

## BETTER LIVING FACILITIES FOR AFRICAN FARMERS.

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### Abstract

Many African farmers were not convenient to obtain water. The water resource was 1km or more away from their house. Firewood stove was very simple and the energy waste big. They slept on soil beds or ground and lived in small houses. Obtaining water from underground, energy saving firewood stove, bamboo bed and the house made of soil brick, etc. were described in the article. The purpose was to guide African farmers to improve basic living facilities and have a more comfortable life.

**Keywords:** Well, Stove, Bed, House.

### INTRODUCTION

Scientific research points out that moisture in the human body accounts for 65-70% and the body's daily loss of water from urine, sweat or skin is about 1800-2000mL. There is 300-400mL water in the food in a meal. Hence, drinking daily at least 1000-1200mL water is necessary. Healthy drinking water standard proposed by the World Health Organization is that the water does not contain harmful substance, contain right amount of minerals, rich oxygen, moderate hardness, small water molecules and weakly alkaline pH. Natural water should be filtered and boiled before drinking. Boiling can kill bacteria in water. Drinking water is mainly from river, lake or underground well. The water resource for African farmers was usually 1km or more away from their house. They often drank no boiled water. Every year, there were about 700,000 people in African continent died of disease caused by insecure food and drinking water (the Food and Agriculture Organization, the World Health Organization, 2005).

Farmers should settle down near water resource, gather together to form villages where there are roads leading to a major highway. If the house is far away from water resource, a well (Fig 1) nearby should be dug. Under the premise of not passing any disinfection treatment, water in a well is cleaner than that from a river, lake, fish pond or irrigation canal and ditch. At least 2 persons have to cooperate when digging a well. One person in the well digs soil and transfers it into a container, the other person on surface pulls the container by a rope and discard the inside soil. The main tools include a hoe (the iron plate has 30-50cm length, 16cm width, 1.2cm thickness in upside, total net weight 2-3kg and 45cm length of wooden handle), a shovel, a rope and a bucket (Fig 2). A place of 110cm length and 70cm width, which closes to a fish pond, trees, bushes or a hill near the house, is selected for a well. Digging down 50cm each time 2 holes (the size per hole is same as the person's foot) are made on the inner wall of symmetry so that the person can get out of the well by stepping on the holes. The general depth of a well is 5-10m. Digging until spring water appears. The well can be circular type and its inner wall reinforced with bricks.

A fence around the well should be installed for fear that children fall in and are drowned when play games nearby. A wooden scroll installation above the well is for labor saving (Fig 1). A shade also can be made above the well to avoid rain or pollution. A gourd ladle can be simply made by sawing a bamboo between two nodules (Fig 2). Well water also should be boiled before drinking. They can be used to irrigate vegetables near the house in dry season.

### Energy-saving firewood stove

African farmers almost cooked by burning firewood among three

bricks. There was much smoke around the stove which made people unable to open eyes. The energy waste was also great. A kind of energy-saving firewood stove (Fig 3) should be adopted, which mainly made of soil or soil bricks, the length, width and height is 100-120cm, 60-80cm and 80cm respectively. 6-8 iron wires are put on the place where the distance to ground is about 40cm. Burning firewood on the wires and ash will fall through leaks between wires. The size of firewood inlet and ash outlet is 25-30cm by 20cm. That of above placket depends on the size of wok used by local people. A chimney on the other side of stove is constructed by soil bricks which across the roof so that the smoke is expelled in air. The chimney can be rectangular or circular type. If two or more stoves are constructed together, a connected channel should be built to allow the smoke flowing to the chimney. A shade should be made on top of the chimney to avoid rain.

There is a small channel from the stove to outside, which is ready for connecting with an air box. The depth, width and height of the air box are 60-80cm, 25cm and 30cm respectively. It is mainly made of wooden blocks. The hole beside it aims to the channel for transferring artificial wind. A small window is made in its back. A movable baffle is fixed on top side in order to open and close the window. The wooden scraper inside the box is fixed at the end of stick. The window will open and wind come in the box when dragging out the handle. The window will close and winds go into the stove when propelling the handle. The firewood will be burned completely due to sufficient oxygen.

### Bamboo bed

Many African farmers slept on soil beds or ground, which were airtight that affected sweat discharging from skin. The soil temperature was low, the contact part of body lost much energy and rheumatoid arthritis would be easily caused. Pollution on the soil bed or ground was easy to induce parasites or bacterial diseases. Farmers should try to sleep on normal beds. Bamboo is generally available. A bamboo bed (Fig 4) can be made by oneself. 3-4 bamboos (180cm length) are cut into small blocks (0.5-3cm width) and assembled as a large block (120cm width, simplified as A). Another 4 bamboos with the same length (185cm) are simplified as BBCC. 37-43cm away from the two ends of bamboo B is half cut into a U type trough so that it can be bent and the bamboo C fixed inside. The four bamboos (two 135cm and another two 185cm length) below are connected with the bamboo B, which play a stabilizing role. About 7 bamboo blocks are inserted the bamboo C to support the assembled block A (Fig 5).

When the weather is cold, a layer of wheat (rice, wheat or teff)

straw is put on the bamboo bed and a cloth covered on the straw. A pillow can be made of a cloth (or fiber) bag filled with minced straw.

**House**

Many African farmers' houses looked like haystacks. A few dry tree branches or wooden sticks were inserted into ground to form a circular enclosure. The wall around it was constructed with wet soil. Crop straw was covered on a conical wooden frame to form the roof. The area and space in the house was small and narrow. The indoor light was dim. Soil brick house can be used to expand the area and space. Firstly, a soil brick mold (35-40cm length and 25cm width) is made of 4 wooden boards (1-1.5cm thickness). The mold has no bottom. Secondly, much cohesive soil is dug with a hoe and mixed with suitable water. The wet soil is changed into mud by repeated treading. Thirdly, the mold is fully filled with mud and then carefully pulled out. A wet soil brick is finished. Many of them are made according to the same procedure. When the wet bricks are dry, they are ready to be used. Fourthly, number of door and window is prepared according to need. In general, the height and width of a door is 200-210cm, 70-100cm or 90-120cm, respectively. That of a window is about 150cm and 110-120cm respectively. Fifthly, number of wood (about 10cm diameters) and wooden board or bamboo board are prepared for the frame of roof and enough straw for roof cover. Each half roof needs about 8 woods. Sixthly, determining the size of rooms, the best ratio of room length and width is 3:4 (e.g. 300cm length and 400cm width). Doors are temporarily fixed so as to be constructed in the future wall. Windows are also in the wall (90cm from ground). Two ladders are prepared for two persons going on or down the future roof. Lastly, the house is constructed step by step. Trees or bamboo should be planted around the house for fear that the straw is blown off by wind in rainy season (Fig 6).

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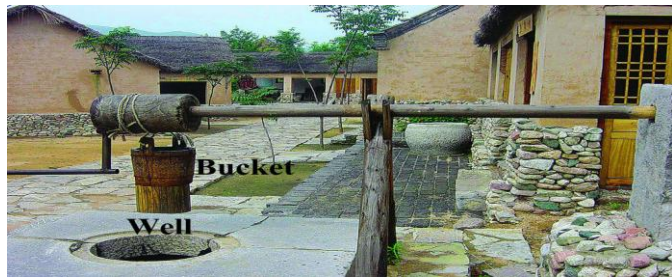
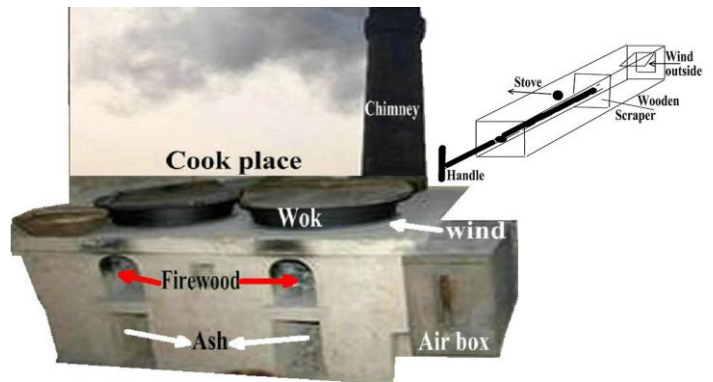


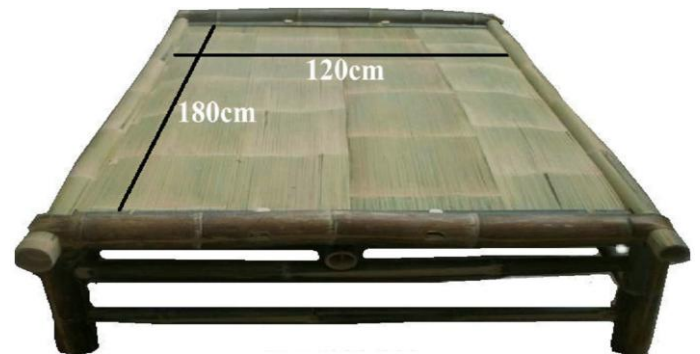
Fig (1) Labor saving device for water intake in a well.



Fig (2) Hoe, wooden bucket and bamboo gourd ladle



Fig(3) Energy-saving firewood stove and cutaway drawing of air box.



Fig(4) A kind of bamboo bed.



Fig(5) A Chinese farmer was making a bamboo bed.

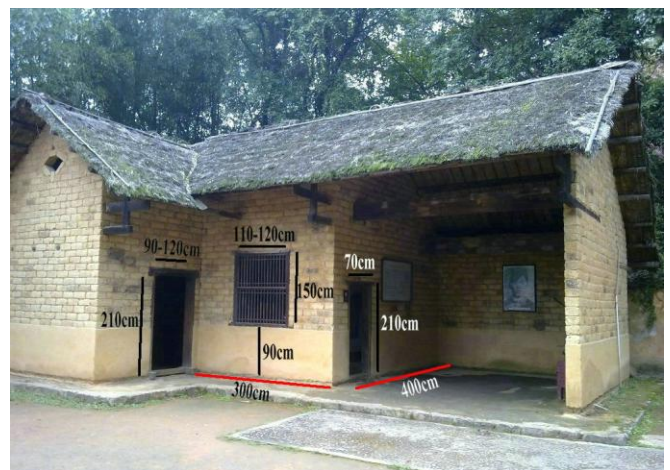


Fig (6) A kind of house used by Chinese farmers.