

Implementation and Coordination of Agricultural Research and Training in the SADC Region (ICART)

SITUATION ANALYSIS OF AGRICULTURAL RESEARCH AND TRAINING IN THE SADC MEMBER STATE OF THE REPUBLIC OF MOZAMBIQUE”

SUMMARY

1. Assessing with the relevant Ministries the policies for research and training in agriculture

Policies and strategies for the agrarian and rural development in Mozambique

Acknowledging the importance of this sector, several policies and strategies were traced in the last years based on the orienting documents of the socio-economic development of the country. PROAGRI II, 2004 (Support program to the agrarian sector), Bio security Strategy, the Strategy of Rural Development (2007), the Strategy on Food security and Nutrition (2007) and the recently approved Strategy for green Revolution in Mozambique in 2007 are the main current political instruments.

During the last decade, the government of Mozambique has been doing important institutional changes in his policies and strategies searching to promote the sustainable development and the rational and sustainable use of the natural resources. In the sequence of this, several legal instruments were approved to reinforce government regulator role in the agrarian sector: In 1997, the government approved the Land Law and the Law of the Environment; in 1999 the Forests and Wild Life Law and the Forests and Wild Life regulation in 2001. It recently it was approved the Seeds regulation.

Policies and strategies of agrarian research in Mozambique

The priorities of agrarian research for the public sector were defined by Mozambican Institute of Agricultural Research (IIAM) from the study entitled "Priorities establishment for the agrarian research in the public sector in Mozambique” based on data of Agricultural Inquiry (AUNT) done by Walker *et al* (2006). The research priorities were defined taking as base the economic importance of the products and their potential for absolute poverty reduction for each four IIAM's zonal centers. Table 1 indicates the priority products of the research.

Table 1. Priority products for the agrarian research in the public sector in Mozambique

Zonal center	Priority rank by commodity				
	Very high value commodities (priority 1)	High value commodities (priority 2)	Medium value commodities (priority 3)	Low value commodities (priority 4)	Other commodities (priority 5)
South (Provinces of Maputo, Gaza)	cassava, maize	sweet potato, peanut	chicken, goats, cashew, rice	cattle, cowpea, tomato, coconuts, cowpea	pigs, bambara nuts, cabbage lettuce, mango, mandarin,

and Inhambane)					orange, onion
Central (Provinces of Manica, Sofala, and Tete)	cassava, maize	sweet potato	sorghum, goats chicken, rice cotton	cattle coconuts, sugarcane beans	banana, pigeonpea, sesame onion, lettuce, mango, mandarin, pigs,
Northeast (Provinces of Zambézia, Nampula and Cabo Delgado)	cassava, maize	sweet potato, peanut	chicken, rice, tobacco, sorghum, cashew, cotton, goats	cowpea, sugarcane	pigs, banana, bambara nuts, pigeonpea, sesame, potato pearl millet, sheep, oranges, mangos
Northwest (Province of Niassa)	maize cassava	sweet potato	tobacco, goats	cattle, beans, tomato, sugarcane	banana, potato, cabbage onion, lettuce, mango, sheep

Source: COMPETE (2006).

It is clear from Table 1 that the cassava and maize (first priority) and the sweet-potato and the peanut (second priority) are the agricultural crops of larger priority in the public sector. For the animal area, the chickens, goats and cattle are the larger priority animals.

Based on the workshop held in 2006 in the scope of the COMPETES(1) program and based on the work of Walket *et al* (2006), were defined 6 priority transversal themes for the agriculture area and 6 to the animal area.

a) Priority transversal themes for the agriculture

1. Evaluation, testing and introduction of genetic materials (germplasm, varieties, hybrids, and clones) better adapted to the existing environmental conditions (including drought), with better productivity, adapted to the market, with tolerance or resistance to the major pests and diseases, free of contaminations (use of biotechnology).
2. Integrated pest and disease management, including birds, insects, nematodes, fungi, bacteria, viruses, weeds and parasitic plants and aspects related to cleaning and multiplication of vegetative propagation materials.
3. Integrated soil fertility management, including conservation farming, use of inorganic and organic (manure, compost, green manure and mulching) fertilizers, and the use of legumes.
4. Increase the productivity of cropping systems (sole, mixed and intercropping), through the use improved agronomic practices adapted to the prevailing socio-economic conditions, including high intensity land use systems (irrigation), animal traction, and land preparation and forming.
5. Improvement of the post-harvest process, including betterment of the drying and processing conditions at farm level, quality adapted to the market, agro-processing and alternative products, and marketing.
6. Inventories and surveys.

b) Priority transversal themes for the cattle breeding

1. Disease identification and control and farm level, including the development and use of vaccines.
2. Identification, testing and dissemination of alternative feed technologies adapted to the rural producers (family sector), which guarantee a better nutrition and growth of animals, including the cyclic annual critical periods and pre-sale.
3. Adaptation and genetic improvement of the main domestic and domestic able animal species, including the determination and application of selection criteria adapted to the prevailing socio-economic conditions of the rural areas.
4. Improvement and dissemination of low cost lodging technologies adapted to the rural household producers (family sector).
5. Testing and introduction of processing techniques for animal products and derivatives, with special attention to aspects of public health and marketing.
6. Improvement of management practices aimed at reducing Young mortality and the appropriate use of animal traction.

Mozambique is a country with great forest potential in the region. However, Walker's *et al* (2006) study does not include the forest sector because the Agricultural Inquiry does not embrace the forest sector. As a result, the priority research areas in the forest sector are established based on the Research Program of the Department of Forest Engineering of the Agronomy Faculty and Forest Engineering (FAEF) of the University Eduardo Mondlane (UEM), an institution with wide experience in training and research in the forest sector, as follows:

- Forest plantations
- Sustainable natural forest management
- Community forestry and wildlife management
- Logging, transport and timber processing technology
- Forest policy and economy
- Watershed management and rehabilitation of degraded lands
- Forest ecology and environment
- Forest genetic conservation and tree breeding

The cabinet council approved in 2006 the Mozambican Technology, Science and Innovation Strategy. This strategy has the virtue of being the only that boards strategic areas of research at inter institutional and national context. The agriculture is one of the nine strategic areas. The strategy consist 12 strategic topics of agrarian sector that including topics about vegetable production and protection, irrigation technologies, agro processing, animal production and forest. The research priorities for the public sector defined by IIAM are in conformity with this strategy of the Ministry of Science and Technology, allowing the interests conciliation of the public research institutions with the government as policy regulator institution.

Eduardo Mondlane University (UEM) has an important role in the agrarian research in Mozambique. UEM approved recently (in 2007) her research policy. The priority areas of research at UEM policy were defined according with the Mozambican Technology, Science and Innovation Strategy of the Ministry of Science and Technology and therefore they coincide with the priority themes of the public sector. With this instrument UEM is going to

choose and to announce, periodically, for central level and of the organic units, of among priority areas, the ones of larger priority and preference.

Policies and Strategies of agrarian higher education

Until the end of the civil war in 1992, the agrarian higher education in Mozambique was just confined to UEM through the Faculty of Agronomy and Forest Engineering and faculty of Veterinary in Maputo capital in the south of the country. The government's policies since the first democratic elections of 1994 were focused for the development of the higher education, prioritizing expansion along the country. Based on this policy were created the Faculty of Agriculture of the Catholic university of Mozambique in 1999 and Mussa Bin Bique University in 2001 in the north zone of the country, Manica's Polytechnic Institute in 2006 at the centre of the country and the Polytechnic Superior Institute of Gaza in 2006 in the south zone. These institutions have been offering *licenciatura* degree in the Agriculture, Agricultural Engineering and Zootechnic Engineering. The policies of the training of higher agrarian institutions prioritize equally the elevation of training levels. It is in this scope that was introduced Master degree in UEM in 2001, Master in Agrarian Development.

The Universities and the Polytechnic Institute in Mozambique constitute the main agrarian higher education systems. The strategies of agrarian higher education are basically dependent of these two systems and consist in documents of the courses. The training strategies in UEM establish that the academic training should stimulate and develop in the students a constant search for knowledge, integration and application capacities of this to accomplishment the tasks of professional areas, and the comprehension of the Mozambican reality so that the graduated can turn in an intervention and change agent. This is the strategy followed by the Faculties of Agronomy and Forest Engineering and of Veterinary of UEM. The Agriculture Faculties University Mussa Bin Bique and Catholic University in Mozambique have been following identical strategy.

Regarding the Polytechnic Institutes, the training strategies are targeting for a graduate with larger abilities to solve practical problems of the agrarian sector with base in the existing experience in the sector and in the research results produced by the universities and by the agrarian research institutes. In the polytechnic training, the educational process is eminently centered in the student, in other words, the lecturer concentrates his attention in the creation of learning environments to the students.

Policies regarding the agrarian higher education seems to be effective and the strategy very clear. However the sector still has lots of challenges such as the improvement of the teaching quality, conditioned mostly by the quality improvement of the teaching staff and resources availability for the Faculties, as well as the introduction of other courses at master level. The establishment of networks for training institutions in the region can be part of the solution. The networks could include the next activities:

1. Lecturers exchange: experienced Lectures of specific areas could teach temporarily at other faculties in the region where there is lack of capacity or less experienced lecturers.
2. Short courses: The networks could organize short courses for lecturer for skills development in teaching methodologies or/in innovation
3. Organising pedagogical courses: the networks can get involved in helping the lecturers to discussion pedagogical issues in the agrarian teaching
4. Students exchange: students of one faculty could remain for a period at another university in order to get access to specialized laboratories. They could equally acquire new experiences in specific crops less frequent in their origin countries

5. Development of curriculums for MSc courses: teaching institutions of the region could develop new teaching programs to MSc level, taking into consideration the priorities of the agrarian sector in the region

In the sequence of the aforesaid strategies, the training support must be oriented to support the curriculums development to *Licenciatura* and master levels that board in more profound form priority themes of agrarian research in Mozambique. In this context the research networks in priority areas will be a fundamental tool to feed the education systems, by means of students' participation, particularly of the master courses in important research activities.

2. Private sector organizations, their research needs and their role in research and training

The research institutions in general have as mandate generate new products and technologies through research and introduce of these results to the productive sector. The farmers' organizations, private sector and ONGs should absorb the new products and technologies developed by the research to increase the production and productivity. It is our perception that the relationship between these two groups of stakeholders weak, because historically the technologies transfer services in the research institutions was weak or even non existent. Adding of that, unclear definition of research priorities has lead the agrarian research to have a poor impact.

IIAM has created a division for Technologies Transfer to improve the relationship among research institutions and the productive sector. The invigoration of the transfer area of agrarian technologies by means of experiences change in the region through the establishment of one specific regional network can contribute for larger and better relationship between research and the productive sector and improvement the research impact.

The organizations of the productive sector are very receptive for training courses. However given to weak capacity of the sector, this initiative should be made in partnership with the institutions of agrarian training.

The needs to research of the private sector are introduced in the point 7.

3 e 4. Registered institutions/organizations delivering agricultural research and training

The agrarian research in Mozambique is performed mostly by public institutions, with highlight for the Institute of Agrarian Investigation of Mozambique (IIAM) under guardianship of the Ministry of Agriculture. The private research institutions in the country are very recent.

Besides IIAM, agrarian research is also done by higher education institutions, with highlight for UEM through Faculty of Agronomy and Forest Engineering and Faculty of Veterinary. Table 1 indicates the research and/or training institutions.

Table 2. List of Research and/or training institution in Mozambique.

Institution Name	Activity	Apex Ministry	Year of establishment	Type of institution
Mozambican Institute of Agricultural Research	Research	Ministry of Agriculture	2004	Public
Eduardo Mondlane University, Faculty of Agronomy and Forestry Engineering	Training and research	Ministry of Education and Culture	1963	Public
Eduardo Mondlane University, Faculty of Veterinary	Training and research	Ministry of Education and Culture	1964	Public
University Mussa Bin Bique	Training and research	Ministry of Education and Culture	1998	Private
Catholic University of Mozambique, Faculty of Agriculture	Training and research	Ministry of Education and Culture		Private
Polytechnic Institute of Gaza	Training and research	Ministry of Education and Culture	2006	Public
Polytechnic Institute of Manica	Research	Ministry of Education and Culture	2006	Public
Institute Cruzeiro do Sul	Research	-	-	Private

5 e 6. National Agrarian Research System (NARS)

Mozambique does not yet have a National Agrarian Research System (NARS) according with ICART definition. The Ministry of Science and Technology is currently leading an initiative to create National Research System (NRS) where NARS will be a subsystem with subsystems of key sectors of the national economy. The Ministry of Science and Technology initiative boards NRS in a holistic way, that is, NARS can not be seen as an isolated institution, but as a very interlinked subsystem to other research subsystems, under which cross several transversal subjects as gender, environment, HIV/AIDS, among others. In spite of there being this initiative, the support and regional experiences about NARS's establishment will be very important for the creation of an efficient National Agrarian Research System in Mozambique.

Because Mozambique does not have a NARS, it was found that the country also does not have an national research evaluation and monitory body. The institutions use as tools the annual meetings, the audit reports and the technical reports for the evaluation and monitoring of the research programs and projects.

7. Research methodologies

Priority areas

The priority areas for public sector were presented on point 1. regarding the private sector, the agrarian companies in Mozambique are concentrated on sugar, cotton, cashew, rice, tea, coconut, fruit, horticultural, bovine cattle, swinish cattle and forests (forest concessions, sawmills and carpentry). The priority transversal themes for these subjects are the same as for the public sector mentioned on point 1.

Funding mechanisms

Basically there are four financing modalities of research: competitive, allocation in function of the interest areas, donations and indirect finance through the Government budget.

Competitive financing: Currently several programs make available research funds using this modality. The main programs under this modality are the Quality and Innovation Fund (QIF) of the Ministry of Education and Culture, the Research National Fund (FNI) of the Ministry of Science and Technology, and the Research Fund of UEM. These research programs are not specific to agriculture. IIAM has a program called that's is specific for agrarian research. The Agronomy Faculty and Forest Engineering and the Faculty of Veterinary, both of the UEM, as well as the Institute of Agrarian investigation of Mozambique are the main beneficiaries.

Donations under this modality, the funds allocation is based on the areas of interest of the country. This financing mechanism is applied for IIAM and the public universities. In the scope of their annual activities, IIAM elaborates research plans with the respective budgets and submits them to the guardianship entities (Ministry of Agriculture and Ministry of Finance) for budget allocation. The public universities also submit annually plans and budgets to the Ministry of Finance. At UEM, the Ministry of Finance is paying a research grant for undergraduate students to write their *licenciatura* thesis.

Donations: The donations for research are performed for specific areas of different organizations in the different institutions. Among main institutions is important to highlight the Rockefeller Foundation, DANIDA, USAID, SIDA/SAREC, Italian Cooperation, IIED, Ford Foundation, ICRISAT, CIFOR, ICRAF and RUFORUM.

Indirect financing: The state, through salaries payment to the researchers and other indirect expenses, participates in the financing of the agrarian research.

It is believed that the creation or invigoration of research networks in priority areas is going to contribute for the economy and better resources utilization, translating itself in larger impact of the research programs or projects.

collaboration mechanisms

The collaboration mechanisms among research institutions include:

- researchers of different institutions participating in designing and implementing multidisciplinary research project/programs;
- joint participation of the research institutions in the scientific events, seminars, courses, etc.
- researchers of different institutions participating in writing scientific publications and technical reports
- researchers of different institutions participating in a multidisciplinary teams to identify research problems and priorities.
- researchers of different institutions participating in technologies transfer activities

8. Identify actual and potential demand for cooperative relationships between research and training institutions and the farmers' organizations and private sector

Universities and the Polytechnic Superior Institutes have benefited a lot from the experience brought from outside which contributes for a quality teaching. Faculties of Agronomie and Veterinary get experts from research institutions and productive sector in general to teach. On the other hand the research institutions had benefit from the experience of the productive sector by means of multidisciplinary research projects.

In current context of the agrarian sector in Mozambique there is need to relationship among different partners and there is potential for such. The partners forum of IIAM is used to introduce to the partners the research results as well as annual plans, are a clear example of the need to collaboration among different stakeholders of the agrarian research. Similar initiative is being established through the National Forum which was launched formally in 2007 in UEM who intends to be a space for research results dissemination, identification of specific needs of farmers, and private sector, Government and other partners. The forum intends equally be a space for consultation on the quality and the performance of the graduated of the higher education in the productive sector, as well as about the new needs to productive sector in terms of abilities of the professional futures, allowing adjusting the curriculums to the reality.

9. Collaboration inter institutional along the production-consumption chain inside the country

In Mozambique there is a several examples of partners collaboration along the production-consumption chain. Examples of academic extension for the invigoration of the production-consumption chain were identified. The Engineering Faculty of UEM in collaboration with the Faculty of Agronomy and Forest Engineering, with the Faculty of Veterinary and with IIAM and with other partners is to promote innovation initiative system and clusters

innovations since 2005. A cluster is a firms agglomerate operating at the same sector and with a geographical proximity that allows to improve your efficiency in the production or service rendering. (A cluster can be integrated vertically, including raw materials and components vendors, manufacturers and exporters, or it can contain some elements inside the values same chain). In the table 3 are indicated the pilot projects in the agrarian sector.

Tabela 3. Innovative clusters proposed for the agrarian sector.

Project	Stakeholder
Cashew	INCAJU, Agro Alfa, Kanés, commercial producers, FAEF
Cattle in Boane	IIAM, Faculty of Veterinary, private organizations and sellers
Cassava production and agro processing (Inhambane province)	FAEF, IIAM, Engineering Faculty and producers
Wood furniture	FAEF, Engineering faculty, carpentry and sellers

10. Contextualize the alliances to SADC's Level

In Mozambique there are several collaboration examples between different institutions regarding training and research. The two best examples are the following:

a) Collaboration between DONAVANT and FAEF

It is of one research and training partnership between Master in Agrarian Development of FAEF, which includes the *Licenciatura* level. For the MSc level, DONAVANT, a cotton company provides lodging and transport for lectures and students of the FAEF. MSc students can collect data for their MSc thesis. DONAVANT benefits by the research results and FAEF and the student's benefit of the conditions offered by the company and by the opportunity to address field problem.

b) Collaboration between IDEA and FAEF

It is of one research and training partnership that allows to research good agricultural practices in the cultivation of the sunflower. FAEF provides specialized folks and seeds for the field rehearsals. IDEA, an ONG who operates in the agrarian sector, in coordination with households association provides field for rehearsals "on-farm" and supervises the rehearsals. The households association, through their members it makes available to accomplish all field actividades of the culture. The initiative has the advantage of the households care for faithfully the rehearsals that at the same time are familiarized with the actividades of the culture. The initiative involved 20 peasants in 2007.

These two collaboration examples constitute admittedly initiatives that can be partitioned to the regional level. The initiative FAEF-DONAVANT has the advantage of associating the training to the investigation and to allow the students, more than research, to be familiarized with the others areas of the managerial sector. The initiative IDEA-FAEF has the advantage of allowing peasant's training in the field.

The examples mentioned before refers to two organizations and two cultures. Naturally that other organizations that work with the priority cultures nominated in the points 1 and 2 constitute an important source for alliances of this kind.

11. Contextualize the cooperation with international institutions of investigation

Mozambique through different institutions is involved in research networks. The research results in Mozambique can bring benefits for the region, and particularly for the priority areas. The main international institutions that are involved in research in Mozambique are:

CIMMYT	Centro Internacional para o Melhoramento do Milho e do Trigo
CIAT	
CIP	Centro Internacional da Batata
IARCS	Centros Internacionais de Investigação Agrária
ICRAF	Centro Mundial Agroflorestal
ICRISAT	Instituto internacional para a Investigação de Culturas dos Trópicos Semi-Áridos
IFPRI	Instituto Internacional de investigação de Políticas Alimentares
IITA	Instituto Internacional de Agricultura Tropical
ILRI	
IRLCO	
KARI	
KIT	Instituto Tropical Real da Holanda
RUFORUM	Fórum Regional das Universidades para Capacitação na Agricultura
SARNET	Rede de Investigação de Raízes e Tubérculos da África Austral

12. Needs to collaboration inter institutional and research networks

From the interviews of several stakeholders, it was clear that Mozambique needs to have more research networks on priority areas for public and private sector and between these two sectors.