

Water purification with *Moringa* seeds

from Dian Desa*

Dian Desa is an Indonesian non-governmental organization which was established in 1972 to work for rural development.

IN many developing countries, clean water has always been a major problem, especially for the rural poor. Many villagers, since they have no alternative, have to consume surface water either from rivers or rain-fed ponds. The purity of these sources cannot be guaranteed.

Dian Desa adapts or refines known technologies and processes to fit local conditions. It works in co-operation with self-motivated villagers. And part of the organization's success is that it maintains a close and direct contact with the community where it has a village development programme.

One of the Dian Desa's activities is improving drinking water supply for rural people. Since 1979, Dian Desa has been working in a hilly limestone area of Southern Central Java. In this area the villagers relied for their drinking water on rain-fed ponds or underground caves. As such sources do not provide sufficient water for this heavily populated area, a lot of effort has been directed to improving both the quality and quantity of water to be consumed by the villagers. Dian Desa has been developing and disseminating rainwater catchment tanks (ferrocement and bamboo-cement) in the area.

In spite of this, however, many of the people still have to take their drinking water from rain-fed ponds. And as the ponds seem to be the only water sources, many activities such as washing, bathing and bathing cattle are carried out there. The villagers take water from the same pond home in tin cans for domestic uses such as drinking and cooking. The water is therefore polluted and needs treatment in order to make it safe.

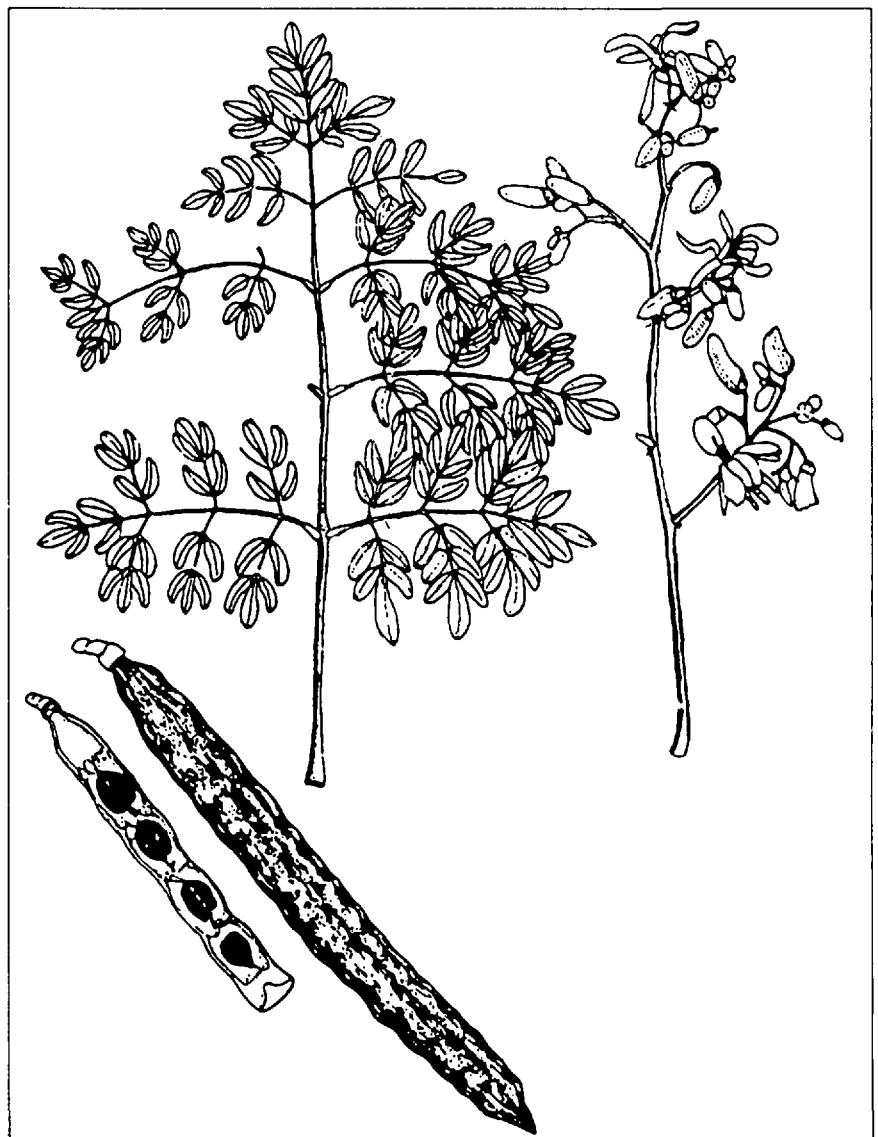
Realizing such a need, Dian Desa water purification staff tried to find ways to give access to potable water to the villagers. Methods such as slow sand filtration and disinfection with iodine dispensers were tried out, but they were not workable at the village level. Colloidal solids soon clogged up the filters of the iodine dispenser.

There are several aspects that should be taken into consideration in working at the village level. In relation to water treatment technology, the following should be considered:

- ☐ The method of treatment should be simple
- ☐ The cost of the material and equipment needed for the treatment should be within the economic capabilities of the villagers
- ☐ Materials should be easily available locally

Dian Desa heard about the power of *Moringa oleifera* seeds as a coagulant to temporarily precipitate solids, including bacteria, from dirty water. And it was found that in Indonesia *Moringa oleifera* is a well-known species called *kelor*. To further prove and test the usefulness of the seeds, a laboratory test was carried out with the following results:

	Percentage of total weight
Skin	35.08
Seed	64.92
Calcium	0.18
Phosphorous	0.69
Protein	36.00
Fat	32.09



Sketch of leaves (left), fruit (right) and pods of *Moringa oleifera*, or *kelor*. Each seed is composed of three paper-thin beige wings and a dark brown rounded shell. (Diagram from Common trees of Puerto Rico and the Virgin Islands, Little and Wadsworth, Washington DC, USA, 1964)

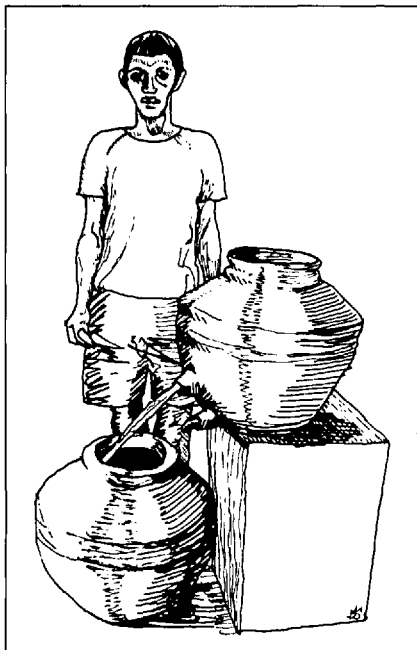
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After mixing one powdered seed in 1 litre of turbid water, almost all the solids had coagulated and fallen to the bottom of the container after two hours. By then, 98 per cent of the coliform bacteria had been removed from the water. Coliform bacteria indicate pollution from faeces.

No side effects were identified: *kelor* was not poisonous to laboratory mice even at a dosage of 50g per 100ml of distilled water. Now that Dian Desa was sure that the seeds had no side effects, Djoko Srihono, who was responsible for the project, began to look at the possibilities of disseminating this water treatment



Pouring turbid water into the first pot for treatment



The bung is removed from the outlet of the first pot and clarified water is stored in the second. The lower outlet is used to drain the jar.



Extract from a comic book illustrating the use of seeds in water purification

technology to rural people. It was, however, not just a matter of disseminating the technology even though it seemed to be appropriate.

In most villages in Indonesia and also in many other developing countries, villagers do not seem to care about the condition of the water they consume. Accordingly, they do not treat the water either. In such a situation it would be useless to try and disseminate water treatment technology because the people do not see the need for it. So, the priority for Dian Desa was to find out some of the villagers' perceptions about water.

- ☐ Do the villagers think that the water they consume is dirty?
- ☐ Do they want cleaner water?
- ☐ Do they know the danger of drinking polluted water?
- ☐ Have they ever tried to treat the water they consume and how?
- ☐ What do they think of *kelor* trees? Are there any constraints on the use of *kelor* trees, such as a taboo on consuming the species?
- ☐ How do they react to an explanation of how *kelor* can be used?

In the test village, Sumberwungu in the Gunung Kidul area, very few villagers realized the danger in consuming polluted water in spite of their eagerness to have clean water available. So, the first thing to be done was to develop some educational materials and conduct some health education in the villages to change people's perceptions of dirty water and to make them realize the danger of consuming it, by discussing the kinds of diseases which might be caused by dirty water.

Test village

Villagers were also told about the advantages of consuming clean or treated water. They were then briefed on water treatment using *kelor* seeds. A cartoon booklet using the traditional stories of the Ramayana to illustrate the theme of using a seed to cleanse water was produced and distributed.

It was only after the villagers really understood about all the aspects mentioned above and showed interest in the water treatment technology

that Dian Desa really began to introduce *kelor* seeds.

Introduction and dissemination was done either through group demonstrations or by going from house to house. First, the technique was demonstrated using two glass jars. The two jars were filled with dirty pond water, then the water in one of the jars was mixed with powdered *kelor* seeds and stirred. The villagers could then see the process at work and the difference between the appearance of the treated and untreated water. Villagers' main concern was that water should be clear rather than turbid. When the villagers accepted the technology as demonstrated, they were introduced to the equipment needed for day-to-day use.

Two clay jars are used. The settling occurs in one and the clarified water is stored in the second. Jars are modified slightly by the addition of an outlet to siphon the treated water. This is because the protein in dissolved *kelor* seeds will start to ferment and smell after about 12 hours.

When the jars are ready, then the villagers are taught how to grind the seeds. The equipment needed and the method of grinding is exactly the same as that by which they grind their spices, so there is nothing really new about it. What is important for villagers to know is that they should grind the seeds before using them. They are also taught how to dispose of the sediment in the first pot.

In the meantime *kelor* cuttings are distributed to the villagers to be planted in their yards or even to be used as fences. This is so that the villagers have easy access to the *kelor* seeds at no cost. It is a very important aspect of supporting the development of the technology, and involves transplanting *kelor* shoots from an existing source 50km away.

So far the villagers seem to accept the *kelor* technique and are quite enthusiastic in practising it. So Dian Desa hopes to further disseminate this water treatment technology using *Moringa* seeds so that it can be utilized by rural people all over Indonesia, and in other countries. ☐