

Development and promotion of orange-fleshed sweetpotato to reduce vitamin A deficiency in Uganda

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Introduction

Sweetpotato is an important crop in Uganda and is produced for food security and cash generation. Most of the sweetpotato varieties grown in the country are white-fleshed, and so contain little, if any, beta-carotene. Because farmers' selection criteria focus heavily on yield and sweetness level, white-fleshed sweetpotato varieties (WFSP) are usually preferred over the orange-fleshed varieties (OFSP). Moreover, WFSP are generally more resistant to prolonged drought and disease stress, such as sweetpotato virus disease and *Alternaria* spp; most of the OFSP varieties are introductions from temperate countries, and thus tend to succumb to tropical diseases. Development and promotion of OFSP has become part *of* the overall national strategy to add value to the crop, increase storage life, expand market opportunities and combat vitamin A deficiency. The significance of vitamin A became apparent during interviews and on-farm visits, when it was also shown that vitamin A deficiency was a serious problem in many parts of the country. Fortunately, it was found that children of all the communities liked to eat OFSP because of their attractive colour and sweet taste. This suggests that efforts to promote OFSP would be welcome by a large proportion of the population.

Because of the important role sweetpotato plays in the nutrition, food security and economy of the people (Bashaasha et al, 1995), the Government of Uganda, through the National Agricultural Research Organization (NARO), has given high priority to research on the crop. Since 1998, research has been directed at enriching the nutrient contents of sweetpotato through development of OFSP varieties, diversifying sweetpotato-based products and fortification. To achieve this goal, the Sweetpotato Programme, based at

Namulonge Agricultural and Animal Production Research Institute, has the mandate for generating, testing and disseminating sweetpotato production technologies (NARO, 2000). The programme has links with national, regional and international institutions. Major collaborators include the Post-harvest Programme at Kawanda Agricultural Research Institute, which is responsible for developing methods for storage of fresh and dry chips and processing sweetpotato-based products; Makerere University, which plays a role in manpower development in training students and developing sweetpotato-based products; PRAPACE (Programme régional d'amélioration de la pomme de terre et de la patate douce en Afrique Central et de l'Est, or Regional Potato and Sweetpotato Improvement Program in Eastern and Central Africa), which coordinates and facilitates research within the region on sweetpotato and *Solanum* potato; and the International Potato Center (CIP), which coordinates and provides technical backstopping and facilitates germplasm exchange and cleansing materials of viruses. Other collaborating institutions are the Ministry of Health, the Ministry of Agriculture, Animal Industries and Fisheries, non-governmental organizations and community-building organizations.

Advantages of producing OFSP

Until recently, little emphasis had been placed on development and popularization of OFSP in Uganda; only scanty knowledge was available on the extent of vitamin A deficiency (VAD) in the country or on the role sweetpotato could play in circumventing the problem. Some of the advantages of OFSP as a strategy for improving the people's nutrition in general and combating VAD in particular are that:

- the crop matures in 4–5 months, thus utilizing the short rains and freeing land for growing other crops
- the crop gives good yield, even in marginal soils and under low input conditions
- storage roots and foliage are nutritious and not toxic even when consumed in unprocessed forms
- storage roots are rich in carbohydrates, copper, iron, fibre, folate, calcium and pro-vitamin A (beta-carotene) (Woolfe, 1992; Rodriguez-Amaya, 1997)
- the crop is compatible with other cropping and agricultural systems, such as livestock (cattle, goats, sheep and pigs) rearing
- the crop is environmentally friendly because its foliage spreads on the soil surface while storage roots hold soil particles together, thereby minimizing erosion

Research progress made on development of OFSP

The Sweetpotato Programme undertook four projects between 1998 and 2001:

- using orange-fleshed sweetpotato to combat VAD in selected communities in Soroti district
- multiplication and dissemination of new and improved sweetpotato varieties in Soroti and Kumi districts
- promotion of orange-fleshed sweetpotato to avert VAD in Luwero District in central Uganda
- use of OFSP as a component of weaning foods for babies

Using orange-fleshed sweetpotato to combat VAD in selected communities in Soroti District

This project had three objectives:

- to assess the extent of knowledge about VAD problems in selected communities
- to educate rural communities, especially women, about the role of sweetpotato in the diets of children and adults
- to adopt and promote acceptable orange-fleshed varieties as sources of beta-carotene

Extent of knowledge about VAD problems in selected communities

Surveys were conducted in health delivery units and sub-dispensaries to establish whether communities had knowledge about VAD and how to control it. Rapid market surveys were also carried out, including group discussions with key informants. Quantitative assessment surveys utilized the food frequency methodology described by Helen Keller International (Rosen et al, 1994, Low et al, (1997).

Results showed that 90% of the respondents were not familiar with VAD and related health problems. The communities had poor access to vitamin A, indicating that VAD was a public health problem. Alternative sources of vitamin A, such as fish, were scarce and/or too expensive for most of households.

Education of rural communities about role of vitamin A in the diet

Nutritional education seminars were conducted in field schools for women and farmers. Awareness has been created in small communities in the test district, so accompanying packages should be introduced and expanded.

Sixty farmers attended nutrition education seminars. They learned of the advantages of growing crops rich in pro-vitamin A, and about methods for preparing sweetpotato-based recipes.

Adoption and promotion of improved varieties

Farmer groups in three subcounties were selected to grow and manage 11 sweetpotato varieties. Seven were varieties released by NARO: Naspot 1, Naspot 2, Naspot 3, Naspot 4, Naspot 5 (orange-fleshed variety), Sowola and Tanzania (Mwanga et al, 2001); the others were an introduced variety (SPK 004, or Kakamega, with orange flesh) and three local varieties (Haraka, Ateseke and Osapat). Farmers were asked to select their preferred varieties taking into account yield, suitability for market, colour, taste and whatever other qualities they chose.

All the farmers considered high yield an overriding factor in selecting a variety. Most (90%) of the farmers sell, or hope to sell, excess roots for cash, so suitability for marketing was also an important criterion. Only 30% of the farmers cared much about the

roots' skin or flesh colour. On that basis, Osapat, Kakamega, Ateseke and Tanzania received the highest mean scores for overall appreciation. Osapat and Naspot 2 had the highest yields. Osapat, Kakamega, Ateseke, Naspot 2 and Naspot 1 were selected as the preferred varieties by at least 50% of the farmers at the three locations.

Farmers multiplied the vines of the varieties they selected. Vines of varieties Kakamega, Kala and Ejumula (orange-fleshed varieties) were transferred to Luwero District for promotion under the Child Health Development Project, which lays emphasis on the nutritional aspects of OFSP.

Multiplication and dissemination of new and improved sweetpotato varieties in Kumi and Soroti districts

This project was run by the Soroti Catholic Diocese Development Organization (SOCADIDO) in collaboration with NARO and CIP. SOCADIDO is an NGO that uses women's groups and individual farmers to implement efforts of various development projects, particularly agriculturally based ones (CRF, 2001; SOCADIDO, 2001).

SOCADIDO's mission is to empower the communities in Teso to achieve sustainable social and economic development. Specifically, its goals are to:

- disseminate newly selected sweetpotato varieties to many farmers in Kumi and Soroti districts of Uganda, together with information on their nutritional value and suggestions on how to use them
- establish a decentralized system of small entrepreneurs who can multiply sweetpotato and hence provide farmers with planting materials in a timely fashion; the system should persist beyond the life of the project

During the 1998–2000 seasons, planting materials were disseminated to 72 groups of farmers. Training on multiplication and fresh storage techniques was given to 87 field staff and 252 farmers. Most of the farmers have applied the multiplication techniques to conserve planting materials over the dry seasons near available water sources.

Promotion of orange-fleshed sweetpotato to avert VAD in Luwero District in central Uganda

This project was initiated in May 2001 by the Ministry of Health in collaboration with VEDCO (Volunteer Efforts for Development Concerns) and NARO. The project is trying to introduce and popularize orange-fleshed sweetpotato varieties among the malnourished people of Luwero District (VEDCO, 2001)

Activities

1. Multiplication and on-farm promotion of currently available of varieties (Ejumula, Kakamega, Kala). Kakamega was an introduced variety from the Kenyan breeding Programme. Kala was a local variety, and Ejumula a mutant from local germplasm materials earlier evaluated under the G x E study in Soroti District (Abidin, 2002)

2. Sensitization of, and interaction among, stakeholders in the project (farmers, extension agents, VEDCO staff, nutrition staff from Makerere University/Mulago Hospital, NARO)
3. Evaluation and promotion of sweetpotato breeding lines currently in advanced stages of evaluation
4. Production of pamphlets on general methods for sweetpotato production

Expected output

1. Development of orange-fleshed sweetpotato adaptable to biotic and abiotic stresses in the project district
2. Improvement in health of children in the project area
3. Farmers will have acquired techniques of producing sweetpotato
4. Farmers sensitized on advantages of growing and consuming orange-fleshed sweetpotato to improve on their nutritive requirements
5. Women groups trained on methods of processing sweetpotato to improve the nutritive value and extend the shelf-life of the crop
6. Extension staff trained in sweetpotato production and processing
7. Collaboration fostered among members of different institutions

Progress

1. Multiplication of orange-fleshed varieties, viz: Kakamega, Kala and Ejumula varieties, and a local check, was started at six sites in Luwero District in May 2001
2. Sensitization workshops have been conducted on the importance of producing orange-fleshed sweetpotato
3. Sweetpotato production packages have been demonstrated to some farmers
4. Multiplication of orange-fleshed varieties and lines is at advanced stages of evaluation

Planned future activities

1. Accelerated multiplication of current locally available and well-adapted OFSP and their dissemination to farmers
2. On-farm testing of OFSP at an advanced stage of evaluation
3. Introduction and evaluation of pathogen-tested OFSP from CIP and PRAPACE countries
4. Training of farmers in integrated crop management skills for sweetpotato, targeting major pests (mainly sweetpotato weevils, sweetpotato butterfly) and diseases (sweetpotato virus diseases, *Alternaria* spp)
5. On-farm visits and continuous assessment of the project
6. Training of farmers on rapid multiplication technology to preserve planting materials and storage to conserve fresh tubers
7. Dissemination to end-users of methods for processing sweetpotato and sweetpotato-based products

8. Monitoring and evaluation of the projects, to determine the adoption and diffusion of the technology

Use of OFSP as a component of weaning foods for babies

As a part of the manpower development effort, MSc students are undertaking projects on the development of weaning foods based on sweetpotato recipes. OFSP will be increasingly important ingredients of these foods.

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