

# FOOTSTEPS

No.21 DECEMBER 1994

TECHNOLOGY 

## Home-made plant dyes

THE COST AND DIFFICULTY of obtaining synthetic dyes sometimes makes it impossible to make use of these for regular dyeing of material. If synthetic dyes are available their use is recommended, as they give good and permanent results. However, if synthetic dyes are not available it is possible to use home-made plant dyes. You can dye natural materials like cotton and wool with home-made dyes.

There is a whole variety of plants which can be used to make plant dyes. We can suggest some well known plants found in many countries. However, each area will have its own plants which can be used to make dyes. Ask older people for their advice. Experiment and try out different plants. Different parts of plants are used to make dyes – for example, the leaves, the skins of fruit, the bark, roots or wood. When you pick plants for making dye, collect seeds and plant them so that more plants will grow. If you cut bark never take too much at one time, or the tree may die. Lichens are very small plants which grow on rocks. There are many colours of lichens and they are very good for making dyes.

Large amounts of plant materials are needed to produce these dyes. Natural

dyes are therefore rarely useful on a commercial scale. However, for individual households or women's groups they may be helpful. Wool and silk are fairly easy to dye. Cotton, however, is much harder. Because cotton is the most common material that people will want to dye, we will only look at recipes for cotton dyes in this article.

The quantities that follow will be sufficient to dye 0.5 kg of dry cotton material. This is about two to three lengths of cotton fabric (*khangas*, *kitenges*) or three to four T-shirts. You will need at least two large pans which you do not plan to use for cooking food and a stove to heat these pans.

As well as natural dyes, try buying potassium permanganate from a

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chemist and using that as a dye to get a deep purple colour.

### Washing

Place the cotton in boiling water, adding washing soap and 2-3 tablespoons of washing soda. Boil for an hour and then leave to soak for 24 hours before rinsing the cotton well.

### Mordanting

Mordants prepare the cotton fibres and help them to absorb the dye better. It is possible to dye without using mordants – a few plants such as indigo do not need mordants. But using mordants will generally give much better, brighter and more permanent colours. Many



Photo: GHACOE Women's Ministry

## FOOTSTEPS

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*Footsteps* is a quarterly paper, linking health and development workers worldwide. Tear Fund, publisher of *Footsteps*, hopes that it will provide the stimulus of new ideas and enthusiasm. It is a way of encouraging Christians of all nations as they work together towards creating wholeness in our communities.

*Footsteps* is free of charge to individuals working to promote health and development. It is available in English, French, Portuguese and Spanish. Donations are welcomed.

Readers are invited to contribute views, articles, letters and photos.

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*Indigo, a legume which gives a strong blue dye – if you can stand the smell of processing it.*



different chemicals can be used as mordants, most of which are very poisonous. Before you put the wool or cloth into the dye, you must soak it in a mordant. The most common mordants are alum, copper sulphate, potassium dichromate, ferrous sulphate and tannin. Most of these can be bought in hardware stores or chemists. Often two mordants are mixed together for the best results. On the next page are four recipes for mordants.

Different mordants will give different colours from the same dye. Again, you can experiment to see what results you get. Alum mordant usually gives the best results as it is cheap, very reliable and gives bright colours. Salt, vinegar and wood ashes can also be tried as mordants if nothing else is available.

### Plant materials

Collect the flowers, leaves, roots, bark, berries or lichen which you plan to use. About 500 g of plant material is needed. This is enough plant matter (leaves, flowers etc) to fill half a 20 litre water bucket. You will need less if you are using wood or bark as a dye source. Boil the plant matter with 10 litres of water (half a full water bucket) for about one hour until the dye is dark in colour. (Indigo and sorghum do not need boiling.) Then strain out all the plant material. Now you are ready to dye the cotton.

In the table opposite is a list of some plants which are useful as dyes. There are many others which can be used. We have tried to pick out those most commonly known. Use plant materials which are readily available. Onion skins can be stored over time. If you are processing mangoes for drying (see page 4), you would have a ready source of material.



Rinse off the mordant with clean water. Now add the wet material to the hot dye. Bring the dye to just under boiling temperature and let the mixture simmer, but not actually boil. Keep the material moving gently to ensure that the dyeing will be even. Keep the material in the dye for at least half an hour – depending on how strong you want the colour to be. Take it out and rinse the material several times until the water becomes clear. Give a final wash with soap, then rinse and dry.

### Dyeing with indigo

Indigo is well known in West Africa as a strong, deep blue dye. The plants can be grown specially for dyeing, though in many countries they grow wild. Indigo does not need boiling, mordants or other chemicals – instead, a strong stomach is needed!

Indigo is extracted from the fresh leaves by soaking in fermented urine. Collect about 5 litres of urine in a pot. Cover tightly with a lid and put in a warm place to ferment for 6 weeks. Then pound about 1 kg of fresh indigo leaves and add to the pot, stirring well with a stick. Leave the liquid for 3–4 days. Add 0.5 kg of clean, wet cotton and stir gently. The longer the cotton is left in the pot, the deeper the colour will become. Lift it out after about an hour and squeeze gently. If you want a darker blue return it to the pot. When you take the cotton out of the pot it will smell very unpleasant and must be washed and rinsed several times until the smell goes.

### Experiment

You can use indigo on cotton already dyed another colour to produce different shades. For example, green shades can be produced on yellow cotton, and purple shades on cotton dyed pink or red.

Each time you dye material, keep careful records of everything you do. Colours will vary, depending on the age of the trees and roots used. Experiment by varying the amounts or kinds of mordants, by varying the quantity of dye used and the length of time in dyeing materials. Find out what works best in your situation with the materials you have available.

## Tie and dye

Once you have worked out how to make successful plant dyes, there is no need to stop experimenting! Now you can try out obtaining patterns on your cloths. Tie and dye is a very simple technique which will give many different results. Before dyeing white or cream coloured cloth, simply tie the material together before dyeing. Wherever the material is tied, the dye will not get through so easily, resulting in pleasing patterns. You can tie up the cloth in all sorts of ways – into a loose ball, into long strips with tight bands and knots – or try pleating the material before tying it, to give a regular pattern. You can even use tie and dye with one colour, and then tie the cloth up in different ways and dye with another colour.

Tie and dye will work best with synthetic dyes and dyes which do not need long boiling and soaking because the dye will slowly seep into the places which have been tied up. If you

## Some useful plant dyes...

Plant material	Mordant	Colour
Eucalyptus (blue gum) leaves	alum	yellow
Eucalyptus (blue gum) leaves	gum tree bark & copper sulphate	green/brown
Grenadilla skins (passion fruit)	alum or chrome	brown
Onion (unused outer brown skins)	alum or cream of tartar	yellow
Walnut shells (fresh or dried)	none needed	dark brown
Indigo (a legume)	none needed	deep blue
Black soya bean skins	none needed	violet-brown
Black soya beans	iron water	silver grey
Red groundnut skins	gum tree bark & copper sulphate	red/brown
Mango skins and seeds or leaves	gum tree bark & alum	yellow
Mango skins and seeds	gum tree bark & copper sulphate	brown/orange
Maize skins (red husk varieties)	none needed	purple
Red sorghum (finely crushed base of leaves)	lemon juice and vegetable ash	red

use this method with natural dyes, you must tie the cloth very tightly indeed.

*With thanks to Rosie Malcolm, EFZ, Zimbabwe and Martin Hardingham, Textile Adviser for ITDG, UK for their help in compiling this article. It would be good to hear from readers who could share their experiences with natural plant dyes.*

## Recipes for mordants

**ALUM MORDANT:** Add 1 small teacup of alum and, if available, 2 level tablespoons of cream of tartar to 5 litres of water (quarter of a large water bucket). Dissolve the chemicals in warm water and leave cotton to soak for 24 hours.

**TANNIN MORDANT:** Tannin powder can be bought but you can also use bark from trees known to contain high levels of tannin. Use 2 heaped tablespoons of the powder or 500 g of bark from African wattle, gum tree (eucalyptus species) or mimosa thorn tree. Bring to the boil in 5 litres of water and leave cotton to soak for 24 hours.

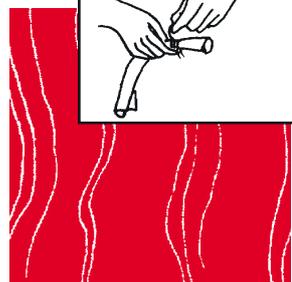
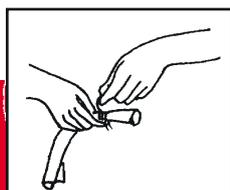
**COPPER SULPHATE MORDANT:** Mix 500 g of gum tree bark with 1 heaped teaspoon of copper sulphate. Again, bring to boil in 5 litres of water and leave cotton to soak for 24 hours.

**METAL MORDANTS:** You can make mordants from iron, chrome or tin by boiling some of these metals with water. To make iron mordant, for example, boil 5 litres of water with 2 cups of vinegar and 1 cup of rusty nails for one hour. Leave it to stand for 24 hours and then pour off the water. This water is the mordant.

## Tie and dye patterns to try...

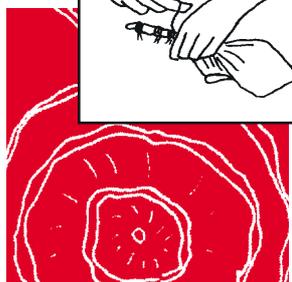
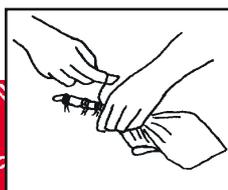
### WAVES

Roll the material loosely together and tie in tight bands using cotton or fine string.



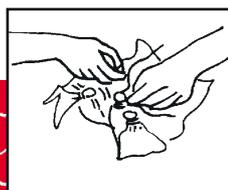
### CIRCLES

Take firm hold of the point where you want the centre of the circles to be. Shake the material so it hangs together and then begin to tie tight bands around it, starting from the top.



### MARBLE

Tie small round stones tightly into the material wherever you want a circle to appear.



# Food drying

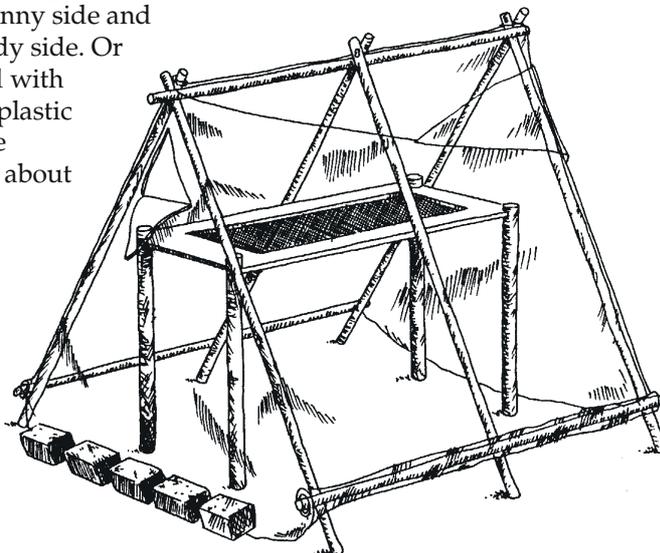


DRYING is one of the oldest methods of preserving food. Beans, cereals, meat and fish are commonly dried to preserve them. The drying of fruit and vegetables is less common but this technology is a very simple one and would greatly improve the variety in people's diet. Tomatoes, herbs, mangoes and onions are examples of vegetables and fruit which can easily be dried and stored. Drying provides the opportunity for preserving good harvests instead of selling when market prices are low. Well packaged, dried produce can be sold later when prices may be higher.

When drying food, particularly if the produce is to be sold, it is very important that the food is kept as clean as possible. Workers must carefully wash their hands; all equipment should be properly cleaned. Any packaging must be clean and dry. Flies must be kept away from the food at all stages. The following methods simply use the sun to dry food. This will work well where there is plentiful sun and the humidity is not too high. In areas of high humidity or little sun, there are other methods of drying food, using fuel. (See page 12.)

## Tent drier

This is a tent shaped wooden or bamboo frame tied together and covered with plastic sheeting. Clear plastic is used on the sunny side and black plastic on the shady side. Or the drier can be covered with clear plastic with black plastic on the ground. The wire drying frame should be about half a metre from the ground. One end is left loose for entry – and closed with stones or bricks. The sides can be rolled over a pole to allow air flow and to control the temperature.



## Mangoes

Good quality, half-ripe large mangoes which do not contain too many fibres will give the best results. The mangoes are first washed, peeled and cut into thin slices (6–8 mm thick) with a stainless steel knife. Soak the mangoes in a bowl containing:



- 1 litre of boiling water
- 7–800 g (5 small teacups) of sugar
- 3 g (1 heaped teaspoon or soda bottle top) of potassium metabisulphite (a preservative which can be bought in chemists)
- 2 large spoons of lemon juice.

After 18 hours drain the slices and place them in a sun drier on trays which are first coated with glycerine to stop the mango slices from sticking to the metal. When the slices are really well dried, they should be stored in plastic bags or jars, which are sealed tightly to prevent air or damp from entering. These mango slices will keep for up to a year.

This method can be used to dry other juicy fruits – for example: pineapple, papaya, figs, jack fruit.

## Tomatoes and onions

Tomatoes, onions and herbs do not need any kind of treatment or preservative before drying. Tomatoes should be cut in half and the seeds removed before cutting into thin slices. Store the dried onion or tomato in sealed plastic bags or jars. They are delicious when added to stews and soups and should keep for up to a year.

## Other vegetables

Other vegetables such as okra, cabbages, yams, carrots, green beans and peppers should be cut into thin slices and then dipped for three minutes into a pan containing:

- 1 litre of boiling water
- 50 g (2 large spoons) of salt
- 3 g of potassium metabisulphite.

Place the vegetables in a clean cloth or in a wire mesh to dip them easily into the boiling water. This will keep their colour better and preserve their taste. Drain the vegetables and then dry on trays under a sun drier. Again, store in sealed plastic bags or jars for up to a year.



**Using the sun's energy**

In *Footsteps 16* we showed how to make a solar cooker. This cooker and a similar version (shown on page 9 of this issue) can also be used to preserve fruit and vegetables in addition to cooking meals.

Fresh fruit or vegetables are peeled and sliced. Place in clean plastic bags which feel crisp (not smooth) when rubbed between the fingers. A little sugar can be added to fruit. No water

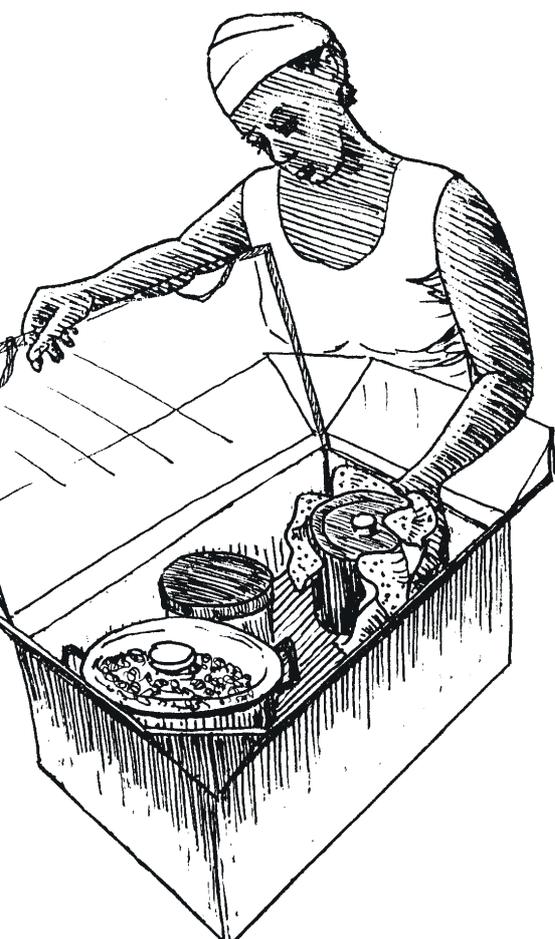
is needed for leafy vegetables. The bags are placed in a pan of water in the solar cooker for one or two hours with the ends of the bags hanging out of the pot. The bags are then tightly sealed without letting any air enter. Food will be preserved and kept sterile if the bags are not opened.

Delicious crystallised fruit can be produced in solar cookers. Fruit such as oranges, lemons or grapefruits are cut up into small pieces. About the same weight of sugar as fruit is added with a little clean water. The fruit and sugar is cooked for several hours in a glass or metal pot, with an occasional stir to make sure the sugar has dissolved. The crystallised fruit can be sun dried as above so it will keep for up to a year, or used immediately to produce cakes. Young leaves of prickly pear cactus can also be used in this way (after removing the prickles) to produce crystallised fruit. The sweet juice left over can be used for a fruit drink by adding fresh lemon juice and water to dilute.

**Successful food drying**

- 1** Good hygiene at all stages
- 2** Good quality fruit and vegetables – over-ripe or damaged produce will not give good results
- 3** Cut produce into thin slices to allow proper drying
- 4** Treat fruit and vegetables with preservative if recommended
- 5** Store in clean, air-tight bags or jars

*With thanks to UNIFEM, FAO and Anna Pearce of Box Aid for permission to include information and illustrations.*

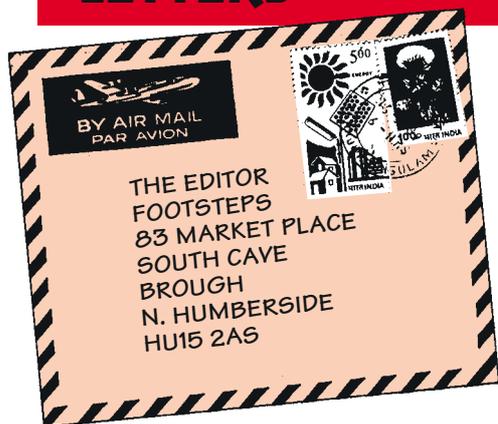


**FROM THE EDITOR**

THIS ISSUE brings together a great variety of good, practical ideas, most of which have either been sent in by readers or have been requested. Most of these ideas cost very little to try out. We hope that all our readers will find something of interest in these pages. Simple technologies often encourage people to adapt ideas for their own use. Just because an idea works well in one situation does not mean it will be appropriate for every situation. Communities have their own sets of priorities, but will be very ready to accept new ideas if they meet these priorities. Let us know how successful you find some of these techniques. There were plenty more for which, alas, there was no room in this issue!

Your letters and comments continue to be a huge encouragement. So, too, is the rapidly growing mailing list and the use of *Footsteps* material by different groups around the world. Future issues will look at agricultural training, alcohol and drug abuse, women's health issues, bee keeping and honey processing, and street children. Do write in if you have practical information to share on any of these subjects.

*Isabel Carter*



## More uses of neem

WHILE VISITING rural villages, I found some more interesting uses of neem which I would like to share with *Footsteps* readers.

Villagers clean their teeth everyday with a toothbrush made out of a piece of neem wood about the same size as their little finger. They chew one end of the stick to make a brush that looks like this. It keeps their teeth healthy and prevents holes.



Neem roots are used to kill round-worms. A small piece of neem root (about the size of a finger) is dug up and cleaned and then crushed with a mortar and pestle. A little clean water is added to make a paste which is stirred into a cup of clean water and drunk just before going to sleep at night. Next morning dead round-worms should be seen in the faeces.

Many people in Nepal do not have medical doctors and modern medicines. The use of home-made remedies for treating parasites is common. The use of neem is widely accepted and it is good medicine.

*Padam Bhandari*  
*Kathmandu, Nepal*

## AIDS resources

I READ WITH INTEREST your extremely informative issue about the growing global effects of AIDS and TB (*Footsteps* 19).

Prevention is the only real weapon we have in the fight against AIDS. A vaccine or cure is unlikely to be found until well into the next century. Asia will soon outstrip Africa in terms of the rate of spread of infection.

AIDS has the potential to undermine all of the good work being done by development groups around the world. We still have a 'window of opportunity' to make a difference. Christians everywhere need to have a sense of urgency in understanding the need for HIV/AIDS prevention and care work.

Our experience in many different countries around the world has enabled ACET to become a provider of HIV/AIDS training and materials to a wide range of groups around the world. If *Footsteps* readers would like to make use of our resources, please write to one of the addresses below.

*Chris Munday*  
*Overseas Co-ordinator, ACET*

*PO Box 3693, London, SW15 2BQ, UK*  
*PO Box 9710, Kampala, Uganda*  
*GPO Box 3046, Bangkok 10501, Thailand*  
*PO Box 31240, Dar es Salaam, Tanzania*

## Ferro-cement plastering

MY COLLEAGUES AND I recently followed the instructions for building ferro-cement water tanks from *Footsteps* 1. Here in Guinea Bissau, chicken wire is extremely expensive, so instead we used 6 mm reinforcement bars – which had the advantage that we could bend them to form the roof, and so unite the whole structure.

We found it hard both to get the plastering mix of the right consistency and then to keep it that way. The plaster tends to fall through the holes in the mesh and a small plastering board on the inside doesn't always give good results. We ended up using a sheet of metal from an old oil drum hooked onto the bars and held there by one man. This helped our progress.

We found it very difficult to keep the cement damp while curing. Sheets of plastic are best – but it is a great problem to prevent them being stolen.

Finally we used a thin layer of 1:2 sand: cement mix as a final coat on the inside, two weeks later. This helps to cover all the little cracks and flaws that will probably happen because of the lack of curing time for the walls. We then filled the tank with water only eight hours after applying this



*Reinforcing rods are bent to form the roof shape.*

final coat – this meant that this layer at least stayed wet while curing! That idea worked well.

*William Hume*  
*Guinea Bissau*

## The Church and disasters

HAVING BEEN INVOLVED in nursing for many years, I was delighted to see the emergency health section in *Footsteps* 17 and the practical advice it gave. However, I was troubled by Jun Vencer's article warning against sharing the gospel message with a 'captive audience' in relief situations. I do not question that as Christians we have a social responsibility to help those in need. But the overwhelming idea that we should not also give a clear presentation of the gospel because the audience is 'captive' or because they must 'keep their dignity' is beyond me. Does the gospel bring spiritual life to those who believe or not? Are we not showing the ultimate selfishness if we hesitate to share life-giving good news with people in case we offend them?

Rice Christians we do not want, I agree – but let's at least give people the chance to hear. Physical life is meaningless if the spirit is dead. People cannot believe unless they hear and understand. Let's not deny the spiritually starving of the one thing that can give them life.

*Dorothy Egeler*  
*Mombasa, Kenya*

## TB treatment

ISSUE 19 OF *FOOTSTEPS* on TB and AIDS as always made interesting reading. Your cover article was very appropriate and timely, as WHO has already declared TB as a global emergency. It has established itself as a number one killer among all the infectious diseases in adults.

I have one observation to make. Readers get an impression that TB treatment is for up to one year. However, short course therapy (SCT) is becoming increasingly widespread and is recommended by WHO. SCT is usually more effective than longer treatment and is usually more acceptable to the patient. A recent WHO publication states 'WHO's policy is that all countries should replace long course therapy with short-course chemotherapy as soon as possible. One of WHO's goals is to ensure that when TB patients are treated, they are treated successfully'.

Dr Zafar Mirza  
Islamabad, Pakistan

### EDITOR:

*SCT is recommended, but at present it is not adopted by all countries. It is also often more expensive. We did not want to cause any confusion in Footsteps so encouraged readers to adopt their own countries' treatment of TB, simply stating that treatment could take up to one year which would then cover all situations.*

WE TREAT over 1,200 patients a year with TB in our hospital. In our experience the number of patients completing a full course of TB treatment in India is very poor, leading to a disastrous rise in drug resistance. In 1987 less than 20% of our own patients who started treatment finished their full course. Now we are glad to report that nearly 85% of patients complete their course. We would like to share some of the reasons for this great improvement.

Most people with TB are very poor. After many days lost from work because of poor health, patients are often desperate when they finally decide to attend a hospital. Many doctors fail to see this simple fact and the expense of the first visit of correct treatment will put off further visits.

In our hospital we try to keep initial costs to a minimum by...

- avoiding X-rays if sputum tests are positive
- obtaining free government drugs whenever possible (supplies are very erratic) or subsidising the cost of drugs ourselves
- using the intermittent treatment because this costs less. Drugs are given two or three times a week, packaged into small plastic bags. Patients are told to take one packet, say every Wednesday and Saturday, for example. Most patients find this easy to understand.



We give great importance to health education. This is impossible in busy outpatient departments, so we admit all patients for two days (helping with hospital costs and food if necessary). A health educator provides repeated health education in small groups on how to take drugs, why symptoms take so long to improve, the need to continue treatment even after the patient begins to feel well again, the need to bring all contacts for treatment, and possible side effects.

This two day hospital stay also allows the TB health worker the chance to develop a relationship with each patient. The health worker sometimes does home visits and is always available in morning clinics so that patients can see a familiar face in a crowded hospital clinic. An interested, understanding TB health worker from the poor community itself can make a big difference.

A deposit scheme is used for all patients so that they pay an initial deposit of Rupees 100 – 200, depending on their social situation. This is only refunded on completion of treatment. It is forfeited if treatment is irregular or stopped early.

A TB clinic is run each Friday and each patient receives an appointment card. Two letters are sent in one week or a home visit is made if a patient misses an appointment.

We hope our experiences may help other *Footsteps* readers involved in treating TB patients.

Dr Rajkumar Rama Samy  
TB Clinic, Christian Fellowship Hospital  
Oddanchatram, India

## Farmer communication

I APPRECIATED Wilfredo Morán's comments in *Footsteps 19* on the importance of sharing information between farmers. Farmers can also be helped to try out new methods if the messages of extension agents are repeated on the radio, in print and on television. Adapting indigenous methods of communication such as folk songs and drama can be highly useful. Farmers can participate as actors and the message will get more support. Instead of one media man, deciding for many farmers, the farmers themselves can be organised to share their messages.

K S Meenakshi Sundaram  
Madras, India

## A good idea for the kitchen...

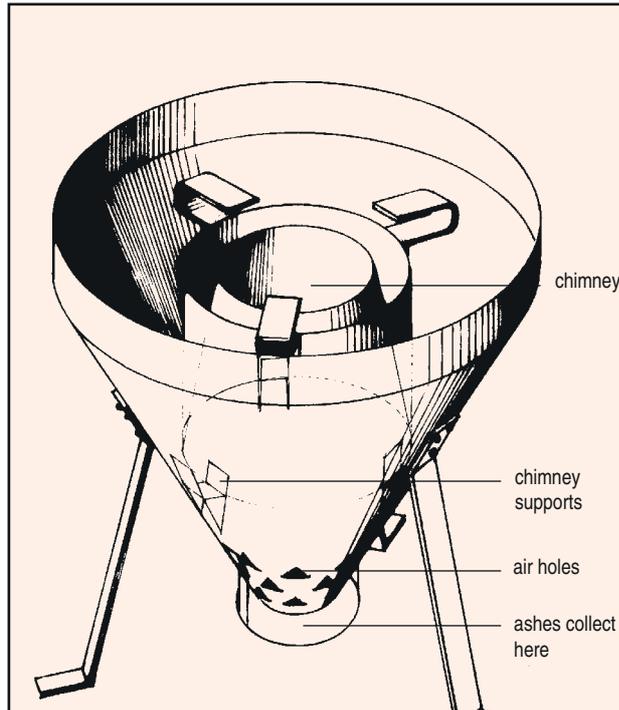


The photo shows the proud owner of an impressive-looking kitchen cupboard in Rukungiri, Uganda. Mud and cement plaster coats a wooden framework. The mat on top can be rolled down to close the cupboard.

# New ideas for cooking stoves

With thanks to...

- Aprovecho Research Center, USA
- Anna Pearce, Box Aid SSS, UK
- Heifer Project Exchange
- FAO
- Jan Willem Dogger



## The 'Lo-Trau' – a rice husk burning stove

This idea, originally from Vietnam, has been developed in Senegal by FAO with Dutch funding. As yet there is little literature available. However, these drawings will give a good idea of the design and may enable a good mechanic to build the stove. It costs about \$30 to make, stands 30 cm high, weighs 2.5 kg and burns rice husks with a clean, almost smokeless flame. Dried goat manure or coffee husks can also be used. To light the stove, crumpled paper or straw is placed at the base of the chimney before filling with husks.

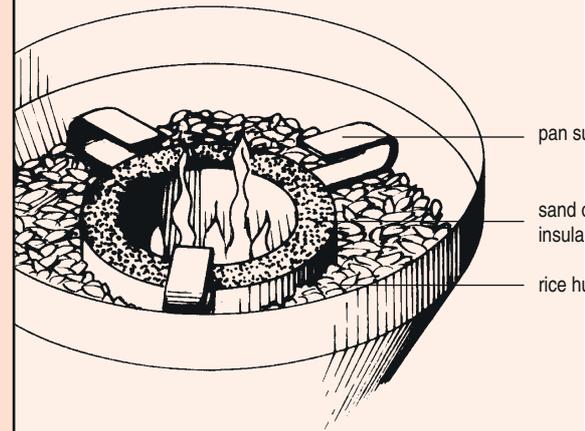
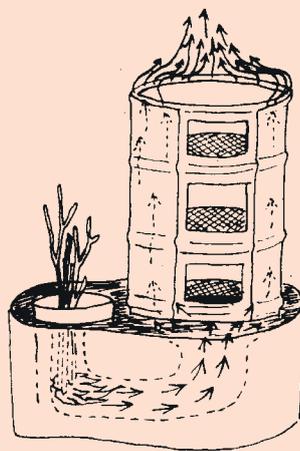
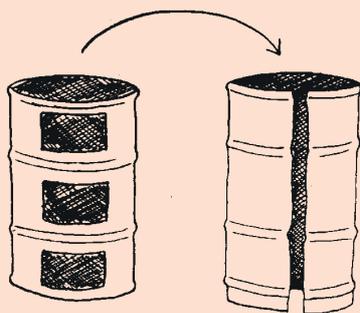
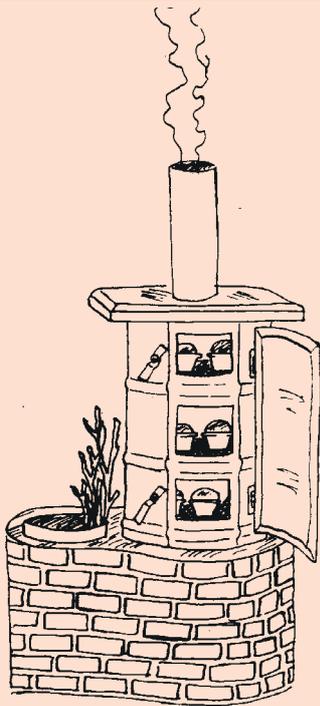
This stove is highly efficient, burning less than 1.5 kg of husks per hour while providing a lot of heat. FAO are encouraging its use in West Africa. If widely adopted, the stove could reduce demand for fuelwood.

Interested readers can send comments or queries to Jan Willem Dogger, c/o Footsteps

## The 'Rocket' Bread Oven

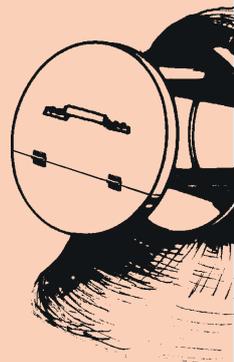
This oven was designed by Larry Winiarski of Aprovecho Research Center. It heats up very quickly, uses little wood, doesn't smoke and bakes up to 20 loaves of bread at a time.

The oven is built out of two empty 55 gallon drums. The inner barrel is closed, except for the three doors cut out in front. The outer barrel is then wrapped around the inner barrel. Hot air rises up between the two barrels. The oven works well because the fire chamber is insulated, the air is pre-heated before joining the fire and the heat is in contact with the bottom, sides and top of the cooking area.



## Insulated Bread Oven

This oven uses one empty 44 or 55 gallon drum, raised off the ground on stone supports, allowing room for a fire and chimney pipe to pass underneath. The whole drum is then covered with a thick layer of mud, ferro or fibre-cement which provides good heat insulation. Shelves are fitted for cooking and the lid is hinged one third of the way up and fixed to the base.



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## The 'Wonderbox Debe' – a multipurpose solar cooker

This solar cooker makes use of the sun, but has the great advantage that if the sun goes in or a meal needs warming up in the evening, there is no need to light a fire. This cooker also works well over a candle or a small paraffin burner for heat.

You will need to make some insulating cushions to keep in the heat as the food cooks. All kinds of material can be used to provide insulation – polystyrene granules, waste cloth, dried grass, wood chippings, foam rubber or crumpled paper. A cover of tough cloth is sewn together and filled with insulating materials.

You will need a square tin – ideally a paraffin tin (debe) with a large round opening. If there is no opening you can make one. Cut off the top of the tin with a tin opener or shears (1).

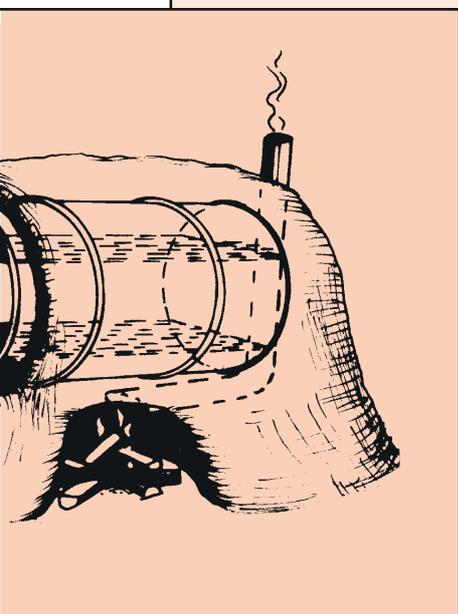
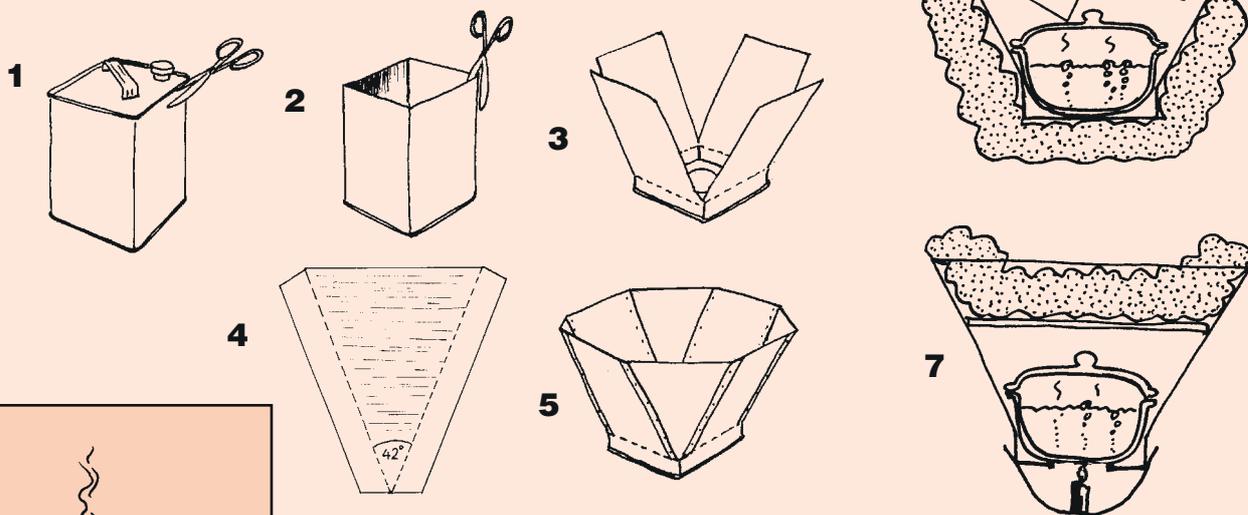
Cut down the four corners of the tin to about the width of a ruler from the bottom (2). Gently bend the sides of



the tin outwards, above the ruler, till they are like the petals of a flower (3). Cut out corner pieces (4) which have sides the same length as the 'petals', allowing a small overlap. Using this overlap, attach the pieces to the 'petals' with nuts and bolts or rivets (5).

For solar cooking (6), place insulation under the base of the debe cooker. The pot you use should have either a black or clear glass top. Cut the food up into small pieces and allow more time for cooking than on a conventional stove. If the sun goes in, surround the pot with cushions to keep the food hot.

For cooking inside or re-heating meals (7), support the cooker (which has a round opening at its base) over a small heat source such as a candle or small paraffin burner. A metal dish makes a good support. Cover the top of the pan with a cushion.



## Nearly right!



This stove was introduced to the Maasai in Kenya. It had the advantage that it could cook more than one pot at a time and it meant that children were no longer at risk of falling into the traditional open fire with three stones.

However, although it worked well it was later destroyed. Why? Because it didn't produce enough heat or light in the home – very important at night to the Maasai.

A helpful reminder of the importance of working together to develop technology which not only works well but is appropriate.

# Fibre-cement tiles

FIBRE-CEMENT tiles and bricks are a relatively recent development. They use less cement than conventional tiles and bricks and make use of locally available fibres, reducing costs, and making light, strong building materials. A wide variety of fibre-cement building materials can be made – tiles, blocks, gutters and curved blocks for water tanks. A special machine called a vibrator and the appropriate moulds need to be purchased. For simplicity, we will just consider the tiles in this article.

Fibre-cement tiles will build long-lasting, strong roofs which can collect rainwater. They are usually cheaper and look better than metal sheets. However, a lot of careful planning and costing is essential before a group considers purchasing the vibrator and other necessary equipment. This requires a large capital outlay, and profits will only be made gradually. A regular supply of cement is essential. The cost of alternative roofing – corrugated metal sheets – will usually be the deciding point. If these are relatively cheap it will be very difficult to make a good profit. Technical skill is needed too to obtain good results. At first there may be a high rate of damaged tiles and breakages.

Two sizes of roofing tile are available. For new groups the smaller is recommended, as inaccuracies with this size are not too important. One badly formed large tile can throw the whole roof out of line.



*A tiled roof needs a strong roof structure. Tiles are heavier than metal sheets. The roof will need to be well constructed with accurate measurements and level cross beams.*

The quality of the sand is very important. People assume that the locally available sand will be fine. However, if the sand particles are too fine or too coarse, the tiles will fall apart. Before investing in the machinery, check carefully the quality of sand available.

Sisal and jute fibres have proved very successful in tile manufacture. However, the processing of the fibres is quite time-consuming. They have to be separated and chopped into small pieces. Other fibres (eg: banana fibre) may also prove successful.

The fibre-cement is mixed carefully from the recommended proportions of chopped fibre, sand, cement and water. The mixture is then placed onto the vibrator where the outline shape of the tile is formed in a mould.

Another important point is to consider the transfer sheet. This is the piece of plastic-like material which is used to transfer the newly made tile onto the form for drying. This needs replacing surprisingly quickly – often after only about 25 tiles. The replacement of these must be costed. Heavy duty plastic can be used as a substitute after being cut to size.

The newly formed tiles are left in the moulds to harden, usually overnight, to prevent them from drying out. The tiles can then be removed and the

moulds re-used. To avoid breakages, it is important to follow carefully the instructions for curing the hardened tiles. They must be soaked in water for at least seven days.

Prices begin at about £1,400 for the basic machine and all necessary equipment, which can be obtained from...

*J P M Parry  
Overend Road  
Cradley Heath  
West Midlands  
B64 7DD  
UK.*

They are happy to answer serious enquiries and technical queries.



*Moulding a tile on the vibrator.*



Transferring the wet tile onto the form for drying.



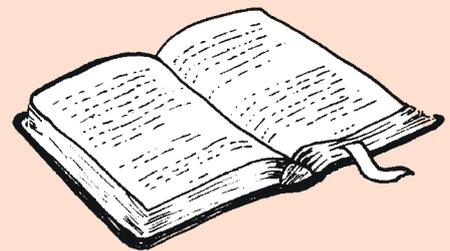
The newly formed tiles are left to harden in the moulds.



The dried tiles must be soaked in water for at least seven days.

## BIBLE STUDY

# Discipleship courses



THE NEED TO DISCIPLE CHRISTIANS – especially new Christians – is very important. We are encouraged to do this in many places in the Bible – for example, Matthew 28:19–20 and 2 Timothy 2:2. The church often gives more attention to preaching and teaching. These are very important but, to enable people to grow in their faith, discipleship courses in small groups are also of great benefit. Such a course was developed at Kagando Hospital, Uganda by Louise Potts and Dr Emmanuel Luyirika to encourage people to study the Bible together in small groups. They developed a 14 week course, including an introduction to discipleship, studying the Bible, quiet times, how to disciple others and how to prepare Bible studies. The course proved a great success at Kagando – many leaders were trained and the course was translated into the local language, Lukonjo.

Here is an example of how to prepare for leading a group Bible study when there are no teaching notes available. Here we use, as an example, a passage from 1 Thessalonians 5: 16–18. However, these guidelines can be used for any Bible passage. This preparation must be done thoroughly **before** the Bible study – not during it!

### 1. Read and understand

Read the passage (1 Thessalonians 5: 16–18) through carefully, looking out for words which people may not understand. This is very important if people are studying in a second language. Remember that people may feel embarrassed to say they don't understand. It is better to go over any difficult words.

### 2. Observe

Help people to observe what the passage is really saying. Use some questions to help people understand the message or the situation. For example...

- *What are we to do in all circumstances?*
- *When should we be joyful?*

### 3. Interpret

Now that people understand the facts, they need to be helped to understand to interpret them. *'Why did that happen?'* or *'Why should we do this?'* are the sort of questions to encourage people to discuss in order to help them make sense of the passage. For example...

- *What does it actually mean to pray at all times?*
- *Why should we be thankful in all circumstances?*
- *How would you feel if Paul had said this to you?*

### 4. Application

When people understand what the passage means, we need to look at our own lives and see if we are doing what the Bible is teaching. These are the sorts of questions which change our lives and really challenge us. For example...

- *Am I thankful in all circumstances?*
- *Am I joyful always?*

### 5. Action

When we look at our own lives we often find there is a gap between what we are doing and what we have now learnt that we should be doing. This kind of question gets us to think about how to make this gap smaller. For example...

- *What can I do to give thanks in all circumstances?'*
- *What can I do to be joyful all the time?'*

These five guidelines can be used to help prepare a study from any Bible passage. If possible, give the study a title which mentions the things which you want to draw out of the Bible study.

Would it be appropriate to begin discipleship courses or Bible study groups in your church or place of work? There are some useful guides available in Christian book shops – or you could develop your own, as they did at Kagando.

## Drying – Food Cycle Technology Sourcebook No.6

UNIFEM, the United Nations  
Development Fund for Women  
62 pages paperback

A useful and practical booklet, giving detailed information on the design and building of a range of different food dryers. It introduces the technical principles of food drying and also contains project planning checklists, case studies and extensive references and contacts. UNIFEM has offices in many countries you could contact. Or write to...

Women Ink  
777 United Nations Plaza  
New York  
NY 10017  
USA.

## Rural Processing and Preserving Techniques for Fruits and Vegetables

Published by FAO

A well illustrated manual giving clear and simple instructions on various ideas for processing fruits and vegetables to preserve them. Photos, examples and case studies are from Burkina Faso. It includes information about hygiene, blanching, drying of fruit and vegetables, mango jam and

juice, citrus fruit juice and tomato pulp. It aims to encourage small groups to produce good quality products that can be marketed. The manual was first prepared in French and is now also available in English

To request a copy of this helpful book, write, with details of your work, to...

Peter Steele  
AGSI, FAO  
Via delle Terme di Caracalla  
00100 Rome  
Italy.

## Food Chain

This is a helpful and practical journal published by Intermediate Technology about every aspect of small-scale food processing. It is aimed at development institutions, non-government organisations and individuals working with poor communities in the South who are involved with food processing activities. If you would like to receive this journal (which is published three times a year) write, giving details of your work, and if appropriate, copies will be sent free of charge.

Food Chain  
Myson House  
Railway Terrace  
Rugby  
CV21 3HT  
UK

## Looking Forward and Looking Back – a participatory approach to evaluation

by Jerry Aaker and Jennifer Shumaker  
Heifer Project International

This is a practical aid to effective evaluation which has been developed over ten years of project development with Heifer Projects. It breaks down the process of evaluation into six steps which are each looked at in detail: the purpose of the evaluation, setting the focus, collecting information, planning for implementation, analysing and organising the data, and the follow-up plan.

A useful and practical guide to anyone actually involved in carrying out evaluations and monitoring the progress of a project.

The manual costs \$6, including postage. Order from...

Heifer Project International  
PO Box 808  
Little Rock  
AR 72203  
USA.



# Networking contacts

Following our earlier collection of networking contacts in *Footsteps 17*, here are some further addresses of people who have agreed to act as contacts for others in their geographical area. It is

always helpful to write or meet with others involved in similar work, so we would encourage you to make contact. Please note, however, that these people are **not** sources of funding or literature.

### Agriculture

Andrew Gwaivangmin  
COCIN  
PMB 2127  
Jos  
Nigeria

Jameson Mubita  
Icubo Farm Institute Ltd  
P O Box 260152  
Kalulushi  
Zambia

Stephen Carr  
Private Bag 5  
Zomba  
Malawi

### Church and Development Work

T K Joy  
EFICOR  
College Square PO  
Balangir – 767002  
Orissa State  
India

Bougma J Marie  
AAILD  
01 BP 3368  
Ougadougou  
Burkina Faso

Sally Chademana  
Development Officer  
Baptist Union of Zimbabwe  
Harare  
Zimbabwe

### Development

Alexis Andino  
CONSEDE  
AP #4339  
Tegucigalpa DC  
Honduras

Chantelle Wyley  
Development Contact Network  
50 Umbilo Road  
Durban 4001  
South Africa

### Primary Health Care

Dr Diana Srinivasagam  
IEM  
7 Langford Road  
Bangalore 560 025  
India

N Andriamitandrina  
B P 381  
Antananarivo 101  
Madagascar

### Technology

Ken Hargesheimer  
Box 1901  
Lubbock  
TX 79408  
USA

### Traditional Knowledge and Customs

Ravindra Shakya  
P O Box 842  
Kathmandu  
Nepal

### Training and Income Generation

Revd Nimi Luzolo  
Coordinator de PRAAL  
c/o Dr Ray Dourney  
BP 4464 Kin II  
Kinshasa  
Zaire

## Neem – a tree for solving global problems

*National Research Council*

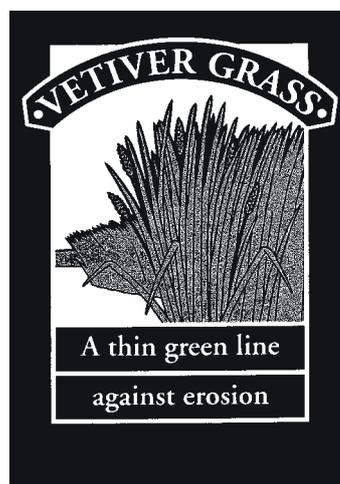
This report is written in clear language and covers a huge variety of the uses to which neem is put in different countries. The people of India have long revered the neem tree and because it can help with so many different complaints it has been called 'the village pharmacy'. Millions in India believe neem has miraculous powers. Now scientists around the world are beginning to think they may be right.

The report contains details of ongoing research into neem products and likely future developments. Copies of the book are available free of charge. Write, including a clear label with your name and address and giving details of your work, to...

*Noel D Vietmeyer*  
National Research Council  
2101 Constitution Avenue  
Washington DC 20418  
USA

## Vetiver Grass – a thin green line against erosion

Also published by the National Research Council, this is a similar report which looks into the effectiveness and potential of vetiver grass in controlling erosion. It gives much information on the different uses of vetiver grass in different countries. It includes details of husbandry, case studies, research work and future potential for this useful plant. Very useful for anyone involved in soil erosion control.



This book, also, is available free of charge – write to the name and address given above.

## Taking Hold of Rural Life

*by Patchanee Natpracha and Alexandra Stephens*

*FAO – Regional Office for Asia and the Pacific*

This is a very helpful manual encouraging small scale participatory development. It is aimed at field workers in Asia and the Pacific. It is very well illustrated, and provides plenty of ideas, methods and new approaches. The book is divided into five sections:

### An introduction to real participation

**Research** – understanding and studying situations together

**Planning** – the best way of reaching goals together

**Management and Implementation** – enabling communities to become self-reliant, creative and self-motivating

**Monitoring and Evaluation** – continuous feedback about all aspects of development

Nearly all the numerous illustrations are of women which makes a refreshing change! Highly recommended.

Limited free copies are available.

Write, describing your work, to...

*Alexandra Stephens*  
FAO Regional Office for Asia and the Pacific  
Phra Atit Road  
Bangkok 10200  
Thailand

## Participatory Monitoring and Evaluation – a handbook for training fieldworkers

*by Alexandra Stephens*

This booklet is a guide for training fieldworkers to assist village groups in Asia who want to develop a monitoring and evaluation system which allows everyone in the community to participate, to benefit from and to make use of the information gathered. This is a helpful introduction to this important subject, particularly in the very practical methods it describes of gathering information, monitoring progress and

## Technology Resource Groups

The following groups may be able to provide advice for specific problems concerning technology. Please note: they are **not** funding agencies.

### ITDG – INTERMEDIATE TECHNOLOGY DEVELOPMENT GROUP

Publish several journals and offer advice on a wide variety of technologies.

*ITDG, Myson House, Railway Terrace, Rugby, CV21 4HT, UK*

### GATE – GERMAN APPROPRIATE TECHNOLOGY EXCHANGE

Publish the journal *GATE* and provide an information service.

*GATE, PO Box 5180, D-65726, Eschborn, Germany*

### APPROTECH ASIA

Links 38 organisations in south and south-east Asia. They encourage the sharing of information about technologies such as renewable energy, sustainable agriculture, water supply and food processing. To find out more about the network, write to:

*Approtech Asia, Philippine Social Development Centre, Magallanes cor. Real Street, Intramuros, Manila 1002, The Philippines*

### CTI – COMPATIBLE TECHNOLOGY INC

May be able to provide advice concerning the post-harvest treatment of food crops – for example: food drying, preserving, food grinders, oil extraction.

*CTI, 5835 Lyndale Avenue South, Minneapolis, MN 55419, USA*

### CEMAT – CENTRO MESOAMERICANO DE ESTUDIOS SOBRE TECNOLOGIA APROPRIADA

A network for appropriate technology in Central America. Contact:

*CEMAT, Carlos Estrada B, Apartado Postal 1160, Guatemala 01901*

displaying the results with simple graphs and charts.

Very well illustrated, again mostly with drawings of women. Extremely useful to anyone involved in working with communities. Like the above book, limited numbers of free copies are available. Write, giving details of your work, to Alexandra Stephens at the previous address.

# Bicycle trailers

BICYCLES are found all over the world and are a very useful way of transporting people and loads. The use of a motor vehicle may often be impossible for a variety of reasons – usually because of the high cost, and sometimes because there are few accessible roads. Without transport it is very difficult to carry quantities of goods to market. Adapting bicycles to carry loads more effectively can bring great benefits.



Baskets or paniers can be added to a bicycle. Even more useful are small trailers. These may be expensive to buy ready-made, but here are some good ideas to help build your own at very little cost. These designs have all been tested and proved useful. Once the main frame is built, you can adapt their design for your own purposes, depending on your priorities – a tanker to carry water, an open trailer to carry goods, a flat bed trailer to use as an ambulance to carry sick people – there are all sorts of possibilities. You may want more than one kind of

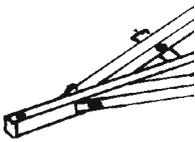
trailer. If bicycles are very expensive, a group of farmers could join together and buy a bicycle and trailer which could be available for each of them in turn. In urban areas, trailers could be used for a variety of means of earning income – such as selling vegetables, paraffin or charcoal, distributing drinking water or rubbish collection. In towns and cities, however, heavy motor traffic may be a hazard.

If you become skilled in producing these trailers, they could also prove a useful source of income if you are able to sell them.

## Recommended reading...

*The Design of Cycle Trailers*, by M Ayre. Cost £8.50 from Intermediate Technology Development Group.

ITDG  
Myson House  
Railway Terrace  
Rugby  
CV21 4HT  
UK

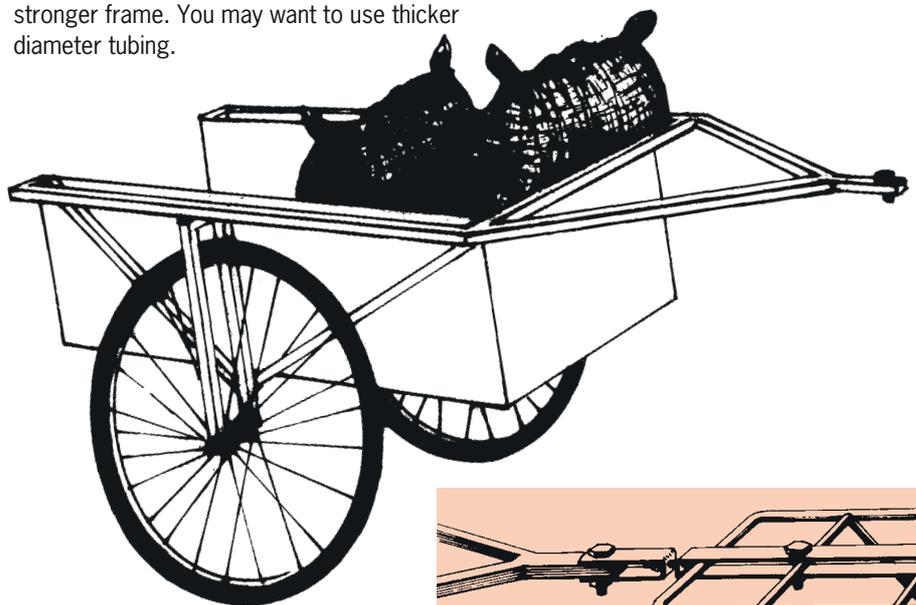


## Box trailer

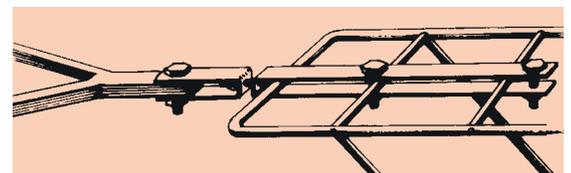
This design was developed by Ben Maxted in Sri Lanka and the joint is bolted onto the back luggage rack, allowing the trailer to roll on rough surfaces without damage.

The basic trailer was adapted by Mallavi Hospital and converted into a covered ambulance. This could carry one person – sitting or lying down, with a tray at the front for carrying health materials. The roof provided shade for the patient.

This design was made from welded tube steel which is not too expensive in Sri Lanka. A bending machine is useful as it reduces the amount of welding needed and gives a stronger frame. You may want to use thicker diameter tubing.

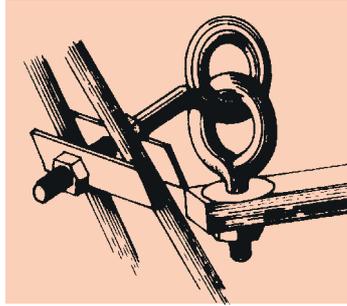


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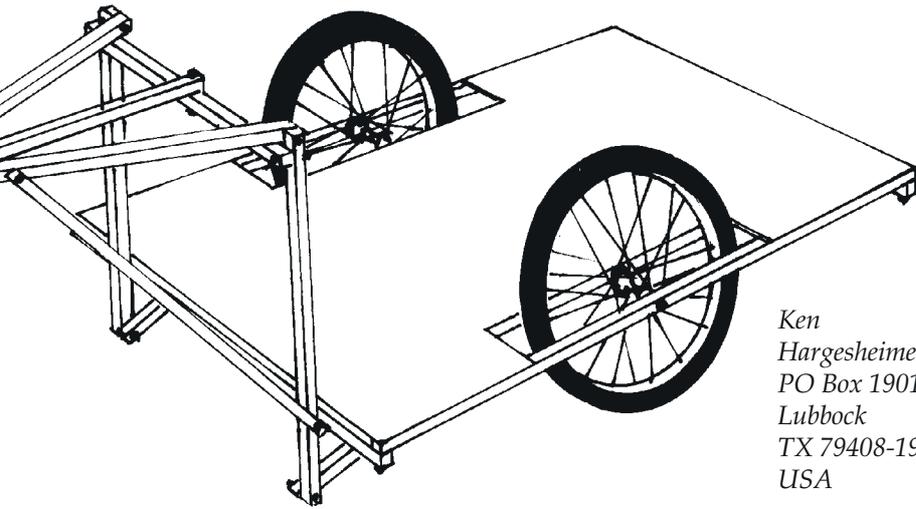


## Flat bed trailer

This design was developed by Ken Hargesheimer and bolts onto the bike frame just above the back wheel. Although this design could also be made from welded metal, not many people have metal welding equipment. This frame has therefore been made either from angle iron or wood – drilling holes in the end of each piece and bolting the frame together. It may also be possible to make a frame out of bamboo – tightly tied together at the joints.



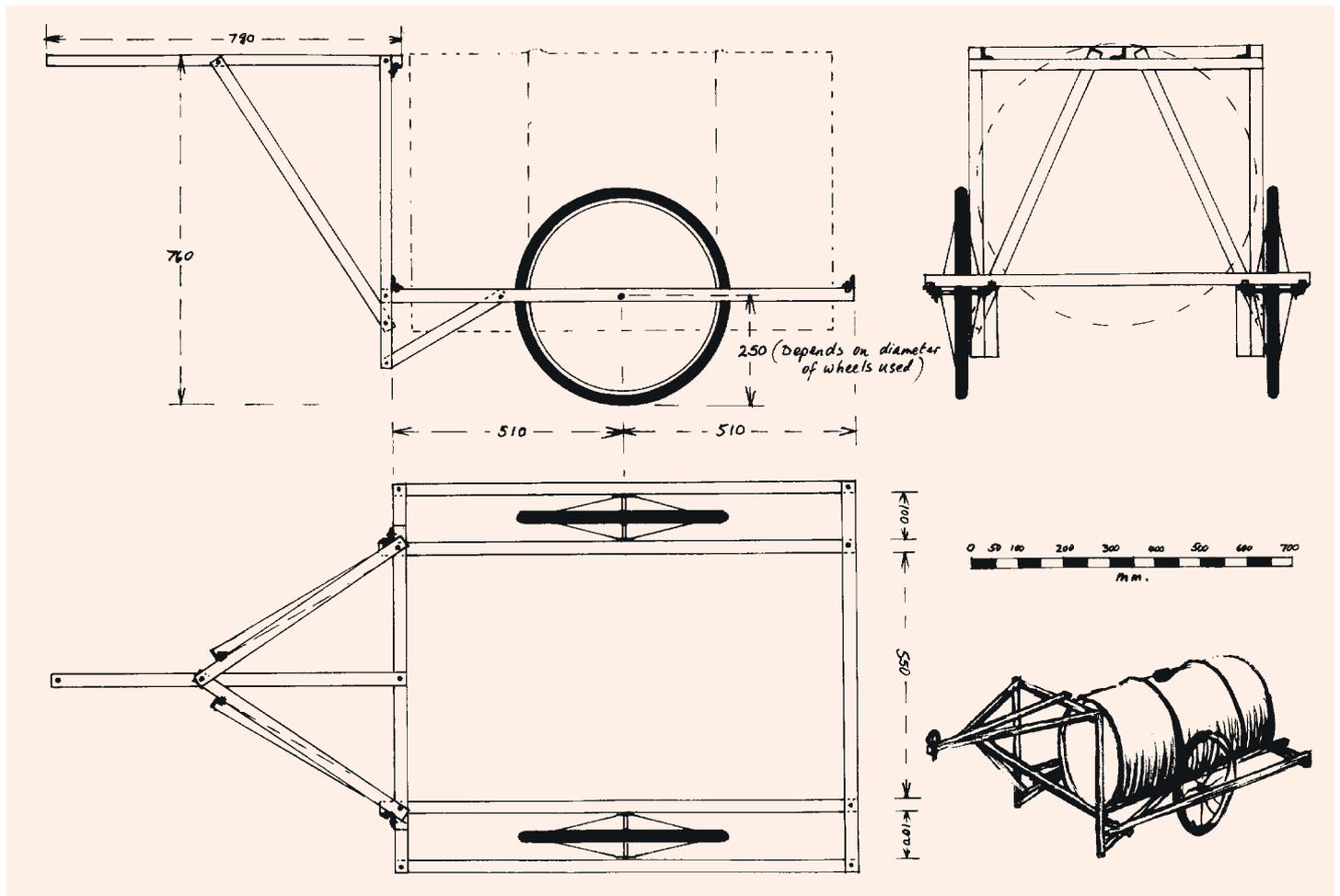
Towing link detail



Ken  
Hargesheimer  
PO Box 1901  
Lubbock  
TX 79408-1901  
USA

## Watch where you're going!

Certain driving skills are needed to drive a trailer, which is, of course, much wider than a bicycle. Allow plenty of room for driving round corners and beware of holes in the road. Don't overload these trailers – both designs should carry up to 100 kg, or a little more if they are made out of metal. Used with care, they should provide many years of useful service.

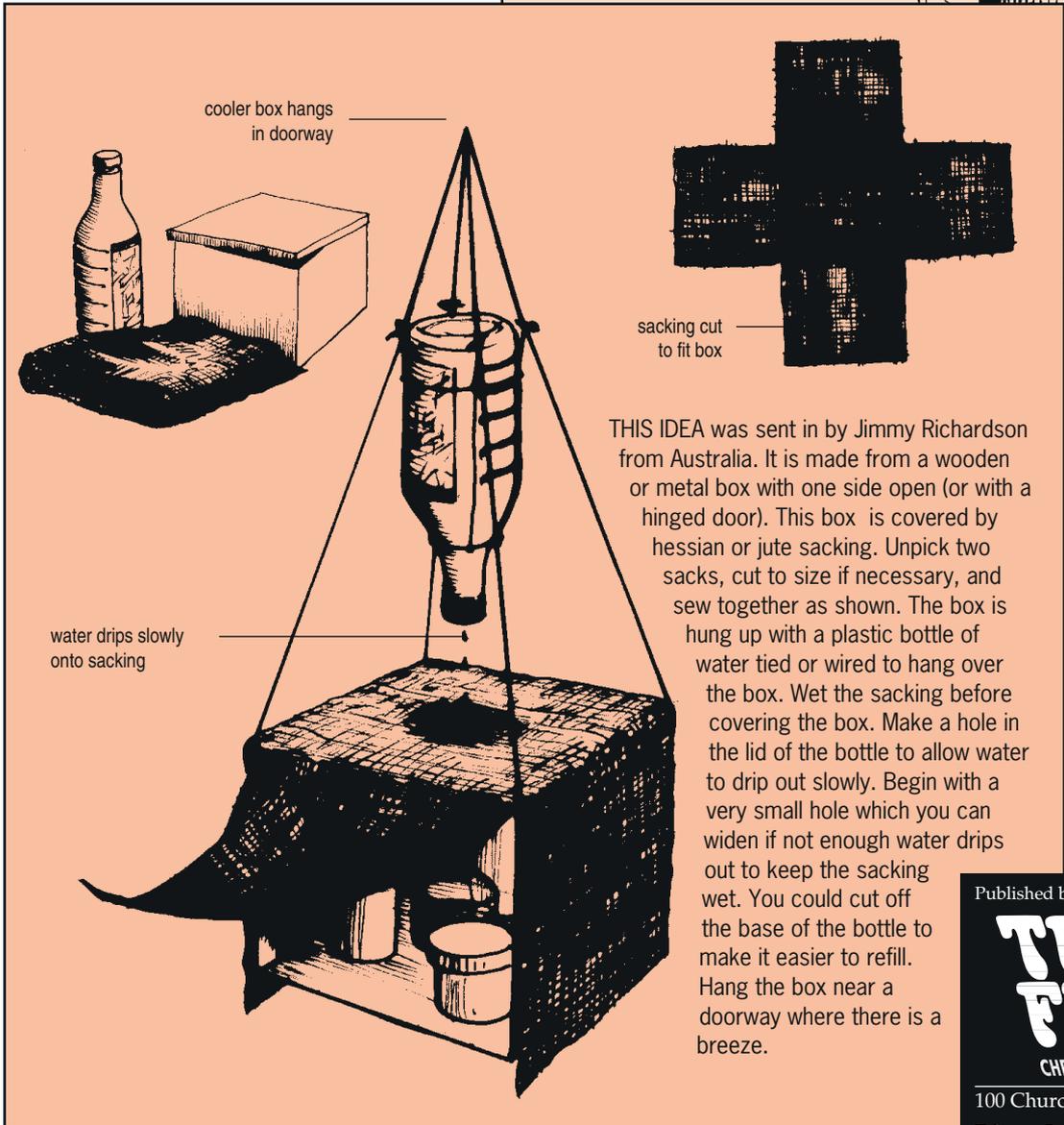
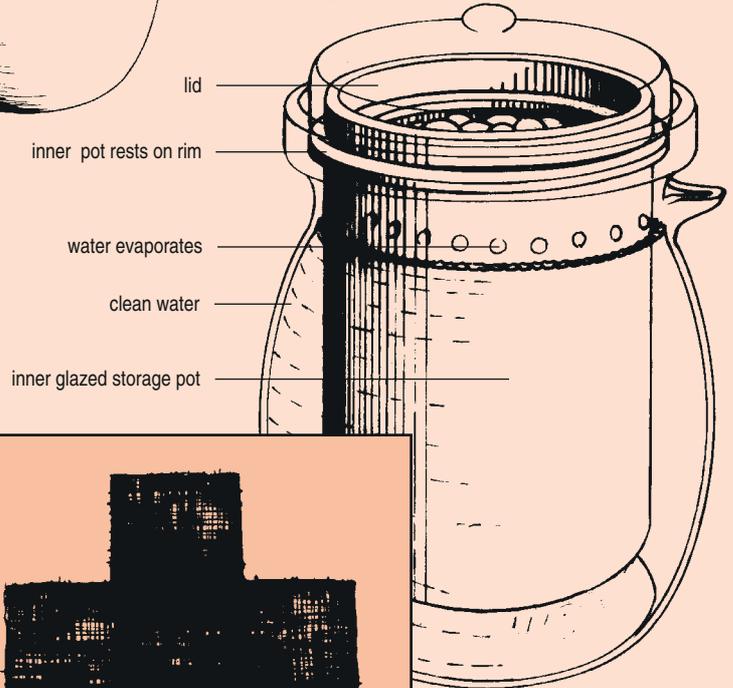


# Food coolers

IN HIGH TEMPERATURES, cooked meals and fresh food such as meat, fruit or dairy products, will not stay fresh for very long. Food will quickly become unsafe to eat, often after just a few hours. Here are two simple ideas which help to keep food cool – and also covered and free from flies. They cost little to make and will keep



THE SHITAL POT was developed by the Ceramic Unit, Centre of Science for Villages, Wardah, India and can easily be made by a village potter. The inner pot is glazed or waxed to make it watertight. It rests inside the rim of the outer porous pot. The heat of the day causes water to evaporate and escape through the holes below the lid of the pot as well as through the pot itself. This cools the inner storage pot and its contents.



THIS IDEA was sent in by Jimmy Richardson from Australia. It is made from a wooden or metal box with one side open (or with a hinged door). This box is covered by hessian or jute sacking. Unpick two sacks, cut to size if necessary, and sew together as shown. The box is hung up with a plastic bottle of water tied or wired to hang over the box. Wet the sacking before covering the box. Make a hole in the lid of the bottle to allow water to drip out slowly. Begin with a very small hole which you can widen if not enough water drips out to keep the sacking wet. You could cut off the base of the bottle to make it easier to refill. Hang the box near a doorway where there is a breeze.

food fresh for longer. They work on the principle that as water evaporates or dries up in the heat, the temperature inside the container is lowered. Both methods need a continuous supply of clean water and should be kept in the shade.

Published by

**TEAR FUND** 

CHRISTIAN CONCERN IN A WORLD OF NEED

100 Church Road, Teddington, TW11 8QE, UK

Editor: Isabel Carter, 83 Market Place, South Cave, Brough, N Humberside, HU15 2AS, UK