New sweet potato technologies make more the merrier

RIU

Validated RNRRS Output.

A programme designed to help farmers make the most of surplus production has identified 20 local and 300 potential global markets for fresh sweet potato grown in Kenya, Rwanda, Tanzania and Uganda. More than 2000 farmers were able to access new markets and cut their on-farm post-harvest losses by 20-30%. Previously, these farmers were unable to appreciate the benefits of new, high-yielding varieties that produce three times as much as the former ones. The programme promoted a range of orange-fleshed sweet potato-based products. At the industrial scale, at least three private firms now absorb over 80 MT of dried sweet potato chips per month.

Project Ref: **CPH44:**
Topic: **5. Rural Development Boosters: Improved Marketing, Processing & Storage**
Lead Organisation: **PRAPACE, Uganda**
Source: **Crop Post Harvest Programme**

Document Contents:

Description

CPH44

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

Geographical regions included:

Congo DR, Kenya, Rwanda, Tanzania, Uganda,

Target Audiences for this content:

Crop farmers, Processors,

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.

Sweetpotato technologies for food, markets and renewable energy

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

- Crop Post Harvest (CPHP) programme was the major source of funds.
- The Regional Network for the Improvement of Potato and Sweetpotato in Eastern and Central Africa (PRAPACE) contributed funds.
- Horticultural Strategic Intervention Programme, Uganda contributed funds
- NARO contributed in-kind contribution.

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.

- PROJECT No. **R8273, ZB0342**: Improving the livelihoods of small-scale sweet potato farmers in Central Uganda through a crop post harvest-based innovation system

The above-named project was implemented by a range of partners in the science community, government, private sector and civil society. The partners formed a coalition that productively worked together under the management of the regional network-PRAPACE.

The coalition of comprised the following partners

Managing Partner	The Regional Network for the Improvement of Potatoes and Sweetpotato in Eastern and Central Africa (PRAPACE) Contact: Dr. Berga Lemaga P.O. Box 22274 Kampala- Uganda. Office tel. +256-41-286209, mob :+256-772-696808 Fax. +256-41-286947 E-mail: berga@prapace.co.ug

Core Partners

1. Buganda Cultural and Development Foundation (BUCADEF)

Contact

Mr. Kyewalabye Male
P.O Box, 34071,Kampala- Uganda.
Tel: 256 41 271870
Fax + 256(0) 41344169
Email: bucadef@infocom.co.ug

2.BUCADEF and associated Farmer groups in Luweero,

Contact

Mr. Ssetyabula Rajab
P.O.Box 34071, Kampala- Uganda.
Personal Tel: 256 (0) 77 549332,
Office Tel. +256(0)41271870,
Fax +256(0)41344169,
Email: bucadef@infocom.co.ug

3. Namulonge Agricultural and Animal production Research Institute (NAARI):

Contact

Dr. Robert Mwanga
P.O Box, 7084, Kampala- Uganda,
Tel. +256 77 2825725
e-mail: naari@afsat.com

4. Kawanda Agricultural Research Institute (KARI)

Contact

Constance Owori
P.O Box, 7084, Kawanda- Uganda
Tel. +256 77 2663690
e-mail: oworiconstance@hotmail.com

5. International Potato Center (CIP)

Contact

Dr. Regina Kapinga
P.O. Box 22274 Kampala- Uganda.
Office tel. +256-41-287571, mob :+256-772-563217
Fax. +256-41-287538
E-mail: R. Kapinga@CGIAR.ORG

6. FOODNET (A regional agricultural research network focusing on market-oriented research)

Contact

Mr. Jjagwe John
P.O Box 7878 Kampala- Uganda
Tel: 256 41 223460,
Fax 256 41 223459,
Email: *foodnet@imul.com*

7. Horticultural Exporters Association of Uganda (HORTEXA)

Contact

Mr D. Lule
P.O Box 29392, Kampala-Uganda
Tel: +256 77 419357, Fax: +256 78 2214202
e-mail: hortexa@yahoo.com

8. Food Science and Technology Research Institute:

Contact

Dr William Sali
P.O Box 7852 Kawanda-Uganda
Tel.: +256 41 566844

9. Maganjo Millers

Contact

Ms Mary Tamale
Tel: +256 41 567935/566394,
Fax:+ 256 41 566394/567097

10. The Royal Institute of Business and Technology

Contact

Ms Leticia Nakimuli
P.O Box 29599, Kampala-Uganda
Tel +256 77 2760853

11. Department of Food Science & Technology

Contact

Dr. Agnes Namutebi
Makerere University, Department of Food Science & Technology
P.O. Box 7062, Kampala- Uganda
Tel: +256-71 2958736
Email: asnamutebi@agric.mak.ac.ug

12. Tonet Enterprises

Contact

	Mr. Joseph Kavuma Kalerwe Gayaza Road P.O. Box 3163, Kampala, Uganda Tel: +256-77 2413754 e-mail: kalerwe@yahoo.com

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.*

Project **R8273** was a follow-up of project R8040 that was successful in alleviating food insecurity but paved way for another set of constraints namely; surpluses in production as improved varieties often produced about three times more than the traditional ones, and post-harvest losses topping >25%. Farmers, therefore, according to Uganda's Plan for Modernisation of Agriculture (PMA) experienced only modest rates of poverty reduction, as they failed to capture the potential gains due to limited market access.

The project was implemented between 1st January 2003 and 31st December 2004. The purpose was to promote the adoption of CPHP, PRAPACE and CIP outputs in a manner that (i) improves rural producers' access to markets (ii) improves employment opportunities for the resource poor and (iii) culminates into an institutional framework for stakeholders to sustain links to markets, sources of knowledge and technologies.

Twenty local and 300 potential global markets were identified for fresh sweetpotato and >2000 farmers linked to the new markets that required over 80 MT of fresh roots per month, mostly for export. Export markets have since 2003 absorbed at least 1,000 MT of three varieties that also are grown in Kenya, Rwanda, Tanzania and Uganda.

Five methods and systems of processing sweetpotato into flour and **weaning food** for the resource poor and several **sweetpotato flour-based recipes** were adaptively tested and disseminated in both rural and urban areas, particularly in areas where the private sector is capable of absorbing large quantities of sweetpotato.

At rural level, Community-based Organizations are producing and marketing a range of **orange-fleshed sweetpotato-based products**.

At the industrial scale, at least three medium to large-scale private firms are already demanding over 80 MT of **dried sweetpotato chips** per month (mainly orange-fleshed) and a number of the recipes as a basis for their commercial products. This translates to monthly supply of over 240 MT of fresh sweetpotato. The companies are **UGACHICK FEEDS LTD** that process animal and poultry feeds, **MAGANJO MILLERS LTD and KASAWO MILLERS** that process packaged foods and confectionery for humans. However, the demand of UGACHICK has not yet been met.

Over 2,000 farmers were also sensitized and trained on four on-farm post-harvest loss mitigation technologies that reduced losses from 30 to 20%.

The coalition finally evolved into a national **umbrella/apex** institution called (**Uganda Sweetpotato Development Association**) that mobilizes stakeholders in the sector for collective action and prepares members for facing livelihood challenges.

5. What is the type of output(s) being described here?
Please tick one or more of the following options.

Product	***Technology***	***Service***	***Process or Methodology***	***Policy***	***Other Please specify***
X	*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

Sweetpotato is the focal crop. However, the generated outputs could well be relevant to other major Eastern and Central African staples notably potato, bananas and cassava that are also vegetatively propagated.

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

Semi-Arid	***High potential***	***Hillsides***	***Forest-Agriculture***	***Peri-urban***	***Land water***	***Tropical moist forest***	***Cross-cutting***
X	*X*	*X*		*X*		*X*	*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

Smallholder rainfed humid	***Irrigated***	***Wetland rice based***	***Smallholder rainfed highland***	***Smallholder rainfed dry/cold***	***Dualistic***	***Coastal artisanal fishing***
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**).*

Though past validation phases successfully identified a significant number of markets and efforts were also made to link producers to markets, the producers have not effectively responded to the market. This was mainly because of the illusion that farmers had that processed products result in very high profits. However, production of fresh roots and vines was very profitable. The failure of processed products to result in good economic returns could be attributed to a range of institutional, marketing and policy constraints.

To overcome these constraints, the Uganda Sweetpotato Development Association (USPDA) that evolved out

CPHP experiences could do the following.
In the short-run motivate discouraged producers by strengthening available market linkages in a way that harnesses broadened partnerships that are geared to generating benefits for putting back into the partnership. This could involve: (1) enhancing smallholder farmer's capacity for collaborative bargaining (**R7502, 6306, 8182, 8271, 8431, 8418, 8275, 8498, 8421 and 8274**), (2) encouraging private entrepreneur investment in value addition, including for feed (**R7520, 8113, 8114, 6769, 6507 and 7498**), (3) encouraging formulation of favourable policies and harmonization of standards (**R7493, 8270, 8433, 8366 and 8272**), (4) Increasing awareness and information dissemination (**ZB0380 and R8402**), (5) improving market efficiency (**R8422, 7151, 8250 and 7494**) and (6) improving productivity through quality vine production with private sector (**R8303, 8278 and 8302**).

In the long-run, develop innovative ways of creating a lasting local market that is capable of absorbing large quantities of sweetpotato and other agricultural produce via orienting research towards the use sweetpotato for food, feed and energy. Increasing attention should be given to transforming starchy and oily crops into Bio-fuels to meet the region's increasing energy requirements**. (R6087, 6504, 7418, 8268, some of the RNRRS-forestry outputs together with others generated in particularly in Tanzania, Malawi and India).**

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)**.*

The project identified marketing systems, adding value, and reducing storage losses as the priority areas for increasing market access for rural sweetpotato producers in Uganda. The approach used was one that promotes the use of CPHP and PRAPACE outputs while at the same time developing an innovation system to sustain the access to markets and help farmers to have access to sources of new knowledge and technologies. These areas were addressed as follows:

Marketing systems: by developing ways of linking rural producers directly with stable local, regional and global markets through: (i) A network of Boarding Schools, medium-scale food-processors and exporters to which produce/products from the rural producer/ agro processor groups would be marketed (ii) enhancing stakeholders' capacity to set up viable rural agri-business firms (iii) establishing and promoting contract farming arrangements between small holders and agri-business firms (iv) collaborating with FOODNET a regional market information provider in setting up a supply/markets information database that is readily accessible and user friendly to all stakeholders in the sector. Moreover, with regard to linking rural SP producers to markets for fresh roots, the project drew lessons from the outputs of R7478.

Value addition: was promoted mainly through the formation (through the NGO BUCADEF) of groups of rural based processors targeting mainly rural youth, female-headed and child-headed households so as to target gender, poverty and HIV/AIDS. Much attention was also given to enhancing the post-harvest capacity of such producer groups and that of food processors through empowering and training them in SP value addition and enterprise development using outputs from (R7497, R7036) and some of PRAPACE's outputs particularly technologies for production of quality SP chips and flour, bringing into the partnership machine fabricators village artisans. The objective was to develop products (initially pro-Vitamin-A enriched) for rural consumption, schools and large scale processors.

The development of an innovation system: was through:

a. Formation of standing partnership organs (particularly committees) with negotiated process for interaction between the rural producer and processor groups and the other members of the partnership. This entailed activities such as formation of a work team interest group with a common vision, strategy and objectives. The project particularly aimed at empowering the rural groups to participate in the partnership through training in group formation and partnership dynamics as well as facilitating them to access credit and to tap into development resources available from publicly-funded programmes.
b. Fostering the formation of *"Nutrition and Crop-post harvest student clubs"* The groups were initially to be formed within the network of schools that had been linked to the SP producer and processor groups. The clubs would then be involved in the promotion of the consumption of SP and SP products and in the process get exposed storage and value addition technologies.
c. A network of researchers (local, regional, international) who were to (i) adapt and validate CPHP and PRAPACE knowledge and outputs (ii) train farmer advisors and the user groups (iii) undertake additional research (iv) derive lessons for up-scaling from emerging partnerships.
d. A local NGO to mobilise, sensitise, train facilitate groups in the partnership

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)****.*

o The project outputs were validated during January 2003 and December 2004 in three districts of central Uganda namely; Luwero, Wakiso and Mpigi Districts that lie 1,000 – 1,300 m.a.s.l, under rain-fed farming systems [smallholder rainfed, both humid and semi-arid systems] in agro-ecological environments in which forest or trees plus tall grass would be the natural climax vegetation [High potential + Forest agriculture]. Targeted groups comprised:

- Poor rural producers of SP to benefit from the increasing access to markets and from the linkages with research. The project targeted women producer and market groups to enhance the balance of the benefits from increased access to markets between men and women. It was anticipated the improvement in market access would contribute to the attainment of the PMA objective of transformation farmers from subsistence to commercial agriculture.
- Resource poor youth, female headed households and HIV/AIDS victim child-headed households who do not

produce SP would benefit through the rural SP processing groups. Women would benefit more than men because of the deliberate targeting.

- The project was initially based on the new pro-Vitamin A rich SP varieties. So consumers – particularly school children – would benefit from the more nutritious SP and SP-products (men and women would benefit equally)
- Local artisans would benefit from the increased demand for maintenance of SP processing machines. (men were expected to directly benefit more than women)
- The school clubs targeted rural communities for their activities so poor farmers in these communities would benefit from the new knowledge (clubs targeted mainly women and the youth farmers)
- Waged labourers employed by the large food processors and processing machine manufacturers would benefit from enhanced job security created by the increased work that would become available (men expected to benefit directly more than women).

Current Situation

C. Current situation

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

- The project culminated into Uganda Sweetpotato Development Association (USPDA) that is an operational apex institutional framework for stakeholders country-wide. USPDA is a recognized Ugandan Non-Profit Company Limited by Guarantee that was registered in 2005 under the certificate number 74956. USPDA is a consortium of 43 farmer groups, 5 agricultural researchers' institutions, 10 processors of agricultural produce and 5 trading firms that strive to use outputs of agricultural and industrial research to improve the livelihoods of its members while conserving the natural resource base.
- The five methods and systems of processing sweetpotato chips and flour are used by at least five rural CBOs and at industrial level, by at least three medium to large-scale private firms. At rural level, the CBOs use the outputs to process dried chips and flour that they market to urban food processors.
- Nine varieties that are suitable for export are increasingly the basis of Uganda's sweetpotato exports mainly by one farmers association called Horticultural Exporters' association (HORTEXA), a member of USPDA.
- Buganda Royal Institute for Business and Technical Education adopted document sweetpotato recipes as a basis for training over 100 catering students. The institute also has a nutritional club where students learn about sweetpotato from production to consumption.
- One company that belongs to Buganda kingdom is collaborating with the Kingdom's biggest university in an effort to start using sweetpotato for bio-ethanol production

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).***

Collaboration with PRAPACE has enabled rapid dissemination of the project's researched results to many other end users not only in Uganda, but also in other PRAPACE member countries as follows;

1. Mainly in Central Uganda where the Buganda Cultural and Development Foundation (BUCADEF) has sensitized and trained at least 25 potential end-users both at rural and industrial levels in urban centres.

2. In Western Kenya, mainly by a number of CBOs that are using OFSP to develop commercial products.
3. In Rwanda, mainly making use value addition outputs.
4. In the Democratic Republic of Congo, mainly making use of fresh roots storage technologies.
5. In North Western Tanzania disseminating OFSP and export varieties are used.

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

- In Uganda, 1000 copies of a manual on SP production and marketing were published in English and a local language (Luganda). These were all within the project's lifetime distributed in all sweetpotato growing areas of Uganda, North-western Tanzania and Western Kenya
- Several sweetpotato-based recipes that were adapted and validated within the project's life time were compiled in PRAPACE's book of recipes from East and central Africa. This documentation is available for wider use in the region.
- Five workshops and many demonstrations were carried out, and two video documentaries on SP technologies were broadcast world-wide on BBC-TV.
- The project's activities were presented at various workshops, meetings, and seminars in addition to being reported upon in all PRAPACE's reports
- The outputs were also made available through a website (http://www. Sweetpotato coalition.org) that the project opened up and through PRAPACE's official website (http:// www.asareca.org). PRAPACE helped much in maintaining the website.

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).***

- Networking with the regional network PRAPACE facilitated mutual learning and dissemination of the project outputs and hence provided a unique opportunity for accelerated scaling up among its 10 member countries. PRAPACE's significance to the consortium is best underscored by the role it plays regionally to add value to what is being done nationally by the various institutions of the member countries.
- Government policy on agriculture emphasizing commercialization of this sector was very instrumental for at one time, funds were even secure from the National Agricultural Research Organization (NARO) to assist in promoting the project's outputs.
- Donor support in favour of technology transfer. There are apparent concerns that a lot of technologies have been developed but are shelved, thus leading to increased donor interest in dissemination and adoption studies to facilitate and enhance technology transfer, fortunately this agrees with our scaling-up and scaling-out vision.
- Use of an institution that is preferred and respected by the target people can be of strategic importance. In this case use of the Buganda (located in Central Uganda and with a population of over six million) monarchy's institutions as the principal mover of the technology transfer project was very effective in transferring research outputs. The successful and cherished centuries-old traditional/cultural practices and traits of traditional community mobilization and developmental guidance were much exploited in formulating the project's implementation. The '**Royal Reward System'** whereby excellent performers, in recognition of exemplary performance towards blending of culture with modern Science and technology (individuals or groups/

communities), are appropriately honoured, was also a major implementation strategy that bore fruit.
- Prioritizing broadening and strengthening partnerships (right from project planning, technology development through marketing and utilization) particularly with the private sector helped us create room to harness the nexus of opportunities and resources offered by the rich mix of partners. In the process because the partners share synergies, scarce resources are more effectively used to impact more people's lives.

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).***

Currently, due to restricted funding, the USPDA collaborates with PRAPACE, the "Participatory Market Chain Analysis (PMCA) project and Buganda Royal Institute for Business and Technical Education (BRIBTE) to promote the outputs mainly to potential end-users in Central Uganda. Leaflets and posters are the major channel and these are distributed to farmers and scientists and students/school children mainly in Buganda Kingdom's academic institutions.

*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)**.*

The following have been enumerated as the key processing constraints in the sweetpotato sub-sector:

- **Lack of strong farmer groups/associations:** This has resulted in the small-scale farmers who are the major producers of sweetpotato operating individually.
- **Limited flow of information:** Its on the prevailing market prices, expected market volumes, specifications and market opportunities known to farmers at planting and harvesting of the crop.
- **Lack of awareness of the SP products**: Potential end-users of processing technologies and knowledge are not aware of their existence.
- **Lack of standards**: The sub-sector is lacking both production and marketing standards, causing unfair trade practices in most markets.
- **Inadequate financial intermediaries:** Inadequate financial resources coupled with the prevailing high commercial banks interest rates.
- **Low-level of product development**: For example, virtually 95% of the sweetpotato produced in the project is freshly consumed.
- **Insufficient and poor storage facilities:** Poor storage facilities have undermined faster bulking and consolidation.
- **Poor road network infrastructure:** Poor transport networks, limited communication infrastructure and networking amongst the key participants in the supply chain.
- **High costs of electricity and inefficient utility service providers**: Due to high electricity charges and

irregular power supply, processors use wood or charcoal fuel for frying, thus leading to poor quality products and high losses.

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).***

There could be two strategies for mitigation.

First ***in the short run,*** *there is urgent need to* motivate discouraged producers by strengthening available market linkages in a way that harnesses broadened partnerships that are geared to generating benefits for putting back into the partnership to address the barriers and for mutuality. This can be achieved in the following ways; (i) Market promotion, (ii) Micro-enterprises development in urban and rural communities to transform sweetpotato into value-added products for expanded markets, (iii) Adoption and impact assessment studies of the disseminated outputs to facilitate better planning for future technology deployment, (iv) Equity in R&D endeavour, (v) Broadening and strengthening partnerships, (vi) Seed/planting material production, (vii) Capacity building, (viii) Awareness campaigns, and Policies, on use of sweetpotato products in the local industries, on tax and harmonization of seed policy on variety release and dissemination.
Second, **In the long-run**, develop innovative ways of creating a lasting local market that is capable of absorbing large quantities of sweetpotato and other agricultural produce via orienting research towards the use sweetpotato for food, feed and energy. Increasing attention should be given to transforming starchy and oily crops into Bio-fuels to meet the region's increasing energy requirements.

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).***

- Use of an institution that is loved and respected by the target people can be of strategic importance. Use of the Buganda (over six million) monarchy's institutions as the principal mover of the technology transfer project was very effective in transferring research outputs.
- Broadening and strengthening partnerships (right from project planning, technology development through marketing and utilization) particularly with the private sector should be priority for this creates room to harness the nexus of opportunities and resources offered by the rich mix of partners. Networking with the regional network PRAPACE facilitated mutual learning and dissemination of the project outputs, hence provided a unique opportunity for accelerated scaling up among its 10 member countries.
- Farmer-to-farmers technology transfer is a very effective means of technology dissemination.
- Increasing awareness to partnership and linkage with stakeholders including NPPs outputs as in a strategic position to join efforts and expertise to make better impacts in a short time with existing capacities of implementing agencies.
- Donor support in favour of technology transfer. There are apparent concerns that a lot of technologies have been developed but are shelved leading to increased donor interest.
- A growing urban market for French fries and crisps. There is a very good opportunity for the development of the potato sector.
- The promotion of orange-fleshed sweetpotato as a dietary source of ß-carotene, a precursor to vitamin A is a very important opportunity for the sub-sector.
- Micro-enterprises in urban and rural communities are coming up that will transform sweetpotato into value-

added products for expanded markets, promoting partnership in sub-sector.
- Regionalization. The network looks forward to take advantage of regional integration arrangements such as the East African Community.
- Willingness of staff scientists of implementing institutions in member countries to participate in PRAPACE R & D activities.

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.

- To better plan for future technology deployment, two Participatory Rural Appraisals (PRA) and formal surveys were carried out in the eight target districts of central Uganda (Luwero, Kiboga, Masaka, Mubende, Mukono, Mpigi, Rakai and Wakiso). The studies were to assess adoption of the intervening technologies and their impact on the livelihoods of rural smallholder sweetpotato producers and medium-scale food processors to an extent. The two PRAs/surveys were;

- Ahabwe G., Kyewalabye M., Berga L., Nsumba J., 2003. **Adoption and impact study assessment of efforts by BUCADEF to disseminate improved sweetpotato varieties in central** Uganda. A report of a survey that was carried out at the end of PROJECT No. **R8040/ZA0483**: RAPID MULTIPLICATION AND DISSEMINATION OF SWEETPOTATO VARIETIES WITH HIGH YIELD AND ß-CAORTENE CONTENT in 2003 by BUCADEF's field staff under the supervision of one subject matter specialist.
- Tindiwensi K.C., Berga L., Nsumba J., 2005: **Cost benefit analysis of sweetpotato on farm enterprises in central Uganda**: A report of a survey that was carried out in 2005 by a hired consultant at the end of PROJECT No. **R8273, ZB0342**: IMPROVING THE LIVELIHOODS OF SMALL-SCALE SWEET POTATO FARMERS IN CENTRAL UGANDA THROUGH A CROP POST HARVEST-BASED INNOVATION SYSTEM. This study was commissioned after realizing a number of gaps with regard to the economic viability of enterprises that had been promoted by previous interventions.

Among major findings:

- In 50% of the target districts of Luwero, Kiboga, Rakai and Mubende, sampled farmers experienced low rates of poverty reduction compared to farmers in Wakiso, Mpigi, Mukono and Masaka due to poor market access in the former districts, as they are off the road.
  - Snacks are viable with a low start up capital and farmers can do this as a separate on farm enterprise.
  - Juice processing is viable when combined with sale of roots. The profitability margin and net income levels however are lower than when a farmer sells fresh roots alone. Farmers are therefore better off selling fresh roots combined with vines.

- Production of juice and sweetpotato chips were for example found to be not viable as separate enterprises. Chips combined with fresh roots was viable in the long term but with poor margins. Farmers should avoid long term enterprises because of the high start up capital
- Flour whether from purchased or homegrown roots is viable in the long term with good margins
- Flour from purchased roots has better indicator levels than from homegrown roots
- Snacks are profitable and suitable for small scale processors because of the low start up capital
- The production of fresh roots is financially viable even when the farmers incur costs of buying the land
- All technologies perform better when land is hired instead of buying
- Indicators for the export market are better than for the local market
- Juice production is not viable as a separate enterprise
- Juice combined with fresh roots is viable but with reduced indicator levels compared to fresh roots
- Chips alone is not viable both in the short term and long term
- Chips combined with fresh roots is viable in the long term but with poor margins
- Flour whether from purchased or homegrown roots is viable in the long term with good margins
- Flour from purchased roots has better indicator levels than from homegrown roots
- Snacks are profitable and suitable for small scale processors because of the low start up capital
- Farmers should avoid long term enterprises because of the high start up capital

- **At national level in Uganda**, a three-phased sub-sector systems analysis of the sweetpotato sector was carried out drawing upon a range of both secondary and primary sources. The study; **Sweetpotato sub-sector market survey in Uganda (by** Kelly W., Luwandagga D., Berga L., Nsumba J., 2003) used Holmatz's approach and focused on both demand and supply covering the major production and marketing sites in the country. It sought to understand the structure and performance of sweetpotato markets in Uganda and also to identify constraints and opportunities for commercialisation of sweetpotato against a background of trade liberalization, poverty alleviation, food insecurity and trade competitiveness.
- Namutebi A., Berga L., Nsumba J., 2003: **Investigating the potential of sea freighting sweetpotato from East Africa**. A technical report handed to the sweetpotato coalition project.
- At regional level in together with PRAPACE and ECAPAPA (two networks of ASARECA), a review of sub-sector status, constraints, opportunities and investment priorities was carried out for potato and sweetpotato: Released in March 2005, this is an executive report of the potato and sweetpotato sub-sector study conducted in Ethiopia, Kenya, Rwanda and Uganda, major potato and sweetpotato producing countries in the ASARECA region. The analysis had as overall objective to identify obstacles, opportunities and the way forward for increased efficiency and competitiveness of the two sub-sectors. In conceptualizing and commissioning the study, ECAPAPA and PRAPACE worked closely together to identify a Resource Person who in turn was able to work with a team of experts drawn from within the PRAPACE network and the broader commodity sub-sectors. The study approach utilized the ECAPAPA Policy Change Cycle model. ECAPAPA is an ASARECA

network focusing on policy matters.

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*

A. Sweetpotato varieties for export

Improved incomes, lifestyle and a shift towards commercialization: Male-dominated export markets fetched the farmer about twice the income derived by selling to local markets. From four of the target districts, over 350 metric tons of sweetpotato worth about UK£ 178,000 were exported in 2003 and since then, export volumes have on average been increasing by 14% per year fetching the national treasury over UK£ 20,000/year

B. Post-harvest technologies and value-added sweetpotato products.

Although at the moment value-added products and processing technologies are steadily emerging, smallholder producers have not yet felt much impact as these tended to reward less than what particularly farmers expected.

Improved food security: On-farm post-harvest losses were in many cases seen to fall from 30 to 20% through storage of fresh roots in pits for 2 months. Based on Uganda's per capita-consumption of 82.5 kg/year, it is estimated that the amount of food saved through this reduction in loss can feed three families of 10 for two months thus potentially enabling them to go through two thirds of June-August dry season.

Improved household incomes: There is a gradually changing status of sweetpotato from subsistence to a commercial commodity thus creating earnings.

At rural level, two predominantly women CBOs reported dodging extremely low prices at time of glut through production of chips and flour that they sold to millers. They were poised to lose crops worth UK£ 6,250 but through conversion to chips that they sold to a poultry-feeds mill managed a 32% recovery.

Chips/flour processing however requires heavy start up capital of over UK£ 550.

"Bajjabasaaga", one of the above-named CBOs that has 60 members (43 women and 17 men) generates on average UK£ 150/month as profit through the production and successful marketing of sweetpotato juice and snacks to five rural schools Luweero district. Last year, business grew by 3%).

Under some special government scheme (NAADS) the CBO has been contracted as a service provider with regard to disseminating value addition to agricultural produce.

Import substitution and rural industrialization

At the industrial scale mainly two private firms have since 2001 been using OFSP and a number of recipes as a basis for their commercial brands.

The medium-scale food processing company "MAGANJO" in Kampala annually saves over UK£ 145,000 by using sweetpotato flour particularly that the OFSP type to substitute wheat flour for its commercial bakery

products. The company buys about one ton of dried sweetpotato chips per month, creating monthly demand for 3.4 tons kg of fresh sweetpotato, A famous "Nutri-Porridge is also obtained. However since 2003, Maganjo's usage of sweetpotato is sharply declining its demand is not fully met.

UGACHICK is another commercial firm that picked great interest to use sweetpotato as a major ingredient for its commercial brands that have markets in Uganda, Rwanda, D.R. Congo and Tanzania. Whenever supply permits, the company includes 15% orange-fleshed sweetpotato to mitigate shortcomings associated with maize and to improve the nutritional quality of its products especially eggs. UGACHICK requires over 80 metric tons of dried sweetpotato per month, which demand has not been met yet.

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.

Positive impacts

i. The transformation of sweetpotato into an income generating activity might lead farmers who have limited land to adopt better natural resource management practices to enhance productivity
ii. Creation of income generation opportunities for the youth may move them away from activities that damage the environment like dealing in firewood from public land and brick making

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

Potential Negative impacts

i. Sweetpotato is often (especially during dry weather/offseason) grown in areas where inadequate drainage, steeply sloping lands, population pressure and other social and physical factors raise the potential for environmental problems. The project might exacerbate this.
ii. Increased demand for sweetpotato might cause forest clearing

Sweetpotato is increasingly becoming a fallback source of carbohydrate for especially cash-strapped urban dwellers in East Africa where what have been major food staples bananas and cassava, are succumbing to disease epidemics. To ensure year-round supply of the crop in urban areas, sweetpotato is often produced on wetlands that urbanization is subjecting to increasing levels of pollution from Industrial and domestic effluents

- Encroachment on wetlands
- Health hazards of deep fried products (junk food)
- Health hazards of storage roots produced on polluted grounds
- Cross border movement of diseases and pests
- Soil erosion due to production in sloping lands

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. Poor people turn to sweet potato when climate change or natural disasters occur because it is has the capacity to yield large amounts of food from a small amount of land and within a short time (3 mths; faster than most other staple food crops). Sweet potato is also very resilient in the face of erratic rainfall because of its indeterminate growth, unlike, e.g., maize. Thus, NGOs have begun to provide sweet potato planting material for refugees. Under such circumstances, improved crop and postharvest management practices can provide the difference between a successful harvest and crop failure.

The long-term bio-fuels related outputs have even greater potential to increase poor peoples' capacity to cope with effects of climate change because they are geared to producing and using cleaner renewable energy that contributes less to global warming.