

Next, the **security valve** should be placed according to the following:

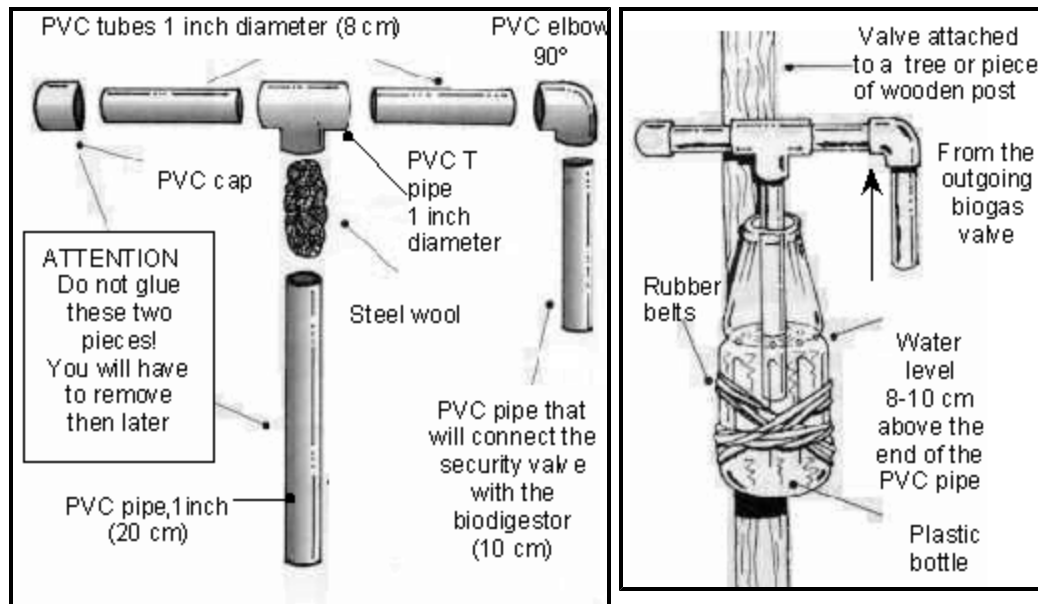


Figure 8. The security valve is tied to a wooden post.

Figure 7. Diagram of the security valve.

ATTENTION: Make sure the **20 cm PVC tube, is not glued to the "T"**. Every **six months**, the Steel wool **needs to be changed**, without dismantling the rest of the system.

Insert the valve into a transparent plastic bottle, full of water, and tie it to a wooden post (next to the exit valve). Make small holes in the plastic bottle to ensure that the 20 cm PVC pipe is 8-10 cm under the water level.

Finally, the outgoing biogas and security valves are connected through the transparent plastic hose.

Step 6: Fill up the biogas plant with exhaust and water

Tie one end of the double bag with rubber belts, and insert a hose into the other end. Connect this hose to the exhaust pipe of a car, making sure it is well attached. Start the engine, and let it run until the bag is full. When the outgoing biogas valve starts to bubble, that indicates that the biodigester is at its maximum capacity.



Next, through the same hose, fill the biodigester with water, until it reaches the level of the buckets, and the gas can no longer escape. This is a critical step, because if it is not carried out correctly, the bell where the biogas will be stored will not form.





Figure 9. Connecting a hose to the exhaust pipe of a car, in order to fill the plastic bag with exhaust.



Figure 10. Photo of a biogas plant, filled with exhaust and water.

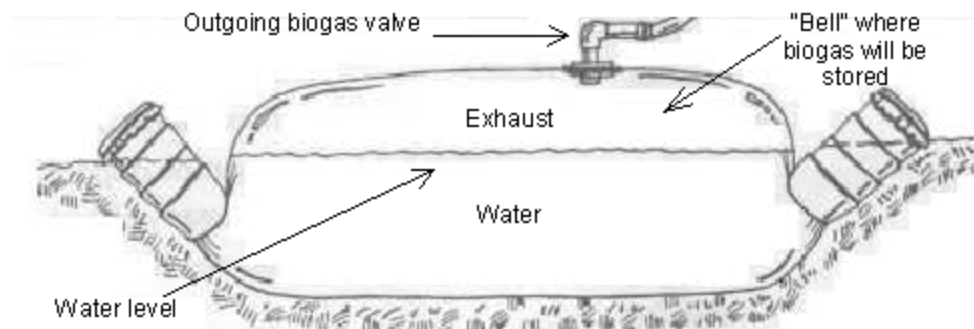


Figure 11. Diagram of a biogas plant, full of exhaust and water.

Water represents 75% of the total volume of the bag.

The other 25% is full of exhaust.



Figure 12. When water reaches the level of buckets,

both ends are opened. Water level keeps gases inside the bag, forming a bell.

At this point, open both ends of the plastic bag. The bell should be formed and biogas will not escape.

Step 7: Management of the biogas plant

Daily, the biogas plant must be fed with 18 kilos of FRESH excrement (from cows, buffaloes, goats, pigs, etc.) blended with 90 kilos of water. This is approximately a mixture of 1 bucket of excrement with five buckets of water. This mixture is needed to replace the water lost during the process and keep a flowing material inside the biodigester.

YOU SHOULD **NEVER** CHARGE THE BIOGAS PLANT WITH **CHICKEN MANURE**. This is not appropriate for biogas production.





Figure 13. The biogas plant should be fed every day with fresh manure. Manure is blended with water (1:5) and then through to the biodigester.

Step 8: Protection of the biodigester and use of organic fertilizer

In order to protect the plastic bag from sunlight and animals, a roof and a fence should be built. This will extend the life of the biogas plant (10 years)

Dig a hole next to the end of the biogas plant to collect the effluent which can be used as fertilizer (see figure). This fertilizer can be utilized for orchards or to produce aquatic plants for animal consumption or composting, as well as in ponds for breeding fishes.

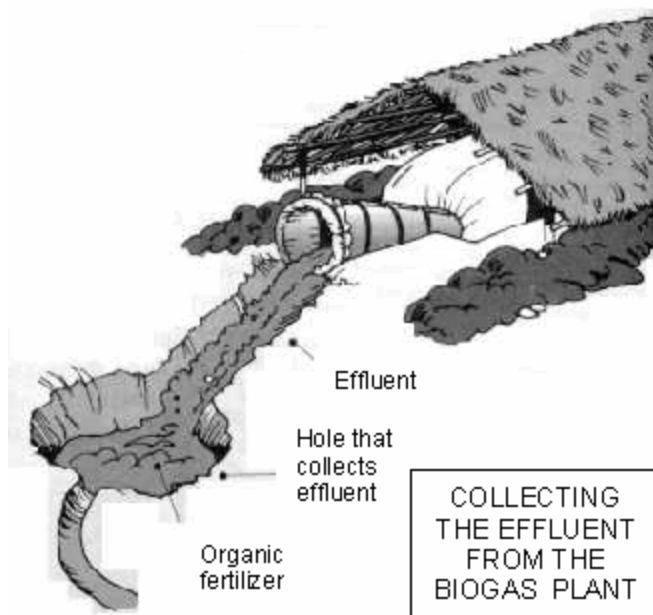


Fig 14. The effluents from the biodigester can be used directly as organic fertilizer or to produce aquatic plants, that then can be used to feed pigs or produce compost.

Step 9: Install the burner

30 days after the installation of the biogas plant, remove the PVC cap from the security valve and connect the end of the PVC pipe to the burner. All connections should be made with plastic or PVC pipe, because the biogas is corrosive. Only the pipe that will be used to burn the biogas is galvanized iron.





Figure 15. Biogas is brought to the kitchen using PVC connections, due to its corrosive action. Only the last tube is a iron galvanized pipe. A biogas plant can produce enough fuel to fulfill the requirements of a rural family.

Through the application of biogas technology the quality of life can be improved, save money and increase productivity of the farm and the same time, while protecting our natural resources. This simple and cheap technology can be applied everywhere in the Tropics.

4. REFERENCES

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