Good practices in agricultural adaptation: Findings from research in maize, sorghum and cotton farming systems in Togo

Introduction

The aim of this research was to highlight agricultural practices from six countries across the continent (Burkina Faso, Cameroon, Ethiopia, South Africa, Togo and Zambia) that will continue to be sustainable in the face of a changing climate. The following provides a brief summary of the agricultural adaptation good practices in the maize, sorghum and cotton agricultural subsectors in Togo.

Vulnerability of agriculture to climate change

The agricultural sector contributes over one third of Togo's GDP and supports two thirds of the population. Small-scale rain-fed farming of millet, sorghum, maize, and rice are the most common commodities. Cotton is grown in four of the five Togo agro-ecological zones, and is one of the three main cash crops of the country. Togo has good agricultural potential, and agricultural growth features prominently in the country's development plans. Climate change will likely affect the nature of rain-fed farming through drought, floods, high temperatures, shifting seasons, poor distribution of rainfall and strong winds.

Observed adaptation practices

Good practices that are already being practised by farmers are:

- Installing and reading on farm rain gauges
- Agroforestry (intercropping of crops and trees)
- Protection of degraded soils (by building stone barriers, filter belts, grass strips, etc.)
- Use of drought resistant and early maturing seed varieties
- Mulching techniques
- Making compost from animal and vegetable waste.

Each of the observed adaptation practices has pros and cons in terms of simplicity, availability, affordability, available policy and research support, and other benefits to women and environmental co-benefits. All the observed adaptations were evaluated using these criteria to determine those that can be classified as good practices. The evaluations were informed by literature reviews, interviews, and observations. The table shows the scores for each practice for each agricultural subsector. The maximum score is 140. The table shows that rain gauges, agroforestry, and protection of degraded soils are good practices across the subsectors. Use of drought resistant and early maturing seed varieties, mulching techniques, and making compost from animal waste are only good practices for small-scale maize and sorghum farmers.

Table : Evaluation of adaptation practices per subsector

Adaptation practice	Agricultural subsector		
	Maize (small-scale and subsistence)	Sorghum (small-scale subsistence)	Cotton (only commercial)
Installing and reading on farm rain gauges	96	96	96
Agroforestry	65	65	65
Protection of degraded soils (stone barriers, filter belts, grass strips)	99	99	99
Use of drought resistant and early maturing seed varieties	108	108	3
Mulching techniques	82	82	02
Making compost from animal waste	95	95	03

Description of agricultural adaptation good practices

Installing and reading on farm rain gauges

Installing and reading on farm rain gauges is widespread. At national level, more than 400 rain gauges have been distributed and installed in farms or villages since 2011, representing a coverage of approximately 30% villages covered. This technology is of utmost importance and is a good adaptation practice for all agricultural subsectors. This is because it helps to provide the appropriate weather and climate information so that the resulting agro-meteorological advice is more robust and targeted to the farmers' needs. Knowing likely conditions and being able to make appropriate conditions enables a significant increase in crop yields of around 30% on average.

Agroforestry

Agroforestry refers to all the systems and techniques of land use where crops/livestock and trees are deliberately combined as a spatial arrangement or temporal sequence on the same plot. Agroforestry is also a popular mechanism of conservation agriculture, and was observed in a variety of different circumstances and regions in Togo. Both men and women farmers are involved

in this practice in Kloto, Vo, Yoto, Moyen-Mono districts and in the Savannah region, and are convinced of the value of the longer term benefits approach to farming. The combination of cereals and leguminous plants (for instance *Mucuna sp* in Tchamba and *Cajanus cajan* in Vo Koutimé) is very common and also considered as agroforestry. It consists of planting leguminous in association or rotation with crops. According to the maize and sorghum farmers, such intercropping and/or rotation covers the soil and prevents the growth of weeds, especially *Imperata cilyndrica*.

Protection of degraded soils (stone barriers, filter belts, grass strips)

Stone barriers are composed of rubble mechanical structures (large stones) which are then aligned along the contour of the land. These barriers support adaptation to the variability of rainfall by reducing water erosion and increasing infiltration. Filter belts are a similar mechanical structure consisting of free stones, or gabions, built on the opposite side of a ravine. It allows recovery of lands that have been degraded gully erosion, and encourages groundwater recharge. Grass strips are biological barriers which consist of grasses (*Andropogon gayanus, A. ascinodis, Vetiveria zizanioides*, etc.) installed in the fields along contours. This good adaptation practice for maize, sorghum and cotton farming is used mainly in the Savannah region, and was observed in the districts of Tône and Tandjoaré, where the effects of the degradation of vegetation cover and erosion are severe.

Use of drought resistant and early maturing seed varieties

Introduction of maize and sorghum early maturing and drought resistant seed varieties is a practice that gained popularity in the 1990s due to low yields with local varieties. It is now widespread throughout the whole country. Farmers have the knowledge and understanding necessary to use drought resistant and early maturing seed varieties of maize, millet, sorghum, soybeans, and peanuts. Some varieties are drought resistant and adapted to enable a harvest even when the rainy season is short and the rains start later than in the past.

Mulching technique

Mulching is a simple process that involves covering the soil with a layer of approximately 2cm of vegetable waste, equivalent to 3-6 tonnes per hectare of branches or crop residues (stalks of sorghum, maize or millet). The purpose of this layer of mulch is to stimulate termite activity and reduce evaporation and weed growth. Instead of burning agricultural residues, farmers spread them in the farms. The practice is widely adopted in all regions and was observed in Anfouin (Lacs district). The practice is a good agricultural adaptation for maize and sorghum farming. Mulching protects the soil from erosion due to rain and the sun drying effects and wind, and limits the variations of temperature and humidity.

Making compost from animal or vegetable waste

Composting is a biological process of conversion of organic materials (biomass by-products, biological organic waste, etc.) into a stable and hygienic product similar to a mould. Composting occurs when organic waste (various residues and phosphate) is broken down under controlled conditions in the presence of oxygen. Composting is a good practice to adapt to climate change for maize and sorghum farming. Making compost from animal or vegetable waste occurs throughout Togo. In this research it was observed especially in the northern part of the country (districts of Kozah, Assoli, Bassar, Doufelgou, Kéran, Oti, Tandjoaré, Kpendjal, Tône, Cinkassé, Agou, Haho, Est-Mono, Kloto, Amou).

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