

Maximizing Rainwater and Nutrient Use in the Volta Basin



HIGHLIGHTS

- ✓ Tripling of yields for maize and cowpea
- ✓ Doubling of sorghum yields
- ✓ Farmers can sell their produce at increased prices
- ✓ Success has led to planned expansion in other countries

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Outcome Stories

Using an integrated approach to water, nutrient and crop management, this research project optimized the use of inputs and improved crop production in semi-arid areas in the Volta basin. One of the major findings was the value of farmers' associations and community based organizations working as partners with researchers to bring about effective and lasting results.

Reducing risks

Low water availability, poor soil fertility, and increasing soil degradation can put food security in an entire basin under threat. Most of the people in the Volta Basin are small-scale farmers largely dependent on rain-fed agriculture for

their livelihood. Although the average rainfall of 1000mm per year seems to be adequate for crop production, the onset of the rainy season is often erratic. The frequent dry spells can result in significant yield losses. Rain-fed agriculture in the region is therefore considered a risky venture.

A CGIAR Challenge Program on Water and Food (CPWF) supported project addressed the constraints encountered by marginal farmers in the Volta Basin. In semi-arid areas, most of the already scant rainwater is lost to evaporation. Only 10% is used by crops. Working with farmers



in Ziga and Saala, Burkina Faso, and Tamale and Navrongo, Ghana, the project showed that crop yields in this harsh environment can be increased several-fold by improving rainwater use and by enhancing the efficiency of nutrient uptake by crops. This was achieved through the combined effects of simple, low cost technologies: water harvesting and cultural practices that improve water availability and retention, proper application of mineral fertilizers in smaller quantities than normally used (micro-dosing) and the inclusion of legumes in the crop rotation systems.

The project exposed the communities to different technology options, allowing them to test and learn about the importance of proper use of technologies.

Promising results were noted both by farmers and researchers.

Improving yields

In Burkina Faso, yields of maize and cowpea almost doubled. In Saala, maize yields tripled with the combined use of *zai* (a micro-water catchment method), stone lines, and fertilizer micro-dosing supplemented with animal manure. In the Ziga research site, the use of organic fertilizer with nitrogen supplements likewise resulted in cowpea yields that were triple those of the control.

In Ghana, micro-dose application of mineral fertilizer quadrupled maize yield, from 0.26 with farmer practice to 1 ton / hectare, and nearly doubled sorghum yield. Nitrogen use efficiency (with micro-dosing) increased by 45% compared to the recommended method of application. In Tamale, tied ridging (another micro-water catchment technique) coupled with NPK fertilizer application almost tripled the yield of maize compared to that of tied ridging with zero NPK.

Rainwater management and small reservoirs in Burkina Faso and Ghana

Photo: CPWF / Simon Cook



Securing better prices

The project also conducted market studies in order to help farmers to secure better prices for their crop. Studies on farmer and trader perspectives on markets provided valuable insights into the kind of services needed by farmers. Supply and demand patterns indicated that farmers used to sell their produce at low prices prevailing during the harvest season when supply is abundant.

Warrantage, an inventory credit system where farmers keep their produce in a warehouse, against which they can draw credit, was tested as a way to provide farmers with better prices for their produce. Farmers could now borrow against their 'deposits' of grains.

These funds could be used for other income generating activities, such as sheep fattening and small trading ventures, while waiting to trade their stored produce at more favorable prices.

As a result, farmers could sell their produce at increased prices of up to 42% in Ziga and 21% in Saala, compared to prices at harvest.

This innovative support mechanism has increased household food security and financial stability, benefiting farmers' organizations in Burkina Faso, and is now also being adopted in Ghana.

Success and expansion

The success in Burkina Faso has led to a plan for expansion. The Alliance for a Green Revolution in Africa (AGRA) is now running a USD 11.5 million project, helping to scale up the fertilizer micro-dosing project and the warrantage system to Burkina Faso, Niger, and Mali. The project targets a 40% average increase in grain yields and is expected to reach several hundreds of households within three years.

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Project Partners

International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)
CNRST, Ghana
Savanna Agricultural Research Institute (SARI)
International Center for Tropical Agriculture (CIAT), Burkina Faso
Tropical Soil Biology Fertility Institute of CIAT
Institute for Natural Resources in Africa
Semi-Arid Food Grain Research and Development
The Center for Development Research

About CPWF Outcome Stories

The CPWF Outcome Stories document changes in knowledge, attitudes and practices that have emerged through CPWF-funded research. Outcomes occur when research outputs foster engagement processes that result in changes in practice or changes in behavior. These stories capture outcomes at a specific point in time; outcomes may have evolved since the completion of these projects.



Photos cover and this page: CPWF

Andes • Ganges • Limpopo • Mekong • Nile • Volta

About CPWF

The CGIAR Challenge Program on Water and Food was launched in 2002, with the aim to increase the resilience of social and ecological systems through better water management for food production (crops, fisheries and livestock). We do this through an innovative research and development approach that brings together a broad range of scientists, development specialists, policy makers and communities, in six river basins, to address the challenges of food security, poverty and water scarcity.

The CPWF is part of the CGIAR Research Program on Water, Land and Ecosystems. WLE combines the resources of 11 CGIAR centers and numerous international, regional and national partners to provide an integrated approach to natural resource management research. The program goal is to reduce poverty and improve food security through the development of agriculture within nature. This program is led by the International Water Management Institute (IWMI).

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