ANNEX V
INTERIM NARRATIVE REPORT
Year 4(31/05/2015 – 30/05/2016)

CASSAVA GMARKETS

THE QUEEN'S ANNIVERSARY PRIZES FOR HIGHER AND FURTHER EDUCATION 2015	
	

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1. Description

1.1. Name of beneficiary of grant contract:	Natural resources Institute, University of Greenwich at Medway
1.2. Name and title of the Contact person:	Professor Andrew Westby
1.3. Name of partners in the Action:	University of Agriculture, Abeokuta, Nigeria Council for Scientific and Industrial Research, Food Research Institute, Ghana Tanzania Food and Nutrition Centre, Tanzania Africa Innovations Institute, Uganda University of Malawi, Chancellor College, Malawi Naliendele Agricultural Research Institute, Tanzania
1.4. Title of the Action:	Improving the livelihoods of smallholder cassava farmers through better access to growth markets (CassavaGmarkets)
1.5. Contract number:	DCI-FOOD -2012/290-6
1.6. Start date and end date of the reporting period:	13 May 2015 to 12 May 2016
1.7. Target country (ies) or region(s):	Ghana, Nigeria, Tanzania, Uganda, Malawi.
1.8. Final beneficiaries &/or target groups! (if different) (including numbers of women and men):	Final beneficiaries: Small-holder cassava farmers; Processors; Employees of Small and Medium Scale Cassava Processing Enterprises; implementers of cassava value chain development initiatives Target Groups: Small-holder cassava farmers; Processors; Employees of Small and Medium Scale Cassava Processing Enterprises; Scientists in beneficiary countries, Institutions, Small and Medium Enterprises; Users of cassava flour and related products.
1.9. Country(ies) in which the activities take place (if different from 1.7):	India

2. Assessment of implementation of Action activities

2.1. Executive summary of the Action

In this reporting period, activities have commenced for all workpackages. During this reporting period there was the 3rd Annual Project Preview Meeting, Blantyre, Malawi, 12th to 14th May 2015. This meeting was used to assess project progress and plan ahead for the following year. The Project Committee coordinated activities via email at other times.

A ROM mission was undertaken in Tanzania in this time period. The project sought an extension of five months with was agreed. A five month extension was sought and approved by the EC. The impact of being granted an extension is that the completion of a PhD and evaluation of the new flash dryer in Uganda will be fully testing and analysis of real time costs, benefits, efficiency and management of the flash dryer in comparison to the open sun drying racks and solar screen house drying will be completed. The extension will enable the project to design and fabricate more robust cassava graters and presses (de-waterers) that are suited to industrial level operations as envisaged for the six cyclone flash dryer with a semi-automatic feeder.

A significant success in 2016 was the contribution that the Cassava Growth Markets project made to the University of Greenwich being awarded the **Queen Anniversary Prize**. Queen's Anniversary Prizes are awarded to universities and colleges by the Royal Anniversary Trust. They recognise excellence, innovation, impact and benefit for the winning institution and for people and society generally in the wider world. The prizes illustrate the variety and quality of innovative work being done in UK universities and colleges. They seek to encourage our institutions to think about what they are doing in terms of practical benefit as well as intrinsic quality. The work being recognised combines a track record of outstanding achievement with the promise of future development." This was the result of world-leading research and development on cassava in collaboration with partners overseas. This recognised the cassava programme that looks specifically at four key areas along cassava's journey from 'farm to fork'. They include: combating pests and diseases, adding value through processing and business development, reclaiming waste products from the cassava industry, and strengthening the capacity of developing-country scientists and practitioners. The work improves the lives of farmers through increased food security and better incomes, demonstrating a practical benefit to smallholder farmers and small- and medium-scale enterprises in the developing world. Over 30 cassava specialists are behind these achievements, with expertise spanning molecular biology, entomology, food technology, market economics and social development. They are working in collaboration with partners in 17 countries, with a focus on sub-Saharan Africa. The main external funders are the Bill & Melinda Gates Foundation, the UK government's Department for International Development (DFID), the European Commission, the African Union and the International Fund for Agricultural Development. Together, they contribute towards a current portfolio of cassava projects totalling £18.8 million, and their backing over the last ten years has helped to support almost £30 million of cassava work.
"The prize is also a tribute to the international funders and partners. **Dr Jean Pierre Halkin, Head of Unit Rural Development, Food & Nutrition Security at European Commission**, attended an event at the Mansion House, City of London, UK.

To date nearly 20 publications have resulted from the work of this project along with conference presentation and media coverage.

The summary for each workpackage is as follows:

Workpackage 1. Assessing the impact of climate change on cassava flour value chains
The overall objective of WP1 is to assess the impact of climate change on cassava flour value chains.
Through a literature review WP1 assessed the projected climate change for cassava growing areas in Africa, but focused on joint CassavaGmarket and C:AVA project geographical areas in Ghana, Nigeria, Uganda, Tanzania and Malawi. Climate change is and will influence the suitability of a given area for

cassava production. In line with the overall WP objective we therefore considered the influence of climate change on cassava value chain systems (i.e. from root production to consumption), but our emphasis on postharvest systems, which have received very little attention to date. As well as the review work, WP1 is doing some further targeted work at selected C:AVA sites to assess impacts of climate change and variability. This includes an assessment of the influence of climate change and variability on cassava cyanogenesis and mycotoxin formations (on-going PhD study in Nigeria); MSc studies of the impact of climate change and variability on cassava flour value chains in Ghana (completed) and Nigeria (completed); and an MSc study on the impact of climate change and variability on food safety and quality in Malawi (on-going). Outputs from the above activities are leading to the development of recommendations for adaptation, including the identification of further research needs which will be reported in later reports.

Workpackage 2. Understanding the impact of cassava brown streak disease in producing HQCF

Cassava brown streak disease (CBSD) has been a major impediment to food security and economic development of smallholders in eastern Africa since its major outbreak in 2004. The disease particularly affects value addition products such HQCF (High Quality Cassava Flour) as the severely rotten roots are unfit for processing and also contaminate other good quality roots. The main aims of WP2 are to understand the effect of the disease on cassava root yield and quality, to investigate the effect of farmer practices such as early harvesting as a coping strategy, to identify sources of resistance in local cassava land races and elite lines for controlling the disease, and finally to use state of the art next generation sequencing technologies (RNA-Seq) to identify resistance genes. We've made much progress on all the above activities in this Action. Three major field experiments to understand the effect of CBSD on cassava yield and quality confirmed that CBSD can cause yield losses up to 28% in the susceptible variety Albert, while the average yield loss of 9% was recorded across different varieties tested. Harvesting of cassava 12 and 15 months after planting caused greater yield losses to farmers of 10% and 12%, respectively while harvesting at 9 months caused only 4% losses. Experiments to identify sources CBSD resistance identified high diversity in the cassava germplasm and identified 4-5 lines with high levels of resistance to the disease. Experiments on next generation sequencing have identified eight cassava alleles from CBSD-resistant varieties which are consistently associated with disease resistance. These alleles have great potential to develop into molecular markers for disease resistance and subsequently in cassava field-breeding programmes. The activities of WP2 are collectively aiming to generate new knowledge that can be used to mitigate the impact of disease on smallholders in CBSD-affected countries.

Workpackage 3. Developing specific technologies to improve the efficiency of household/village and SME level processing

In WP3, findings from fabrication, optimisation and testing of low cost drying technologies at village level, modification of flash and bin drying technologies for small and medium scale levels and use of agricultural waste for drying have encouraged transfer of technologies to Malawi, Uganda and Tanzania drawing experiences from Nigeria, Ghana and India. Investors have been shown various options to enhance viable and profitable cassava enterprises using appropriate drying technologies. SMEs adopting those drying technologies have started to increase and the project is currently building more capacities for machine operation and maintenance. Documentation of drying options for sustainable and profitable ventures and demonstration of best solar and artificial (flash and bin) drying technologies are ongoing to ensure good manufacturing practices.

Workpackage 4: Ensuring the safety and quality of processed cassava products in market orientated production

Establishment of implications of variation to flour processing on the cyanogenic potential of end product were concluded in the previous year. Results showed that grating following by pressing and drying is very efficient in reducing HCN to safe levels of <10 ppm as recommended by WHO. Critical control points in HQCF processing were identified and these were on process control management and good manufacturing practices. Therefore work in year 4 focussed on demonstration and validation of proven approaches for quality assurance and documentation and demonstration of approaches to overcoming practical constraints to basic processing conditions.

Applying systematically the principles of HACCP, GAP and along the value chain including approaches to overcoming practical constraints under what are often very basic processing conditions can ensure quality and safety of finished products. Activities in year 4 focussed on development of standard operating procedures (SOP) for HQCF processing based on work conducted at Universal Industries using flash dryer in Malawi. The SOPs are very important as they improve efficiencies, profitability, consistency and reliability in production and service. Results highlighted potential areas which could affect quality of products and human resources to be involved to ensure that consistently high quality products are produced. The SOPs can be applied in any country to produce consistently safe and high quality products. This led to documentation and demonstration of approaches for overcoming practical constraints for basic processing conditions. These procedures are being further developed into best practice quality management and assurance manual for circulation. Recommendations on tests to be conducted to determine the quality of HQCF under field conditions were made and procedures documented. Some of the tests are easy and do not require sophisticated equipment such as for pH, % moisture content, colour, fineness while others such as for microbial contamination, HCN content, heavy metals and fibre content require well equipped laboratories

Workpackage 5. Expanding the range of uses of cassava flour to meet identified market demands
WP5 is focused on assessing the extent to which HQCF can be used for novel foods and industrial applications and hence, expanding the markets for HQCF and developed products. This is because HQCF has been identified by previous research as a replacement for wheat flours in bread, confectionary products, some improved versions of traditional food products, as an extender in the glues for the plywood and paperboard industries. Under WP5, HQCF has been used to develop various products across the project countries. For instance; the development of *Banku* and *Tuo Zaafi* using HQCF as an ingredient in flour blends; the development of prawn crackers from the composite of HQCF and Marine Shrimps; the development of snack-based products from the composite of HQCF, Cassava Starch and Prawn Powder (Ghana). The production of *Chin-chin* from blend of wheat, mushroom and HQCF; fried snacks formulated from HQCF, Wheat Flour (WF) and Corn Bran (CB); doughnuts from wheat-cassava composite flour (Nigeria). The preparation of *Ugali* from blended Maize Flour and HQCF (Tanzania). The development of *Atap* from HQCF and High Quality Cassava Chips (HQCC) (Uganda). The application of principal cassava varieties for use in paperboard companies; the substitution of maize starch with commercial HQCF in the formulation of hot-setting corrugated board adhesives (Malawi). These products and technologies have largely been accepted by consumers and are currently being prepared for dissemination with end use industry partners.

Workpackage 6: Maximising the gender and livelihood impacts of cassava value chain development
WP6 includes gender studies that focus primarily on Uganda, and comparing against similar research conducted in Nigeria and Malawi. The final output of the work package is a paper for publication along with other communication and teaching materials and will be the first comprehensive study based on observing new / existing cassava value chains. To date, activities have been largely completed but outputs continue to be developed. Two publications have been accepted and published and a training course developed based on the research.

Workpackage 7: Establish best practices and dissemination of project outcomes
The overall aim of WP7 is to establish, document and disseminate best practices in cassava value chain development. Two important deliverables contributing to this are Case Studies and Best Practice Guidelines for establishment and support to cassava value chains, which are based on experience with cassava value chain development across five countries, drawing on C:AVA project experience and final evaluation studies. Case studies have been identified across all five countries, reflecting important learning points associated with different cassava value chain development scenarios. The drafting of the Case Studies is almost complete.

The Best Practice Guidelines are based on the lessons arising from the case studies and from other literature on cassava value chain development. An outline and first draft have been developed. The timing of these activities has been delayed because of delays in availability of C:AVA phase 1 evaluation data, but are now well on the way to completion.