Involving schoolchildren in orange-fleshed sweetpotato promotion – Achievements in Kampala

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Abstract

Schoolchildren are the future parents and targeting them with Orange-Fleshed Sweetpotato (OFSP) interventions could influence lifetime food preferences. This paper presents results on changes in schoolchildren's OFSP awareness, knowledge, production and consumption when interventions are primarily agricultural, primarily nutritional, or combined. Schools were used as venues to disseminate OFSP production technologies for roots and vines (AG) and nutrition education (NE) to surrounding communities. In 3 divisions of Kampala, Uganda, 15 schools were enrolled in NE (grp3), AG (grp2) or both (grp1), with 5 schools in one control division (grp4). Depending on the intervention group, primary 3-7 schoolchildren were exposed to OFSP Rapid vine Multiplication Technologies, given vines to grow at home and involved in up to three NE sessions on general nutritional facts, OFSP and vitamin A. Post-post comparisons were carried out using Chi-Square. The results demonstrate that AG and NE raised schoolchildren's awareness of OFSP. In intervention groups all schoolchildren had heard about OFSP (39% grp4). All schoolchildren in grp1 and 2 cited at least one vitamin A rich food (82% grp3, 61% grp4). More schoolchildren in grp1 (77%) than in grp2 (60%) planted vines received at school. Schoolchildren reporting consumption of OFSP prepared in home was highest in grp1 (100%) and in grp3 (91%) compared to 56% in grp2 and 75% in grp4 (p=0.006). Results demonstrate that the impact is greatest when schoolchildren participate in both interventions. More research is needed to evaluate whether schoolchildren are effective entry points for knowledge and technology transmission to other household members.

Keywords: Orange-fleshed Sweetpotato, vitamin A, targeting schoolchildren, primary schools, urban and peri-urban farming.

Introduction

Vitamin A deficiency (VAD) is a major health concern in many low-income populations with high mortality rates, including Uganda (Ezzati *et al.*, 2002; Uganda Bureau of Statistics and Macro International Inc., 2007). It is an important cause of morbidity and mortality, impaired night vision and, in more severe manifestations, of blindness and increased mortality among young children (West, 2002). In the last Ugandan Demographic and Health Survey of 2006, about 20% of children under five were found to have vitamin A deficiency (<0.825 µmol/L of Retinol-Binding Protein) (Uganda Bureau of Statistics and Macro International Inc., 2007). Vitamin A deficiency disorders are a serious public health concern in Uganda.

One option for controlling and preventing vitamin A deficiency is biofortification. Traditional staple food crops with low nutrient content are substituted with improved, nutrient-dense varieties. Orange-fleshed sweetpotato (OFSP) is an example of a biofortified crop. The beta-carotene content is enhanced through plant breeding to the point where impact on the vitamin A status can be achieved (Bouis, 2002). This strategy is particularly promising for poor rural households that cannot access purchased fortified food products but could grow OFSP.

Children under five years of age are at greatest risk of VAD. However, other target groups might be considered for many reasons. For example, targeting school children may be an effective means for reaching large numbers of households through a centralized location if children prove to be effective transmitters of technologies from school to household (Andrade *et al.*, 2009). This latter aspect was the key feature of the project: 'Promotion of

Orange-Fleshed Sweet Potato Varieties through Schools in Urban and Peri-urban Communities of Kampala" (Schools OFSP Project) that was implemented from 2004 to 2006.

Approach and methods

The schools OFSP project was started in Kampala in 2004 and implemented by a multi-stakeholder partnership led by the Department of Agricultural Extension, Makerere University. The aim of the project was to contribute to widespread production of two OFSP varieties ("*Kakamega"* and *"Ejumula*"), using an approach of training primary school teachers and primary 3-7 schoolchildren as well as men and women farmers from communities surrounding 11 selected schools in the divisions of Kawempe and Rubaga of Kampala city. The training focused on methods and techniques of rapid multiplication (RMT) of sweet potato vines, as well as production agronomy and some aspects of post-harvest processing of the OFSP varieties. This project was a build-up and adopted an approach of another project carried out in Kampala from 2002 to 2003 entitled "Schools as Technology Dissemination, Extension Support and Commercial Seed Production Centres for Urban and Peri-Urban Farming Communities", which sought to assess the appropriateness of using schools to produce and make available planting materials to urban farming communities (Miiro et al forthcoming).

The project used a variety of methods including presentation-question-answer meetings, on-plot demonstrations, drama, farmer-to-farmer extension, farm station visits and distribution of posters to train and transfer knowledge and technologies to beneficiaries. The school was the principle meeting place for training and learning purposes. OFSP gardens and RMT plots were established at the schools for demonstration as well multiplication of vines. The schoolchildren maintained them under the supervision of the trained teachers. In addition, schoolchildren received vines to grow OFSP at home (Kapinga *et al.*, undated).

Realising that the Schools OFSP project did not have a nutrition component beyond 'sensitisation', Urban Harvest, CGIAR's system wide program on urban and peri-urban agriculture, joined the partnership to compliment the agricultural interventions with deeper nutrition education to build synergy for increased adoption, consumption as well as intra-household distribution of OFSP. Nutrition education and training started in February 2005, one year after commencement of agricultural interventions, and concluded in December the same year. In each school, three training sessions were carried out. The first one covered general nutritional facts and introductory aspects of vitamin A in health, the second one covering food and non-food sources of vitamin A while highlighting importance of OFSP. The last session concentrated on attitudes to vitamin A capsule supplements, mosquito net use, other attitudes and practices as well as the practical cooking classes.

The interval between training sessions averaged 4-6 weeks. Training of groups of 30-40 participants on average followed a facilitated group discussion approach. Demonstrations, posters and calendars depicting plant and animal foods rich in vitamin A were also used to communicate nutrition education messages. Participants underwent practical classes to formulate recipes, prepare and cook enriched dishes for young children. Community members and primary 4-6 schoolchildren were trained separately on the premises of the school but during the same visit.

The nutrition education component was added to the schools OFSP project in Kawempe Division (Rubaga Division: remained with agricultural intervention only). Another two divisions were included: Nakawa Division, where nutrition education was introduced (no agricultural intervention) and Makindye Division, which acted as a relative control where no interventions were undertaken. A cross-sectional survey was conducted from July to September 2006 to compare areas 'with' and 'without' different interventions (post-post comparison). The intervention design allowed assessment of the separate and combined impacts of the agricultural and nutrition education interventions (see Table 1).

Four types of questionnaires were administered in the cross-sectional survey: food frequency questionnaire covering the past 7 days; questionnaires on vitamin A-related Knowledge Attitudes and Practices (KAP); 24-hour food consumption recall and anthropometric measurements of children under 5 years of age. To understand the effect of nutrition education on vitamin A-related knowledge, attitudes and practices, one questionnaire was administered to the main respondent identified as the person from the household who most attended nutrition education and/or agriculture sessions (mostly the principal woman of the household) and one questionnaire to a child from the respondent household who was a schoolchild in one of the intervention schools. The data presented here focus on the schoolchildren KAP.

Table 1. Comparison groups created by agricultural and nutrition education interventions

Group	Division	Type of interventions	Number of participating schools
1	Kawempe	Agricultural Technologies/Extension andNutrition Education	5
2	Rubaga	Agricultural technologies/extensions only	5
3	Nakawa	Nutrition Education only	5
4	Makindye	No intervention (control division)	5

Descriptive analysis of the data was conducted. Inferential testing for intervention group was done using Pearson's chi-square test.

Results and discussion

The sample included 85 schoolchildren (Group 1: n=25; group 2: n=10; group 3: n=22; group4/control: n=28) mainly from primary four to six. Schoolchildren from grade one and two were not targeted by the nutrition education as they were considered too young. The average age of the schoolchildren in the sample was 12.55 years (from 7 to 16 years). 61% of the schoolchildren in the sample were female and 39% male.

Schoolchildren's OFSP awareness

Eighty percent of all schoolchildren had heard about OFSP. Stratification by group shows that all schoolchildren respondents in the three intervention groups had heard about OFSP, but only 39% had heard about it in the control group (p=0.000). In the intervention groups, the majority who had heard about OFSP had heard it from the teacher or the OFSP project people. In the control group, most of the schoolchildren had heard about OFSP from the teacher or the parents (p=0.000).

Overall, 71% of the schoolchildren had seen any OFSP root. There are statistically significant differences between the groups. All schoolchildren respondents in intervention groups 1 and 2 had seen OFSP at school, either shown by the OFSP project team or by the teacher in class. The majority in group 3 (82%) had seen OFSP, mainly at school but also in the market and at home (harvested from the garden). But in the control group only 25% had ever seen OFSP. None of those who had seen OFSP in this group had seen it at school.

The majority of those who had seen OFSP and who were in agricultural intervention groups (1 and 2) knew and could name both Kakamega and Ejumula (>90%). In group 3 (nutrition education only), 78% did not know any OFSP variety by name. This is not surprising since the nutrition education material did not differentiate between different OFSP varieties. In the control group, none of the respondents was able to name an OFSP variety (p=0.000).

Schoolchildren's Vitamin A Knowledge

44% of schoolchildren were able to indicate one vitamin A rich food and 39% two vitamin A rich foods. 18% did not know any vitamin A rich food. This varies significantly between the different groups (p=0.003). In intervention groups 1 and 2, all schoolchildren were able to name at least one vitamin A rich food and about half of them could cite two. In group 3, 18% were not able to indicate any vitamin A rich food and in the control group, this percentage rose to 39%.

Overall, more than half of the schoolchildren (64%) were not able to cite any disease related to vitamin A deficiency. 33% could name one disease and 4% two diseases. This varies between the different groups, but the differences are not statistically significant (p=0.062). The percentage of those who did not know any disease is highest in the control group (86%) and lowest in group 3 (41%).

OFSP Production

The majority of schoolchildren who attended schools that were part of the agricultural intervention (group 1 and 2) had received OFSP vines from the school to take home (88 and 100% respectively). Only a fifth of group 3 children (nutrition education only) had obtained vines and none in the control group.

Of those schoolchildren who have taken home OFSP vines from school, overall 69% made their own nursery beds (group 1: 82%; group 2: 60%; group 3: 25%). The differences are statistically significant (p=0.057). The majority of those who made their own nursery bed in group 1 and 2 also planted their own sweet potato crop. In group 3, the one schoolchild who had made a nursery bed did not plant own sweet potato crop, whereas some schoolchildren in each group had not made a nursery bed, but planted their own SP crop (total of those who planted: group 1: 77%; group 2: 60%; group 3: 50%). The majority of schoolchildren respondents who had received OFSP vines at school, but had not planted their own SP crop said that they gave the vines to the parent/guardian who planted them.

Overall, 60% of those schoolchildren who had planted their own SP crop indicated that they were given the place where to plant them by their mother and 32% by another adult. 32% received help from their mothers, another 32% from their sisters/brothers, and 28% had not received help at all in planting the vines. Only very few schoolchildren respondents (13% overall) did still have a RMT nursery at home at the moment of the survey. Different reasons were mentioned for not being able to keep an RMT nursery at home: the vines had wilted due to drought; they had never established a nursery, they had planted directly in the garden; the bed was destroyed by cattle/animals; they had used all the vines from the previous nursery and had not yet established another one; and parents harvested the roots from the nursery and uprooted the vines. There are no statistically significant differences between the groups.

OFSP Consumption

Overall, 57% of the schoolchildren said that OFSP had been cooked and served in their homes. There are statistically significant differences between the groups (see Table 2). The percentage is highest in group 1 and lowest in the control group. Of those in whose homes OFSP had been cooked and served (n=48), 88% reported having eaten from the boiled or steamed OFSP. Within each intervention group, the share of children in whose homes OFSP was prepared and who have personally eaten it, is highest in group 1 (100%) (see Table 2); in group 3 the majority, in the control group two-thirds and in group 2 just about half of the children in whose homes OFSP was prepared have tried it themselves.

Table 2. Consumption of OFSP by intervention group (% within intervention group)

	Group 1	Group 2	Group 3	Control
OFSP prepared in home (n=85)				
Yes	96.0	90.0	50.0	14.3
No	4.0	10.0	50.0	78.6
OFSP personally eaten (n=48)				
Yes	100.0	55.6	90.9	75.0
No	0.0	44.4	9.1	25.0

OFSP prepared: F-value=42.64, p-value=0.000
OFSP personally eaten: F-value=12.51, p-value=0.006

Of those schoolchildren who had eaten it (n=42), 93% said that they would prefer OFSP if they were to choose between eating OFSP and WFSP, mainly because OFSP contains vitamin A, tastes better and is sweeter. There are no statistically significant differences between the groups.

In summary, the project interventions have resulted in creating awareness for OFSP among schoolchildren. Schoolchildren had heard about OFSP, had seen OFSP roots and were able to name two OFSP varieties. Best results were demonstrated for schoolchildren who participated in the agricultural interventions (group 1 and 2).

Similarly, for vitamin A knowledge participation in the agricultural intervention seemed to be important. In terms of knowledge of diseases caused by vitamin A deficiency, more than half of schoolchildren of group 3 (nutrition education only) mentioned at least one disease, whereas less schoolchildren in group 1 and 2 were able to cite one or two diseases related to vitamin A deficiency. Schoolchildren who participated in the agricultural and nutrition education activities were more active in establishing nursery beds and planting OFSP and more likely to eat the boiled and steamed OFSP roots prepared in their homes. The nutrition education had also a positive influence on consumption in group 3 – most of the schoolchildren in whose homes OFSP had been cooked have reported eating it, but the lack of access to vines in this group results in limited OFSP production in the homes.

It is surprising that schoolchildren in group 2 (agricultural intervention only) seem to have quite good knowledge on vitamin A. This might be due to the fact that sensitization activities on the nutritional value of OFSP were conducted as part of the agricultural interventions. Schoolchildren were trained on OFSP by teachers, who had been trained by scientists from the national research institutions. The training focused on establishment and management of RMT, OFSP agronomy, post harvest handling and utilization, but included some aspects on importance of vitamin A, vitamin A deficiency symptoms and sources of vitamin A (Miiro *et al.*, 2006). In addition, schoolchildren may have participated in open promotion campaigns on nutritional and other benefits of OFSP that were held in schools in order to raise general awareness by the communities (Kapinga *et al.*, undated). Schoolchildren were in general much more involved with the agricultural activities than with the nutrition education activities. They maintained the OFSP and RMT plots and were involved in day-to-day activities such as weeding, watering etc. We don't have data on how many times schoolchildren participated in nutrition education sessions in group 3. Sometimes the sessions were conducted on weekends when schoolchildren could not attend, but every schoolchild has participated at least in one session, but up to three sessions (A. Lubowa, personal communication).

A key feature of the project's approach was to use schoolchildren learning at school in a practical and active way and then expect transfer of technologies and innovations to their households of origin and some influence on household decision making. With the current dataset we are not able to evaluate whether the transfer of technologies to the schoolchildren' households has happened and whether the decision making with respect to OFSP has been influenced. The data do not allow assessing the levels of adoption by parents/communities that can be specifically attributed to schoolchildren's efforts.

Conclusions

The results demonstrate that the agricultural and nutritional interventions raised schoolchildren's awareness of OFSP, improved their knowledge on vitamin A, encouraged planting and consumption of OFSP and led to changing consumption preferences related to SP. Results also show – as expected - that the impact is greater when schoolchildren participated in both interventions. Schoolchildren are the future parents of the world and addressing them is an opportunity to influence lifetime food preferences. Therefore, schools are useful venues for OFSP related interventions. Another advantage of using schools as venues is that schools are regarded as neutral places where communities can meet, share and exchange knowledge (Kapinga *et al.*, undated). However, more research is needed to evaluate whether schoolchildren are effective entry points for knowledge and technology transmission to other household members, and whether this has an impact on OFSP uptake in schoolchildren's households.

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