

Catalysing rural transformation through a community based approach

Edimu, M., Atim, P., Ekwamu, R., Orone, J.¹, Omara, T.¹ & Kawuki, R.¹

Research and Education Agency, Plot 54, Factory Road Ntinda, P. O. Box 29152, Kampala, Uganda

¹National Crops Resources Research Institute (NaCRRI), P. O. Box 7084, Kampala, Uganda

Corresponding author: medimu@rae.co.ug

Abstract

Dissemination of agricultural information and/or technologies in Uganda and indeed elsewhere relies on multipronged approaches. This is being fast-tracked by effective engagement of institutions that have great potential to deliver results. On our part, packaging and dissemination of agricultural information and knowledge (AIK) through schools has been proposed as a cost-effective approach for reaching grass-root rural households. Our forte for this is based on the fact that both primary and secondary schools, are pivotal in delivering on the key public goods of socio-economic transformation for two main reasons; 1) they serve as a focal point of many rural and urban communities, and 2) they educate future generations and thus ensure sustainable transference of knowledge and skills. In this paper we document on-going efforts made towards reaching rural households through engaging students of Adipala High School (AHS). The school in collaboration with the Research and Education Agency (REA) has provided a platform for National Crops Resources Research Institute (NaCRRI) to disseminate elite cassava varieties in Kaberamaido, a location hardest hit by cassava viruses. The partnership between AHS, RAE and NaCRRI is in its budding stage, and has in its 24 months of existence, laid a foundation for increased AIK uptake by 1) establishing and implementing mechanisms for sensitizing students about the role of agriculture for national development; 2) piloting a process of sensitizing farmers on opportunities for cassava value addition, the challenges the crop faces along the production to consumption continuum, and the vast opportunities it presents; and 3) establishing a mother garden from which disease-free cassava seed can be accessed; this multiplication site is being managed by the farmers and students. All these interventions are mindful that women and girls are pivotal in development and thus need to be empowered. Feedback from this engagement has in a short period of time yielded a vibrant learning platform. There is evidence that the approach is very attractive to both farmers and students as an effective tool for experiential learning. Initially, and probably arising from previous on-farm experimentation undertakings, the target stakeholders expressed scepticism. This has since reduced significantly especially amongst farmers owing to the experiential learning approach which has enabled them to assess the performance of the elite varieties compared to varieties they commonly cultivate. This is a learning process and thus, the partners in this effort (REA, AHS and NaCRRI) are keen on learning and appropriately adjusting, with a view of offering an effective and contextualized

approach for AIK uptake that adequately engages key actors in rural households, including in particular the youth.

Key words: Agricultural research, education, experiential learning, rural development, Uganda

Résumé

La diffusion de l'information agricole et / ou technologique en Ouganda et en effet, ailleurs, repose agricole sur des approches à plusieurs facettes. Ceci est rapidement suivi par un engagement effectif des institutions qui ont un grand potentiel pour produire des résultats. Pour notre part, l'organisation et la diffusion des informations et des connaissances agricoles (AIK) dans les écoles a été proposée comme une approche rentable pour atteindre les ménages ruraux populaires. Notre point fort pour ceci est basé sur le fait que les deux écoles primaires et secondaires, sont essentiels dans la prestation des biens publics essentiels de la transformation socio-économique pour deux raisons principales; 1) elles servent de point focal de nombreuses collectivités rurales et urbaines, et 2) elles éduquent les générations futures et ainsi assurer le transfert durable des connaissances et des compétences. Dans cet article, nous avons fait la documentation des efforts continus déployés pour atteindre les ménages ruraux en engageant les étudiants d'Adipala High School (AHS). L'école en collaboration avec l'Agence pour la Recherche et l'Education (REA) a fourni une plate-forme pour l'Institut de Recherches en Cultures Nationales (National Crops Resources Research Institute (NaCRRI) pour diffuser des variétés de manioc d'élite dans Kaberamaido, une région plus durement touchée par les virus du manioc. Le partenariat entre AHS, RAE et NaCRRI est dans sa phase naissante, et dans ses 24 mois d'existence, il a mis les bases d'une absorption accrue de AIK 1) mettre en place des mécanismes pour sensibiliser les élèves sur le rôle de l'agriculture pour le développement national; 2) le pilotage d'un processus de sensibilisation des agriculteurs sur les possibilités de la valeur ajoutée du manioc, les défis auxquels la culture fait face de la production à la consommation, et les vastes possibilités qu'elle offre; et 3) la création d'un jardin principale à partir de duquel les semences de manioc indemne de la maladie peuvent être consultées, ce site de multiplication est gérée par les agriculteurs et les élèves. Toutes ces interventions prennent en conscience que les femmes et les filles sont essentielles dans le développement et doivent donc être habilitées. Le commentaire de cet engagement a dans un court laps de temps donné une plate-forme d'apprentissage dynamique. Il est prouvé que l'approche est très attrayante pour les agriculteurs et les élèves comme un outil efficace pour l'apprentissage expérientiel. Dans un premier temps, et probablement résultant d'engagements antérieurs d'expérimentation à la ferme, les parties prenantes cibles ont exprimé leur scepticisme. Cela a depuis réduit de manière significative en particulier chez les agriculteurs en raison de l'approche d'apprentissage expérientiel qui leur a permis d'évaluer la performance des variétés élites par rapport aux variétés qu'ils cultivent couramment. Ceci est un processus d'apprentissage et donc, les partenaires de cet effort (REA, PAPA et NACRRI) sont désireux de l'apprentissage et en ajustant de manière appropriée, en vue d'offrir une approche efficace et contextualisée pour l'absorption de l'AIK qui engage de manière adéquate des acteurs clés dans les ménages ruraux, y compris en particulier les jeunes.

Mots clés: la recherche agricole, l'éducation, l'apprentissage expérientiel, le développement rural, l'Ouganda

Outreach roles of schools to grass-root communities

Available literature is replete of outreach as one of the tenants for higher education institutions, particularly universities (Turk-Bicakci and Britt, 2005; Sherrard, 2016, this volume). In the case of Uganda, primary and secondly schools equally present alternative outreach avenues that would target a broader spectrum of households, and would thus leverage technology uptake pathways that target rural stakeholders. Indeed, the reality is that both primary and secondary schools are increasingly taking on outreach activities to complement several other actors engaged in the complex social transformation arena. Primary and secondary schools are pivotal in socio-economic transformation for two main reasons; 1) they serve as a focal point of many rural and urban communities, and thus, providing a platform for family unification; and 2) they provide a foundation for educating future generations and thus, ensuring sustainable transference of knowledge and skills.

Formal western education was introduced in Uganda in 1886 by the Church Missionary Society, and has since evolved to have seven years of primary education that provides candidates for either lower secondary education (some of whom make it for higher secondary and consequently universities) or for craft and technical institutes (MoES, 2001). There has been rapid growth over the years and by 2010, pupil enrolment in primary education approximated 8.7 million, with 50% being girls; during the same period the transition rate from primary to secondary approximated 64.5%. On the other hand, the transition rate from lower to upper secondary approximated 51%, while that from secondary to University approximated only 35%. Unfortunately, the highest drop rate is amongst the girl child, as high as 50% (Nakabugo *et al.*, 2008; Tamusuza, 2011). It is these disturbing trends that could be the recipes for gender inequalities that eventually lead to marginalized and/or disempowered communities.

At the University level, Uganda has currently 32 registered Universities, accounting for a student population of ~110,000. Technical and other commercial business colleges enrol ~20,000 students. It's therefore, evident from the foregoing that ~55% of Ugandan students who at one time enrolled for formal education will not make it to the University; they attain secondary education and possess functional literacy and are equipped to engage in social economic development. This group should not be missed in terms of disseminating AIK through experiential learning processes. Given opportunity, they have capacity to apply and also serve as examples to their household members and thus reducing the gender inequalities. These youth should be targeted to get involved in the socio-economic transformation, as they have been equipped with modest and/or subtle skills of writing, learning, listening and communication that could be of value beyond the classroom. In this undertaking, we have targeted students enrolled in secondary schools, to use them to engage with the grass-root communities in agricultural-based enterprises that are likely to have the greatest impact. This aspiration is driven by the fact that no society can achieve its potential with half of its population marginalised and/or disempowered (Melinda, 2014).

Our forte for this is further based on the achievements made by the International Potato Centre (CIP), which developed an innovative and inclusive programme for dissemination of

orange-fleshed sweet potatoes (OFSP) that in part, involved enhancing technology uptake through proactive engagement of pupils in primary schools (see CIP, 2005). Briefly, this initially entailed an elaborative sensitisation programme on the value use of OFSP and the distribution of at least 100 vines of two varieties to each of the 270 primary schools enrolled in Kenya. The approach registered increased uptake with evidence of scale out in which similar and/or slightly modified approaches are now used in other countries to disseminate OFSP. This constituted a key outcome in agricultural knowledge dissemination and translation of research into use that has turned out to benefit millions of disadvantaged households. It is therefore, not surprising that several years later the three-person team from CIP: Dr. Maria Andrade, Dr. Robert Mwanga, and Dr. Jan Low, were honoured for their achievement in developing and disseminating the single most successful example of micronutrient and vitamin biofortification in OFSP (https://www.worldfoodprize.org/en/laureates/2016_andrade_mwanga_low_and_bouis/). Certainly, this is a world-class example we would like to emulate; in fact, this has been a major motivation for us to consider primary and secondary schools as vehicles of technology dissemination within communities mindful of the legal obligations and the limits of the technologies involved. We are keen to adopt and contextualize the OFSP experience to promote cassava.

Test-running schools engagement to combat cassava viruses in communities

Cassava is a hugely popular crop grown in Uganda owing to its food and non-food uses; its demand is expected to increase in response to the huge demand from breweries and/or small-scale ethanol processing factories. It is therefore, rational that its key production obstacles be urgently addressed to meet the increasing demand and/or news vistas for its use. It is partly for these reasons that the Global Cassava Partnership for the 21st Century - GCP21, was instituted and formalized “Global Alliance to Declare a War on Cassava Viruses in Africa” (Legg *et al.*, 2014). This alliance is strategically targeting cassava viruses because they have for the past 80 years been considered as key yield-robbing cassava stresses that limit optimal cassava productivity (Nichols, 1947; Jennings, 1957; Hahn *et al.*, 1979; Hahn *et al.*, 1980). The viruses of concern are cassava mosaic virus (Legg and Fauquet, 2004), associated with cassava mosaic disease (CMD); and cassava brown streak viruses (Mbanzibwa *et al.*, 2009; Winter *et al.*, 2010), associated with cassava brown streak disease (CBSD). Wherever these diseases occur (including in eastern Uganda) they continue to cause significant yield losses (Legg *et al.*, 2014).

For this purpose, AHS, located in Kaberamaido eastern Uganda, was selected by NaCRRI to work in partnership with REA to test-run the school’s outreach engagement with the grass-root community. The school has a total of 450 pupils most of whom are residents from nearby communities that primarily derive their livelihood from agriculture. In addition, Kaberamaido is a traditionally known cassava growing area for a period of no less than 100 years and it has also witnessed overlapping disease epidemics that are often a result of high whitefly populations. Our assumption here is that upon pupils’ return back to their respective homes at end of school term, they will have acquired relevant information and/or technologies that they can freely and accurately be shared with their respective family members, and thus being cassava technology ambassadors. Our approach and motivation is based on what

was done by CIP for OFSP, and a highly successful pilot project by Makerere University in two districts in eastern Uganda (Kamuli and Soroti) where they used school gardening to test improved crop varieties and interest primary school students in Agriculture. The students proudly brought their parents to see their school gardens and took improved seed to their families (Paul Kibwika, unpublished).

With technical backstopping from the NaCRRI, Adipala High School (through the Research and Education Agency) accessed two elite cassava varieties (NASE 14 and NARO_CASS1) and established them at a single site in Kaberamaido during the second season (August-December) of 2014. Each variety was established on ~0.4 ha as a joint activity with farmers and management of Adipala High School, following standard procedures (IITA, 1990). We selected the two varieties owing to their high levels of resistance to CMD and tolerance to CBSD (Kawuki *et al.*, 2016). Ideally, these two varieties will replace NASE 3, which is predominant in the area, and has also been implicated in sustaining CMD in the community for the last two decades. The two varieties being promoted (NASE 14 and NARO_CASS1) have fresh root yields > 34 t/ha with dry matter content >30%. This translates to approximately 10 t/ha of dry root yield; yields which are higher than those obtained from NASE 3 that is currently widespread in eastern Uganda.

NARO has proposed a four-step process for the dissemination of improved cassava varieties as outlined in (Anthony Pariyo, Unpublished data). Briefly, these four steps include: 1) pre-basic seed production, where only virus-indexed and officially released varieties are micro-propagated at approved public and/or private laboratories; 2) pre-basic seed bulking in screen houses, where 2-3 months tissue culture plantlets are cloned; 3) field multiplication of planting materials generated in step-2 above in carefully selected sites characterised by low CBSD and/or CMD pressure to generate basic seed; and 4) planting materials generated in step-3 above used to initiate a de-centralized certified seed production scheme to enable easy access of elite and clean planting materials by cassava farmers. Efforts will be made to ensure that students are knowledgeable about these four steps through having at least five to six practical and theoretical sessions that will be facilitated by staff from NARO's Root Crop's Programme. In the end we hope that students will serve as a focal point and source of information for their respective families. Certainly, this initiative will be backed up by support from Government and or community-based organisation agricultural extension and advisory services agents operating within the communities.

Lessons learnt and future outlook

Within the past two years, the collaborative undertaking between AHS, RAE with NaCRRI has been able to: 1) establish and implement mechanisms for sensitizing students about the role of agriculture for national development; 2) pilot the process of sensitizing cassava farmers on opportunities for cassava value addition, the challenges the crop faces along the production to consumption continuum; and 3) establish a cassava multiplication site within the area that has been managed by the farmers; in the meantime, this is to be used as the source of planting materials for a farmer-to-farmer seed distribution system. In addition, Kaberamaido was selected by NaCRRI to be part of the sites involved in the evaluation of the 25 best-bet

cassava varieties sourced from five countries in eastern and southern Africa (Uganda, Kenya, Tanzania, Malawi and Mozambique). This was based on a situation analysis of the society needs and the involvement of stakeholders with a shared vision of uplifting cassava productivity at every household.

To better coordinate this initiative and future desires, RAE was founded to principally have two major roles: 1) support and undertake research that addresses development challenges focussed on rural development issues; and 2) to empower youth through provision of access to and improvement of non-formal and formal education. These roles directly contribute to Uganda's NDP II, other strategic frameworks designed to equip the youth such as Skilling Uganda and also recognise Uganda's "Education White Paper" recommendation that outlines measures to increase access and quality of education through undertaking equitable support for development of education services to enable integration of grass-root communities. Melinda (2014) observed that when development initiatives don't focus on women and/or girl empowerment, they neglect the fact that empowered women have the potential to transform their societies. The RAE recognizes the pivotal role of women and girls in development, and thus the choice to work with pupils of AHS and cassava farmers in Kaberamaido.

Since the inception of this initiative we have so far noted: 1) increasing interest from students, their teachers and the community in the joint agricultural activities, and 2) formation of an agricultural club to directly manage the multiplication sites. Thus, the AHS partnership with REA and NaCRRI remain very eager to learn and appropriately adjust, with a view to achieve a contextualized experiential learning approach that is tailored to the community. All this will be driven by questions like "How best can development actors remain relevant to youth and their respective families that primarily depend on agriculture?"

Acknowledgement

We acknowledge NARO/NaCRRI that provided the cassava varieties used to establish the multiplication site. In addition we applaud their willingness to partner with RAE and AHS to provide formal training and learning sessions to both students and farming community in Kaberamaido. We also acknowledge the local community, students and teachers of AHS for their willingness and keen interest effort in agriculture. This paper is a contribution to the 2016 Fifth African Higher Education Week and RUFORUM Biennial Conference.

References

- Anonymous. 2015. Uganda Vision 2040. A transformed Ugandan society from a peasant to a modern and prosperous country within 30 years. 315pp.
- CIP. 2005. Annual Report International Potato Centre. CIP, Lima, Peru
- Hahn, S.K., Terry, E.R. and Leuschner, K. 1980. Breeding cassava for resistance to cassava mosaic disease. *Euphytica* 29:677-683.
- Hahn, S.K., Terry, E.R., Leuschner, K., Akobunda, I.O., Okali, C. and Lal, R. 1979. Cassava improvement in Africa. *Field Crops Research* 2:193-222.

- IITA.1990. Cassava in tropical Africa: A Reference Manual. International Institute of Tropical Agriculture, Ibadan, Nigeria
- Jennings, D.L. 1957. Further studies in breeding cassava for virus resistance. *East African Agricultural Journal* 22:213-219.
- Kawuki, R.S., Kaweesi, T., Esuma, W., Pariyo, A., Kayondo, S.I., Ozimati, A., Kyaligonza, V., Abaca, A., Orone, J., Tumuhimbise, R., Nuwamanya, E., Abidrabo, P., Amuge, T., Ogwok, E., Okao, G., Wagaba, H., Adiga, G., Alicai, T., Omongo, C., Bua, A., Ferguson, M., Kanju, E. and Baguma Y. 2016. Eleven years of breeding efforts to combat cassava brown streak disease. *Breeding Science* (In Press).
- Legg, J.P. and Fauquet, C. 2004. Cassava mosaic geminiviruses in Africa. *Plant Molecular Biology* 56:585-599.
- Legg, L., Attiogbevi, E.S., Barker, I., Beach, L., Ceballos, H., Cuellar, W., Elkhoury, W., Gerling, D., Helsen, J., Hershey, C., Jarvis, A., Kulakow, P., Kumar, L., Lorenzen, J., Lynam, J., McMahon, M., Maruthi, G., Miano, D., Mtunda, K., Natwuruhunga, P., Okogbenin, E., Pezo, P., Terry, E., Thiele, G., Thresh, M., Wadsworth, J., Walsh, S., Winter, S., Tohme, J. and Fauquet, C. 2014. A global alliance declaring war on cassava viruses in Africa. *Food Security* 6:231-248.
- Mbanzibwa, D.R., Tian, Y.P., Tugume, A.K., Mukasa, S.B., Tairo, F., Kyamanywa, S., Kullaya, A. and Valkonen, J.P.T. 2009. Genetically distinct strains of *Cassava brown streak virus* in the Lake Victoria basin and the Indian Ocean coastal area of East Africa. *Archives of Virology* 154:353-359.
- Melinda, F.G. 2014. Putting women and girls at centre of development. *Science* 45:1273-1275.
- Ministry of Education and Sports (MOES), 2001. The development of education in Uganda in the last ten years. Report on the development of education to the 46th Session of the International Conference on Education, 5 – 7 September, 2001, Geneva, Switzerland.
- Nakabugo, M.N., Byamugisha, A. and Bithaghalire, J. 2008. Future schooling in Uganda. *Journal of International Cooperation in Education* 11: 55-69.
- Nichols, R.F.W. 1947. Breeding cassava for virus resistance. *East African Agricultural Journal* 15:154-160.
- Sherrard, D. 2016. Linking universities to communities: The case of EARTH University. RUFORUM Working Document Series 14 (1): 403-407.
- Turk-Bicakci, L. and Brint, S. 2005 University-Industry collaboration: Patters of growth for low- and middle-level performers. *Higher Education* 49: 61-89.
- Tamusuza, A. 2011. Leaving school early: The quest for Universal Primary Education in Uganda. *Journal Statistique Africain* 13:110-151.
- Winter, S., Koerbler, M., Stein, B., Pietruszka, A., Paape, M. and Butgereitt, A. 2010. Analysis of cassava streak viruses reveals the presence of distinct virus species causing cassava brown streak disease in East Africa. *Journal of General Virology* 91:1365-1372.