

# Science and partnership take the punch out of finger millet blast

RIU

## Validated RNRRS Output.

Farmers in East Africa are safeguarding their food security and nutrition thanks to new understanding of finger millet blast: its diversity, aggressiveness and epidemiology. Farmer-selected blast-resistant varieties and improved control techniques are being promoted through scientific conferences, stakeholder workshops, on-farm testing and training, and the mass media. Previously, the lack of linkages between grain processors and other stakeholders was a major barrier to realizing the enormous potential of finger millet in fighting malnutrition and poverty. Now, efforts to foster innovation and linkages along the finger millet production-supply chain are creating an effective pathway for improving finger millet production and use.

Project Ref: **CPP13:**

Topic: **1. Improving Farmers Livelihoods: Better Crops, Systems & Pest Management**

Lead Organisation: **Warwick HRI, UK**

Source: **Crop Protection Programme**

## Document Contents:

[Description](#), [Validation](#), [Current Situation](#), [Current Promotion](#), [Impacts On Poverty](#), [Environmental Impact](#), [Annex](#),

## Description

**CPP13**

### A. Description of the research output(s)

1. Working title of output or cluster of outputs.

*In addition, you are free to suggest a shorter more imaginative working title/acronym of 20 words or less.*

Finger millet blast management in East Africa: Creating opportunities for improving production and utilisation

## Research into Use

NR International  
Park House  
Bradbourne Lane  
Aylesford  
Kent  
ME20 6SN  
UK

## Geographical regions included:

[Kenya, Uganda,](#)

## Target Audiences for this content:

[Crop farmers,](#)

through an innovation systems approach

2. *Name of relevant RNRRS Programme(s) commissioning supporting research and also indicate other funding sources, if applicable.*

Crop Protection Programme

Sponsorship and in-kind contributions from Grain Processing Industry (e.g. Maganjo Grain Millers and Family Diet, Uganda) for promotional workshops.

3. *Provide relevant R numbers (and/or programme development/dissemination reference numbers covering supporting research) along with the institutional partners (with individual contact persons (if appropriate)) involved in the project activities. As with the question above, this is primarily to allow for the legacy of the RNRRS to be acknowledged during the RIUP activities.*

R8030 (ZA0482), R8445 (ZA0670 & ZA0734)

Serere Agricultural and animal production Research Institute (SAARI), Uganda [John Takan, Nelson Wanyera, Julius Okwadi]

Kenyan Agricultural Research Institute (KARI), Kenya [Stella Nyaboke, Chrispus Oduori]

International Crops Research Institute for Semi-Arid Tropics (ICRISAT), East Africa [Mary Mgonja, Eric Manyasa]

Maganjo-Grain Millers [Mary Tamale] and Family Diet [Issa Wamala], Uganda

Queen's University of Belfast [Averil Brown, Ronan Coll]

Prof. Jill Lenne, Project Consultant [Consultant, International Agricultural Development]

Warwick HRI, University of Warwick, UK [S. (Meena) Muthumeenakshi, S. (Prasad) Sreenivasaprasad, Project Leader and Co-ordinator]

4. *Describe the RNRRS output or cluster of outputs being proposed and when was it produced? (max. 400 words). This requires a clear and concise description of the output(s) and the problem the output(s) aimed to address. Please incorporate and highlight (in bold) key words that would/could be used to select your output when held in a database.*

Finger millet is a staple food for millions of resource-poor people in the semi-arid zones of Africa and Asia and plays a key role in the livelihoods of small-holder farmers, their families and communities. It is an important food security crop, and is hugely important nutritionally.

African national agricultural research systems have identified blast disease as a high priority constraint to further expansion of the finger millet sector in East Africa. Neck and panicle blast cause serious yield losses to finger millet production. Little or no knowledge of the blast pathogen in East Africa was available.

A highly productive partnership between East African National and Regional Agricultural Research Organizations and Advanced Research Organisations in the UK enabled rapid scientific advances in understanding the finger

millet blast pathogen and identifying the critical disease intervention strategies. A framework has been developed for resistance utilisation and blast management based on the pathogen diversity, aggressiveness and epidemiology. Farmer preferred and blast resistant varieties have been identified through on-farm surveys and on-station screening and working with farmer groups. The project team recognised that effective finger millet blast management provides a key entry point for fighting malnutrition and poverty in East Africa. However, there was an overwhelming lack of linkages between the grain processors and other stakeholders in this sector. Through a regional workshop in Nairobi, Kenya during 2005 and a successful industry co-sponsored and jointly-led (Maganjo Grain Millers Ltd., Uganda) Finger Millet Awareness Campaign in Kampala, Uganda during 2006, the process of fostering innovation and linkages among the key stakeholders in the finger millet production-supply chain in East Africa has been firmly initiated. Building on these partnerships, the process of promoting the knowledge and technology outputs to intermediary (research-extension-policy) and ultimate (farmers-industry) beneficiaries is well underway via scientific conferences, stakeholder workshops, on-farm testing and training, and mass communication channels such as internet, TV, Radio and Newspapers. The stakeholder connectivity initiated and the wider partnerships established (the finger millet coalition now includes nearly 20 different stakeholder groups) provide an effective pathway for scaling up and up take of the outputs to improve finger millet production and utilisation in the future.

These Outputs were generated via projects R8030, April 2001- November 2004 and R8445, Jan 2005 – Feb 2006.

5. What is the type of output(s) being described here?

Please tick one or more of the following options.

<b>Product</b>	<b>Technology</b>	<b>Service</b>	<b>Process or Methodology</b>	<b>Policy</b>	<b>Other Please specify</b>
	X		X	X	

6. What is the main commodity (ies) upon which the output(s) focussed? Could this output be applied to other commodities, if so, please comment

Finger millet.

Some of the knowledge and principles can also be applied to rice blast management, particularly as the NERICAs are beginning to be widely promoted in SSA.

7. What production system(s) does/could the output(s) focus upon?

Please tick one or more of the following options. Leave blank if not applicable

<b>Semi-Arid</b>	<b>High potential</b>	<b>Hillsides</b>	<b>Forest-Agriculture</b>	<b>Peri-urban</b>	<b>Land water</b>	<b>Tropical moist forest</b>	<b>Cross-cutting</b>
X							

8. What farming system(s) does the output(s) focus upon?

Please tick one or more of the following options (see Annex B for definitions).

Leave blank if not applicable

<b>Smallholder rainfed humid</b>	<b>Irrigated</b>	<b>Wetland rice based</b>	<b>Smallholder rainfed highland</b>	<b>Smallholder rainfed dry/cold</b>	<b>Dualistic</b>	<b>Coastal artisanal fishing</b>
X			X	X		

9. How could value be added to the output or additional constraints faced by poor people addressed by clustering this output with research outputs from other sources (RNRRS and non RNRRS)? (**max. 300 words**).

Please specify what other outputs your output(s) could be clustered. At this point you should make reference to the circulated list of RNRRS outputs for which proformas are currently being prepared.

Project R8030 started as a strategic science-based collaboration among 4 R & D organisations. Within this short four year funding period, the potential for innovation in the finger millet sector has been substantially increased through enhanced connectivity and flow of knowledge between the key actors in a finger millet coalition of nearly 20 stakeholder groups across the production-supply chain.

Through close stakeholder engagement, some exciting opportunities have been identified to address additional constraints that currently limit production, by spill-in and adaptation of existing and relevant technologies and models developed to tackle similar problems in other commodities and farming systems through RNRRS and other programmes.

These include, 1) Improved seed systems through community based multiplication and distribution of farmer and industry preferred varieties, 2) Improved crop management (row planting, draught animal power, reduced labour for weeding, host resistance development), 3) Improved post-harvest handling and grain quality through producer marketing groups, 4) Improvement in the production – supply chain, particularly through market access and 5) Product diversification, value addition, and consumer awareness through industry-led campaigns.

The finger millet coalition is well-poised to achieve significant increases in finger millet production, utilization and trade in East Africa by taking an innovation system based approach utilising the technologies developed and lessons learnt in the various RNRRS projects and other programmes as detailed below.

Village-level, community-based seed production models for multiplication and promotion of new varieties of crops successfully established in EA by CPP projects R8105, R8442, R8104, R8435; and in India by CPP x LPP projects R7346, R8339 and R8450.

Draught animal power weeding technologies (DAP) developed in the Ugandan Teso system by the LPP CPP Project R7401.

Bean ICPM implemented by CIAT in East Africa by Projects R8414, R7965, R7568, R7569, R8316.

PSP seed priming projects R6395, R7438

Market information and access CPHP project R8250 linked to improving the quality constraints highlighted by finger millet processors and millers, lack of market information and access faced by producers. Producer Marketing Groups (PMGs) being implemented by TechnoServe for other commodities in EA to generate group innovations based on structured and well-led participatory processes involving key actors in the market chain. Ugandan processor Family Diet is working with a farmers' cooperative society to buy-back quality assured finger millet grains at a guaranteed price (Mr. Issa Wamala, Managing Director, Family Diet). The production-supply chain for finger millet could also be strengthened through product diversification and improved consumer awareness. These models provide excellent opportunities for enhancing links between farmers, traders and processors for a more efficient production-supply chain both at domestic and regional level.

The strong growth of the baking and brewing industries in East Africa in recent years provide exciting opportunities for product diversification and value addition. In addition, highly nutritious finger millet flour has potential to be used in health foods locally and for export.

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## **Validation**

### **B. Validation of the research output(s)**

#### **10. How were the output(s) validated and who validated them?**

*Please provide brief description of method(s) used and consider application, replication, adaptation and/or adoption in the context of any partner organisation and user groups involved. In addressing the "who" component detail which group(s) did the validation e.g. end users, intermediary organisation, government department, aid organisation, private company etc... This section should also be used to detail, if applicable, to which social group, gender, income category the validation was applied and any increases in productivity observed during validation (max. 500 words).*

Mother and baby trials, based on standard biometric designs followed by ICRISAT for the validation, demonstration and promotion of the improved and blast resistant varieties, disease intervention and crop management technologies identified in R8030. Mother trials were researcher-managed and completely randomized, with two to four replications per site. They were designed to directly compare different 'best bet' technologies in the same field, allowing farmers to choose technologies most appropriate to their needs. Baby trials managed by the farmers were located around mother trials, and consisted of a few treatments chosen from the mother trial. Baby trials allowed farmers to 'do and see' for themselves the performance of treatments at different trial sites, and allow for faster, larger-scale testing at different locations under different management conditions. Demonstration plots were set up on farm along with locally grown varieties. Linking with local extension workers, project staff worked with the farmers for maintenance of the crop and data were collected. A comparison was also made between researcher-managed versus farmer-managed mother- baby trials. To obtain data in uniform manner over the locations, co-operators were supplied with a set of guidelines and data recording pro-forma, and data were analyzed using SAS statistical system. .

In Kenya, the validation trials were managed by ICRISAT and KARI, Kenya and in Uganda, the validation work was managed by SAARI using varieties with various attributes such as blast resistance, high yield, good grain quality and early maturity. Farmer groups, farming community leaders, representatives from CBOs and NGOs,

local extension staff participated. Women and men farmers from farmer groups representing poor smallholder communities participated in the validation work at all locations.

Component technologies such as use of clean seed and improved seed sowing methods notably row planting to manage weeds and reduce labour were demonstrated by working with the farmers groups and also promoted to representatives of the community, extension and industry through participatory workshops and campaign days organised in the project. An interesting model to emerge from these linkages is the farmers' co-operative established by Family diet and Mr. Issa Wamala has been hugely enthusiastic about the prospect of linking up the co-operative with the future plans of the project coalition to promote industry and farmer preferred varieties. Mr. Issa Wamala participated in the stakeholder events in Nairobi as well as Kampala is now a key member of the project coalition. Mrs. Mary Tamale, MD, Maganjo Grain Millers and other industry, policy and finance sector representatives view the farmer co-operative as a model with excellent potential.

#### 11. **Where and when** have the output(s) been validated?

*Please indicate the places(s) and country(ies), any particular social group targeted and also indicate in which production system and farming system, using the options provided in questions 7 and 8 respectively, above (max 300 words).*

The Mother-baby trials were used for validation, demonstration and promotion of blast disease and crop management technologies in the smallholder rainfed farming systems within the semi-arid production system in Kenya and Uganda mainly during 2005-06.

In Kenya, validation work was carried out in Kisii, Gucha, Busia and Teso districts. The demonstrations were hosted by a total of 81 farmer group representatives either working in association with or managing the mother and baby trials. A total of 5 mother trials and 81 baby trials were planted; each mother trial was typically 'surrounded' by 12-15 baby trials. In Uganda, validation work was carried out in Kaberamaido, Katakwi and Soroti districts. At all locations, groups of poor small-holder farmers including men and women participated. An interesting model to emerge from the linkages developed in the project is the farmers co-operative with 300 members established in Western Uganda by Family diet.

A regional workshop organised at Nairobi during 13-14 Sep 2006 working in partnership with ECARSAM provided an excellent opportunity to promote and improve communication and understanding of the mutual needs of the growers and the industry and to disseminate the project outputs. The participants included stakeholders in the finger millet production-supply chain in Uganda and Kenya and researchers and policy makers from East Africa, India and UK. From Uganda, Ms. Mary Tamale, MD, Maganjo and Mr. Issa Wamala, MD, Family Diet lead the representatives from the industry and the farming communities.

A finger millet awareness day organised at Kampala, funded by DFID-CPP and co-sponsored by Maganjo Grain Millers enabled stakeholder engagement with representatives from farmers' groups, representatives of the health and education and research sectors, processors, investment authorities and micro-credit schemes (e.g. Uganda Investment Authority), as well as the media and policy makers (e.g. NARO and NAADS). This also provided an opportunity to link up with parallel CPP projects, and DFID programmes through the Research Showcase event. These activities took place during 9-10 Feb 2006.

## **Current Situation**

### **C. Current situation**

#### **12. How and by whom are the outputs currently being used? Please give a brief description (max. 250 words).**

As emphasised in earlier sections, the finger millet blast management work has functioned with only 4 years of funding and mainly commissioned as a strategic project. Given this, there were no opportunities to formally and fully establish the level of use of outputs and their up-scaling for wider promotion.

However, the project team, fully supported by the programme management, devised innovative approaches to fast track the validation and promotional components within the available time-frame. This included farmers' field days for demonstration and promotion of technologies linked to the mother and baby validation trials, stakeholder workshops conducted in Nairobi and Kenya which provided an opportunity to bring together not only the key players involved in finger millet production-supply chain, but representatives from wider sectors to facilitate future up-scaling and wider adoption processes essential for improved production and utilisation of finger millet.

The knowledge and the disease intervention technologies developed in the project are being used by both the intermediary beneficiaries (national scientists and extension workers) and the ultimate beneficiaries within the finger millet farming communities where the validation and promotional work was carried out and importantly also by the industry. For example, Ugandan processor Family Diet is working with the Katweyombe Cooperative Society of 300 farmers in Kibale to buy 24 tonnes of assured quality grains of finger millet per month for one year at a guaranteed price of 500 US\$/kg (see appendix for Web-cast/radio interviews).

#### **13. Where are the outputs currently being used? As with Question 11 please indicate place(s) and countries where the outputs are being used (max. 250 words).**

Within the Kisii, Gucha, Busia and Teso districts in Kenya and Kaberamaido, Katakwi and Soroti districts in Uganda where the validation and promotion work was carried out. In Busia and Kisii, some farmers have adopted row-planting to reduce the drudgery of weeding. Pelleted seed for row planting and weed management is currently being tested in Kenya. In Uganda, industry supported finger millet grain buy-back system is in the Kibale district, with the potential for distribution to displaced people in East Africa via UN agencies.

#### **14. What is the scale of current use? Indicating how quickly use was established and whether usage is still spreading (max 250 words).**

Validation, promotion, industry partnerships and initiation of stakeholder connectivity were all carried out during late 2004 to early 2006. The enthusiastic response shown by the producers and the industry was clearly evident within this short period and already various initiatives are taking place contributing to some technology diffusion (see interviews by Mr. Issa Wamala, MD, Family Diet and Ms. Mary Tamale, MD, Maganjo Grain Millers). And this is an on-going process.

15. *In your experience what programmes, platforms, policy, institutional structures exist that have assisted with the promotion and/or adoption of the output(s) proposed here and in terms of capacity strengthening what do you see as the key facts of success? (max 350 words).*

R & D organisations supported by national, regional and international systems, particularly the core programmes at SAARI and KARI supported by the Ugandan and Kenyan governments, respectively and the network of links these institutes and ICRISAT-EA have with NGOs/CBOs.

The EU funded ASARECA-ECARSAM network provides a regional mechanism and linkages. At the national level, Ugandan govt funded NAADS is a very good vehicle for the finger millet coalition to work with the many thousands of farmer groups established by them for enterprise development.

Farmer groups were established in Kenya and Uganda linked to ICRISAT, KARI and SAARI network of contacts for the validation and promotion work.

We have established close partnership with the grain processing industry such as Maganjo Grain Millers Ltd., Family Diet, SESACO and East African Basic Foods Ltd. in Uganda as well as Unga and Proctor and Allan in Kenya. An interesting model to emerge from these linkages is the farmers' co-operative established by Family diet and Mr. Issa Wamala has been hugely enthusiastic about the prospect of linking up the co-operative with the future plans of the project coalition to promote industry and farmer preferred varieties.

## **Current Promotion**

### **D. Current promotion/uptake pathways**

16. *Where is promotion currently taking place? Please indicate for each country specified detail what promotion is taking place, by whom and indicate the scale of current promotion (max 200 words).*

PRA work done in R8030 revealed that farmers in Kenya and Uganda did not know the cause, modes of transmission and control measures for blast disease. This dearth of information and also the need to improve post-harvest handling of finger millet seeds to improve grain quality issues raised by millet processors and using clean seed to avoid blast and the availability of blast resistant improved varieties have been addressed through farmer field days conducted at key stages of the crop linked to the validation trials in Kenya and Uganda, stakeholder workshops in Kenya and Uganda and additional promotional work (e.g. interviews by stakeholders including research and industry on one-world radio and Agfax, Participation and direct interaction with Stakeholders at the DFID-RNRRS Outputs Showcase in Kampala, Popular/Science articles in East Africa Standard, International Sorghum and Millets Newsletter, Proceedings of the Pathways Out Of Poverty meeting and a Paper submitted to Outlook on Agriculture). With the participation of the project coalition in the recent research showcase and parallel project-specific events (more details in earlier sections) in Kampala, interaction and contact with NGOs such as SG2000/AFRICA 2000 Network-Uganda/AT-Uganda have been established with a view to further developing community based seed multiplication and distribution system of finger millet varieties preferred by farmers and the industry.

Several millers and processors in Kenya have agreed to test the nutritional quality of the improved finger millet varieties currently being promoted in Kenya and Uganda. In addition, various grain millers and processors including Family Diet are discussing with UN agencies the distribution of finger millet flour as food aid in East Africa. Such initiatives are further enhancing the connectivity within this finger millet innovations system in the region. In Kampala, Uganda, the Hot Loaf Bakery marketed health bread with 20% finger millet flour in 2004. In Uganda, consultations with the Food Science Research Institute, NARO and the Food Science Department of the University of Makerere have been initiated and others are planned with the brewing industry (e.g. USAID Markets Project) to generate awareness and support for future product diversification.

At the policy level, contact and discussions have been initiated with ECARSAM (Prof. Barnabas N. Mitaru, Regional Co-ordinator) NAADS (Mr. John Wakikona and Dr. M. Silim Nahdy, Executive Director), NARO (Dr. J.M. Magyembe, Special Assistant to Director General) and the Agricultural Council of Uganda (Prof. John Joseph Otim, Presidential Senior Advisor on Agriculture).

*17. What are the current barriers preventing or slowing the adoption of the output(s)? Cover here institutional issues, those relating to policy, marketing, infrastructure, social exclusion etc. (max 200 words).*

In spite of the importance of finger millet to the livelihoods of millions of small-holder farmers in East Africa, its valuable nutritional and processing properties, the growing demand exceeding supply and its regional and international trade potential, finger millet has largely been neglected by national and international agricultural research and development systems and by major donors to agriculture in sub-Saharan Africa. This neglect by mainstream agricultural development systems has contributed to a lack of realization of the potential productivity of finger millet.

More specifically, the following constraints that act as barriers to adoption of the outputs to improve the production, utilisation and trade in finger millet have been identified in close consultation and interaction with all the key players involved in the whole production-supply chain:

#### Stakeholder Awareness and Production

- Lack of awareness of the potential of finger millet among all stakeholders, including policy makers.
- Most rural communities are unaware of the nutritive value of finger millet, and consider it inferior to maize, rice or wheat.
- Producers are scattered widely across rural areas; not organized into larger, more effective groups. Hence highly variable production, fluctuations in grain supplies, quality and price
- Poor linkages between farmers and processors
- Lack of quality control systems, or standards/prices based on crop quality
- Lack of credit facilities to enable farmers to expand production
- Lack of seed of improved varieties

#### Marketing

- Long and inefficient marketing chain with numerous middlemen; no formal, organized marketing structures
- Poor infrastructure (roads, communications)
- Farmers lack market information, market access; simultaneously, traders and processors lack information on crop availability, quality and price

- Limited product range, especially among processed foods, hence under-achievement of potential sales in urban areas

#### Policy

- Low government priority for finger millet (except in Uganda as detailed in the next section), extremely low funding for research and extension, hence poor technology development and dissemination.
- Different countries have different tax regimes, import/export procedures, certification and phytosanitary standards etc. This reduces trade opportunities and hinders the creation of a single regional market large enough to attract private investment.
- No policy efforts to encourage utilization in specific areas where potential exists, e.g. baking, brewing

*18. What changes are needed to remove/reduce these barriers to adoption? This section could be used to identify perceived capacity related issues (max 200 words).*

The under utilised potential of finger millet needs to be recognised and the neglect reversed at all levels including closer interaction and connectivity among all key players including national, regional and international scientists involved in blast management (e.g. DFID-RNRRS projects) and the more recently initiated work on cataloguing and exploiting the biodiversity in finger millet in Africa and Asia for developing breeding technologies and improved varieties (e.g. McKnight foundation, USDA and Rockefeller projects).

More specifically, the following opportunities to remove/reduce the barriers to adoption of the outputs to improve the production, utilisation and trade in finger millet have been identified in close consultation and interaction with all the key players involved in the whole production-supply chain:

#### Awareness

- Technical information is available on many aspects, including utilization, nutrition, value-added products. Package and disseminate this information to different stakeholder groups: policy makers, consumers and other potential users e.g. schools, prisons, church groups etc.
- Raise profile of the crop through local media: radio, TV, press. This will improve public awareness of the importance of the crop, and eventually result in more funding for research and extension.
- Spread nutrition awareness by working with Ministries of Health, Education
- Build on and exploit linkages already established, to eventually develop a coalition/platform to promote finger millet. ECARSAM could help increase the profile of the crop, and establish its individual identity, rather than referring to it collectively with pearl millet

#### Production

- Appropriate, low-cost technologies are available to improve production and processing. The Finger Millet Project Coalition partners could act as a conduit to promote these technologies in East Africa
- Examine successful models used for other crops in the region, for (i) quality control system, price/grading standards, (ii) mechanisms to intensify production, e.g. contract farming
- NGOs, community-based and church organizations could provide resources (including staff and local experience) to supplement government extension services
- Facilitate formation of Producer Marketing Groups (PMGs), strengthen existing groups, to increase production and marketing

- Establish collection centers, encourage farmer groups to bulk up produce
- Provide credit through micro-finance institutions, which are available in many areas
- Promote finger millet in non-traditional areas, i.e. outside high-rainfall or cooler zones.

Appropriate high-yielding, disease-resistant varieties are available for multiplication. Seed shortages can be resolved by:

- Promoting alternative models for seed production and delivery, e.g. community based production
- Linking seed producers to the private sector, e.g. seed company contracts small-scale farmers to produce 'certified' seed
- Farmer/Extension staff training and local capacity building on seed production techniques and seed quality control and disease intervention and crop management technologies linked to PMGs/NGOs/CBOs
- Liberalizing the seed sector, particularly for subsistence food crops such as finger millet; harmonizing seed policies across region, e.g. phytosanitary, registration, certification.

#### Marketing and Price Fluctuations

- Use PMGs as the focus for intensified marketing efforts; PMGs can also manage collection centers and disseminate market information to group members
- Agreed price contracts between processors and farmer co-operatives (as noted above)
- Disseminate market information (price, location) through farming radio programs and government extension channels
- Include finger millet in existing market information channels, eg KACE in Kenya, Foodnet in Uganda
- Good business opportunities for the private sector, e.g. demand for value-added (e.g. fortified) finger millet products; high-value niche market for finger millet as an organic product, exported to Europe

Price fluctuations harm both producers and buyers (traders and processors). Fluctuations can be reduced by schemes that will enable farmers to wait until prices rise, not sell immediately at harvest. They can be implemented at PMG level. Options include:

- Micro-finance credit, i.e. loan from a financial institution against stocks
- Inventory credit, where farmers place crop in joint storage and receive credit from an NGO.

#### Policy

- Detailed analyses have been or can be conducted on policy issues; opportunities exist for regional bodies like ECARSAM, ECAPAPA to lobby for favorable legislation
- Influence policy makers to harmonize tax regimes at local and regional levels
- Include finger millet in strategic grain reserves, also in school feeding programs, prisons, food relief
- Review policy on specific products, e.g. use of finger millet in bread, opaque beer
- Establish finger millet committee within ECARSAM, to coordinate and lead promotional and lobbying efforts

Most encouragingly, the Ugandan govt has been very supportive of finger millet production and utilisation recently through a number of initiatives. For example, the Ugandan govt has allocated US\$ 18b for reviving the growth of finger millet and other crops, particularly in the Northern part for the benefit of internally displaced people (The New Vision, Uganda - Web Site, June 2006). Further, US\$ 10b was allocated for the expansion of NAADS to promote and transform the growth of agriculture. And during the finger millet awareness campaign organised by the project coalition in Kampala in Feb 2006, Mr. John Wakikona of NAADS was keen for the finger millet

partnership coalition “to work with the many thousand farmer groups in Uganda for enterprise development”. However, the policy environment for the various initiatives need to work together effectively needs to be created. For example, Eagle Lager Beer uses locally grown millet as a raw material and a tax has been imposed on this and there have been calls on the govt not to impose tax on this beer in the national press (The New Vision, Uganda, June 2006).

**19. What lessons have you learnt about the best ways to get the outputs used by the largest number of poor people? (max 300 words).**

Significant progress has already been made to improve finger millet production and productivity in East Africa through successful blast management strategies. However, several constraints continue to reduce production and utilization. These include labour-intensive weed management, an under-developed seed system, variable grain quality, and an inefficient production-supply chain. Exciting opportunities already exist from progress made with similar problems in other commodities and farming systems in East Africa and South Asia. Technology spill-overs have been a pervasive feature of the history of agricultural development.

Stakeholder connectivity holds the key to improving the production-supply chain and enhance the production and utilisation of finger millet. The two stakeholder workshops in 2005 and 2006 provided ample evidence of this, with enthusiastic participation of a wide range of stakeholders and follow up initiation of fruitful partnerships and new initiatives. For example, lack of connectivity meant the farmers were not aware of the grain quality issues that concern the industry and the industry were not aware of the problems faced by farmers and both these groups were not properly informed of the technological advances (e.g. improved blast resistant varieties) and very little contact and interaction with policy makers to resolve any of the issues.

The lessons learnt by the project coalition for effective up take of the outputs leading to improved finger millet utilisation and production are:

Creating enabling policy environment by lobbying policy makers and providing well researched information to strengthen the case; Working closely with ECARSAM/NARO/NAADS who can play a key role in establishing a distinct identity for finger millet and developing information on production, utilisation and market etc  
Simple and effective varietal release, seed multiplication and dissemination mechanisms; Utilisation of finger millet biodiversity for improved varieties and traits, which can also help in wider adoption/cultivation in new areas; use as fodder and stover  
Closer involvement of the grain processing industry in working with farmers, ensuring proper post-harvest handing to ensure grain quality  
Promotion of partnerships among stakeholders including developing a partnership with the middlemen/traders through training, awareness, technical./financial support, capacity building of service providers and consumer awareness campaigns.

Some of the critical issues in this process are:

The farmers need to be organized into Producer Marketing Groups (PMGs) closely linked to local NGOs/CBOs and national service providers. Farmers working in the PMGs pool their produce and sell collectively in order to increase their bargaining power and selling price. The capacity of the PMGs in business management practices

and quality control can then be built through group training. In addition, rapid promotion of improved varieties and technology innovations among farmers is facilitated by group organization. Enhancing consumer awareness and product diversification as currently, finger millet processors restrict the product range to pure finger millet flour and composite flour mixes for porridge. One processor produces an instant beer mix containing finger millet. However there are proven opportunities to diversify finger millet products further. For example, in South Asia, various demand-led research activities have explored potential markets for new value-added products such as bread, cookies, cakes and biscuits. In the Pokara Valley, Nepal, new value-added products are becoming popular while in Tamil Nadu, India, a range of finger millet-based biscuits and snacks are in great demand. This could be further strengthened by expanding export markets. The high digestibility, high mineral (Ca, Fe) content, and gluten-free characteristics of finger millet flour have particular potential in the development of health foods, especially for diabetics and people with gluten intolerance. Currently, few processors and millers in East Africa export finger millet flour. Those that do so, export a few tonnes only each year (e.g. Family Diet and Maganjo Grain Millers). The opening of an export market for finger millet to Europe, USA and elsewhere would greatly stimulate growth in the finger millet sector in East Africa to the benefit of all key stakeholders.

Linkages established with AT-Uganda, SG-2000 and TechnoServe as well as NAADS will help in utilising the network of farmer groups as well for developing producer marketing groups and market access mechanisms. Interactions with the DFID-CPHP programme during the research showcase were very useful for future development of the knowledge and the framework essential for addressing these critical issues. This is an excellent opportunity to utilise and build on the tools, manuals and resources developed by CPP and CPHP programmes based on groundnut, potato, beans, maize and other commodities providing cross-project and -programme perspectives in future activities on finger millet as well as the farming systems in East Africa.

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## **Impacts On Poverty**

### **E. Impacts on poverty to date**

*20. Where have impact studies on poverty in relation to this output or cluster of outputs taken place? This should include any formal poverty impact studies (and it is appreciated that these will not be commonplace) and any less formal studies including any poverty mapping-type or monitoring work which allow for some analysis on impact on poverty to be made. Details of any cost-benefit analyses may also be detailed at this point. Please list studies here.*

Socio-economic analyses and PRA work were carried out within the Kisii, Gucha, Busia and Teso districts in Kenya and Kaberamaido, Katakwi and Soroti districts in Uganda, where the validation and promotion work was carried out. Further, stakeholder workshops involving a wide range of sectors were organised in Nairobi and Kampala. Representatives of wider stakeholder communities (e.g. Ms. Peninnah Nsiko, Leader, Kampala Farmers Association; Ms. Nakibuka Joyce, Luweero Women Farmer's Association, Uganda) have participated in the workshops at Nairobi and Kampala, which provided the opportunities for wider consultations/discussion of livelihood issues and dissemination of outputs. Focused consultations with representatives of farmer groups and industry were conducted locally prior to the workshops and these issues were discussed at the workshop facilitated by the socio-economist who lead the farmer/industry interactions. Other stakeholders included national research and extension services from Kenya, Tanzania and Uganda, farmers, millers and processors, universities, international agricultural research centres, NGOs and development investors (e.g. Dr. Maggie Kigozi,

Executive Director, Uganda Investment Authority). The participation of the Eastern and Central Africa Regional Sorghum and Millet Network (ECARSAM) provided a regional perspective. The stakeholder community was further expanded with actors from produce marketing organizations, micro-credit schemes, venture capital funds, health and education sectors, policy makers and the media in discussing, documenting the constraints, opportunities and dissemination of information on disease intervention/crop management technologies. The available information could be used in an *ex ante* impact assessment of the contribution of expected growth in the finger millet sector in East Africa on reducing poverty and enhancing national and regional economic growth.

21. *Based on the evidence in the studies listed above, for each country detail how the poor have benefited from the application and/or adoption of the output(s) (max. 500 words):*

- *What positive impacts on livelihoods have been recorded and over what time period have these impacts been observed? These impacts should be recorded against the capital assets (human, social, natural, physical and, financial) of the livelihoods framework;*
- *For whom i.e. which type of person (gender, poverty group (see glossary for definitions) has there been a positive impact;*
- *Indicate the number of people who have realised a positive impact on their livelihood;*
- *Using whatever appropriate indicator was used detail what was the average percentage increase recorded*

Promotion of blast disease and crop management technologies took place in the small holder rainfed farming systems in Western districts in Kenya and North East districts in Uganda. Both men and women farmers were among the farmer group representatives who took part in mother and baby trials. Finger millet seed is usually broadcast sown and as wild millet is the dominant weed that grows very commonly, early weeding is very difficult. In addition, broadcast plantings are impossible to weed with machinery or even a hoe. Hand-weeding is labour-intensive and time-consuming. In Kenya and Uganda, broadcast and row-planting trials were compared at key project sites. Interest in row-planting is already growing among women farmers and reduces drudgery as such plots can be hoed in much less time than that needed to hand-weed the broadcast plots. In Busia and Kisii, some farmers have adopted row-planting to reduce the drudgery of weeding. Wider adoption of row-planting will also open the opportunity to spill-in the successful draught animal weeding methods developed in the Ugandan Teso system through RNRRS. An added benefit of finger millet in crop-livestock systems such as the Teso system is its highly digestible residues in comparison to sorghum and pearl millet residues. Furthermore, recent studies in Northern Ireland on the potential of finger millet as a forage crop have shown the benefits of water-absorbing, pelleted seed currently being tested in East Africa for adaptation to local farming systems.

Grain processing industry in Uganda have started working with the farmers through a farmer co-operative model which increases the support to farmers in terms of seeds/finance and also a guaranteed income with the buy-back. The possibility to further extend this model for the distribution of finger millet through the UN food aid programmes to displaced people. From the information gathered to date, further uptake and up-scaling of the cluster of finger millet production and utilization outputs described above is highly likely to contribute measurable livelihood impacts on poor, female and male small-holder farmers and their families in East Africa.

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## ***Environmental Impact***

## H. **Environmental impact**

24. *What are the direct and indirect environmental benefits related to the output(s) and their outcome(s)? (max 300 words)*

*This could include direct benefits from the application of the technology or policy action with local governments or multinational agencies to create environmentally sound policies or programmes. Any supporting and appropriate evidence can be provided in the form of an annex.*

Most of the technologies are components of the currently followed integrated pest and crop management (IPCM) programmes in other crops such as use of improved varieties, clean seed systems, row planting and the potential use of draught animal power, post-harvest grain quality, use of fodder are generally likely to be of benefit to the environment. The same IPCM programmes have passed environmental risk scrutiny in past projects.

25. *Are there any adverse environmental impacts related to the output(s) and their outcome(s)? (max 100 words)*

None anticipated as most of the technologies are components of the currently followed integrated pest and crop management (IPCM) programmes in other crops.

26. *Do the outputs increase the capacity of poor people to cope with the effects of climate change, reduce the risks of natural disasters and increase their resilience? (max 200 words)*

Yes, adoption of current outputs leading to improved finger millet production and utilisation will contribute to the well being of poor people and increase their resilience in general. Finger millet is nutritionally important particularly for young, elderly, weak and immuno-compromised and to reduce the health risks. The grains store well and for long periods and finger millet is considered as a famine reserve food. Currently a new initiative is being discussed with UN agencies to set up a system for distribution of finger millet to displaced people. Further, up-scaling and wider adoption of current outputs will link into, inform and direct recently initiated efforts towards utilising finger millet biodiversity for resistance to biotic and abiotic stresses which are likely to develop improved varieties that could tolerate adverse climatic conditions.

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## **Annex**

### **One World Radio Africa**

*Click below to view the related information ....*

[PF\\_CPP13\\_Annex.pdf](#)

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