



REPUBLIC OF NIGER  
MINISTRY OF AGRICULTURE DEPARTMENT OF  
STUDIES AND PROGRAMMING



Japan International Research Center for  
Agricultural Sciences

## Manuel soil conservation measures using more cement sandbags



December 2012

Appendix: Technical Manual 4

"Guide for the Management and Natural Resource Conservation"



## Préface

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*Dans le monde rural en perpétuelle dégradation due à l'action conjuguée des hommes et des phénomènes de la nature (érosion hydrique et éolienne), la recherche/vulgarisation devient une préoccupation quotidienne. **Les mesures de conservation des sols à l'aide de sacs de sable plus(+) ciment en est une.***

*La contribution du gouvernement japonais dans le secteur aussi important que celui du développement rural, en collaboration avec celui du Niger à travers la JIRCAS appuyée par les cadres nationaux nigériens pour résoudre ces problèmes de nos écosystèmes est à saluer.*

*Ce document, fruit des recherches sur les sites de SAY, apportera une contribution de tout premier plan dans l'univers des techniques de conservation et restauration des terres.*

*Peut-être sommes nous au seuil d'une découverte majeure concernant la technique de récupération des eaux et des terres dans les régions du Sahel.*

*Les pages qui suivent, je l'espère vont nous éclairer sur les techniques découvertes par la JIRCAS.*

**LE DIRECTEUR GENERAL DU GENIE RURAL**





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## 1. Introduction

This manual is intended to explain a technique to fight against land degradation in rural areas where it is growing as a result of predatory actions that lead farmers including: keep overgrazing and poor farming practices such as crop , excessive are among the poor cultivation practices.

## 2. definition

Soil conservation with sandbags and cement is a technique used to fight against water erosion in places where stone problems arise. The technique is to create a lightweight mortar mix: that is to say little cement but with a lot of sand, which is used to fill the empty bags are placed in areas undergoing erosion threat and upstream.

## 3. Objective

This technique can protect land threatened:

Breaking the force of attack of floods and washouts banks to direct runoff and promote sedimentation.

- Reducing the length of the slope and speed of the water to allow its spreading and its infiltration.
- Facilitating the development of plants around the structures.

## 4. Description / Features

This technique involves:

- The ears rejection to direct water flowing in gullies.
- The bank protection embankments to reduce sapements
- Small thresholds placed against the direction of flow of water gullies.
- Mortar bags cords to permit infiltration and sedimentation. The filled bags were to dimensions:

- a) Length = 90 cm
- b) Height = 30 cm
- c) width = 40 cm

## 5. Application Area

- The ravine and Ravines;
- Part most upstream of the troughs, surface erosion of areas of the slopes

These structures are effective everywhere, but economic in areas where stones are missing, because it is enough simply to use sand or earth lying around point to treat. This technique:

- Uses less labor;
- Easy to master by farmers (or population);
- Fits anywhere because the dry mortar bag Wet wife although any form of ground.

## 6. Implementation of technology

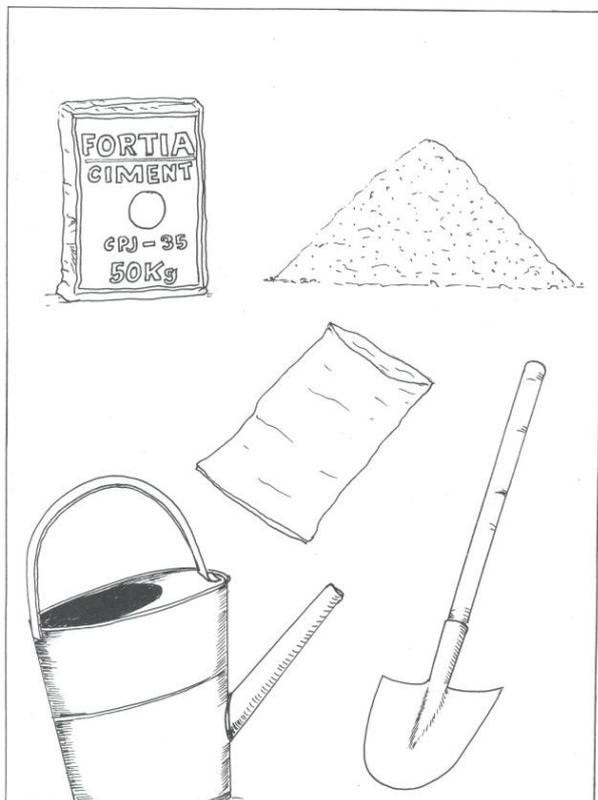
### 6.1. implantation

- It is to identify the places, threat analysis, decide the type of structure (spikes thresholds cords) suitable and then proceed to its implementation.

### 6.2. Preparation

- Pile up the soil in the vicinity of the structure and which is in the form of deposit. It is to avoid digging too and create weak points for water.

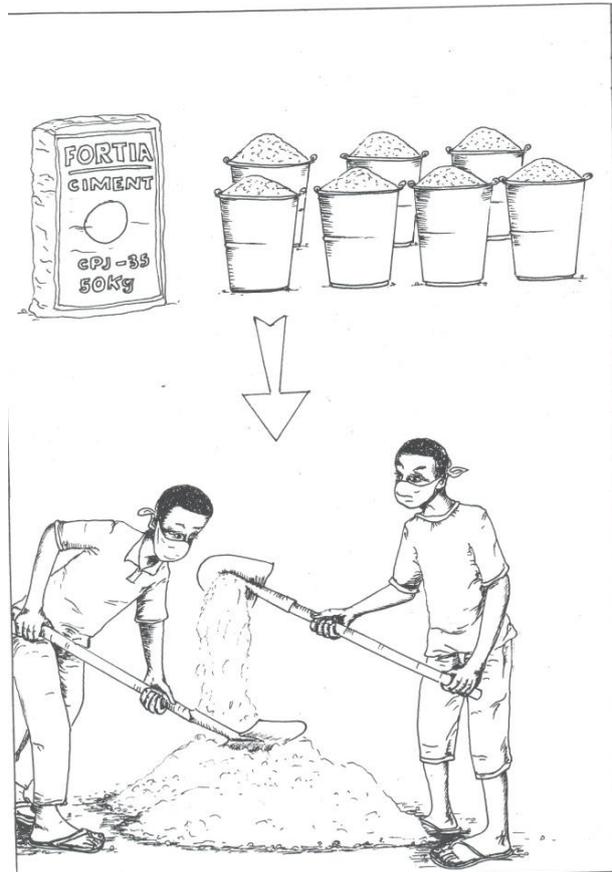
- Supplying cement, empty bags, water, small equipment (shovels, wheelbarrows, masks, empty barrels, buckets etc.)



### 6.3. Mixture to dryness

- On the chosen place is mixed using a shovel sand and cement properly calibrated. Thus the volume of sand has to be 5 to 7 times more than that of the cement. So to 50 Kg, we can put 250 350 kg of sand.

- Beware that the cement does not penetrate directly into the eyes, nose, or mouth. It is good for it to cover his mouth and nose with a tissue.

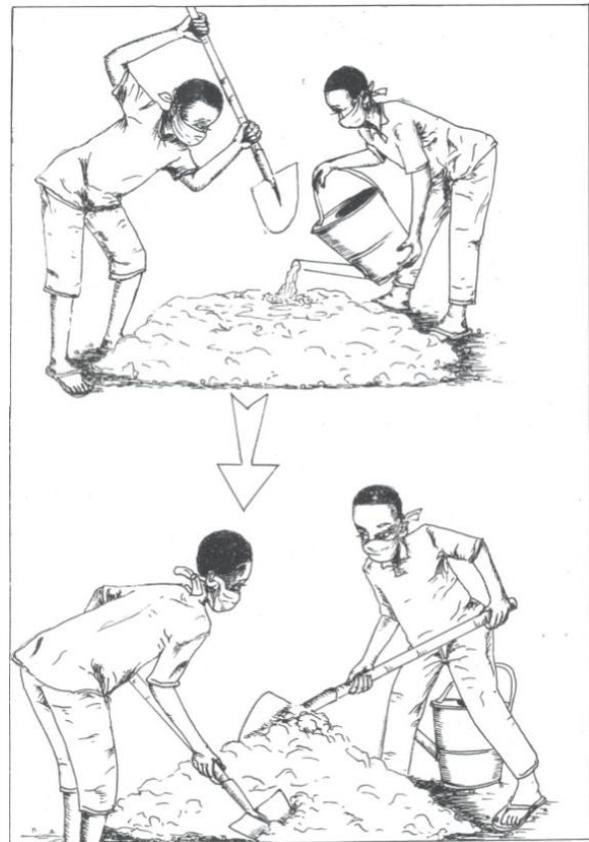


### 6.4. mixing

- is gradually added in small amounts water to the mixture of sand and cement.

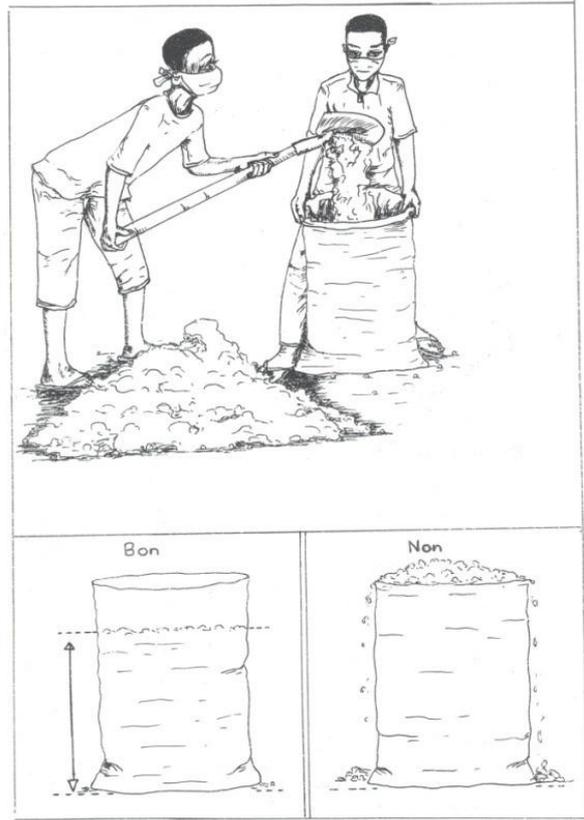
- The volume of water to be used is one and half times the volume of cement.

- If work can be done during or just before the rainy season, we will have the bags with dry blending without spoiling, but the resistance of mortar bags thus produced will be less than if the mortar had been spoiled.



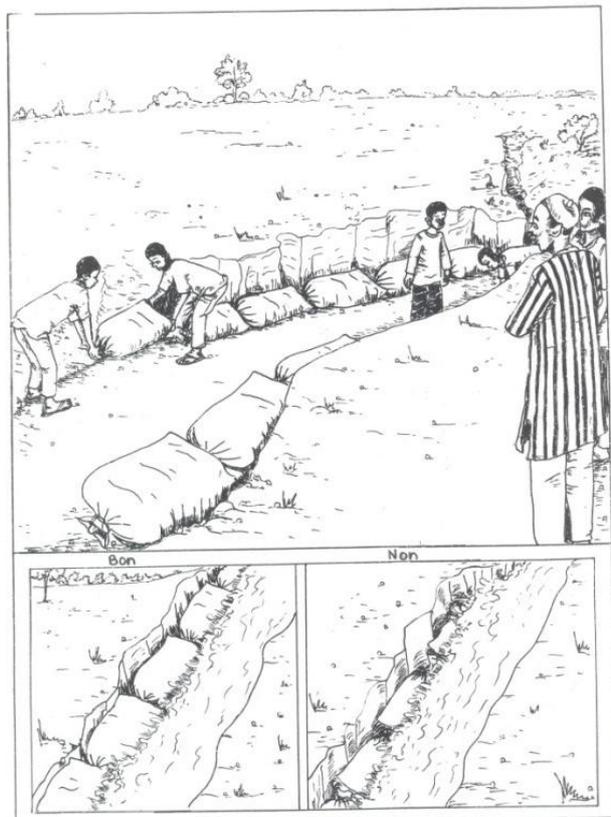
### 6.5. Filling bags

- Complete the mortar mix well kneading the mixture of cement, water and sand
- Introducing the mortar into the bags and sewing by using a string.
- The bags will be filled up to 80% of their total capacity.



### 6.6. Placing

- Set up the bags in the eroded parts.
- Perpendicular to the flow direction for the thresholds and cords and bias for the ears.
- Tap lightly on the bags to each layer of bags implementation so they match the shape of the ground or the bag on which they are placed



[Photos]



① Preparation of materials



② Mixture to dryness



③ mixing



④ Making mortar bags



⑤ Placing



⑥ The completed facility

**7. Advantages and disadvantages / constraints**

Advantages	disadvantages
<ul style="list-style-type: none"> <li>- This technique can be easily implemented by anyone without advanced knowledge or experience, has a high degree of diffusibility.</li> <li>- Provides possibility of biological fixation of the banks.</li> <li>- .Channeling runoff and épands</li> <li>- From an economic standpoint, this method is more interesting than the establishment of structures Gabion etc.</li> </ul>	<ul style="list-style-type: none"> <li>- If the bags are altered, they are cause for concern to the extent that they seem incapable.</li> <li>- The costs are higher than the works made solely of stones such as stone bunds, the thresholds in areas where the stones are in abundance.</li> </ul>

## 8. Cost Structure Technology

Estimasif for a book: Height 60cm (2 layers of 30cm), length 100 meters, width 50 cm

inputs	Amount	Unit price	Total (CFA)
empty sandbag	222 bag	200	44,400
<b><u>cement bags ( 50kg )</u></b>	116 bag	7,500	870,000
Travel costs of materials	<u>20 traveling</u>	-	To take into account if necessary
Water transport costs	<u>20 traveling</u>	-	To take into account if necessary
labor costs ( The amount of work and <u>wages are estimated</u> )	<u>37 pers./day</u>	1,500	55,500
Grand total			969.900

## 9. Potential Users

Projects / NGO / Technical Services

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