Consortium for the improvement of agriculture-based livelihoods in Central Africa

Musa Sub-Sector Strategic Plan for Rwanda: 2006–2011

"Addressing the challenges of integrating bananas into the market economy"

April 2007

IPGRI and INIBAP now operate under the name "Bioversity International

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FOREWORD

This strategic plan for the *Musa* sub-sector was developed for the Consortium for the Improvement of Agriculture-based Livelihoods in Central Africa. CIALCA brings together national, regional and international partners to focus their resources on improving the livelihoods of people recovering from decades of civil conflicts. CIALCA is implemented by the National Agricultural Research Systems (NARS) of Rwanda, Burundi and the Democratic Republic of Congo, in collaboration with three Consultative Group for International Agricultural Research (CGIAR) centres (Bioversity International, the International Institute of Tropical Agriculture-IITA and the *Centro Internacional de Agricultura Tropical*-CIAT).

CIALCA also draws in the Association for Strengthening Agricultural Research in East and Central Africa (ASARECA) in the framework of the Banana Research for Eastern and Southern Africa (BARNESA) and mirrors the Institute de Recherche Agronomique et Zootechnique (IRAZ), which brings together the NARS of the three Central Africa countries. With the recent revival of the Economic Community of the Great Lakes Countries, IRAZ's role in coordinating sub-regional efforts to address agricultural productivity will be enhanced. Moreover a number of NGOs and private sector organization are operating across the borders of the countries of the sub–region. Such a large number of partners working within the agriculture sector of the sub-region would benefit from a regional strategic plan to facilitate their collaboration, share information and technologies and exploit synergies and institutional comparative advantages within and between them.

It is against this background that the sub-regional players were brought together to analyse and prioritize the contraints on banana productivity at the sub-region level, before identifying and prioritizing them at the country level. The approach also reflects the understanding that the majority, and sometimes the most important constraints, such as banana Xanthomonas wilt (BXW), Banana Bunchy Top Virus (BBTV), fusarium wilt, weevils and nematodes, as well as a host of socioeconomic problems, cut across borders. In addition it was also realized that there was a lot of similarity in terms of demographics, farming systems and socio economic fabric with potential for cross-border synergies that need to be exploited to address any agreed research for development priorities effectively. It was also perceived that identifying, prioritizing and addressing sub-regional constrains in a coordinated way would add value to the national level efforts to address the same.

As the sub-regional level, a number of challenges need to be addressed by research and development:

- Improving transfer of appropriate banana technologies;
- Adding value and improving post-harvest handling;
- Broadening the genetic base of bananas;
- Addressing the major pests and diseases;

Furthermore, another set of very important constraints were rated as medium priority because of the perceived probability of success in the face of the limited resources.These include:

- Improving soil fertility and water management.
- Enhancing the nutritional quality of bananas for income and food security.
- Intensification of the existing production systems.

- Promoting transboundary banana/plantain trade between Uganda, Rwanda, Burundi and DR Congo.

The country priorities mirror the sub-regional priorities, further supporting the need for looking at the larger picture at the sub-regional level, where resources can be aggregated to create greater impact at national levels.

The sub-regional priorities will serve as a guide for resource allocation and sharing of responsibilities between countries and will form a basis for the development other associated policies aimed at improving the livelihoods of the people of the sub region. The document will facilitate discussions at national, sub-regional and international levels where partners may need guidance on resource investment and potential impacts. It will also guide the development of cooperation and collaborations mechanisms with respect to comparative advantages and roles in the collaboration. The priorities however must be construed as dynamic and requiring constant analysis to ensure synergies are exploited, lessons are learnt and critical and timely changes are made to maximize investment by all the interest groups from grassroot organizations to policy makers. To this end CIALCA (along with IRAZ and other sub-regional platforms) will play important roles in strengthening the sub-regional cooperation on agricultural research for development, while enhancing the linkages for information and technology access/exchange between the sub-region and the wider global fora with interests in the region.

INTRODUCTION

Banana is one of the major commodity crops in Rwanda. It occupies 23% of the country's arable land. Banana is both a food and a cash crop for most producers and, as such, is a key component in Rwanda's food security. Most production is on small plots. Banana is grown by more than 65% of households in eleven provinces. Banana beer is generally processed on-farm and marketed locally. Cooking and dessert banana are generally marketed in urban centres. Some semi-industrial groups produce banana beverages (juice, wine, beer, liqueurs). Significant quantities of cooking bananas are also imported from neighbouring Uganda and the Democratic Republic of Congo. However, farmers are still not fully benefiting from the growing market opportunities, mainly due to poor quality, high transaction costs and lack of marketing infrastructures. A small quantity of dessert Apple bananas is exported to Europe; however, this market niche is experiencing problems as Apple banana are highly susceptible to fusarium wilt. The handicraft industry produces a range of products made out of banana fibre for tourists. Since its introduction, banana production has expanded to almost all marginal areas and is the principal source of rural trade providing easy income on regular basis, and it is integrated in the culture.

The mild Rwandan climate is favourable for banana production and bananas are grown at altitudes ranging from 800 to 2000 m, with the main production zones concentrated between 1300 and 1800 m: the Kivu Lake border, Kibungo, in Umutara province, and the Kigali–Butare area, where bananas contribute 60 to 80% of household income. The central area gets between 1100 and 1200 mm/year and the eastern countryside 800–1000 mm/year.

The Northern Kivu Lake border (Kibuye and Gisenyi provinces) is a narrow band of lakeside highland. This area produces mainly beer types of East African highland bananas beer bananas (*Musa* AAA-EAHB). As the cultivated area is limited to the highlands, its contribution to the country's banana production is low (12% for both provinces). Soils vary from relatively fertile in the south (Kibuye) to very rich volcanic in the North (Bugoyi).

Beer bananas predominate in the Northern Kivu Lake border province of Cyangugu, but cooking bananas play an important role for food as well as a source of income. The contribution to the country's is however low, about 6%, as this region is remote, isolated by Nyungwe National Park and poor road conditions. Soils are fertile but often acid and showing signs of decline.

Kibungo is a leading banana production area with predominantly cooking types. The area contributes more than 20% of the country's banana production. The Kigali Ngali Province also contributes more than 20% of country's banana production. A traditional beer-banana growing area, the demand from Kigali city is stimulating a shift to producing cooking bananas and especially dessert bananas. Soil fertility varies from poor to relatively good.

In the Kigali–Butare zone, there were significant shifts in banana production although it had been uniform in the past. It is mostly concentrated in the plateau around the Kigali city, while at Butare and Gitarama production has substantially declined, probably due to poor soil fertility.

The remaining areas (Byumba, Ruhengeri and Gikongoro) are marginal for banana production. Since highland cultivars are less tolerant to poor soils, farmers in this zone tend to cultivate introduced beer bananas (Kayinja, *Musa* ABB).

Principal in-country partners in banana research and development include research and educational institutions (ISAR, NUR, ISAE), policy and extension body (MINAGRI), local and international NGOs (World Vision, Care International, LWF, RWARRI, BAIR), processing enterprises (such as COVIBAR, Gorilla Mountain Banana Industries, Frulex, ASSOABI etc.), community based organizations, local community development committees and farmers

associations. There are also inkages and partnerships with international organizations such as IITA, IRAZ, Bioversity, BARNESA as well as ASARECA and various ASARECA networks.

Banana research at ISAR (formerly the Institut National pour Etudes Agronomiques du Congo-Belge) started in the colonial period, but it has focused mainly on introducing and evaluating different dessert bananas. During the first years of independence (1963–1981), banana research received little attention. In 1982, the National Banana Research Program was created at ISAR to improve banana productivity. Major achievements of banana research and development included introduction of exotic (ABB) brewing clones and dessert (AAA) cultivars in the 1950s and1960s; creation of National Banana Research Program at ISAR in 1982; collection of 85 highland banana cultivars in 1982-1984, which were later established in the national collection; diagnostic survey on production constraints in Kibungo in 1988; screening trials for resistance or tolerance to banana bunchy top virus, black sigatoka and fusarium in 1992-1994; introduction of a number of ABB beer and dessert cultivars; establishing in 1993a tissue culture laboratory for supplying clean planting material; nematode survey in 1996; rehabilitation of National germplasm collection in 1999 with 98 banana and plantain varieties; country surveys in 2000-2001 on production constraints; survey in 2002on marketing constraints and opportunities; dissemination of clean planting material of local cooking varieties; introduction and evaluation of new FHIA and IITA hybrids; development and dissemination of extension material (farmers' guides and extension leaflets and brochures) and radio programmes on banana management, fusarium wilt and bunchy top diseases, new varieties and banana bacterial wilt; and development of processed products based on green banana flour.

PRIORITY SETTING FOR THE *MUSA* SUB-SECTOR

The process of developing a strategic plan started by identifying the constraints and priority research interventions in order to make decisions on the allocation of investments.

The Project Strategic Planning Workshop followed the seven-step priority setting process recommended by the International Service for National Agricultural Research (ISNAR) and the International Food Policy Research Institute (IFPRI) and adopted by the Association for Strengthening Agricultural research in East and Central Africa (ASARECA). A Network Committee comprising the Bioversity-ESA Regional Coordinator, the Director of the Monitoring and Evaluation and Planning Unit of NARO, and an Associate Scientist at Bioversity-ESA was established (Step 1) to review the banana sub-sector or research domain (Step 2), evaluate existing results (Step 3). For the fourth step, a second committee, a Workshop Process Management Committee (Annex 1), comprising the head of the National Banana Research Programme, eminent scientists and the Network Committee was established to develop/analyse the individual constraints (Step 4) into a set of research alternatives and consolidated into research for development sub-themes (Step 5). Subsequently, a priority setting workshop (Step 6) involving stakeholders was held during the first three days of the Workshop.

Steps 1 to 5 were conveyed to participants by way of presentations and discussions during the workshops. Work in groups and plenary discussions were also used. Presentations were delivered in both French and English, when necessary. Templates and background material were presented in French and English.

Step 6 involved the priority setting workshop itself. The process can be summarized into four key stages:

1. Presentation of the results obtained by the Network Coordination Committee and the Workshop Process Committee were delivered to participants through presentations. The

regional sub-thematic areas for the Great Lakes Region were delivered by the Head of the National Banana Programme to the stakeholder representatives.

2. Group work exercises (and plenary discussions) were utilized to:
    a. verify the key constraints and research areas proposed by the Process Management Committee,
    b. agree on the criteria at country level and determine their relative weight,
    c. score the research areas.
3. The Workshop Process Management Committee synthesized and classified the results into high, medium or low priority research areas.
4. Stakeholder approval of the final results.

IDENTIFICATION OF CRITERIA

The priority-setting process used the weighted scoring method. The method ensures that adjustments can be made as priorities and circumstances change. Application of the weighted scoring method included identifying relevant criteria representative of national goals and research for development thematic areas. The team modified the BARNESA criteria (Annex 2) as indicated in Table 1. The total had to add up to 100.

Table 1. Weight given by the stakeholders to the criteria used to identify the priorities.

Criteria	Weight
Increasing household income	
Creating employment	10
Adding value to banana products	5
Increasing banana products on the market	9
Introducing new and profitable technologies along the chain	5
Improving product quality	6
Increasing household food security	
Increasing banana yields and products	8
Reducing losses at all levels along the chain	5
Introducing demand-driven technologies	6
Improving nutritional value of banana and banana products	7
Maintaining the sustainability of the natural resource base	
Reducing use of chemical additives	3
Reducing soil fertility loss	8
Improving air and water quality	4
Conserving banana-based biodiversity	5

Criteria	Weight
Strengthening institutional capacity	
Improving linkages and partnerships	2
Improving the skills of stakeholders	3
Strengthening financial resource base	2
Improving infra-structure	2
Improving the policy environment	
Strengthening advocacy at the grassroots	2
Generating policy data/information	2
Improving linkages between policy organizations	2
Facilitating information exchange and utilization	
Increasing information generation	2
Increasing information dissemination	2
Increasing information utilization	2

IDENTIFICATION OF CONSTRAINTS

The situation was analysed to identify the main constraints that need addressing and how they interact. Opportunities were also highlighted. The potential impact of resolving a constraint or addressing an opportunity was borne in mind while establishing priorities.

The process began with the strategic management committee consulting with a wide range of stakeholders. The committee synthesised the results of the consultation in a list of key constraints and opportunities. A causal structure among the constraints was used to establish the problems rather than the symptoms.

From the analysis of the constraints, it was established that the banana cropping system and the marketing of banana are much constrained by biotic and abiotic factors leading to low productivity and institutional weaknesses. The following constraints were identified.

Production constraints

Despite a growth in acreage, productivity has declined in recent times. Production increased from 1995 up to 2000 when it drastically fell, leading to an increase in prices. The decline in output in 2000 is estimated at about 29% compared to the1990 figures. This decline in productivity is due to several factors, which include poor farm mangement, declining soil fertility, pests and diseases, drought, wind and changes in the socio-economic environment.

Poor farm management: Generally, the standards of farm management are low leading to low productivity. There is limited use of manure or mulches due to lack of resources. Traditionally, banana is intercropped with annual crops (predominantly beans).

Low and declining soil fertility: Soil fertility levels have declined due to continuous cultivation, without the use of fallow, fertilizers, or crop rotation. Continuous cultivation has over time resulted in exportation through harvested crops while land pressure has greatly reduced or eliminated the use of fallow and crop rotation. Poor soil conservation measures have also contributed to loss of fertility through erosion. The use of organic fertilizers is very limited given the small number of livestock. Cooking bananas is more sensitive to soil fertility levels and it is one of the reasons it is not the dominant type of banana grown in the country.

Pests and diseases: Cooking bananas are more susceptible to pests. The leading pest on cooking banana is banana weevil while beer bananas (ABB) are most affected by fusarium wilt. Given the dominance of beer banana, fusarium wilt is the most damaging and rapidly spreading disease across Rwanda. Other diseases are limited to certain areas. Banana streak virus in Kibungo, banana bunchy top and bacterial wilt in Cyangugu, cigar end rot in Gisenyi and banana weevil in Kibungo and Kigali rurale. Nematodes are widespread. Pesticides are not used at all as well as mineral fertilisers.

Planting material: Use of high yielding cooking banana varieties is not widespread. Cyangugu area is an exception, as the best cooking variety (Injagi) dominates supply. There is no planting material supply system for cooking bananas at the moment. Banana planting material is obtained primarily from own old banana plantations. Sometimes farmers also get planting material from neighbours. Suckers are usually given out for free. Selling of suckers is negligable.

Poor access to improved production technologies: The country has been characterised with internal strifes to the extent that the research system could no longer generate improved production technologies. In effect the farmers continue recycling their old technologies which can no longer match the emerging constraints. Consequently, the productivity is reduced resulting into low incomes and food insecurity.

Shortage of labour: Production largely depends on family labour (>60%) except in commercialized areas like Kayonza in Kibungo region where more than 50% of the labour is hired.

MARKETING CONSTRAINTS

Markets and marketing can play a big role in improving livelihoods but the major constraints are poor infrastructures, price fluctuations and inadequate market information.

Poor market infrastructure: Bananas are a bulk commodity and can perish quickly. This requires good access to organised markets. The road infrastructure, especially the feeder roads into Rwanda, are poor.

Price fluctuations: Unpredictable price fluctuations make planning difficult. Sometimes the prices are so low that it becomes uneconomical for a farmer to trek to the markets, discouraging investment in the farm.

Poor market intelligence and skills: There is no formal mechanism for scanning the environment to establish market opportunities for the farmers to sell their produce. This is worsened by the fact that the skills for market intelligence are lacking in banana communities. Without appropriate market information farmers cannot decide quickly where and when to sell.

Post-harvest constraints

Many losses are incurred after harvest. The situation is worse with bananas because of being highly perishable. There is a need to invest in post-harvest technologies to improve the value of the crop right from harvest up to consumption. The major factors are poor handling, low value addition, high production costs for some products and poor planned harvests.

Poor handling: Poor handling of bananas from harvest to the market is one of the major causes of poor quality. This can be discouraging to the buyers especially when the fingers are bruised. Most farmers do not know how to handle bananas to attract the attention of buyers.

Narrow range of value added products: Cooking bananas are mainly sold as bunches or hands. Deserts are sold when ripe. In some cases juice and beer are extracted from bananas. There

are many more products that can be developed from bananas and yet this knowledge is lacking. The shelf life of some products is low. Also some products are expensive to develop for example juice as compared to liqueur. At times the supply cannot be sustained due to poor planning of the harvests.

Institutional constraints

There is need to have processes and procedures in place for the *Musa* sub-sector to play a leading role in transforming the livelihoods of the people of Rwanda. For example the private sector is poorly informed and organized. The private sector can act as a catalyst in the marketing of bananas and value addition. Similarly, there is limited human resource capacity for research and extension in Rwanda. This makes it rather difficult to generate and disseminate appropriate banana production technologies.

IDENTIFICATION OF RESEARCH AREAS

Based on the overview of the banana sector, evaluation of existing results in Rwanda, and the constraints derived from constraint analysis, a list of research areas was generated in groups and discussed, modified and agreed upon in plenary. The research areas agreed on are:

- Developing appropriate banana varieties (high yielding adapted to specific eco-zones and resistant varieties within each banana type and fitting to consumer preferences);
- Developing national policies;
- Developing a national seed supply system;
- Improving and promoting conservation and management of soil fertility and water;
- Integrated management of major pests and diseases;
- Enhancing value addition and post harvest handling of bananas (diversification, quality improvement, processing);
- Developing and implementing effective participatory approach;
- Promoting a systems approach (optimization of various technologies within the system and interaction studies)
- Developing and implementing effective partnerships (forums for exchange between stakeholders along the production to consumption chain)
- Developing and strengthening human capacity (farmers, private sector, extension, researchers, NGOs)

PRIORITY RESEARCH AREAS

The participants discussed the contribution of the research areas to meeting the identified criteria. Each research area was scored according to its estimated impact on a given criterion, from -5 for a very significant negative effect (if, for example, it had a negative impact on the environment, gender equity or employment) to +5 for an extremely positive effect. A score of 0 implied that the research area would contribute nothing to that criterion. The scores given by the participants were averaged and multiplied by the weight given to each criterion. The standard deviation was used to separate the research areas into three groups: high, medium and low priority.

This exercise is to help managers decide to which projects allocate resources. All high being equal, the high priority projects will be allocated more resources than the ones ranked medium

and low. The results of the priority exercise are presented in Table 2. Participants were given the opportunity to review the results of their scoring so as to identify outlier scores. If resources are very limiting, the high priority areas will be considered first.

Table 2. Priority given to each research area for Rwanda.

Research areas	Priority
Enhancing value addition and post harvest handling of bananas	High
Improving and promoting conservation and management of soil fertility and water	
Developing appropriate banana varieties	Medium
Developing a national seed supply system	
Developing and strengthening human capacity	
Promoting a systems approach	
Developing and implementing effective partnerships	
Integrated management of major pests and diseases	Low
Developing and implementing effective participatory approach	
Developing national policies	

STRATEGIC PLAN FOR THE *MUSA* SUB-SECTOR

Stakeholders recognise the fact that bananas are a very important commodity in the livelihoods of the people and that the production-to-consumption chain does not effectively meet the stakeholders' expectations. The need to improve production and productivity of bananas has become so apparent that research has to be conducted in a different way from what it has been. The overriding goal here is to contribute to poverty eradication. To this effect the paradigm shift in banana research will be geared towards increasing household income, improving household food security, maintaining the sustainability of the natural resource base, strengthening institutional capacity, improving the policy environment and facilitating information exchange and utilisation.

VISION AND MISSION

The vision is for the banana sector to contribute significantly to the Rwandan economy, reduce poverty, increase food security and contribute to environmental protection, whereas the mission is to generate and disseminate appropriate technologies that will result in improving the banana cropping system for increased contribution to the well-being of the population of Rwanda.

CHALLENGES

The ultimate goal of this strategic plan is to have bananas fully integrated into the market economy but appropriate strategies and approaches need to be implemented in order to address the following challenges:

- *Increasing commercialization of fresh and value added products.* The result of addressing this strategic challenge will be more banana products and better quality of bananas in the market. To this effect, ISAR has developed technologies and products that should be disseminated. This challenge will be addressed by identifying existing post-harvest technologies and products and introducing post-harvest technologies. Research efforts will also be geared towards evaluation of new technologies, including

palatability tests, market trials and quality control studies. Resistant material will be introduced, evaluated under local conditions and multiplied for distribution.

- *Reducing pressure by pests and diseases*. Addressing this strategic challenge will result in reduced losses from pests and diseases. Generally the approaches for achieving this will be through integrated management and the development and implementation of effective participatory approaches in research. Specifically, the activities to be implemented will include; participatory and multidisciplinary evaluation of improved technologies to optimize system productivity, interaction studies of various technologies and/or system components and Information sharing with the stakeholders.
- *Reversing the deterioration of the natural resource base.* The need for improving and promoting conservation and management of soil fertility and water was found a critical challenge. The output of addressing the challenge is improved sustainable agricultural production systems. The government of Rwanda is strongly committed to the environment protection and conservation of soil and water. To this effect, ISAR is developing an integrated watershed management approach. In the next 5 years, more efforts will be expended in developing soil fertility and water management technologies, evaluating the technologies on a wider scale, promoting soil fertility and water management technologies, developing skills of stakeholders and sharing information.
- *Improving banana productivity.* Developing and implementing a systems approach will be the focus for improving banana productivity. This will result in increased production and productivity and higher income on farm and/or agro-ecosystem level. Specific activities that will be conducted include; participatory and multidisciplinary evaluation of improved technologies to optimize system productivity, interaction studies of various technologies and/or system components and information sharing with the stakeholders.
- *Strengthening linkages among producers, processors and researchers*. Effective networking of banana sub-sector stakeholders will be established at national level and this will need development of national policies to support the banana sub-sector. The government of Rwanda is encouraging farmers to work in associations and cooperatives and is promoting private sector initiatives. Also MINAGRI is committed to improving the banana sub-sector. Enhancing effective networking will require identifying the stakeholders, evaluating their needs, facilitating their organization, facilitating information exchange/flow and strengthening technical and organizational skills.
- *Capacity building (human resources and infrastructure).* Generally, this challenge will be addressed by developing national banana seed supply systems. will be specifically achieved by implementing activities such as quantifying the needs for planting materials and identifying partners and initiating partnership with NGOs, CBOs and farmers associations interested in seed production and seed dissemination. Human resource capacity will be built through degree training (MSc and PhD) for scientists from the national research organizations and NGOs. Short term training sessions for farmers, extension agents and technicians will be conducted. In addition farmer field days, study tours, radio programmes will be organized and extension materials produced and disseminated.

STRATEGIC OBJECTIVES AND OPPORTUNITIES

In addressing the strategic objectives there are opportunities to take advantage of. Major opportunities include the commitment from the Rwandan government to develop the banana sub-sector, presence of processing facilities, local initiative for the export of Apple bananas,

post-harvest programme at ISAR, willingness of various NGOs to intervene in banana sub-sector. The strategic objectives that will be pursued in the coming years are:

- Developing and disseminating high yielding resistant varieties that meet consumer preferences;
- Improving crop, soil and water management;
- Assessing, monitoring and managing pests and diseases;
- Developing and promoting handling and processing technologies;
- Disseminating and promoting developed technologies;
- Promoting marketing and value-added products and strengthening linkages between researchers, producers, processors and private sector;
- Building capacities of researchers, extension agents and other stakeholders and putting in place an effective seed distribution system.

The logical framework for the implementation of the strategic plan is presented in Annex 3.

SUCCESS FACTORS

In order to effectively implement the different strategies for achieving the strategic objectives, the critical factors that will define success are:

- Timely funding: the proposed research interventions will require a timely flow and release of funds if the action plan is to be implemented accordingly.
- Adherence to work plans: this is necessary to achieve the outputs of the agenda and a means of accountability to the partners.
- Community participation and ownership: the communities must be involved and own the process.
- Effective partnerships: the production to consumption chain requires the participation of different players each contributing at critical points. The processors, marketing, transport to mention but a few will need to work together with a common vision.
- Security: this affects all the spheres of the economy and research can be very vulnerable to the extent that no funds will flow into the system and researchers won't be able to work.
- Political will: The government and other policy makers should be committed to the cause of improving the banana sub-sector.

CORE VALUES

The following core values are recommended in the implementation of the strategic plan:

- Team spirit: valuing team spirit, creativity and respect for one another and recognising diversity in the workplace (gender, cultural and professional), building on them as strengths.
- Integrity: respecting and responding to the needs of our partners and the people we serve with a high degree of integrity.
- Transparency: believing in and supporting transparency in our activities, resource allocation and decision-making.

- Result oriented: valuing time management and a result-oriented work ethics.
- Non-bureaucratic: maintaining an informal working environment, valuing effective vertical and horizontal communication more than hierarchy (non- bureaucratic).

IMPACT AND PERFORMANCE ASSESSMENTS

Periodic assessment of performance and impact is a key element to measure the contribution of banana research to rural development, as well as to identify its strengths and weaknesses. In future, the Banana Research Programme will ensure that performance indicators are identified. Such indicators will be simple and clearly defined to allow appropriate participatory methodologies to be used in performance and impact assessments.

The Banana Research Programme will also assess the processes and methods. Accuracy and dependability of results not only depend on clearly defined monitorable indicators and the availability of reliable data and information, but also on the wider participation of stakeholders in the assessment process. A management information system is a useful tool for capturing, updating and creating data, and monitoring provides a feedback mechanism. Integrating the two greatly facilitates performance assessment. The programme will seek to develop and implement such a system and to monitor and evaluate processes and methods by:

- Establishing a set of key quantitative and qualitative monitorable indicators to asses the project outputs and results;
- Documenting results to evaluate their effectiveness and impact on increasing production, incomes as well as their environmental impacts;
- Creating a database to ensure the timely and reliable assessment results.

The assessment process will involve partners and clients in operational areas. In order to integrate monitoring and evaluation processes with the performance assessment process, the focus will be on developing milestones and outputs for performance evaluation. Comprehensive baseline surveys will be conducted to set benchmarks against which future improvements will be gauged.

ANNEX 1: THE WORKSHOP PROCESS MANAGEMENT COMMITTEE

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ANNEX 2: ORIGINAL CRITERIA AND SUB-CRITERIA

INCREASING HOUSEHOLD INCOME
Creates employment
Adds value to banana products
Increases banana products on the market
Introduces new technologies along the chain
Improves product quality
IMPROVING HOUSEHOLD FOOD SECURITY
Increases yields of banana and products
Reduces losses at all levels along the chain
Introduces demand-driven technologies
MAINTAINING THE SUSTAINABILITY OF THE NATURAL RESOURCE BASE
Reduces use of chemical additives
Reduces loss of soil fertility
Improves the quality of air and water
Conserves banana-based biodiversity
STRENGTHENING INSTITUTIONAL CAPACITY
Improves linkages and partnerships
Improves the skills of stakeholders
Strengthens Financial Resource Base
Improves infra-structure
IMPROVING THE POLICY ENVIRONMENT
Strengthens advocacy at the grass-roots
Generates policy data/information
Improves linkages between policy organisations
FACILITATING INFORMATION EXCHANGE AND UTILISATION
Increases information generation
Increases information dissemination
Increases information utilization

ANNEX 3*:* LOGICAL FRAMEWORK OF THE STRATEGIC PLAN

	Objectives/Narrative	Indicators (Verifiable indicators)	Evidence (Means of verification)	Assumptions
Goal	Bananas fully integrated into the market economy of Rwanda	- Percentage increase in contribution of banana to GDP - Number of organised marketing channels - Number of value added products on the market	- National budget speeches - National statistics -Market survey reports	
Purpose/ Outcome	Increased banana productivity in Rwanda	- Level of commercialization of fresh and value added products, - Decrease in loss due to pests and diseases, - Increased soil fertility and watershed management - Increased banana yields - Number of functional linkages among producers, processors and researchers	Rapid rural appraisal reports Annual reports Survey reports	
Outputs	1. More banana products of better quality in the market t	- Number of banana products on the market - Quality of bananas on the market	Market survey reports	
	2. Appropriate varieties developed	- Number of demand specific varieties	Variety release committee reports	

	Objectives/Narrative	Indicators (Verifiable indicators)	Evidence (Means of verification)	Assumptions
	3. More producers accessed new varieties	- Number of producers accessing new varieties - Number of mechanisms for accessing varieties	Producers satisfaction survey reports Extension delivery reports	
	4. Professional skills and capacity improved at all levels of the stakeholders	- Number of professionals applying the skills imparted into them - Number of people trained	Follow-up study reports Training reports	Conducive environment for applying the skills exists
	5. Better production / Productivity and higher income on farm and /or agro-eco-system level (eg. Watershed)	- Yield increase - Amount of money accruing from bananas	Survey reports	
	6 & 7. Economic losses from pests and diseases minimized	- Reduced loss due to pests - Reduced loss due to diseases	Yield loss assessment studies	Farmers adopt the pests and disease management technologies
	8. National policies to support the banana sub-sector developed	- Number of policies that support the banana sub-sector - Number of people happy with production policies	- Policy documents - Customer satisfaction reports	Favourable policy environment
	9. Sustainable agricultural production systems improved	Productivity of production systems	Survey reports	
	10. Effective networking of banana sub-sector stakeholders established at national level	- Number of functional partnerships - Number of activities jointly implemented	Partnership documents Annual and quarterly reports	Conducive environment for networking exists

ANNEX 4: STRATEGIC RESEARCH OUTPUTS AND ACTIVITIES.

Project	Output	Activities	Work by other partners
1. Enhancing value addition and post harvest handling of bananas	More banana products of better quality in the market	1. Identification of existing post-harvest technologies and products 2. Introduction of new p-h technologies 3. Evaluation of new technologies including palatability tests, market trials, quality control studies 4. Awareness creation for further dissemination	ISAR has developed some technologies and products
2. Developing appropriate banana varieties	Appropriate varieties developed	1. Introduction of new resistant material 2. Evaluation of new material in Rwandan conditions 3. Multiplication of elite stock for massive multiplication	IITA has developed resistant material, BIOVERSITY conserves and shares world germplasm collection
3. Developing national banana seed supply systems	More producers accessed new varieties	1. Quantify the needs in planting material 2. Identify partners and initiate partnership with NGOs, CBOs, farmers associations interested in seed production and seed dissemination 3. Reinforce capacity of potential seed producers 4. Involve stakeholders in massive production of best existing and new released varieties 5. Ensure quality control of seeds produced 6. Awareness creation on availability of seed supply system	Private in vitro labs exist in the sub-region (Agrobiotec – Burundi) NGOs available at grass root level (WV, BAIR,RWARRI)

Project	Output	Activities	Work by other partners
4. Developing and reinforcement of human capacity	Professional skills and capacity improved at all levels of the stakeholders	1. Degree training (MSc and PhD) for scientists from the national research organizations (ISAR, NUR) and other stakeholders (NGOs) 2. Short term training sessions for farmers, extensionists and technicians 3. Organize farmer field days, study tours, radio programs, produce and disseminate extension materials	DGDC, USAID, World Bank have provided some scholarships for degree training ATDT project has organized radio programs, study tours, short term training for farmers, technicians and scientists, produced various extension material
5. Developing and implementing system approach	Better production/ Productivity and higher income on farm and/or agro-eco-system level (eg. Watershed)	1. Participatory and multidisciplinary evaluation of improved technologies to optimize system productivity 2. Interaction studies of various technologies and/or system components 3. Information sharing with the stakeholders	Limited interaction studies from various research institutions
6. Integrated management of major pests and diseases	Economic losses from P&D minimized	1. Collect/update information on P&D incidence and severity 2. Establish the status of major P&D 3. Evaluate available IPM options for major P&D 4. Promote the effective IPM options 5. Develop capacity for IPM implementation 6. Sharing information with different stakeholders	IITA/BIOVERSITY/CABI have developed many IPM options
7. Developing and implementing effective participatory approach	- see project 5 above	- see project 5 above	- see project 5 above

Project	Output	Activities	Work by other partners
8. Developing national banana sub-sector policies	National policies to support the banana sub-sector developed	1. Generate appropriate information for policy makers 2. Share information with policy makers to convince them about the needs of the policy 3. Develop the policy	MINAGRI has commitment to improve the banana sub-sector
9. Improving and promoting conservation and management of soil fertility and water	Sustainable agricultural production systems improved	1. Develop soil fertility and water management technologies 2. Evaluate the technologies on a wider scale 3. Promote soil fertility and water management technologies 4. Develop skills of stakeholders in NRM 5. Sharing information and linkages with different stakeholders	ISAR is developing integrated watershed management approach Government is strongly committed to the environment protection and conservation of soil and water
10. Developing and implementing effective partnerships	Effective networking of banana sub-sector stakeholders established at national level	1. Identification of stakeholders 2. Evaluate of the needs of stakeholders 3. Facilitate organization of the stakeholders 4. Facilitate information exchange/flow among the stakeholders 5. Strengthening of their technical and organizational skills 6. Organize the stakeholders	Government is promoting farmers to work in associations and cooperatives and promotes private sector initiatives

ANNEX 5: ACRONYMS

ASARECA	Association for Strengthening Agricultural Research in East and Central Africa
BARNESA	Banana Research Network for East and Southern Africa
BIOVERSITY	Bioversity International
BSV	Banana Streak Virus
CABI	Commonwealth Abstract International
CIALCA	Consortium for the Improvement of Agriculture-based Livelihoods in Central Africa
CIAT	Centro International de Agriculture Tropical
DGDC	Directorate General for Development Cooperation, Belgium
DR Congo	Democratic Republic of Congo
IITA	International Institute of Tropical Agriculture
IFPRI	International Food Policy Research Institute
ISAR	Institut des Sciences Agronomiques du Rwanda
ISNAR	International Service for National Agricultural Research
MEPU	Monitoring, Evaluation and Planning Unit, NARO
MIS	Management Information System
NARO	National Agricultural Research Organisation, Uganda
NARS	National Agricultural Research System
NGOs	Non-Governmental Organisation
NPP	Network Project and Programmes of ASARECA
NUR	National University of Rwanda
PRA	Participatory Rural Appraisal
RWARRI	Rwanda Rural Rehabilitation Initiative

Consortium for the improvement of agriculture-based livelihoods in Central Africa

Following a call for proposals of the Directorate General for Development Cooperation (DGDC – Belgium) in April 2004, three proposals were approved:

• 'Sustainable and Profitable Banana-based Systems for the African Great Lakes Region', led by the International Institute of Tropical Agriculture (IITA), Kampala, Uganda.

• 'Enhancing the resilience of agro-ecosystems in Central Africa: a strategy to revitalize agriculture through the integration of natural resource management coupled to resilient germplasm and marketing approaches', led by the Tropical Soil Biology and Fertility Institute of the International Center for Tropical Agriculture (TSBF-CIAT), Nairobi, Kenya.

• 'Building Impact Pathways for Improving Livelihoods in *Musa*-based Systems in Central Africa', led by Bioversity International, Kampala, Uganda.

As the above projects proposed to operate largely in the same parts of Rwanda, Burundi, and the Democratic Republic of Congo (DR Congo), with similar national partner institutes, and due to the complimentary nature of the activities proposed, above institutes agreed to operate as a Consortium to ensure cooperation and complimentarity and avoid technical and financial duplication at the national level. The Consortium for Improving Agriculture-based Livelihoods in Central Africa (CIALCA) is a Consortium of the International Agricultural Research Centers (IARCs) and their national research and development partners that aims at close technical and administrative collaboration and planning in areas of common interest, thereby enhancing returns to the investments made by DGDC and accelerating impact at the farm level.

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