

It is beyond high yield when selecting cassava varieties for planting: Experiences with smallholder farming communities in Bukedea and Kumi districts

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As a son of a farmer, I am always compounded and reminded of Bill Gates quotation “Innovations that are guided by smallholder farmers, adapted to local circumstances, and sustainable for the economy and environment will be necessary to ensure food security in the future”. Therefore, I strive to emulate on the farming practices of my fore fathers and at the same time improve on these practices through research so that farming communities like the ones I was raised from improve their livelihoods. In 2017, as a volunteer for the Center for Tropical Agriculture (CIAT), Kawanda, Uganda, I decided to apply for a masters in Plant Breeding and Seed Systems at Makerere University. I was graced with fruitful opportunity by Dr. Peter Wasswa, a Lecturer at the Department of Agricultural Production, Makerere University. I was to be part of the cassava Community Action Research Programmes Plus (CARP+) coordinated by Professor Agnes Wakesho Mwang’ombe from the University of Nairobi under the banner of the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM).

Growing up as a kid from Lutengo village, Buwama sub-county, Mpigi district in Uganda, I always knew the benefits of growing cassava and now that an opportunity had downed on me inform of the RUFORUM CARP+ project I ceased it with open arms with good intensions of learning from other cassava farming communities. Cassava (*Manihot esculenta* Crantz), is an important staple food crop cultivated in many parts of Uganda, the eastern region being the biggest producer. It is a good source of industrial raw materials, substitute in animal feeds and the chief source of dietary food energy for the majority of Ugandans. In my MSc work, I

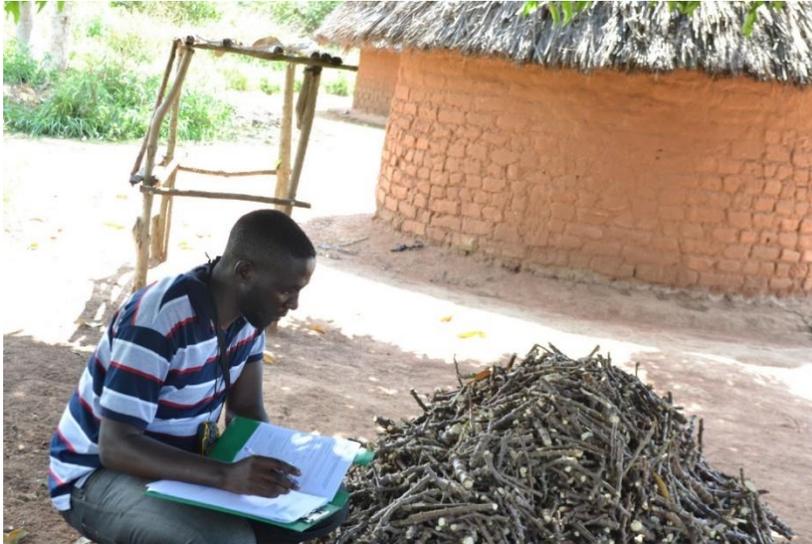
surveyed sub-county communities in Bukedea and Kumi districts in eastern Uganda, in September 2018 to determine the prevalence of major viral diseases on farmer preferred cassava cultivars and farmers' knowledge on how to manage these diseases. In Bukedea district five sub-counties including Malera, Kabarwa, Kidongole, Koena and Kocheka were sampled while in Kumi district four sub-counties including Ongino, Kumi, Kanyum and Ngero were sampled. From these sub-counties, I got a chance to visit and interact with 150 cassava farms/farmers; 74 in Bukedea district and 76 in Kumi district with spacing of at least 1 km between farms.

From this interaction, I got to know that farmers prioritize tastiness to other attributes such as good cooking quality and tolerance to diseases. Thus, cultivars NASE 03 and NASE 14 were most preferred despite their observed susceptibility to Cassava mosaic virus disease (CMD) and Cassava brown streak virus disease (CBSD). Cultivar NAROCASS 1 which was observed to tolerate the two diseases and known to yield high was least preferred and not widely adopted as farmers claimed it was tasteless! Though this observed trend in preference and disease preference could as well be related to the time these varieties were released. Cultivar NAROCASS 1 was more recently released only in 2015 while NASE 03 was released in 1993 and NASE 14 in 2011.



Figure 1: A farmer shows Mr. Kasule her cassava plants hit severely with CMD

Among the farmers I interacted with was Mr. Ogule Samuel from Bukedea district, Kocheke sub-county, Ariet parish, Omoniek village. Samuel had 8 acres of land of which, 6 were used for cassava cultivation. Like all other farmers in the region, Samuel mostly preferred growing NASE 03. Like all other NASE 03 fields by other farmers, Samuel's field was severely hit by CMD and CBSD.



This captured attention and engaged in a serious dialogue with Mr. Ogule in order to find out the cause of this. I found out that the source of cassava planting material used by this farmer was field sourced (FS) cassava planting materials.

Figure 2: Mr. Kasule Faizo inspecting cassava field sourced stem cuttings at Samuel's farm in Bukedea district

These FS materials were obtained from own seed, neighbors, friends, community and NGOs whose virus status is unknown and therefore this caused virus build up in these cassava stem cuttings and hence the increased CBSD and CMD in his field. Mr. Ogule confessed to lose between 60-100% of his cassava produce due to CMD and CBSD, seriously affecting his income but also leading to increased food insecurity in the region and the country.



When Samuel was asked why he does not opt for the use of tissue culture (TC) cassava planting materials which are tested for viruses, he said he was willing to adopt TC materials but accessibility was a problem.

Figure 3: One of the farmers in Bukedea showing CBSD root damages



Figure 4: A farmer shows no yield in his cassava fields due to CBSD

On moving further to Kumi district, Magara parish, Angopet village, I came across Ms. Alupo Christine, another cassava farmer with the same problems as the previous farmer, Mr. Ogule. Ms. Alupo had 8 acres of cassava with a number of cassava cultivars like NASE 03, NASE 14, NASE 19, TME 14 among others. This farmer used various disease management practices including intercropping, uprooting and discarding infected plants, spraying among others to reduce on the disease damage. She largely intercropped cassava with maize, sorghum, sunflower, groundnuts, cowpea among others as do other farmers in the region.



Figure 5: Cassava intercropped with sunflower

However, with the above management practices I noticed that CBSD and CMD were still prevalent in Ms. Alupo's cassava fields as well as in other farmers' fields carrying out the same practices.

I observed that farmers in Bukedea and Kumi were not taking into account the isolation distances suggested in FAO convention, 2012. Their cassava fields were located in close proximity to each other and this eased the spread of virus infections from one farmer field to another by whiteflies.

My encounter with cassava farming communities in Bukedea and Kumi provided me with an exciting experience but rather challenging and as a student pursuing plant breeding, I realized the need for more improved varieties not only in high yielding and disease resistance attributes but also 'good' taste attributes. I also realized that farmers need to be sensitized on the benefits of starting with clean/virus-free planting materials obtained from credible sources. Such material could be obtained from tissue culture labs as basic seed and multiplied in isolated places before dissemination of material to farmers.

This led me to undertake further research on establishing the effective isolation distance for management of viral diseases in tissue culture-derived material and field-sourced virus-tested material. A manuscript has been developed to this effect and is under review by the African Crop Science Journal. This work will provide seed multipliers and smallholder farmers in Uganda with effective isolation distances in order to manage CBSD and CMD during seed multiplication thus enabling farmers to start with clean material whenever establishing new fields.

Gratitude to the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM) for the opportunity to be part of this project, my supervisors for the proper coordination and the cassava farmers from Bukedea and Kumi districts for their lovely enthusiasm and warm hospitality.