RESEARCH PROGRAM ON Climate Change, Agriculture and Food Security

CGIAR CCAFS

Info Note

Information and Technology Transfer Needs of Agricultural Producers to cope with the Climate Changes

Findings from a CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) and the Agricultural Research Institute of Mozambique (IIAM) joint-study focused on "Managing Climate Related Risk to Improve Livelihood Resilience and Adaptive Capacity in Agricultural Ecosystems in Southern Mozambique" in Chicualacuala District, Gaza Province.

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Key messages

- The time, labor and energy required by the new technologies determine whether or not farmers will adopt them.
- The introduction of resource-intensive technologies to farmers with limited resources or market opportunities negatively affect the adoption of technologies.
- Training materials, the dissemination of knowledge and producers' associations can contribute significantly in agricultural technology transfer.

Chicualacuala district

Figure1. Gaza Province, Mozambique (Wikipedia)

Located in the northern region of Gaza province in Mozambique, the Chicualacuala district is located in an area with semi-arid characteristics that suffers the main impacts of cyclical droughts and floods, such as high temperatures and desertification.

The population of Chicualacuala suffers from the occurrence of these phenomena as its survival is dependent on farming and the exploitation of natural resources. Up to 92.8% of the population is engaged in farming. The main effects of climate change and variability include the reduction of agricultural productivity, loss of crops, decrease in the availability of pasture, reduction in the availability of water, a higher incidence of diseases and death of livestock, and land degradation. These effects have led to the reduction of household income, increased food and nutritional insecurity, and an increase in the number of cases of diseases such as malaria, cholera and diarrhea in this population. The rate of food insecurity in Chicualacuala is 26%. In some regions of the district, the population only has continuous access to food for less than 3 months in the year. This is the case in Pafuri. Another region, Mapai, has access to food for a maximum period of 9 months.

Thus, there is an urgent need for farmers in the locality to strengthen their adaptive capacity and resilience to these effects of climate change on their livelihoods. To guide them towards this end, the Institute of Agricultural Research of Mozambique (IIAM) and the International Center for Tropical Agriculture (CIAT), within the framework of the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), drew up a project called "Managing Climate Related Risk to Improve Livelihood Resilience and Adaptive Capacity in Agricultural Ecosystems".

The research was intended to analyze the problems, knowledge and needs of producers – potential beneficiaries of the project – in order to define interventions that meet their needs and contribute to the better management of climatic risk and improving their livelihood resilience and their capacity to adapt to climate change.

Research objectives

- Identify the information, knowledge and agricultural technology gaps (agriculture, livestock and natural resources) in the district of Chicualacuala communities that hamper a better response to the effects of climate change.
- Describe the potential barriers that may prevent the participation of beneficiaries in interventions of technologies dissemination, access and utilization of knowledge to be disseminated.
- Identify intervention strategies to address the information, knowledge and agricultural technologies gaps identified.

Methodology

The research data collection was based on three strategies: (i) household questionnaires; (ii) focus group discussions with clusters of members of farmers' associations (iii) semi-structured interviews targeted at community leaders, leaders of farmers' associations and extension agents working in the villages studied. In total,163 households in 8 villages were surveyed, 7 focus groups discussion consisting of 5 to 13 people were organized and 11 key informants interviewed.

Figure 2. Focus group discussion

Results

Crop production

The main constraints affecting productivity and agricultural production in Chicualacuala are **cyclical droughts, irregular rainfall and field pests** that attack crops of **maize** (corn borer, birds and beetles), **tomato** (red mite), **cassava** (mealybug, mites and termites) and **sorghum** (birds). Other pests which attack almost all crops in the field include rats, threads, caterpillars and grasshoppers. Stored products, especially maize and cowpea, are attacked by rats and weevils.

Diseases are another factor affecting agricultural production; the **leaf blight disease** is the most serious disease in beans and peanuts.

Use of poor agricultural management practices also affects agricultural performance: less than 14% of producers apply fertilizers, manure, compost, natural pesticides and irrigation. Few farmers apply crop rotation, recommended crops densities, varieties of drought-tolerant crops and mulching.

Livestock

The most important animals reared in Chicualacuala district households are poultry (63%), cattle (47%), goats (47%), pigs (17%) and sheep (10%).

Animal production is affected by a multitude of factors. In general, livestock production is affected **by a lack of pasture and water** (especially in the dry season), **diseases, pests and injuries**. In addition, rearing cattle is affected by **parasites** (ticks) and hoof injuries, especially in winter; goats suffer from a lack of pasture, diseases (diarrhea and rickettsial disease), and hoof injuries; sheep farming is more affected by a lack of pasture and hoof injuries; pig farming by scabies and external parasites (lice); chickens are affected by Newcastle disease, and ducks have had outbreaks of viral hepatitis.

With regard to livestock, producers showed limited knowledge of feeding and health management practices for cattle, goats, sheep and poultry. Hay production, isolation of sick animals, conservation and treatment of agricultural waste, fodder tree cultivation, which are resistant to drought, use of supplemental feeding in ruminants and rainwater harvesting for livestock watering are farming practices that are applied by less than 11% of households.

Production of fruit trees

In general, the majority of households do not cultivate fruit trees. The main fruit crops grown in the district are **cash-ew and mango.** Fruit production is severely limited by

inadequate soil and climatic conditions (especially rainfall) and **pests** (termites, black beetles and borers). The **limited availability of water** resources for irrigation in many parts of the district, the **lack of suppliers of seedlings** and the lack of experience in their production affect the development of the cultivation of fruit trees.

Despite these limiting factors, local producers show considerable interest in improving their knowledge and abilities to grow citrus, mango and cashew. One aspect of particular importance to the production of these fruits is the availability of seedlings.

Management of forest resources

The Chicualacuala district has a wide variety of wild fruits used for food by locals, especially during food shortage periods of the year. The main native fruits are Canhu *(Sclerocarya birrea [A. Rich] Hochst. Sbsp. Caffra),* Mapfilwa (*Vangueria infausta* Burch.), Massala (*Strychnos spinosa* Lam.), Macuácua *(Strychnos madagascariensis Poir),* Nhire *(Berchemia discolor [Klotzch] Hemsl),* Chicutse, Timuambo *(Manilkara mochisia [Baker] Durbard),* Malambe *(Adansonia digitata),* Matite *(Artabotry brachypetalus Benth),* Toma *(Diospyros mespiliformis Hochst ex A. DC),* Charro *(Xanthocercis zimesiaca [Bak] Dumaz-le-Grand),* Macoma *(Hyphaene coriacea Gaerth),* Mandocomela *(Landolphia petersiana [Klotzsch] Dyer),* Cholwa *(Grewia sulcanta Mast.),* Cuwa *(Ficus sycomorus L.),* Shampswa/Tindzole e Mahimbe *(Garcinia livingstonei T. Anderson).*

The fruits are eaten fresh or processed using traditional methods – especially for obtaining juices and alcoholic beverages.

There is a complementarity between the harvesting time of annual crops and the time of wild fruits maturation in the district. In general, the harvesting of annual crops occurs from March to July and the maturation of most berries occurs from September to February. This highlights the importance of native fruits for the survival of local populations, suggesting that there is a need for valuation of these fruits and the promotion of appropriate conservation and processing methods that will add value to them, ensuring the availability of by-products throughout the year.

There are also other products that are obtained from the forest. These products include building materials, wood fuel (firewood and charcoal) and the materials for handcraft production. Other exploits in the forest include hunting and beekeeping, which are still in early stages.

Processing and storage of agricultural products

The main products that are processed in the communities include vegetables (cabbage), cassava, sweet potatoes, cow's milk and berries. The processing of vegetables and wild fruits is based on drying methods.

The processing of cassava, sweet potato and cow's milk was introduced to the communities, in recent years, by various organizations. Several producers learned to produce juices, biscuits and cakes from orange-fleshed sweet potato.

Producers were trained by the District Service of the Economic Activities of Chicualacuala, the National Union of Farmers and the United Nations Fund for Food and Agriculture in the use of a modern processing method of cow's milk to produce yogurt, previously processed using a traditional method. However, the farmers continue to use the traditional method of milk processing and the processing of sweet potato is done by limited number of households.

The main reason given by farmers for the **low adoption of the new methods of milk and sweet potato processing** is their high requirements in terms of ingredients - an additional financial burden- and the limited market for the processed products. This situation discourages processing the products both on a large-scale and on a regular basis. A lot of wild fruits are lost because they can just be used when fresh, and no adequate processing methods are locally known.

The **preservation of maize and cowpea**, the two most important crops for food and family income in the district, is a main concern for producers. Products stored suffer attacks from weevils and rats, reducing the availability of maize and cowpea, especially during the food shortage period of the year.

Main needs of agricultural producers Chicualacuala

The following needs in terms of information and agricultural technologies were identified to cope with the challenges of climate change:

- Knowledge of pests and diseases control in corn, cassava, cowpea and vegetables, sorghum, millet, squash, and peanuts,
- Knowledge of production and conservation of sweet potato and cassava planting materials,
- Techniques for improving soil fertility with emphasis on the application of fertilizers and manure and fallowing,
- Knowledge on the advantages of agro-forestry systems,
- Improved varieties tolerant to drought,
- Techniques for soil moisture conservation,
- Information on sowing periods for all crops.

❖ For livestock husbandry, the following needs were identified:

- Knowledge of health management of cattle, goats, pigs, poultry (chickens and ducks),

- Knowledge of feeding management including cultivation of fodder trees and use of agricultural waste to feed the animals,
- Knowledge of construction of improved corrals for animals.

❖ The following needs were identified for fruit production:

- Knowledge of pest and disease control in citrus, cashew and mango,
- Knowledge of soil moisture conservation strategies,
- Production of citrus, cashew and mango tree seedlings.

❖ For forest resources management, needs identified are:

- Valorization of wild fruits (berries are regarded as food in famine),
- Knowledge of forest management including reforestation with native species,
- The practice of beekeeping,
- Knowledge of medicinal plant production.

❖ In regard to processing and storage of agricultural products, the following needs were identified:

- Processing of fruits, vegetables and sweet potato,
- Butter production from almond of canhu fruit and other products,
- Wild fruits processing and conservation,
- Preservation of maize and cowpea in barns (preventing the attack of weevils and rats).

Implementation Strategies

Considering the characteristics of Chicualacuala farmers, the following methods and instruments of communication are recommended to be used in the dissemination and technology transfer process by the project and its partners:

(i) On-the-field training that should include practical demonstrations and demonstration of results. Training based on the Farmer Field School Approach should be considered.
(ii) Dissemination of agricultural messages using community radio;
(iii) Production of materials: leaflets for use by community leaders, promoters and other veterinary extension agents and farmers' associations.

The dissemination of agricultural information and knowledge should be in the local language. In the implementation of activities, it is highly recommended to involve the following local partners: farmers' associations, District Service of Economic Activities and local community radio.

Further Reading

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This brief summarizes the findings of a research entitled "Information and Technology Transfer Needs of Agricultural Producers to cope with the Climate Changes in Chicualacuala District, Gaza Province" undertaken by researchers from the Agricultural Research Institute of Mozambique (IIAM) under a project called "Managing Climate Related Risk to Improve Livelihood Resilience and Adaptive Capacity in Agricultural Ecosystems in Southern Mozambique", for the districts of Xai-Xai and Chicualacuala, Gaza province, Mozambique. The views expressed in this brief are those of the authors and are not necessarily endorsed by or representative of CIAT, IIAM, or any of the co-sponsoring or supporting organizations.

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