

## Cluster annual report - 2018

### CA4.3 – Cluster title



#### Authors

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**Introduction:**

Cluster 4.3 aimed to improve nutrition and diets of at least 10 million households and provide income opportunities for 3 million households in Africa, Asia and the Caribbean through biofortified cassava by 2026. However, the focus is to combat vitamin A deficiency, particularly among pregnant and lactating women and children under 5 years through the deployment of adapted and productive cassava varieties high in PVA carotenoids. This cluster supports research on improving diet diversity and quality, post-harvest and processing technologies and value chain development. This report highlights our achievements in CA4.3 in 2018 and this covers the outcomes or activities that have led to influencing policies (e.g. public policies, investment decisions by the private sector, etc.), achievement with gender relevance, achievement with youth relevance, achievement with capacity development relevance and achievement with climate change relevance.


## MAIN ACHIEVEMENTS

### OUTCOME CASES AND POLICY INFLUENCED (PROPOSED)

Title of Outcome/ Impact Case Report (OICR) (30 words)	Description (up to 80 words)	Geographic scope (Specify if regional, national, sub-national and provide list of regions/countries)
Regional Investments, Policies, Legislation and Advocacy Efforts on Food-based Approaches to Combating Micronutrient Deficiency in Sub-Saharan Africa: Focus on Biofortification	The Building Nutritious Food Basket (BNFB) project works through a "food basket approach" (orange-fleshed sweet potato, provitamin A maize, high iron beans and vitamin A cassava) and has already completed situational analysis and developed advocacy strategies in Nigeria and Tanzania to support the integration of biofortification and use of biofortified crops in relevant policies and plans and strengthen the enabling environment for investments in biofortified crops. BNFB has strengthened capacity of advocates and champions in Tanzania, Nigeria and at regional level.	Nigeria, Tanzania
Advocacy tools for biofortified crops (cassava, sweet potato) + Policy document for nutrition	Policies, and strategic plans developed/formulated and implemented that prioritize support to biofortification to accelerate the scaling of biofortified crops within wider agricultural and nutrition/health	Nigeria, Tanzania
Pro-Vitamin A rich cassava bread and other baked products	Knowledge of how cassava processing influences the retention and bioavailability of nutritional components, beta-carotene, in conventional and bio-fortified varieties, glycemic index studies, and toxicity (e.g. in relation to type of peeling). Different transformed products based on biofortified	Nigeria



	cassava with detailed information on the retention of Pro Vitamin A Carotene.	
Cassava genotypes with best physiochemical properties used by the breeders	Cassava genotypes of b-carotene enriched roots, with best physiochemical properties in proximate composition and pasting properties of high-quality cassava flour (HQCF).	Nigeria
Training and promotion of biofortified released varieties and products/diets among communities during farmers field day (FFD) events in selected states in Nigeria	Adults males, females and youth from selected communities in Nigeria during FFD event are given the opportunity to participate in the demonstration of products and food preparations with biofortified cassava. At this event the benefits for using biofortified cassava is presented and some planting materials are distributed to famers. Good production techniques are demonstrated, and challenges faced by farmers and end users are discussed and solutions arrived at. Youth in Agripreneur share their aspirations to inspire more youth into agriculture	Nigeria
Gender informed strategies to scale-up adoption and utilization of vitamin A cassava among farmers in three Agro-ecological zones in Nigeria	Based on the study on Vitamin A cassava adoption in different ecological zones in Nigeria using focused group discussions and KI interviews, a gender informed tool to scale up adoption of Vitamin A cassava in Nigeria will be developed	Nigeria




Name and description of policies modified in design or implementation, informed by CGIAR research (20-50 words, ideally around 30 words)	Type (policies/ strategies / laws/ regulations/ budgets/ investments/ curricula)	Whose policy is this? The primary organization(s) either designing/promulgating the policy, law, investment (e.g. national government) etc. and/or within which it is operating.	Geographic scope (Specify if regional, national, sub-national and provide list of regions/countries)
National Policy on Food and Nutrition in Nigeria (2016–2020)	Policy	Federal Ministry of Budget and National Planning	Nigeria
Draft Nigerian Food and Nutrition Strategic Plan of Action	Plan		Nigeria
Agricultural Sector Food Security and Nutrition Strategy (2016–2025)	Policy	Federal Ministry of Agriculture and Rural Development (FMARD)	Nigeria
Ministry of Agriculture, Livestock and Fisheries' Food Security draft strategic plan	Strategic plan	Ministry of Agriculture, Livestock and Fisheries' Food Security draft	Tanzania
Tanzania Food and Nutrition Centre 5-year strategic plan	Strategic plan	Tanzania food and Nutrition Center	Tanzania
National Multi-Sectorial Nutrition Action Plan (NMNAP)	Plan		Tanzania
Agricultural Sector Development Programme Phase II	Framework and process	United Republic of Tanzania	Tanzania (BNFB influenced implementation)

### MAIN ACHIEVEMENTS WITH GENDER RELEVANCE

There were 2 articles published under Gender in 2018 uploaded to MEL, they are:

1. Olamide Olaosebikan, Abdulrazaq Bello, Durodola Owoade, Adedayo Ogunade, , Olufemi Aina, Paul Ilona, Adeline Muheebwa, Béla Teeken, Peter Iluebbey, Peter Kulakow, Moshood Bakare and Elizabeth Parkes. 2018. Gender-based constraints affecting biofortified cassava production, processing and marketing among men and women adopters in Oyo and Benue States, Nigeria. *Physiological and Molecular Plant Pathology*. vol. 105, pp. 17–27 <https://doi.org/10.1016/j.pmpp.2018.11.007>
2. Gender informed strategies to scale-up adoption and utilization of vitamin A cassava among farmers in three agro-ecological zones in Nigeria. Parkes et al., (RTB 2018 report)




Gender-based constraints affecting the production, processing and marketing of biofortified cassava in two states in Nigeria were identified using a mixed methods approach. Observed drivers of biofortified cassava production, processing and marketing varied among men and women adopters in Nigeria. Gender analysis show different importance on constraints experienced by men and women along the biofortified cassava chain. The scale of production of biofortified cassava is higher in Oyo state among adult men because of their active involvement and collaboration with research institutes within the state and the ease of transporting products to Lagos State for designated diverse markets. However, in Benue state more adult and young women are engaged in cultivation, processing and marketing business to meet up with the increased demand due to higher consumer acceptance in this region. Gender analysis revealed that lack of access to hired-labour restricted the scale of production among women in especially Oyo state. Low product price and high price of processing equipment, poor market infrastructure and middle men exploitation were constraints significantly more mentioned by women in general. Majorly, the men identified limited processing facilities/equipment as the most important constraint affecting the demand of biofortified cassava roots, while generally women were more constrained by the shortage of basic amenities and training that hindered their processing efficiency. The need therefore for integration of gender-responsive strategies to further enhance the delivery of biofortified cassava products in Nigeria.

Adequate understanding of gender influence among men, women and youth as it influences acceptability and adoption of biofortified yellow cassava among vulnerable households is pivotal in scaling up adoption. Equitable and timely access to quality seed and information source is also critical for widespread acceptance of agricultural innovations. Focus group discussions and key informant interviews were conducted in 2018 in 3 locations in Nigeria (Imo, Benue and Oyo States) where biofortified cassava stems had been largely distributed. Result showed no socio-cultural norms prevented women and men involvement in biofortified cassava production across locations. Large proportion of respondents receive planting materials dissemination by the HarvestPlus using various platforms through NGO's in partnership with ADP's in each state. Adult and young women largely depended on co-farmers, husbands and extension officer for seed while men sourced seed from sources such as NGOs and research institutes.

Key challenges limiting acceptability of the biofortified products include low market potentials, lack of awareness on nutritional and health benefits, low starch content and processing challenges. Interventions include increased awareness about the health and nutrition benefits, provision of market links and points of sale, training in processing and storage techniques, encouraging farmers to form cooperatives and continuous support for research and development in biofortification research. Biofortified cassava delivery activities in collaboration with private and public extension should be task and gender sensitive and inclusive. Strategies and interventions should be targeted towards various task groups (farmers, processors, marketers and consumers) and not only farmers.

### **MAIN ACHIEVEMENTS WITH YOUTH RELEVANCE**

Youths are actively using innovative approaches to scale up adoption and utilization of pro vitamin A cassava to tackle hidden hunger at community level during farmers field day activities. Youth in



agribusiness (Agripreneurs) share their aspirations to inspire more youth into agricultural ventures.

### **MAIN ACHIEVEMENTS WITH CAPACITY DEVELOPMENT RELEVANCE**

Cassava farmers are yet to fully exploit its full potential in terms of improvement of livelihood. Forty-five genotypes of cassava genotypes were processed into High Quality Cassava Flour (HQCF). These genotypes were planted in two sets, set 1 comprised 22 clones of  $\beta$ -carotene enriched roots and 3 check clones of white roots and set 2 comprised 18 clones and 2 check clones. The effects of variety on the proximate composition and pasting profile of the flour were investigated. The starch content ranged between 67.1 g/ 100 g (for 01/1663) and 82.4 g/100 g (for 30572) in set 1 and between 69.6 (01/1560) to 77.8 g/100 g (for Z97/0474) in set 2. Peak viscosity values ranged between 295.6 RVU (rapid visco unit) (30572) and 467. RVU (01/1115) across clones in set 1 while for set 2, it ranged from 271.9 RVU (for 01/1404) to 471.3 RVU (for 01/1417). Significant differences ( $P < 0.05$ ) existed in the proximate composition and pasting properties of the flour from different cassava genotypes investigated. The high peak viscosity exhibited by most genotypes is indicative that the flour may be suitable for products requiring high gel strength and elasticity. The proximate composition compares competitively with values obtainable from conventional clones. Genotypes have been assessed and are available for uptake. The findings of this study have been published and available for breeders to use the information in their breeding programs.

The biofortified (TMS 1368) and white-fleshed (TME 419) cassava varieties were obtained from the research farm of the International Institute of Tropical Agriculture (IITA), Ibadan, Nigeria. The high-quality cassava flour from biofortified (yellow HQCF) and white-fleshed (white HQCF) cassava varieties were produced at a commercial cassava processing factory. This was compared with 100% wheat bread with and without the addition of the artificial colorant. The nutritional composition (total  $\beta$ -carotene, moisture, ash, fat and protein contents) of the samples was done using standard methods. The results showed that yellow HQCF had the highest total  $\beta$ -carotene (10.69  $\mu\text{g/g}$ ) and ash (1.53%) contents. The white HQCF was higher in fat content (1.51%) but lower in total  $\beta$ -carotene (0.06  $\mu\text{g/g}$ ), moisture (10.59%) and protein (0.25%) contents. Wheat flour, on the other hand, was higher in protein (16.43%) and moisture (12.44%) contents, but lower in ash (0.71%) and fat (1.39%) contents. The mixture of 80% wheat flour with 20% of the yellow HQCF significantly reduced its total  $\beta$ -carotene (2.01  $\mu\text{g/g}$ ) and ash (0.86%) contents, but with an increase in moisture (12.03%), fat (1.66%) and protein (13.48%) contents. Similarly, there was an increase in moisture (12.10%), fat (1.96%) and protein (12.72%) contents, but a decrease in ash content (0.80%) in the white HQCF with the 80% addition of wheat flour. This study revealed that bread produced from 20% biofortified and white-fleshed composite flours have the highest of most of the nutritional composition except for the protein content which was higher in 100% wheat bread. The bread produced from 20% composite and 100% yellow high-quality cassava flour may contribute to the pro-vitamin A status of bread consumers if consumed with other foods rich in pro-vitamin A to achieve the FAO recommended daily intake for the reduction of vitamin A deficiency diseases.

Policies, strategies and plans with statements on biofortification were developed and implemented. They are as follows: (1) the Nigerian Food and Nutrition Policy (2016–2020); (2) the draft Nigerian Food and Nutrition Strategic Plan of Action; and 3) the Agricultural Sector Food Security and Nutrition Strategy (2016–2025) of the Federal Ministry of Agriculture and Rural



Development (FMARD). Some state governments (e.g., Oyo, Rivers and Kano) also included biofortification in their strategies.

The inclusion of biofortified crops in the Home-Grown School-feeding Program menus, being implemented by Cross Rivers and Abia states (OFSP). In 2015, Osun State included OFSP in the school menu and BNFB advocated for the inclusion of the nutritious food basket. About 26 of the 36 states have signed into the program and it is expected that other states will join and include cassava and PVA maize in the food basket. OFSP was included in the Geriatrics Department patients' menu at the University College Hospital in Ibadan.

### **MAIN ACHIEVEMENTS WITH CLIMATE CHANGE RELEVANCE**

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### **MAIN GAPS AND CHALLENGES**

The main challenge or bottleneck encountered during the reporting year is non-availability of fund. However, there was little or no deviation from the annual plan of work. Examples of areas where we had funding challenges are:

Partners are keen on reaching out to policy makers and the general public with information and events on biofortified cassava products, but funds are not available.

Events on print and televised media to educate the public and other Institutions on nutritious cassava and products in schools and other institutions has not progressed as planned due to funds.

Joint outreach events with the IITA Youth Agriprenure has been shelved due to funds for traveling with the team.

Ease of joining other projects to reach out to the public and policy makers and get champions to join in educating the public on the use of nutritious and safe foods from cassava has not seen a lot of progress with the completion of the BNFB project. Funds will be required to continue from where their efforts ended with a number of policy briefs.

### **MEASURES TAKEN AND ADJUSTMENTS PROPOSED**

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## PARTNESHIPS: ACHIEVEMENT AND CHALLENGES

Please list up to three important partnerships for 2018, using the following table.

Brief description of partnership aims (30 words)	List of key partners in partnership (one or more partners). Do not use acronyms.	Main area of partnership (may choose multiple), Research/Delivery/Policy/Capacity Development/Other, please specify
Partnership efforts with NARS in West Africa, Ghana, Sierra Leone, Benin and other national nutrition bodies	Ghana Nutrition Association Global Alliance for Improved Nutrition (GAIN) World Vision (an NGO) Forum for Agricultural Research in Africa	Delivery, Policy
Important contributor in improving the nutritional status of the Dar es Salaam urban population by supplying biofortified food products to the market	1. AFCO Investments Company Ltd, Tanzania 2. National research institutions in Tanzania (such as the Agriculture Research Institutes (ARI) 3. Maruku and ARI-Seliani Agricultural Research and Training Institute (ARTI) Agricultural Research and Training Institute (ARTI) - Uyole and other development partners to expedite the evaluation and release of biofortified high iron and zinc bean varieties in Tanzania	Delivery, Policy

Please include collaborations with one or more CRPs or Platforms – or in some cases with other Centers, if these are not already core partners for your CRP.

Name(s) of collaborating CRP(s), Platform(s) or Center(s)	Brief description of the collaboration	Optional: Value added, in a few words e.g. scientific or efficiency benefits
A4NH	HarvestPlus Delivery activities	Value added, as a rich forum of stake holders are drawn together at the Nutritious Food Fair where information is shared
Harvest Plus		

## FUND RAISING

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### ANNEX 1 – OUTPUTS TO BE REPORTED

Related output(s)	Output leader	Completed in MEL (YES/NO)
CA4.3.5.1 - Policies, and strategic plans developed/formulated and implemented that prioritize support to biofortification to accelerate the scaling of biofortified crops within wider agricultural and nutrition/health sectors		
CA4.3.5.3 - Increased investments by public, private and NGO sectors in support of biofortification The policies on nutrition resulted in more activities on nutrition and health. The School feeding program was all centered around the BNFB activities		
We responded to a call on Expression of Interest on Nutrition and food security with partners in Africa and NARS to BMZ GTZ		

### ANNEX 2 – LIST OF FORMATIVE AND EVALUATIVE STUDIES

Title	Deliverable code
The policy document indicated capacity development for policy makers This has been uploaded by Dr. Hilda Munyua	Please make sure that the study has been uploaded in MEL
Reaching Agents of Change Project: Successes, Lessons and Recommendations- Ex-Post Evaluation Report	



## REFERENCES

- Wasiu Awoyale, Adebayo B. Abass, Busie and Maziya-Dixon (2018). Retention of pro-vitamin A carotenoid in composite bread baked with high quality cassava flour from yellow-fleshed cassava root. ***Functional Foods in Health and Disease* 2018; 8(9): 438-446**
- Olamide Olaosebikan, Abdulrazaq Bello, Durodola Owoade, Adedayo Ogunade, , Olufemi Aina, Paul Ilona, Adeline Muheebwa, Béla Teeken, Peter Iluebbey, Peter Kulakow, Moshood Bakare and Elizabeth Parkes. 2018. Gender-based constraints affecting biofortified cassava production, processing and marketing among men and women adopters in Oyo and Benue States, Nigeria. ***Physiological and Molecular Plant Pathology*. vol. 105, pp. 17–27 <https://doi.org/10.1016/j.pmpp.2018.11.007>**
- Eyinla T., Sanusi R., Alamu E., Maziya-Dixon B. (2018) Variations of  $\beta$ -carotene retention in a staple produced from yellow fleshed cassava roots through different drying methods. ***Functional Foods in Health and Disease*, 8(7): 372-384**



**ANNEX 1 – Output report - CA4.3.5.1-Policies, and strategic plans developed/formulated and implemented that prioritize support to biofortification to accelerate the scaling of biofortified crops within wider agricultural and nutrition/health sectors**

During the period under review, the focus at country level was on supporting the implementation of the policies, strategies, and plans that were influenced through advocacy and that capture statements on biofortification. The policy documents influenced in Nigeria to date include (1) the Nigerian Food and Nutrition Policy (2016–2020), (2) the draft Nigerian Food and Nutrition Strategic Plan of Action, (3) the Agricultural Sector Food Security and Nutrition Strategy (2016–2025) of FMARD, and (4) a draft national advocacy brief prepared by the Federal MoBNP. Some state governments (e.g., Oyo, Rivers, and Kano) have also included biofortification in their strategies.

In Tanzania the documents include (1) the Ministry of Agriculture, Livestock and Fisheries' Food Security draft strategic plan, (2) TFNC's 5-year strategic plan, and (3) the NMNAP. In addition, BNFB supported the implementation of statements on biofortification in the ADSP II, launched on 4 June 2018 in Tanzania. The inclusion of biofortification was influenced by the RAC project. ADSP II aims to bring reforms in small-scale farming, increase productivity, increase revenue for farmers, and increase food security among others.

At regional level, through the influence of FARA, regional champions and CIP, biofortification has been included in three key policy documents - the (1) AfDB Multisectoral Nutrition Action Plan (2017–2021); (2) the CORAF Nutrition Strategy for implementation of WAtiP; (3) the African Union Business Plan to guide implementation of the CAADP-Malabo Declaration 2017–2021; and (4) the Communique of the PAP and NEPAD nutrition document and the Resolution of the PAP–NEPAD high level event on nutrition and food systems. The meeting took place on 7 March 2018 in South Africa and was endorsed by the other committees during the plenary session of the PAP in May 2018. Following the success of the BNFB-FARA side event held during the 14th CAADP PP held in Libreville, Gabon, on 24 April 2018, FARA wrote and submitted to the AUC the communique to be appended to the main CAAD-PP report. The declaration on biofortification scaling-up is expected to be submitted for endorsement during the June 2019 summit. Biofortification has also been entrenched in the 2nd African Union Specialized Technical Committee Meeting Agenda and Report; the AUC 2018 Call for Research Proposals; NEPAD's Flagship Programs for Nutrition and Food Security; the TAAT program and the African Union's Department of Rural Economy and Agriculture's Sub-Programme Area 3.4 . Additional advocacy opportunities include influencing the inclusion of biofortification in the African Union Commission strategic plan which expires in 2018. FARA and some regional champions attended the Agriculture, Nutrition and Health Academy Week event in Accra on 25–29 June 2018, and contributed to two sessions: (1) Country Prioritization for Biofortification Crop Interventions; and (2) Learning from Integrating Orange-fleshed Sweetpotato (OFSP) with Nutrition and Health Interventions. They mounted an exhibition and disseminated advocacy materials. There was a lot of interest in the regional situation analysis report and the advocacy strategy. The project will disseminate the documents to more partners and encourage them to continue implementing the advocacy strategy through advocating for policy change and raising new investment for biofortification in their spheres of work