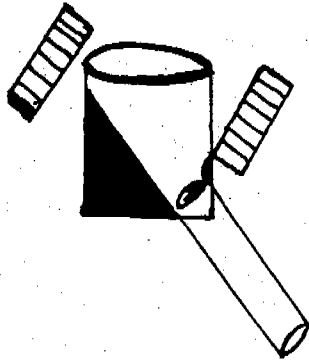
RYFO Flush Toilet

Handout 278



RYFO flush toilets can be built in backward rural areas using traditional village earthen pots, plastic or metal buckets or biscuit tins. Half the pot or container is blocked with cement, and the sloping surface made smooth and slippery as shown in the diagram. If cement is not available, mortar may be prepared mixing 4 kgs of sieved sand, 1 kg of burnt and powdered lime stone, or gypsum, roasted and powdered sea or egg shells, along with quarter kg. of jgaggery, sugar or any gum tapped from a gum tree (see Handout 110) (not in this booklet). This mixture will bind as good as cement. For finding good quality clay or for mixing sand and other materials to make clay see Handouts 109 and 184. (109 not in this booklet) (184 is in page 10)

A hole of 10 cm dia may be made in the container and at one end a two Meter long pipe inserted, plastered and the other end let into the pit as shown. If pipes are not available, bamboo which runs smooth inside may be used and if not smooth inside, the bamboo may be sawed into parts along the joints and uniformly joined outside by plastering to get a free flowing inner surface. Another method is to take two long glass bottles, lay them on the ground, their bottoms touching each other and to use them as a mould to shape the mortar mixture like a pipe (cylinder). Ten such mortar cylinders may be joined by outside sleeve plastering while laying the connection as usually done in sanitary masonry work. The bamboos may be joined also as carpenters usually join wood.



This toilet may be laid in any convenient open space in the village and for privacy the Gandhian lavatory frame shown in Handout 47 (page 9) may be used.

To get an idea of the principle behind a soak pit see Handout 175. (page 4) A long hollow bamboo air outlet from the soaking pit should be provided as shown.

RYFO paint for glaze effect

RYFO Handout 474

Ryan Foundation recommends the use of village made mud pots as water seal latrine pans. See Handout 278. (page 2) On the slanting portion of mortar inside the pot a plastic sheet, if available within the village, may be stuck with tree gum (boil white of tamarind seeds to get good quality gum). Alternatively, if a broken glass sheet or mirror is available within the village it may be cut to size with a glass cutter and fixed on the slant.

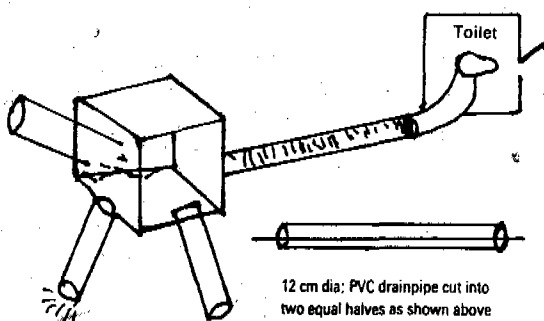
But the best rural alternative, entirely with local materials is to use glaze paint prepared (mixed) as explained below: To make one pot pan take:-

1. Half cup of good dry clay, grind and sieve through fine mesh, preferably in muslin cloth.
2. Half cup of mineral lime - grind and sieve the same way.
3. Dissolve half cup of white crystal sugar in one cup of boiled drinking water and filter.
4. Break two eggs (fowl or duck eggs) and separate the white, reject the yellow.
5. Mix the four and beat with a fork or churn for 15 minutes to get the paint.
6. If too thick, add more water and if too thin add more clay or lime. Get the paint to the consistency of common brush paint used in commercial painting.
7. Use a fine brush and paint the entire inside of the pot. Paint the pot within minutes after the preparation of the paint.

8. Allow to dry for 48 hrs.
9. Add equal quantity of country made alcoholic drink, after filtering it, to the paint left over after painting the pot, make the mix quite watery and pour the liquid on the slanting portion inside the pot to get a permanent smooth finish as good as glazed pottery.

RYFO Rural Home Sewer

Handout 175



Villages in poor countries do not have a sewerage system - for that matter even towns and cities in many Third World countries do not have proper sewerage and drainage. Governments of these countries which are not able to give their village people food to eat are not going to give them sewerage in their life time. The UNICEF, HABITAT and other UN agencies and many NGOs have been developing and

introducing different types of toilets and sewer systems but have not touched the fringe of the problem. Self - help and appropriate technology can take rural communities a long way in this field of development to make life of the rural poor less burdensome.

RYFO rural home sewer system is a simple and inexpensive way of connecting the domestic toilet to an open air disposal tank at a distance of about 50 feet. PVC pipes are convenient to connect the toilet pit to the tank. They are cheap, durable, easily transported and they are easy to lay and maintain. However, earthenware or metal pipes may also be used or lead channels built with brick and mortar. The open brick channel system is to be preferred for villages because it is easy to notice obstacles in the flow, clean and maintain them. Open construction must be closed with slabs, planks, tin sheets or mats. Bamboo pipes (handout 323) may also be used. When water from the bath room is let out through the lavatory pit, the channel will be washed and cleaned every day and once in a fortnight, clogging if any, may be cleared with a broom or a stick.

The slant of the clearing channel must make about 60 degrees to the ground so that what moves out of the lavatory rolls down the channel into the tank. The tank may be about 4

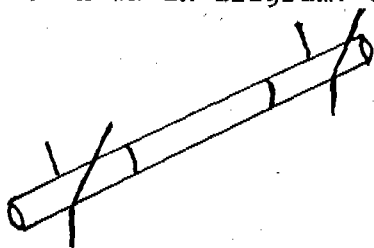
feet deep out of which 3 feet should be underground. The ground may be prepared to slope away from the tank. The 3 outlet lead tubes may be in level with the bottom of the tank. What collects in the tank will go into the soil and spread and fertilize an area big enough to make an excellent kitchen garden for the family. Being exposed to sun and rain, 50 feet away from the home there will be no foul smell. It is better to build the huts in a row and lead all the sewerage towards the same direction. Perhaps this is the most appropriate sewerage system for villages with our sub human level of poverty and abnormal level of corruption. The earth worm called phertima Elongata, explained in page 12 may be introduced into the cement tank to keep it clean and free of bad smell.

RYFO Bamboo Pipes

Handout 323

Bamboo, of the grass family, grows fast and high under hazardous conditions of soil and climate. It is a highly drought resistant forest shrub-tree offering several livelihood possibilities and yet neglected. Bamboos make excellent sewerage pipes in remote rural areas where they can be grown and processed.

RYAN Foundation recommends standardization of bamboo pipes to lengths of 3 mts and 8 cms. internal diameter. Mature bamboos may be cut at either ends uniformly with a saw and projections outside may be chopped with a chisel and hammer and then the inner cavity cleaned and broadened. To do this, a long iron rod 14 mts. long sharpened at one end like a chisel may be used. The bamboo may be placed on two 'Y' stands as shown in diagram. and chiselled from either end. Only in this



position one can see through easily and knock out internal projections and smoothen ruggedness. Whether used above ground or under, all bamboos have to be treated. The best rural technology for treating is to boil castor oil with neem, vasaka, datura leaves (3 parts) and turmeric, chilly powder and wood ash (one part) and

paint the bamboos with the solution inside and outside. On a commercial scale the solution may be prepared in a long concrete pit-tub and the bamboos put into it and soaked for about a week. This treatment prevents bamboos from cracking or being attacked by white ants. If bitumen (tar) is available it may be melted and painted outside (not inside). Inside must be as smooth as possible. If tar is not available, used cement or fertilizer bags (plastic or fibre) or locally woven crude fibre cloth may be wrapped around the bamboos and tied.

Bamboo pieces 30cms long and 10cms in inner dia metre may be similarly prepared and used as sleeves to join the pipes where required. Mortar mixture explained in RF Handout 294 (not in this booklet) may be used as the binder to plaster the joints. They may also be joined as carpenters do.

These bamboo pipes may also be used to take water to fields and for domestic supply of drinking water.

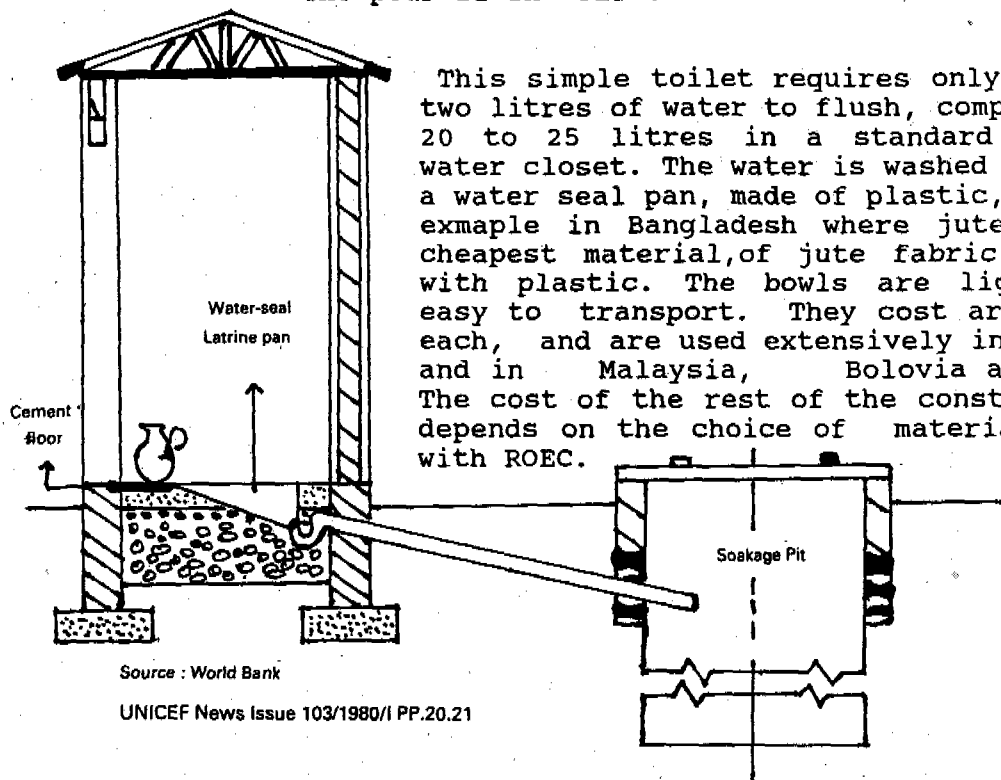
In Tanzania region of Arusha, Rukwa, Morogoro and Dar-es-Salam several bamboo processing and installing units have been established financed by the Dutch Government (US \$140,000) NORAD (US \$196,000); SIDA (US \$80,000); and the EEC. The processing method is different in Tanzania from what is recommended by the RYAN FOUNDATION. For RF processing only local materials available in the village need be used and nothing need be imported.

Raw materials being free, each 3 metre long pipe may be sold for Rs. 10 or US \$1 (one) and the industry can provide full employment for atleast a dozen families of a village in the cultivation, processing, laying, repairs, replacement and maintenance and it is an ideal industry for rural women. For castor see RF Handout 228 (not in this booklet).

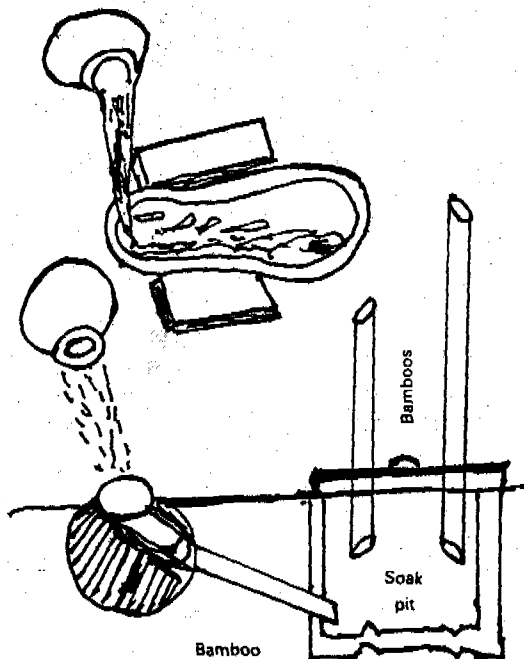
RF MUD POT LATRINE

RF Handout 472

The pour-flush toilet



World Bank UNICEF Model glazed water seal pan made in far away ceramic factories. Costly, and involves handling, transportation, breakage and installation problems.



Ryan Foundation Water seal pan uses village mud pot. Page 3 explains village method of glazing with local raw materials. Cost of latrine is only cost of mud pot and 3 bamboos.

Mud pot half blocked
with mortar without cement

RYFO MIXTURE FOR MORTARS

Handout 270

As far as possible avoid cement in rural houses and toilets. Cement is not necessary in the building industry. The Taj Mahal, the Kutub Minar, the leaning tower of Pisa and millions of buildings all over the world were built in the past without cement. In fact, cement was invented and introduced only a little over a century ago. Before cement was made the common mixture that made mortars were -

1. Clayey sand 3 parts, lime one part (lime may be slaked lime i.e., natural lime stones, or quick lime prepared by roasting sea shells. Where stones and shells are not available and the quantity required is small, bones of birds and animals, shells of snails and crabs and eggs may be burnt (roasted), powdered, sieved and mixed with sand. Addition of small quantity of jaggery or sugar to it will increase the binding property. One kg of jaggery or sugar for about 50 kgs of lime and sand mixture will give good results. Good lime and sand with a little jaggery can be used for all kinds of construction work. It binds well but sets slowly.

2. Clayey sand 6 parts, lime one part, and Surki 2 parts (SURKI is burnt clay or burnt bricks ground and sieved). This mixture sets faster and binds better than sand and lime only.

Note: The ingredients must always be mixed first in dry form before water is added. The dry mixing must be done well until patches or streaks of grey are not seen.

3. Finding and preparing clayey sand is explained in handout 184. (page 10)

4. Where clayey sand is not available mix 3 parts of sieved pit sand with one part of tamarind seed paste. To get paste crush seeds well and boil in small quantity of water. Similarly, paste may be made also with wheat flour (maida) or cluster bean pods.

5. Where tamarind seeds or maida are not available or are costly make paste out of any edible root crop as yam, casava or sweet potato. When edible stuff is used, add also dried and powdered neem leaf to act as insecticide.

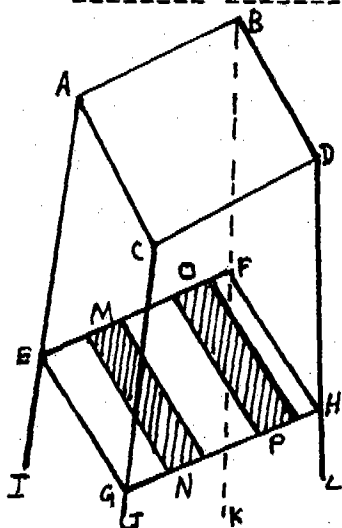
6. The gummy layer beneath the outer thick skin of a jack-fruit also gives a good paste if boiled in little water. There are several trees in villages oozing natural gum and a good many of these trees are identified and explained in Handouts 110 and 111 (Not in this booklet) The gum from these trees may be tapped, boiled in water and mixed with the mortar. All the binders cited above are very good for building small walls and buildings in rural areas.

7. If tempted to use cement mix only one part of cement to two parts of lime, 4 parts of Surki and 20 parts of sand. Binders to this mixture may be added only if found necessary.

8. The same mortar mixture may be made into a semi liquid by adding more water and used for painting the wall to get uniform surface and for better appearance. However, for good glaze RYFO paint explained in handout 474 (page 3) may be used.

GANDHIAN LAVATORY

RYFO Handout 47



Gandhian lavatory was invented by Gandhiji. It is meant to provide comfort and privacy for the user and manure for the fields in rural parts. It is still being used by peasants in many parts of rural India and can be introduced in the poor countries of the Third world.

All the materials required are casuarina or bamboo poles or straight branches of a tree. The entire lavatory is a pole or stick frame-work. Only MN and OP are two strips of wooden planks on which the person sits. If strips of wood are not available two or three sticks or poles may be cut to size and fixed side by side to make it comfortable for the feet to rest.

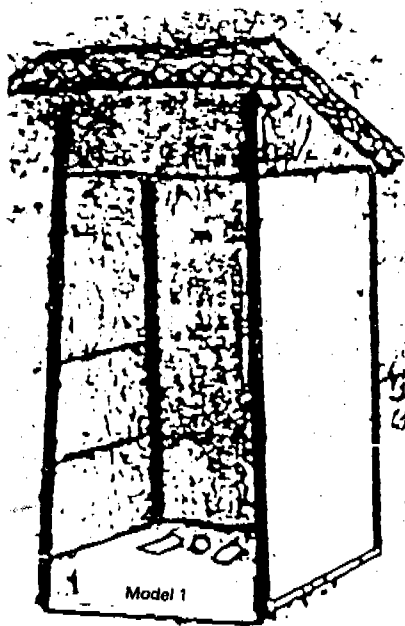
ABCD is open for fresh air and sun-light. AEGC, DHFB and ABFE are closed with gunny cloth or old canvas or plastic sheets. A sheet as big as a bath towel is hung from CD upto GH which serves as the door of the lavatory. Corners EFGH must be tied strong so that the frame does not give way when a fat man or woman sits on it.

The user is advised to carry the stand to the field and use it. After the use it may be taken back to his/her hut and left in the open backyard.

When the villagers use this lavatory in the fields, and shift it from place to place, the fields get fertilised and produce more food.

Sand must be thrown on the excreta to avoid foul smell in the area and to make the excreta get digested with the soil.

Note:- The simplest toilet is made of a pot-pan (page 2) with a removable Gandhian lavatory enclosure on top of it (page 9). Every home should have (own) a family toilet enclosure (Gandhian) and those who want to use the toilet should carry the stand and place it over the pot. When the job is done the pot may be covered with a basket and a stone (weight) put on it to indicate that there is a pot-pan there. Elangota earth worms explained in page 12 may be introduced in the soak pit to keep it clean and odourless.



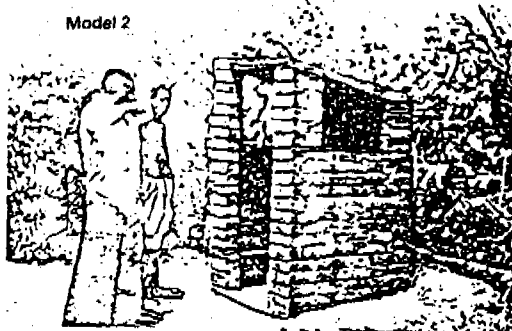
Thatch Superstructure

These three diagrams were taken from the booklet **LOW-COST LATRINE FOR RURAL HOMES** published by the Water and Environmental Sanitation section, UNICEF, New Delhi. Published in 1985 and revised in Aug 1987.

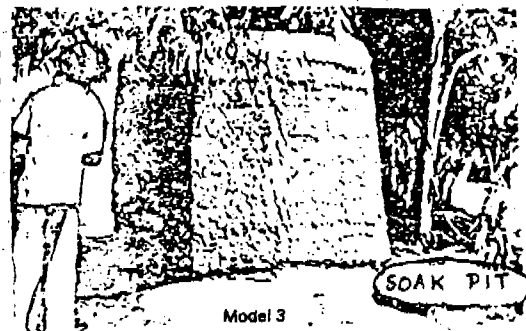
All the 3 models are cheap and easy to build with raw materials found in villages and many be promoted.

Model No.1 The Thatched Superstructure is the easiest to build and cheapest. It is more or less the Gandhian model of lavatory and Ryan Foundation gives priority to this model. The roof and sides may be thatched or closed with used fertilizer or cement bags or jute sacks.

Every family can build it's own superstructure over the Ryan Foundation mud-pot pan recommended in page 9.



Brick Superstructure



Mud Superstructure

Handout 109 (not in this booklet) explains a simple hand mould to make bricks using common earth mixed with other materials and starch. However, excellent bricks can be made only out of natural clay. This handout explains how to find out if the soil is clayey.

When new grounds are dug for brickmaking, after every foot of digging (in depth) the soil should be taken and tested for clay.

Testing is done by adding a few drops of water to a handful of sand and trying to roll it into a ball. If it takes the shape without breaking, the soil is clayey and if the finger impression falls well on the rolled lump it is better clay.

Another way of testing is by shaping a lump of the soil in the form of a small carrot to see if it takes the shape without breaking.

A third way is to spread out the wet soil to a diameter of six cms and thickness of one cm and dry it under the sun. If it is good clay the lump will shrink and crack.

If these give satisfactory results a sample brick may be made and sun dried. As a final test the dried brick may be placed amidst burning fire and after burning if the brick stays hard in a bucket of cold water it is of good clay.

The round pit dug for removing clay may be about 2mts in diameter and narrow downward. The removed soil may be put into a tempering pit and mixed thoroughly well with water. For 3 buckets of clay one bucket of water may be added but this proportion may vary according to the quality of the clay. After mixing for an hour or two it may be left like that over night and it will be ready for brick making the next morning.

The simple frame shown in hand out 109 may be used to shape the clay into bricks. Before the wet clay is filled dry sand must be sieved and put into the moist mould as a lining so that the brick does not stick to the mould. Alternatively, any waste oil may be used to wipe the inside of the mould and cleaning and oiling of the mould should be done after the removal of every brick.

Bricks so made must be dried well in hot sun. To make them strong and rain water resistant they may be burnt (fired) in the traditional Indian way, ie. by building hollow chambers with them and putting fire into the side openings of the chamber.

Instead of firing, the bricks may also be dipped in molten bitumen (tar) and dried. Tar dipped bricks are excellent for huts. Sieved sand or saw dust may be thrown on the tar to prevent it from softening during hot summer. Saw dust is preferable. Bricks thus made may be used to build leach pits and sewerage channels as explained in page 4.

LAVATORY BUILTOUT OF POLES

RYFO Handout 496



Picture shows a do-it-yourself lavatory built out of poles. It is triangle in shape but may also be built square or circular. Materials required are about 100 poles each about 2 metres long and they may be casuarina, eucaliputs, bamboo or Ailanthus. About 30 cms may go into the ground and what goes in may be smeared with ground neem, calotropis gigantea, vasaka, datura, vinca rosea ect which are all insect resistant village shrubs freely available in rural areas of poor tropical countries.

The crevices between the vertical poles can be blocked either by fixing small poles perpendicular to the vertical ones or blocked with common clay, thatch, used cement or fertilizer bags, gunny sacks or even bunches of leaves may be tied on the vertical poles to make the toilet look 'bushy'. The top may be left open.

Toilet pans shown in RYFO handout 278 (page 2) and disposal system shown in handout 175 (page 4) may be used. A bed-sheet, floor mat, or plastic screen or bags stitched together may be used as the door screen. Alternatively, a shutter made of poles may be fixed to the wall of the toilet with fibre ropes.

A good and easy way of blocking the gaps between the poles will be to grow beside the toilet pumpkin, cucumber or any edible climbing creeper and let it climb and spread on the walls of the toilet. Bougainvillaea bushes may also be grown for cover, shade and flowers. The water used in the toilet will water the plants.

The poles required for the toilet must all be grown in the village. Each family may build its own toilet, own and maintain it. However, 3 or 4 families (houses) may join together and have a common soak pit. Sea water or brackish water may be used liberally to keep the toilets clean. (See Ryan Foundation booklet, SURVIVAL BY SEA WATER.)

The floor of the toilet may be elevated and hardened with pebbles and debris so that there is no water logging and slushy soil during rains.

Wastewater recycling with earthworms

WORMS KEEP SOAK PITS CLEAN



The earthworm 'biofilter' is a self-regeneration system which gives out useful manure and protein-rich livestock feed.

For the Farmer's Note Book with courtesy to the author *and* Hindu Paper

RF Handout

Simple system of wastewater recycling using earthworms, which churns out chunks of nutrient-rich 'castings', has been designed by a young chemical engineer from Pune, Maharashtra. The system known as 'BERI Vermifilter', converts non-toxic wastewater into usable water and yields high quality manure and proteins in the bargain, according to Mr. Uday S. Bhwalkar who has been conducting extensive research on the usefulness of earthworms and the biofilter for the last six years.

The earthworms packed in the biofilter continuously work on the effluent water of near normal pH and clean up by recycling the vermicastings. The wastewater trickles through the highly absorbent mass of vermicastings, the organic impurities and pathogens get trapped there, and the earthworms help in regenerating the vermicastings by active feeding. Thus, the system enables a simultaneous production of earthworm biomass. The surplus vermicastings and earthworm biomass are removed from the top periodically says Mr. Bhawalkar.

Removal of suspended particles is effected by filtration in the top layer, and the bacteria, virus, protozoa and helminths are eliminated by adsorption, predation, competition for nutrients and due to other stresses in the filter. The adsorption capacity of vermicastings is rejuvenated by the action of earthworms, and the entire system, thus, becomes self-degenerating. It has been successfully used to degrade domestic sewage, and pre-treated and non-toxic industrial effluents.

The vermicastings have excellent manurial value, with many beneficial traits attributed to them. With porous and moisture-absorbing qualities, they can support crops with fewer irrigations. They are also endowed with different enzymes and growth promoting substances besides being rich in vitamins and antibiotics. A number of beneficial microbes, including the nitrogen-fixing bacteria, proliferate in the earthworm droppings and all the nutrients are available in a 'ready-to-use' form to the plants. To enrich the fields about five tonnes of vermicastings per hectare should be added and it will support an earthworm population of five lakhs in two months.

The burrowing action of earthworms in the field makes the soil porous improving aeration and drainage. Several studies have shown that the earthworms have contributed to significant increase in yields of several crops. It has been proved that introducing large numbers into crop fields doubled the yield of wheat, quadrupled that of grass and multiplied clover yields tenfolds. A number of beneficial effects follow the activities of the earthworms.

Besides contributing to biodegradation the earthworms have other advantages. The protein rich earthworms can be systematically harvested to make cattle or poultry feed. Vermiculture (raising earthworms on a commercial scale) is a popular cottage industry in many southeast Asian countries particularly in the rural Philippines. In the U.S. also it is a promising commercial venture and several thousand families are actively engaged in this lucrative business.

In Philippines and other countries delicious soups and a variety of dishes are made with earthworms meat. When meant for human consumption the worms should be raised in special mediums following rigid regulation. Not much care is required for livestock feed. Earthworms raised for food command a good market price and assure high returns to the growers. When used in biofilters to purify waste water, they are generally fed to birds and animals as a protein-supplement.

Name of the earthworm which eats away.

- evil bacteria and small insects in leach pits (soak pits) and sewerage is
PHERTIMA ELONGAT

For information and for a supply of the worm contact

Bhawalkar Earthworm Research Institute,
A/3, Kalyani, Pune-Satara Road,
Pune - 411037. India.

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