



# CASSAVA G MARKETS

## Cassava Growth Markets

*Improving the livelihoods of smallholder cassava farmers  
through better access to growth markets*



*Photo: Edward Kanju, IITA*

[cassavagmarkets.nri.org](http://cassavagmarkets.nri.org)

## About CassavaGMarkets

'Improving the livelihoods of smallholder cassava farmers through better access to growth markets', or 'Cassava Growth Markets' (CassavaGMarkets) is a project led by the Natural Resources Institute (NRI), University of Greenwich, UK, in collaboration with six international partners and associates. Its aim is to improve the livelihoods of smallholder cassava farmers through better access to growth markets. The countries this project is operating in are Ghana, India, Malawi, Nigeria, Tanzania and Uganda.

*This project is funded by the European Union's  
Food Security Thematic Programme.*



### Why is CassavaGMarkets important?

The project is of importance because cassava production, processing and marketing provide a major source of income for 450 million people, often women and the poorest in sub-Saharan Africa (SSA) and in many other countries in South and Southeast Asia. Cassava is not only strategically important as a food source and famine reserve, combining high calorific efficiency with versatile low cost/ input, reliable and flexible production, but is now seen as a pro-poor vehicle for development that is more resistant to climate change impacts than other crops. Cassava farmers, particularly from remote areas, experience restricted market access for

their produce. Roots are highly perishable, bulky and expensive to transport, and the crop has low multiplication rates due to competition with higher value and higher status crops.

### Objectives of CassavaGMarkets

The main objective of this project is to provide research knowledge that empowers smallholder farmers in their access to markets, to enable farmers to generate cash income and increase agricultural production and diversity. This requires research that examines all aspects of the value chain and factors that can impact either positively or negatively the value chain. This will also fill in current gaps in research. More specifically, the research focuses on specific issues, shown overleaf.





*Photo: A Graffham*

### **Research focus of CassavaGMarkets**

1. Assessing the impact of climate change on postharvest aspects of cassava flour value chains.
2. Understanding the impact of cassava brown streak disease (CBSD) in producing cassava products
3. Developing more eco-friendly technologies to improve the efficiency of household/village/small and medium enterprise level processing
4. Ensuring the safety and quality of processed cassava products in market orientated production
5. Expanding the range of uses of cassava products to meet market demands
6. Maximising gender and livelihoods impacts on value chain development
7. Lesson learning, documenting and disseminating best practices in cassava value chain development

The overall results focus on improvements of High Quality Cassava Flour (HQCF) value chains and other cassava products, enabling smallholder farmers to benefit from improved market access for their produce in a more equitable and sustainable manner.

CassavaGMarkets links with the project Cassava: Adding value for Africa (C:AVA), funded by the Bill & Melinda Gates

Foundation. C:AVA is a development initiative aimed at improving the livelihoods of poor farmers through linking them to markets for HQCF and related cassava products. CassavaGMarkets picks up the key research issues that C:AVA does not address to enable the expansion of the impact and replication of such value chain projects. The project will also share outputs with the EU FP7 project known as Gratitude, which contributed to reducing impact on the environment.

## Project structure

The project has seven workpackages (WP), each of which addresses a key issue related to growing cassava markets in Africa.



Photo: L Forsythe

- **WP1. Assessing the impact of climate change on cassava flour value chains**

Explore likely impacts on cassava food systems in SSA, particularly postharvest activities. Identify opportunities for adaptation within climate smart cassava systems.

Leader: Richard Lamboll, NRI, UK

- **WP2. Understanding the impact of cassava brown streak disease in producing HQCF**

Identify better virus resistant/tolerant cassava varieties and better understand the mechanisms of disease resistance using molecular approaches:

Leader: Professor Maruthi Gowda, NRI, UK

- **WP3. Developing specific technologies to improve the efficiency of household/village and SME level processing**

Specific concerns include the adoption of energy efficient and eco-friendly drying technologies.

Leader: Professor Lateef Sanni, FUNNAB, Nigeria

- **WP4. Ensuring the safety and quality of processed cassava products in market orientated production**

The main remaining challenge with cassava processing is to optimise processing to ensure that safe products are always produced. Leader. Vito Sandifolo, UNIMA, Malawi

- **WP5. Expanding the range of uses of cassava flour to meet identified market demands**

Understanding the extent to which cassava products can be used for other food and commercial applications and so expand the market for the product.

Leader: Dr Nanam Dziedzoave, FRI, Ghana

- **WP6. Maximising the gender and livelihood impacts of cassava value chain development**

To understand the gendered nature and dynamics of cassava value chains and the impacts of staple crop value

chain development on the livelihoods of smallholder farmers, particularly women.

Leader: Lora Forsythe, NRI, UK

- **WP7: Establish best practices and dissemination of project outcomes**

Understand the lessons learned from the project so that they can be linked to best practices and disseminate the outcomes.

Leader: Grace Mahende, TFNC, Tanzania and Adrienne Martin, NRI, UK

## Project successes and impact

### Queen's Anniversary Prize



In November 2015, NRI was awarded a Queen's Anniversary Prize for Higher and Further Education. Queen's Anniversary Prizes are awarded to universities and colleges and recognise excellence, innovation, impact and benefit for the winning institution and for people and society in the wider world. This prize recognises NRI's research and development in the field of cassava, strategically targeting key areas along the cassava value chain. Specifically, NRI's cassava programme works with farmers to combat pests and diseases on cassava plants in the field, works with processors to add value to the product

through business development, and develops new products from cassava industry waste. CassavaGMarkets contributed to the 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 people through increased food security and better incomes, demonstrating a practical benefit to smallholder farmers and small- and medium-scale enterprises in the developing world.



*Photo: L Forsythe*

## Achievements by workpackage

### WP1. Climate change and impact on postharvest production



*Cassava roots postharvest | Photo: L Forsythe*

- Postharvest aspects of cassava and climate change under investigated.
  - Cassava systems are vulnerable in the postharvest phase. For example, cassava's short shelf life after harvest, may become even shorter through the effects of climate change.
  - Storage, transportation and marketing are often directly or indirectly dependent on climatic conditions e.g. water access, renewable energy sources, rate of fermentation or drying.
- This will also have important implications for food quality and safety.
  - Opportunities to move forwards more climate-smart cassava systems identified.

### WP2. Cassava Brown Streak Disease (CBSD)

- Over 20 improved cassava varieties and landraces screened in the UK and in fields in Tanzania for resistance to cassava brown streak viruses.
- Five varieties were resistant to CBSD and the mechanism of resistance was found to be suppression of virus multiplication as measured by real-time PCR tests.
- Employed next generation sequencing technologies (RNA-Seq) to sequence eight of these cassava varieties.
- The sequences are currently analysed to identify candidate resistance genes and these data will be highly useful for developing disease-resistant varieties rapidly.



*Cassava roots infected with CBSD | Photo: M Gowda*

## Achievements by workpackage continued

### WP3. Cassava drying

- Best bet solar drying technologies in Benin Republic, improved and adapted in Nigeria and now under validation in Malawi, Tanzania and Uganda.
- Five SMEs and one Area Co-operative Enterprise are constructing solar screenhouse dryers.
- Project enhanced the efficiency of the flash dryer in Nigeria through an improved heat exchanger reducing costs



*Heat Exchanger with Nobex Flash Dryer in Malawi*

and environmental impact. As a result, several fuel efficient flash dryers (procured from Nigeria) have been installed: six in Nigeria, two in Malawi and two in Uganda. Are used by SMEs where trials are being conducted to ascertain the efficiency, profitability, business models and management practices for industrial cassava processing.

- In Ghana, improvement in the effectiveness of bin dryer after the insulation of heat exchanger. A total of 12 bin dryers and 9 cabinet dryers are now operational.
- ICAR-CTCRI have a joint private sector venture research in HQCF. A continuous wet cassava mash pressing machine will be manufactured and CTCRI will help in establishing a HQCF production unit at Salem, TamilNadu. This will be the first HQCF factory in India.
- CORAF/WECARD-FUNAAB-UDESWA project transferred Nobex six cyclone flash dryer to Ghana, Benin Republic, Sierra Leone and Nigeria



*Solar house*

## Achievements by workpackage continued

### WP4. Food safety and quality management



*Racks covered with black plastic paper used for drying grits by sun drying groups in Malawi*

- Identified best processing methods for HQCF to produce safe products.
- Grating followed by pressing has consistently been shown to be the best method for reducing cyanide to safe levels.
- Trace metals (As, Cu, Fe, Hg, Pb, and Zn) were below the limit set by WHO whilst aflatoxin (B1, B2, G1 and G2) was not detected in HQCF.
- Recommendations from this work will give end users confidence in buying the product and help create markets for smallholder farmers who are the main growers of the crop.
- Identified critical control points in the processing of HQCF and recommendations from this work have facilitated development of standard operating procedures for HQCF production which ensures high quality and safe products are always produced.
- Manuals are being developed following results from this work which will facilitate production of high quality safe products always.

### WP5. Expanding the range of uses of cassava flour to meet identified market demands

Products being promoted in the partner countries include:

- HQCF/HQCC for use in the bakery and confectionery industries
- HQCF/grits for use in the brewery industry
- IGCF for use in the paperboard industry
- Chips/grits as animal feed/aquaculture
- Starch



*Consumer testing in Nigeria | Photo: A Bechoff*

## Achievements by workpackage continued

### WP6. Gender

- These are the first comprehensive gender studies based on observing new / existing value chains.
- Analysis reveals that gender relations characterise market dynamics of staple crops and can limit the ability of women and other social groups from increasing, and benefiting from, cassava commercialisation processes.
- These findings emphasise the importance of integrating a gender and livelihoods approach to understanding markets and their impact on the rural poor from the onset of interventions, and finding innovative methods to address key constraints experienced by women and other social groups in cassava markets.



*Processing cassava in Uganda  
Photo: L Forsythe*

### WP7. Lesson learning

- Lessons learned relating to yields, capacity strengthening in farmer and processor groups and SMEs, gender, processed products and quality, improvements in drying efficiency, inter-regional technology transfer, securing markets, viability of the cassava value chain,

finance and scalability, are being systematised into illustrative case studies and guidelines.

- The development of the website and the dissemination strategy document have established the framework and mechanisms for effective communications, both internal and external.



*Inside the Sunshine factory, Nigeria | Photo: L Forsythe*

## Publications

### 2016

- Coker, O. J., Sobukola, O. P., Sanni, L. O., Bakare, H. A., Kajihaua, O. E., Adebowale, A. R. A., & Tomlins, K. (2016). Quality attributes of cassava-fish crackers enriched with different flours: An optimization study by a simplex centroid mixture design. *Journal of Food Process Engineering*. DOI: 10.1111/jfpe.12484
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- Ogunmuyiwa, Olugbenga; Adebowale, Abdul-Rasaq; SOBUKOLA, OLAJIDE; Onabanjo, Oluseye; Obadina, Olusegun; Adegunwa, Mojisola; Kajihaua, Tundun; Sanni, Lateef; Tomlins, Keith (2016) Production and quality evaluation of extruded snack from blends of bambara groundnut flour, cassava starch and corn bran flour, *Journal of Food Processing and Preservation*, accepted.
- Otti G, Bouvaine S, Kimata B, Mkamillo G, Kumar PL, Tomlins K, Maruthi MN. 2016. High-throughput multiplex real-time PCR assay for the simultaneous quantification of DNA and RNA viruses infecting cassava plants. *Journal of Applied Microbiology* 120: 1346-1356.
- P. T. Akonor, H. Ofori, N. T. Dzedzoave, and N. K. Kortei (2016). Drying Characteristics and Physical and Nutritional Properties of Shrimp Meat as Affected by Different Traditional Drying Techniques. *International Journal of Food Science*, Volume 2016 (2016), Article ID 7879097, 5 pages

### 2015

- Akonor Paa Toah, Dzedzoave Nanam Tay, Ofori Hayford (2015) Degradation of cyanogenic glycosides during the processing of high quality cassava flour (HQCF) *Annals. Food Science and Technology* Volume 16, Issue 2.
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- Gideon Onumah, Sanni Lateef Oladimeji (2015). Crossfire: 'Nigeria has implemented a cassava incentive and subsidy scheme that has given the sector a competitive advantage. Other cassava producing countries could learn lessons from this model'. *Food Chain* 5 (1-2), pp. 4–10
- Lora Forsythe, Adrienne Martin, Helena Posthumus (2015). Cassava market development: a path to women's empowerment or business as usual? *Food Chain* 5 (1-2), pp. 11–27
- Forsythe, L., Posthumus, H. and Martin, A. (2016) A crop of one's own? Women's experiences of cassava commercialization in Nigeria and Malawi. *Journal of Gender, Agriculture and Food Security*, 1 (2):2. pp. 110-128. ISSN 2413-922X (Online)
- Richard Lamboll, Valerie Nelson, Helena Posthumus, Adrienne Martin, Kolawole Adebayo, Francis Alacho, Nanam Dzedzoave, Grace Mahende, Vito Sandifolo, Lateef Sanni, Louise Abayomi, Andrew Graffham, Rory Hillocks and Andrew Westby (2015). Practical lessons on scaling up smallholder inclusive cassava value chains in Africa. *Food Chain* 5 (1-2), pp. 28–52

## Partners of CassavaGMarks



### Natural Resources Institute (NRI)

University of Greenwich (Lead) | [www.nri.org](http://www.nri.org)

Keith Tomlins: [k.i.tomlins@gre.ac.uk](mailto:k.i.tomlins@gre.ac.uk)

### Federal University of Agriculture (FUNAAB)

Abeokuta, Nigeria | [www.funaab.edu.ng](http://www.funaab.edu.ng)

Lateef Sanni: [sannilateef5@gmail.com](mailto:sannilateef5@gmail.com)

### Council for Scientific and Industrial Research

Food Research Institute, Ghana | [www.csir.org.gh](http://www.csir.org.gh)

Nanam Tay Diedzoave: [nanamtay@yahoo.com](mailto:nanamtay@yahoo.com)

### Tanzania Food and Nutrition Centre (TFNC)

Tanzania | [www.lishe.org](http://www.lishe.org)

Grace Mahende: [gngwasi@yahoo.com](mailto:gngwasi@yahoo.com)

### Africa Innovations Institute

Uganda | [www.afrii.org](http://www.afrii.org)

Francis Alacho: [alacodnc@yahoo.com](mailto:alacodnc@yahoo.com)

### University of Malawi – Chancellor College

Malawi | [www.chanco.unima.mw](http://www.chanco.unima.mw)

Vito Sandifolo: [sandifolovito@yahoo.com](mailto:sandifolovito@yahoo.com)

John Saka: [jsaka@chanco.unima.mw](mailto:jsaka@chanco.unima.mw)

### Naliendele Agricultural Research Institute

Tanzania | [agriculture.go.tz/naliendele/index.html](http://agriculture.go.tz/naliendele/index.html)

Geoffrey Mkamilo: [geoffreymkamilo@yahoo.co.uk](mailto:geoffreymkamilo@yahoo.co.uk)

### Associates:

### Central Tuber Crops Research Institute

India | [www.ctcri.org](http://www.ctcri.org)

JT Sheriff: [jtsheriff@rediffmail.com](mailto:jtsheriff@rediffmail.com)

### SABMiller plc

UK | [www.sabmiller.com](http://www.sabmiller.com)

Wolfgang Tosch: [wolfgang.tosch@sabmiller.com](mailto:wolfgang.tosch@sabmiller.com)

### Caltech Ventures Ltd, Ghana

Chris Quarshie: [cquarshie@caltech.com.gh](mailto:cquarshie@caltech.com.gh)

### Peak Precision Products Ltd, Nigeria

Ayo Olubori: [thepeakproducts@yahoo.com](mailto:thepeakproducts@yahoo.com)

### Nobex Technical Company

Adeoya Idowu: [nobexotech@yahoo.co.uk](mailto:nobexotech@yahoo.co.uk)

### International Society for Tropical Root Crops (ISTRC)

[www.istrc.org](http://www.istrc.org) | Lateef Sanni: [sannilateef5@gmail.com](mailto:sannilateef5@gmail.com)  
(secretary)



# CASSAVA G MARKETS

For further information please contact:

**Professor Keith Tomlins, Project Leader**

Natural Resources Institute,  
University of Greenwich  
United Kingdom

Email: [k.i.tomlins@gre.ac.uk](mailto:k.i.tomlins@gre.ac.uk)

Phone: 0044 1634 883460

[www.nri.org](http://www.nri.org)



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