RESEARCH PROGRAM ON Climate Change, Agriculture and Food Security

Info Note

Uptake of Climate-Smart Agriculture in West Africa: What can we learn from Climate-Smart Villages of Ghana, Mali and Niger?

Findings from a series of adoption studies on CSA technologies and practices within the Climate-Smart Villages of Ghana, Mali and Niger.

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Key messages

- Top ten ranked CSA technologies showed the use of organic manure/compost, crop association or intercropping were the most commonly adopted in the Climate-Smart Villages of Ghana, Mali and Niger.
- Most CSA options were adopted for their capacity to improve crop productivity (improved productivity), improve soil fertility and reduce the risk of crop loss due to drought (increased resilience).
- The main constraints to CSA adoption were: Poor technical capacity, illiteracy of farmers, limited availability/access of inputs and equipment for implementing CSA technologies and practices, and low dissemination of information on CSA options.
- The following actions need to be taken in order to boost and sustain the uptake of CSA in Ghana, Mali and Niger: (1) to build farmers' capacity, (2) improve dissemination of information on CSA, and (3) improve access to credits, agricultural inputs and equipment required by CSA.

Introduction

Climate change has emerged as a major threat to agriculture, food security and livelihood of millions of people in the world (IPCC, 2014). A comprehensive analysis of climate change and agriculture in West Africa indicates that agriculture production will be significantly impacted due to increase in temperature, changes in rainfall patterns and variations in frequency and intensity of extreme climatic events such as floods and droughts (Jalloh et al., 2014). The estimated impacts of future climate change on cereal crop yields predicted a decline in sorghum yields by 5–25 percent across West Africa, with greater reductions in parts of Togo, Benin, and adjacent areas of Ghana and Nigeria. A general decrease in maize yields of 5–25% in most parts of the countries along the southern coast of West Africa (Jalloh et al., 2014) is also reported. Agricultural innovations that improve the adaptive capacity of agricultural production systems are required to ensure the food and livelihood security of farming communities.

Climate-smart agriculture (CSA) is proposed as a solution to transform agricultural systems to support food security under the new realities of climate change. CSA refers to an agriculture that sustainably increases productivity, resilience (adaptation), reduces/removes greenhouse gases (GHGs) (mitigation), and enhances achievement of national food security and development goal (FAO, 2010).

In West Africa, the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) has been working since 2011 with various local partners to develop Climate-Smart Villages (CSV) through participatory action research (PAR) at pilot sites in Burkina Faso, Ghana, Mali, Niger and Senegal. Various CSA technologies and practices have been identified and tested in these CSVs. Some of these technologies and practices include: improved varieties of crops, soil and water conservation techniques (e.g. Zaï, half-moon, tie ridging), tree planting (agroforestry), farmer managed natural regeneration (FMNR), integrated soil fertility management techniques (micro-dosing, use of organic manure /compost, crop association), etc. In West Africa, adoption of agricultural innovations are thought to be constrained by several socioeconomic, institutional, infrastructural, biophysical and political factors. Therefore from the perspective of scaling up proven CSA technologies and practices at the CSVs, it is crucial to understand the determinants of their adoption.

In this study, we determined the top ten CSA technologies and practices adopted in the CSVs of Ghana, Mali and

Niger, reasons for their adoption and constraints to their adoption. This information is crucial in the quest to prescribing context-specific solutions that foster the scaling up of CSA technologies and practices in West Africa.

Study site, data collection and analysis

The study was conducted at the Climate-Smart Villages' sites of Ghana, Mali and Niger, in 2016. A participatory inventory and assessment of the CSA technologies and practices was done with communities of the CSVs of Doggoh and Bompari in Ghana; Tongo and Ngakoro in Mali and Kampa-Zarma and Bankadey in Niger. A quantitative survey at farm level was conducted in 7 villages (Kulkarni, Orbili, Jeffiri, Bompari, Tuori, Doggoh, Baaza) at the CSV sites of Ghana and 8 each in Mali (Folanassibougou, N'Tlomabougou, Tongo, Siekourani, Kamanago, Dougakoungo, Kallan and Ngakoro) and Niger (Touliel, Baboussay, Kampa-Zarma, Dey Tegui, Tigo Zeno, Maourey Kouara Zeno, Kida Tafa Kouara and Bankadey).

A total sample of 270 households in the CSV of Ghana, 300 households in Mali and 300 households in Niger were used in the survey.

Data collected included farm resources, farming systems, famers' perceptions on CSA technologies and practices, reasons for use and non-use of CSA options, constraints and incentives for adopting CSA options.

Descriptive statistics were used for data analysis to determine the adoption rate, the reasons for adopting CSA technologies and practices, constraints and incentives to achieving widespread and durable adoption of CSA technologies and practices in CSVs.

Adoption of CSA technologies and practices in CSV sites

Table 1 presents the top ten adopted CSA technologies and practices in Ghana, Mali and Niger. It shows that the type of CSA options as well as the level of its adoption vary from a site to another. This explains the adoption of CSA may be context specific and based on the needs and priorities of farming communities.

The most commonly adopted technologies in all three countries were the use of organic manure/compost and crop association/intercropping which were adopted by more than 90% and 78% respectively in all the three CSV site. In the CSV site of Ghana, the most adopted CSA options were intercropping, crop rotation, organic/ compost manure, early sowing/planting, with more than 80% of adoption rate. In Mali, the most adopted CSA option area farm mechanization, new crop, organic/ compost manure, monoculture with more than 80% of adoption rate. In Niger the most adopted option are crop association, organic/ compost manure, assisted natural regeneration with more than 80% of adoption rate.

Table 1: Top ten adopted CSA technologies and practices at the CSVs of Ghana, Mali and Niger

Rank	Ghana (N=270)	Mali (N=300)	Niger (N=300)
1	Intercropping (95.1)	Farm mechanization (96.7)	Crop association (94.3)
2	Crop rotation (95.1)	New crop (95.3)	Organic/ compost manure (89.0)
3	Organic/ compost manure (90.2)	Organic/ compost manure (90.0)	Farmer managed natural regeneration (88.7)
4	Early sowing/planting (81.8)	Monoculture (84.0)	Mulching (77.7)
5	Agroforestry/tree planting (61.5)	Crop association (78.0)	Early sowing/planting (64.7)
6	Use of climate information (59.7)	Farmer managed natural regeneration (73.3)	Improved Variety (53.3)
7	Contour farming (57.7)	Crop rotation (72.7)	New crop (48.3)
8	Minimum tilling (56.4)	Micro-dosing (71.0)	Monoculture (46.7)
9	Late sowing / planting (50.2)	Improved Variety (66.0)	Agroforestry/tree planting (43,7)
10	Monoculture (46.5)	Use of climate information (65.3)	Zai/tassa (42.6%)

Figure 1 shows that the main reasons for adopting CSA technologies and practices were their capacity to improve crop productivity (38%), improve soil fertility/structure (18%), and reduce the risk of crop loss due to drought (14%). While the reasons for farmers' choice of CSA technologies respond mainly to the productivity and adaptation/resilience pillars of CSA, practices such as tree planting and FMNR have a high mitigation potential.

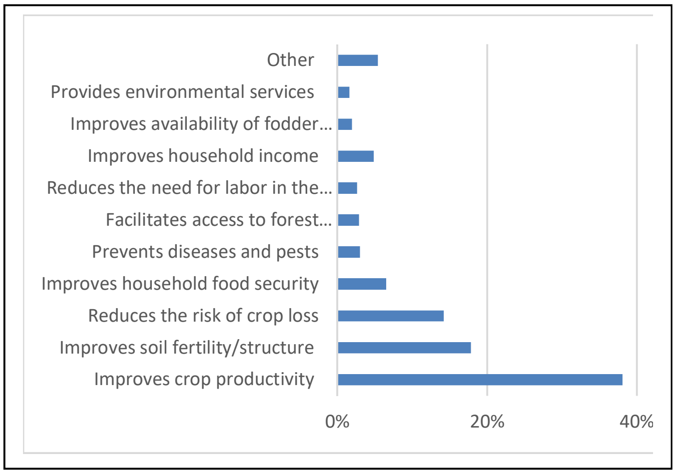

Figure 1: Reasons for adopting CSA options at the CSVs of Ghana, Mali and Niger

Constraints and incentives to achieving widespread adoption of CSA technologies and practices in the CSVs

The important constraints to adopting CSA options are presented in Figure 2. Generally, the main constraints reported by farmers were: (i) the limited availability of inputs (20%), (ii) the poor technical capacity (19%) and the illiteracy (15%) of farmers and (iii) the low financial capacity (9%) of farmers.

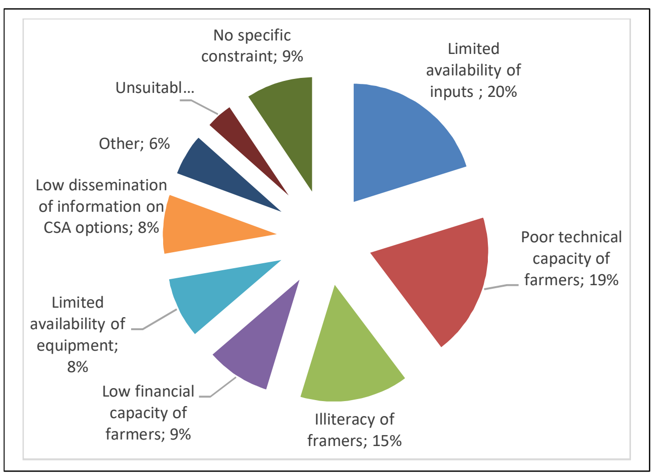

Figure 2. Constraints for adoption of CSA technologies and practices at the CSV sites of Ghana, Mali and Niger

Farmers made some recommendations to influence a wider adoption of CSA technologies and practices. These included: training of farmers (32%), providing information/awareness/advice to farmers (20%), improving access to agricultural credit (17%) and providing subsidies for inputs/equipment (19%) (Figure 3).

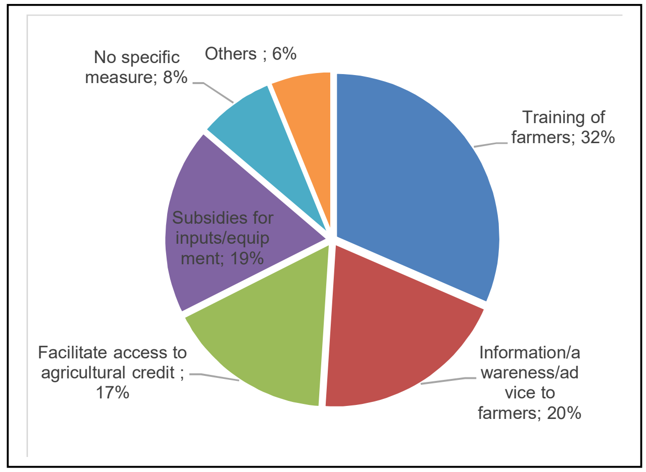

Figure 3: Farmer-proposed measures to improve the adoption of CSA technologies and practices at the CSVs of Ghana, Mali and Niger

Conclusions and policy implications

The study showed that there is a differentiated level of adoption of CSA technologies and practices within the three CSV sites. Some CSA options such as organic manure use, crop association or intercropping, and crop rotation were highly adopted in some sites. The relatively high adoption of these technologies was based on their ability to improve crop productivity, improve soil fertility and reduce the risk of crop loss due to drought.

The high adoption of CSA options such as (organic manure/compost use (90% in Ghana and Mali), crop association (95% in Niger), intercropping and crop rotation (95% in Ghana)) suggests the CSV approach can be a viable approach to scaling out CSA to wider agro-ecologies in West Africa.

The study also found factors such as high illiteracy among farmers, their poor technical capacity, low dissemination of information on CSA options, limited availability of inputs and equipment for implementing CSA options as constraints to CSA adoption. Removing these barriers will require actions towards capacity building of farmers and the provision of agricultural credits and subsidies to achieve required agricultural inputs and logistics. Thus the need to strengthen the components of finance and institutions, and the linkage of the CSV with development programs in the region and policies.

Further Reading

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This Info Note summarizes the results of a portfolio of exploratory studies carried out at the CCAFS Climate-Smart Villages' sites of Ghana, Mali and Niger to understand the determinants of adoption of CSA technologies and practices in West Africa.

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