EUROPEAN COMMISSION / European Research Area / Environment

Water Harvesting Technologies Revisited
Project No 266360

WHaTeR

WP9: Case Study Country Burkina Faso

At a Glance

Manual zaï pits with, in the foreground, organic matter for adding to the zaï pits.

The labour time needed for one hectare of manual zaï is 300 hours.

Mechanized zaï pits in construction, with use of animal traction for pulling a subsoiling device.

Intersecting the dry cross-tillage rows eases the digging of the zaï pits. Subsoiling as practised in mechanized zaï is the process of loosening and breaking up the soil at 10 cm depth with a blade of 8 to 12 mm thick. It reduces the labour time to less than 100 hours for one hectare of zaï pits.

The Challenge

The application of water harvesting technologies is often labour consuming. The farmers in Burkina Faso use mainly rudimentary tools in agriculture, usually manual equipment. This makes Burkina Faso a country with a low level of mechanization and limited performance in agriculture. The adoption of water harvesting technologies increases from the south to the north of the country in relation to the risk of crop failure. To be effective in the whole country in order to control wide-spread erosion and land degradation, the water harvesting technologies have to be refined and adapted to each socio-economic context. This is the challenge to address through this Work package of the WHaTeR project.

Objectives

To analyse water and nutrient interactions and derive sustainable water and nutrient management for Water Harvesting Technologies (WHTS) based farming systems (in cooperation with Work Packages 4 and 6);

To conduct participatory on-farm testing of selected and refined WHTs ;

To assess the integrated effects of (refined) WHTs on disaster reduction, livelihood improvement and food security (in cooperation with Work Package 5 and 8); and

To contribute to knowledge on the uptake and upscaling of WHTs (in cooperation with Work Package 7).

METHODOLOGY

On-farm testing has been carried out to investigate WHTs' impact on soil water and nutrient interactions for crop productions.

For the on-farm testing, experimental sites have been selected according to two climatic zones of Burkina Faso and technologies' adoption level by farmers using the SWC Technologies map of Burkina Faso (Zombré, 2002).

- One site, in the central zone of Burkina Faso with an annual rainfall between 700-900 mm, namely Boukou in Sigle district;
- One site at Péni, in the western part of Burkina Faso where annual rainfall is higher than 900 mm.

Three WHTs have been chosen:

- Mechanized Zaï associated with Stone rows;
- Contour ploughing;
- Mechanized Zaï associated with grass strip of *Andropogon gayanus.*

These technological packages have been assessed in interaction with nutrient management (mineral and organic fertilizers).

Experimental design

In the experiment, each farmer was considered as a replication.

In Boukou, the following treatments were applied on sorghum crop (Kapelga variety) :

T0 : Control (CP)
T1: CP + ZM + MO1 + EM
T2: CP + ZM + MO2 + EM
T3: CP + ZM + MO1
T4: CP + ZM + MO2

CP = Stone rows (*cordons pierreux*)
ZM = mechanized zaï (*Zaï mécanizé*)
EM = mineral fertiliser (*Engrais minéral*)
MO1 = organic matter available from farmer practice
MO2 = Compost.

In Péni, the following treatments were applied on hybrid maize (Bondofa variety):

T0 : Control (farmers' practice)
T1: ACN + MO1 + EM
T2: ACN + MO2 + EM
T3: BE + MO1+ EM
T4: BE + MO2+ EM

ACN = contour ploughing (*aménagement en courbes de niveau*)
BE= grass strip (*Bande enherbée*) of *Andropogon gayanus*
EM = mineral fertilizer (*Engrais minéral*)
MO1 = organic matter available from farmer practice
MO2 = Compost

The crop varieties used (Kapelga and Bondofa) are high-yielding varieties from INERA research stations.

Each treatment was conducted by four farmers. Each farmer implemented one technology and the control (farmer practice), using plots of 0.25 ha each. Crops were sown at 40 x 80 cm spacing. The applied fertilization rates included:

- Organic matter: 5 tons per ha each over year;
- Mineral fertilizer NPK: 100 kg/ha for sorghum and 150 kg/ha for maize;
- Urea: 50 kg/ha for sorghum and 100 kg/ha in two fractions for maize.

RESULTS SO FAR

For the first year of on-farm testing, not all treatments were applied because compost was unavailable to almost all farmers.

At Boukou, central region of Burkina Faso, the sorghum biomass yields were better on the combination of stone rows and mechanized zaï than the control. At Péni, in the western region of the country, it was the combination of grass strip with mechanized zaï that yielded the highest maize biomass (Figure 1).

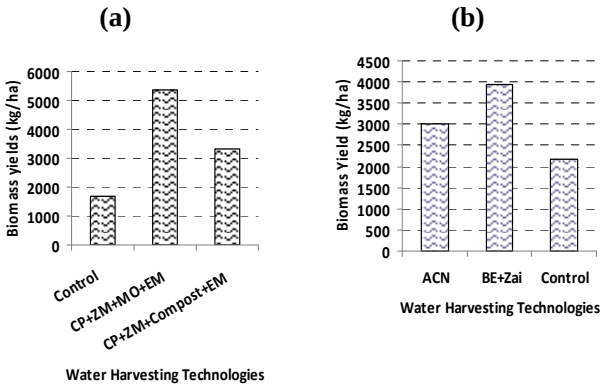

Figure 1: Effect of WHTs on Sorghum (a) and Maize (b) biomass yields in Boukou and Péni respectively.

The stone rows + mechanized zaï + compost treatment yielded more than twice the sorghum grain yields of the control plot, while it was more than three times on the plot where a combination with locally made organic matter was applied (Figure 2a).

For maize at Péni the control and the contour ploughing were not different for maize grain yield, while the grass trip combined with mechanized zaï yielded the best maize production (Figure 2b).

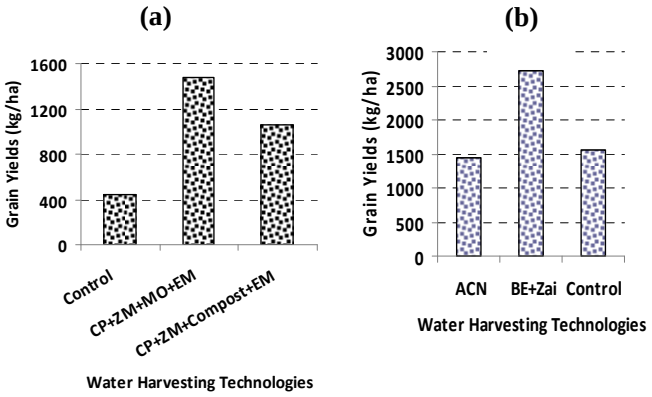

Figure 2: Effect of Water harvesting technologies on sorghum (a) and maize (b) grain yields at Boukou and Péni respectively.

EXPECTED OUTCOME

The best bet water harvesting technology and nutrients management, adapted to the local context, is identified for each agro-ecological zone.

The combination of water harvesting technologies at watershed and plot scales, adapted to the local context, has better potential to improve crop yields.

An increasing number of farmers use the water harvesting technologies developed as the access to animal drawn equipment is improved.

The training of local blacksmiths in mechanized zaï tool has been realized increasing farmers' interest to the zaï technology.

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