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THE CASSAVA VALUE CHAIN

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EDITORS' NOTE

We are delighted to present the twenty-eighth issue of the Sahel Quarterly, focused on the cassava value chain and its untapped opportunities for agricultural transformation in Africa.

Africa is by far the largest contributor to cassava production, accounting for approximately 64% of the global production in 2019¹. Despite this status, Africa still lags behind other top producing continents such as Asia and South America in terms of productivity and trade. Like Asian countries such as Thailand, Vietnam, and Cambodia, Africa has an untapped potential for achieving higher productivity and contributing to the global trade for cassava by-products. Africa needs to drive the much-needed change and address current gaps in the cassava value chain by establishing a commercially viable and economically sustainable seed system, increasing farmers' productivity, and enhancing the nutritive value of the crop.

Cassava is a super crop with naturally endowed qualities such as resilience against climate stress and its ability to thrive under low input conditions. These qualities position cassava as an important crop in achieving Africa's food security. The biofortification of cassava and the fortification of its products is also an effective way to address the burden of micronutrient deficiency in Africa and change the African narrative of malnutrition.

Beyond food security, cassava possesses an immense potential to radically increase the value offering and trade status in its producing regions and create a positive ripple effect on the entire economy of Africa. The cassava processing industry holds great potential for continental trade and is a potential catalyst for economic development in Africa. By closing the demand gap locally, top cassava producers in Africa can reduce their import of cassava derivatives and its adverse effects on their local currencies. A new industry that converts the cassava peels considered as waste into safe livestock feed is a game-changer for the productivity of livestock in Africa.

This quarterly provides insights into practical solutions and business opportunities that key actors in the cassava value chain can explore to generate income, achieve job creation, and contribute to food security in Africa. We expect that this quarterly will compel actors in Africa to lead initiatives and act towards sustainable cassava production and food security in the continent.

1. FAOStat (2019). Production Indices. Available at <<https://www.fao.org/faostat/en/#search/Cassava%20and%20products>> (Accessed: 12 November 2021)



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CASSAVA: A KEY DRIVER FOR FOOD SECURITY IN AFRICA

BY ADEKUNLE ADEOYE

Overview of Cassava Production in Africa

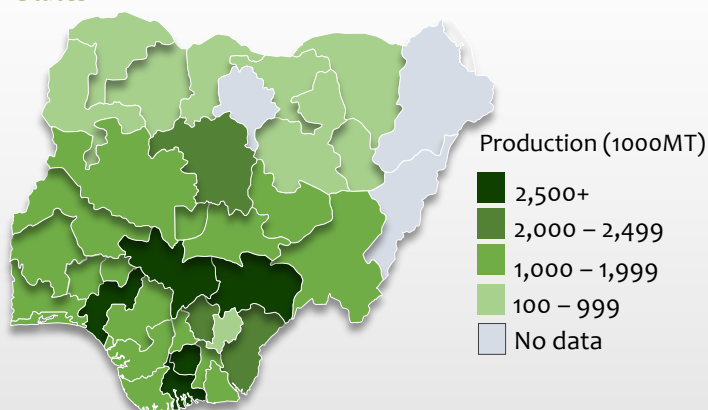
Cassava is a staple crop of choice across countries and cultures in African households². The majority of cassava tubers produced is consumed locally as traditional meals. This makes cassava an important crop by production and consumption.

According to FAOStat, Africa accounts for approximately 64% (192 million MT) of the world's cassava production, with Nigeria taking the lead with a production of over 59 million MT in 2019. However, Nigeria's average yield of 8.2 tons per hectare is very low compared to global best practices of 33.8 tons per hectare³.

Despite being the largest producer of cassava in the world, Nigeria's yield indicates that there exists inefficiency in agricultural production techniques compared to the world's best practices.

Although cassava is grown in all agro-ecological zones of Nigeria, it thrives better in the rainforest and derived savannah areas. The highest cassava production is recorded in the North-Central and South-South regions of Nigeria.

Figure 1: Map of Nigeria Showing the Highest Producing States



Source: Agricultural Performance Survey (APS) National Report, 2020

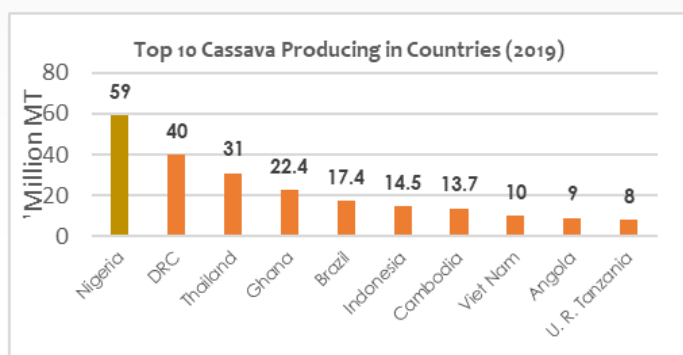
African countries account for 64% of the global production of cassava and 5 of them are among the top 10 largest global producer.

Nigeria is the largest producer of cassava in the world,

representing 19.4% of the global production. However, Nigeria has a very low yield per hectare of 8.2MT compared to world's best practices of 33.8MT.

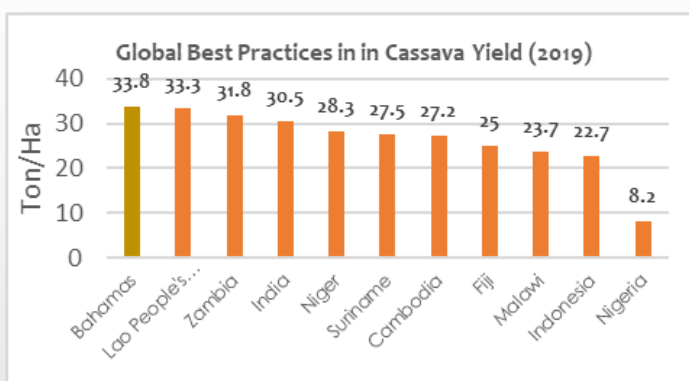
It is a multipurpose crop that is used to produce traditional foods and industrial products such as starch, high quality flour, ethanol, sorbitol, and animal feed. It is also an excellent foreign exchange commodity.

Figure 2: Top 10 Cassava Producing Countries in 2019



Source: FAOStat 2019

Figure 3: Global Best Practices in Cassava Yield in 2019



Source: FAOStat 2019

2. CGIAR (2018). What is the True Impact of Improved Cassava Varieties in Nigeria? Brief No. 64. Available at <https://cas.cgiar.org/sites/default/files/pdf/ispc_brief_64_impact_cassava_nigeria.pdf> (Accessed: 12 November 2021)

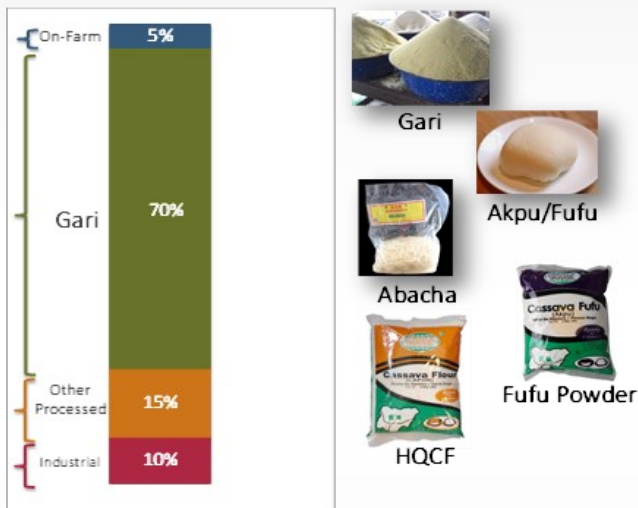
3. FAO (2014). The state of food and agriculture. Available at <<https://www.fao.org/3/i4040e/i4040e.pdf>> (Accessed: 12 November 2021)

Structure of the Cassava Value Chain in Nigeria

Traditionally, farmers source the propagating material (cassava stems) from neighboring farms, open markets, and large cooperatives. Depending on the availability of cassava stems and cropping practices, an average of 6,000 to 10,000 cassava is planted per hectare. Stem prices vary across states, largely due to seasonal availability, the differences in land area devoted to cassava farming across regions, and the concentration of processors.

Cassava production is dominated by smallholder farmers who use low-quality inputs and poor agronomic practices and have limited access to mechanization. This has been a major determinant of Nigeria's current yield of 8.2MT/ha as opposed to a potential of 20-30MT/ha if mechanization and good agronomical practices are involved.

Figure 4: Nigeria Market Share (by usage)^{1,2,3}



Source: ¹Context Network analysis based on field research, farmer interviews, and published source analysis; ²Garri: "CTA Presentation", October 2014; ³Industrial and Other Processed Food: "Sahel Rapid Appraisal of Nigerian Markets for Cassava", August 2013

Most of the cassava produced is processed into local food products such as fufu and gari using traditional food processing methods. The industrial processing landscape is facing competition from the traditional food processing segment given the high level of consumption of local cassava-based food products like gari, fufu, lafun, abacha, and tapioca. However, there is a growing market for industrial products such as starch, flour, and ethanol driven by the activities of FMCGs. This is attracting increased investment by the private sector in industrial processing.

Key Constraints in the Cassava Value Chain in Africa: Nigeria Case Example

There are key bottlenecks along the cassava value chain which are hindering the potential of the crop for income and

food security. The majority of cassava farmers adopt manual labour for land preparation, weeding, and harvesting which account for ~90% of the total production cost. The cost of transportation from the farms to processing centers is high due to the bulky nature of cassava roots. The average starch percentage for cassava varieties produced by smallholder farmers and supplied to industrial processors is low, averaging about 20% or less. However, stems of the improved varieties containing at least 25% starch, that are developed by research institutes are not readily available to farmers due to the long duration of traditional cassava stem multiplication techniques.

The short shelf life of cassava roots calls for timely processing to minimize post-harvest losses while processing equipment is costly and sometimes of poor quality. There is also the issue of price volatility as a result of irregular production with periods of glut when supply is high, and prices are low followed by scarcity and high price.

Key Drivers of Growth in the Cassava Value Chain

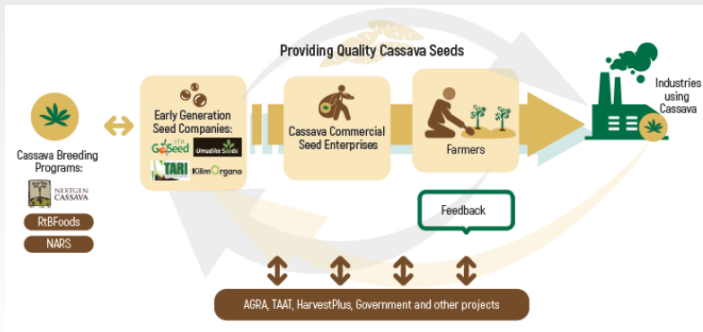
Increased adoption of improved seed and production mechanization will improve the efficiency of smallholder cassava farmers and increase productivity to achieve a vibrant cassava sector.

A seed system that is commercially viable and economically sustainable will position African smallholder farmers to achieve cassava yield potential and increase their income through the use of improved varieties and quality cassava stems. Key stakeholders are developing the cassava seed system and changing the narrative in the cassava production landscape in Africa through the Building an Economically Sustainable and Integrated Cassava Seed System, Phase II (BASICS-II). The five-year BASICS-II project aims to transform the cassava seed sector by promoting the multiplication and distribution of improved varieties thereby creating a community of seed entrepreneurs across the cassava value chain in Nigeria, Tanzania, and other parts of Africa. The program is implemented by the International Institute of Tropical Agriculture (IITA) in collaboration with other partners such as Sahel Consulting Agriculture and Nutrition, the Mennonite Economic Development Agency (MEDA), Tanzania Agricultural Research Institute (TARI), Tanzania Official Seed Certification Institute (TOSCI), National Root Crops Research Institute (NRCRI), National Agricultural Seed Council (NASC), Umudike Seeds, IITA GoSeed and Catholic Relief Service (CRS).

4. Justin K., Samuel N. N., C. P., Aman M. P., & Kukom Edoh Ognakossan. (2016). Cassava production and processing. Available at < https://publications.cta.int/media/publications/downloads/1889_PDF.pdf > (Accessed: 13 November 2021)

Objective of the BASICS-II Project

The project seeks to provide farmers with access to affordable, quality-assured seeds of the cassava varieties in demand by local food and processor markets through the establishment of a commercially viable seed value chain operating across breeder, foundation, and commercial seed levels. This value chain will enable more efficient dissemination and adoption of new varieties to improve productivity, raise incomes of cassava growers and seed entrepreneurs, enhance gender equity, and contribute to inclusive agricultural transformation in Nigeria and Tanzania.



Apart from the use of quality cassava stems, increased farmers' access to basic mechanization equipment in the production and processing segments of the cassava value chain will reduce operating costs and increase the profit margin of smallholder farmers. Also, strengthening the relationship between smallholder farmers and processors by supporting and scaling current backward integration

programmes led by the private sector will promote price stability and ensure a consistent supply of cassava roots to processing factories

Establishing industrial cassava processing in key strategic clusters will facilitate substantial growth in commercial production, and encourage vertically integrated production and processing.

The substantial expansion in integrated cassava processing capacity will serve both local and international markets and sourcing domestically. The support and stimulation of investment in the processing capacity of areas/regions of economically viable supply of cassava will accelerate the greater involvement in commercial farming to ensure supply requirements are met.

Conclusion

Increased mechanization and investment remain the gateway to achieving optimal cassava production and utilization in Africa. This will bring Africa to the limelight as it will foster its rapid industrial development which will in no small measure increase its gross domestic product. In addition to land and human resources, Africa has a huge potential to increase the productivity of cassava and cassava products which will ultimately enhance the continent's food security and improve the livelihood of over 14 million smallholder farmers who depends on the crop.



CLIMATE ADAPTATION STRATEGIES FOR CASSAVA VALUE CHAIN

BY FOLAKE FASHAKIN

Introduction

Africa, the home to over 1 billion people, unfortunately, has a starving population of 226.7 million⁵. Food insecurity remains a growing concern and is worsening with climate change. Increasing temperatures, droughts, and flooding are a continuous threat to food supply; they threaten the viability of numerous staple crops across Africa including cassava. A recent publication by the UN's International Fund for Agricultural Development (IFAD) stated that the yield of staple crops in eight (8) sub-Saharan countries could decrease by as much as 80% by 2050 if temperatures continue to rise. On the global stage, Africa carries the heaviest burden of climate change effects. There is an urgent need for adaptation strategies, changes in agricultural practices, and crop reprioritization to ensure food security across Africa.

In Africa, cassava has not received the attention it deserves, despite gaining popularity as a 'super crop' because of its resilience against climate stress and its ability to record even better yields under less favorable weather conditions. It is known to outperform maize, potatoes, cowpea, millet, and sorghum in the harshest of temperatures⁶. These naturally endowed qualities position cassava as an important crop in making Africa food secure. More attention, prioritization, and investments in the cassava value chain will improve its yield and compensate for inevitable losses on other highly susceptible staple crops in Africa.



Cassava roots infected with Cassava Brown Streak Disease

Cassava stem damaged by flooding

While cassava is resilient to adverse weather conditions, the potency and spread of cassava pests and diseases such as the mealybug, cassava mosaic, and brown streak, are amplified with increasing temperatures, and over one-third of attainable cassava yield is lost every year to pests and diseases⁷. Once established, cassava can grow in areas that receive just 400 mm of average annual rainfall, but much higher yields can be obtained with higher levels of water supply⁸. This shows that with less reliance on rain and the

deployment of irrigation technology in cassava farming, its yield can be significantly multiplied. Also, cassava is highly intolerant to waterlogging, a resultant effect of flooding. Flooding causes the destruction of cassava roots, premature harvest, loss of arable farmland, and displacement of farmers from their livelihoods.

A few programs and interventions have been implemented across Africa by public institutions, private companies, and development organizations, to strengthen climate change adaptability of the cassava value chain. The Building an Economically Sustainable, Integrated Cassava Seed System (BASICS) and the Building an Economically Sustainable Seed System for Cassava in Tanzania (BEST) are projects focused on developing the cassava seed system by addressing farmers' access to stems of improved, climate-resilient cassava varieties. These projects are important because, despite the availability of improved varieties, most smallholder farmers are unable to access quality stems in a reliable and timely fashion. The free or subsidized planting materials provided by the government through intervention programmes are sporadic and so many farmers continue to use stem cuttings from old stock or to purchase inferior quality materials from informal markets⁹. The BASICS and BEST programs established commercial seed entrepreneurs who are multiplying, distributing, and selling high-quality stem cuttings to farmers.

5. SOS Children Village (2020). Hunger and Food Scarceness in Nigeria. Available at <https://www.sos-usa.org/about-us/where-we-work/africa/hunger-in-africa> Accessed: (14 November 2021)

6. Table Debates (2013), Cassava key to food security because of its climate change resilience. Available at <https://www.tabledebates.org/research-library/cassava-key-food-security-because-its-climate-change-resilience> Accessed: (14 November 2021)

7. Food Tank (May 2020) The Impact of Climate Change on pests and Diseases of Cassava Crop. Available at <https://foodtank.com/news/2020/05/impact-of-climate-change-on-pests-and-diseases-of-cassava-crop/> Accessed: (14 November 2021)

8. FAO of the UN (2013) Save and Grow Cassava: Water Management. Available at <https://www.fao.org/ag/save-and-grow/cassava/en/4/index.html> Accessed: (14 November 2021)

9. IITA (2020) Project to build sustainable cassava seed system. Available at <https://www.iita.org/news-item/project-to-build-sustainable-cassava-seed-system-in-africa-gets-new-phase/> Accessed: (14 November 2021)



A BASICS commercial seed entrepreneur in Benue state, Nigeria

Despite these efforts by the BASICS and BEST projects and other similar programs, there are still gaps in farmers' awareness and access to available improved cassava varieties. Many smallholder farmers still resort to planting the same old and disease susceptible stock, hence keeping Africa's cassava production below potential. Also, without funding and technical know-how, rain-fed cassava farming continues to limit farm yield in Africa.

Shortfalls of Existing Coping Strategies Adopted by Cassava Farmers

To mitigate the effects of climate change and the challenges it poses to their productivity and profitability, smallholder farmers adopt several coping strategies such as crop rotation, the use of agrochemicals to control disease outbreaks, construction of drainages within farmland to control flooding, and occasional use of weather forecast when there is access to public or private extension services.

While these strategies provide farmers with short-term cushioning effects, they do not significantly mitigate the effects of climate change or improve the yield and development of the cassava value chain. The overuse of pesticides, for instance, results in soil infertility as beneficial micro-organisms are destroyed by these agrochemicals; and long-term use eventually reduces crop yield. Weather information is not readily available to smallholder farmers, as the infrastructure required to enable them to access this always is not provided. Crop rotation implies that farmer deploys their lands for the cultivation of other crops instead of cassava for a season or more, this results in the reduction of overall cassava yields. Also, constructing drainages to overcome flooding every year increases farm drudgery and usually is not effective.

Recommendations

Reducing the impact of climate change on cassava production will unlock Africa's potential for increased productivity and food security. The following recommendations will help to

refocus mitigation efforts and broaden the impact of initiatives focused on developing and commercializing climate change adaptation solutions across the continent:

- Scaling Up the Commercialization of Seed Systems:** Governments and private sector companies must devise strategies to increase commercial production, multiplication, distribution, and sales of improved stem cutting to smallholder farmers. More sustainable seed businesses must be established by recruiting and enabling seed entrepreneurs. Area mapping should be done, to effectively capture cassava farming communities and create seed markets that are accessible by these farmers. Like the Direct Seed Market approach deployed by the Ethiopian government in 2011, seed commercialization must be encouraged, with more rural entrepreneurs (within the reach of farming communities) taking up the seed business and exploring market linkages.
- Public Investment in Irrigation Programs:** According to a 2019 publication by Alliance for a Green Revolution in Africa (AGRA), irrigation in Africa has the potential to boost agricultural productivity by 50%¹⁰. Cassava farming in Africa is largely rainfed, hence the burden impacted by climate change. On their own, smallholder cassava farmers cannot afford automated irrigation technologies such as drip or sprinkler irrigation. Providing access to suitable irrigation technology such as drip irrigation or tube wells (which are easier and cheaper to install and maintain), and intensive training programs will not only increase existing farmer yields but also encourage entry into cassava farming.



Drip irrigation on a cassava farm



Tube well irrigation

- Increased Involvement of the Private Sector in the Implementation and Sustenance of Development Programs:** Government initiatives and projects aimed at helping farmers mitigate climate change and developing the cassava value chain should partner with private

10. AGRA (2019) Irrigation doubles African food Production. Available on <https://agra.org/irrigation-doubles-african-food-production/> Accessed: (14 November 2021)

sector actors who have the expertise to drive, execute, and manage programs, and build business models linked to profitability to sustain the impact of development programs.

- **Intergovernmental Synergy:** There is a need for increased collaboration among government agencies as this is important in mitigating the effects of climate change on food systems, including cassava. In Nigeria for instance, the Nigerian Meteorological Agency (NiMet) provides advisory to all sectors of the economy and governments on climate and weather forecasts. Linking smallholder farmers constantly with useful data will require a partnership between this agency and related units of the ministry of agriculture. This way, joint policies and aids that facilitate farmers' timely access to meteorological data such as seasonal & daily weather forecasts, best planting dates, early disaster warning signs (e.g., flooding) can be developed and effectively implemented.
- **Strengthening Extension Services:** Ministries of Agriculture must put out policies and incentives that strengthen extensions services to rural farmers. Farmers

should be trained and made aware of climate change, its effects, and best adaptation practices specific to their location.

Conclusion

Unlike other staples in Africa, cassava can thrive under harsh climate conditions; however, pest and diseases of cassava thrive in these same conditions and affect cassava yields annually. Current coping strategies employed by farmers, and several initiatives by government and development organizations have not achieved much success beyond the pilot phases and focus areas. There is an urgent need for interventions that upscale existing programs by actors across the cassava value chain to boost the natural resilience of cassava against climate change, as a tool for achieving a food secure Africa.



WASTE TO WEALTH: SCALING UP THE POTENTIAL OF CASSAVA PEELS AS A SUSTAINABLE ALTERNATIVE FOR ANIMAL FEED PRODUCTION IN AFRICA

BY HAJARAT OKENLA

“Feed accounts for 65–75% of the total cost of livestock production and contributes over 70% to the success of livestock production as it plays a critical role in the development and productivity of any livestock”

Figen K. & Zümrüt A. (2018); Fisayo K. (2021)

The Food and Agriculture Organization (FAO) projects that the global demand for livestock products would increase by over 60 percent by the year 2050. The livestock sector is under significant pressure to greatly increase the amount of safe, nutritious feed available to animals for the provision of animal-based products needed in the future¹¹. Animal feed becomes crucial as it affects the quality of animal-based products consumed by humans. According to Fisayo (2021), it is globally recognized that animal feed contributes over 70% to the success of livestock production as it plays a critical role in the development and productivity of any livestock¹².

Animal feed means any simple or compounded product which is grounded, pelleted, crumbled, or mixed, balanced for various nutrients according to standards, and intended to supply the nutritional requirements of animals or contribute to their maintenance, growth, and productive capacity. Animals, in general, require the same nutrients as humans, thus, feed is given to animals for growth, reproduction, and good health¹². Good animal feeding plays a vital role in animal health & welfare and the production of safe and quality products of animal origin¹³.

Livestock turn feed into added-value products, such as milk, meat, and eggs. Kirkpınar and Açıkgöz (2018) suggest that feed accounts for 65–75% of the total cost of livestock production in Africa and other developing countries. If the feeding is efficient, the cost of production is reduced while the productivity and profitability of livestock production increases¹⁴.

According to Adegoke and Ayantunde (2016), inadequate quantity and quality of feed resources are major factors limiting the productivity of livestock production systems in the Sahelian zone of West Africa. The common problems with these feed resources are marked variation in availability and quality and seasonal shortage, which have been consistently reported as the major constraint to livestock production in developing countries¹⁵.

Feeding of livestock continues to pose many problems due to

a lack of information on the composition and utilization of locally available feed resources. With the present trend of rising feed prices and global inflation, livestock production is increasingly constrained by feed scarcity and the high cost of feeds¹⁶.

The dependence of livestock production on conventional feedstuff such as maize, soybean cake, fish meal, and other items may no longer be cost-effective in Africa because of the rising demand for these ingredients, particularly maize and soybean, and their irregular supply. Furthermore, the availability of quality feed and pasture has drastically reduced over the years due to the effects of climate change and limited access to production resources leading to migration of pastoralists to areas with a relative abundance of forage and places considered safe for the herds which in the process has led to incessant clashes and insecurity (Kayode, 2021).

The results from a study on the livestock sector in Nigeria show that livestock production is dependent on natural pasture and crop residues, which are both harvested by the farmers or purchased.

11. Food and Agriculture Organization, FAO (2021). Importance Of Accurate Feed Analysis In Enhancing Safety And Quality Of Food, Increasing Productivity And Welfare Of The Animal And Conserving The Environment. Available at: <https://www.fao.org/ag/againfo/home/en/news_archive/AGA_in_action/2014_Importance_of_accurate_feed_analysis.html> (Accessed: 11 November 2021).

12. Fisayo Kayode (2021). Commercialized Animal Feed: Lessons from Advancing Local Dairy Development in Nigeria. Available at: <<https://sahelconsult.com/fisayo-kayode-writes-on-commercialized-animal-feed/>> (Accessed: 11 November 2021). ClassHall (2020). Animal Feeds and Feeding. Available at: <<https://classhall.com/lesson/animal-feeds-animal-feeding/>> (Accessed: 11 November 2021).

13. CODEX (2020). Animal Feed. Available at: <<https://www.fao.org/fao-who-codexalimentarius/thematic-areas/animal-feed/en/>> (Accessed: 11 November 2021).

14. Figen Kirkpınar & Zümrüt Açıkgöz (2018). Feeding. Available at: <<https://www.intechopen.com/chapters/61960>> (Accessed: 11 November 2021).

15. Tunde Adegoke Amole and Augustine Abioye Ayantunde (2016). Assessment of Existing and Potential Feed Resources for Improving Livestock Productivity in Niger. Available at: <<https://scialert.net/fulltext/?doi=ijar.2016.40.55>> (Accessed: 11 November 2021).

16. Lukuyu B., Franzel S., Ongadi P. M., & Duncan A.J. (2011). Livestock Feed Resources: Current Production and Management Practices in Central and Northern Rift Valley Provinces of Kenya. Available at: <<https://hdl.handle.net/10568/3817>> (Accessed: 11 November 2021).

Animals were kept on grazing most of the periods of the year including during the wet season when they migrate from their existing settlements due to cropping activities and returned during harvest. Residues from major crops such as millet, sorghum, cowpea, and groundnuts constitute a major source of livestock feed after natural pastures, especially during the dry season.

Similarly, Ghana's non-ruminant livestock production has been severely constrained by a lack of consistent and high-quality feed. Acute shortage of feed occurs in the intensive rearing systems due to escalating prices of maize and other major feed ingredients, including agro-industrial by-products, thus raising the cost of livestock production¹⁷.

Based on the seasonality of crop production, there is always competition for conventional feed sources in Africa between humans and animals. Poor animal nutrition due to inadequate availability and supply of good quality feed and water critically limits the efficiency of livestock production and the economic benefits derived from livestock-based production systems by farmers in Africa.

Energy sources constitute about 15 - 40% of compound livestock feeds and concentrate respectively. Presently, maize constitutes the bulk of the energy source in such rations. The difficulty in obtaining foreign exchange in many African countries has considerably reduced the imports of maize and other cereals. At the same time, local production of cereal grains remains grossly inadequate for human food and animal feed industries. The shortages of grains have therefore resulted in an astronomical increase in their price, particularly in a few months before harvest. Cassava production has been rising steadily in many African countries and its availability along with its competitive price makes it a feasible alternative in animal feed production. According to the Food and Agriculture Organization, "animals raised on cassava have generally good health, good disease resistance, and a low mortality, and require few if any, antibiotics in their feed"¹⁸. In places where it is a cheap carbohydrate source, it can supply adequate calories and therefore offer great potential as animal feed. However, due to limitations such as its low content of protein, and some essential vitamins and minerals, it is often rated as inferior to maize. If properly balanced in proteins, vitamins, and minerals, its suitability as an energy source in compound feed rations for livestock will be fully acceptable¹⁷.



"Feed millers valued High-Quality Cassava Peel (HQCP) fine mash at \$150 per ton, High-Quality Cassava Peel (HQCP) coarse mash at \$100 per ton and unseparated whole mash at \$133 per ton."

Iheanacho Okike (2020)

Trash to Cash: Cassava Peels as Energy Source in Animal Feed Production

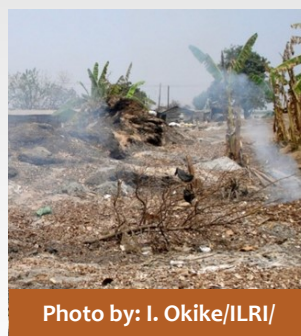


Photo by: I. Okike/ILRI/

The principal parts of the mature cassava plant expressed as a percentage of the whole plant are leaves (6%), stem (44%), and storage roots (50%). The roots and leaves of the cassava plant are the two nutritionally valuable parts, which offer potential as a feed source¹⁷.

Cassava processing for both household consumption and industrial use generates considerable quantities of cassava peel which are left in large heaps to rot or are set on fire. Rotting heaps release methane into the air and a stinking effluent pollutes nearby streams and underground water, while burning produces clouds of acrid smoke. Transforming cassava peel into nutritious animal feed has the potential to partially replace maize and soybeans in the animal feed while reducing environmental pollution and minimizing post-harvest losses. This crop-waste by-product could be a valuable feed alternative¹⁸.

Nigeria, the largest cassava producer in the world, is transforming its cassava sector and strengthening the value chain of the root crop to make it more competitive. The increase in production of cassava roots is also generating between 5.6 – 8.9 million tons of wet peels (that is, ~10 – 15% of the whole tuber), as cassava is processed for traditional food and industrial products. These cassava peels could contribute largely to the income of farmers and provide additional economic options for livestock and fish producers if converted to animal feed. Also, additional benefits accrue to consumers from the availability of maize and soybean grains

17. Kwame Oppong-Apene (2013). Cassava As Animal Feed in Ghana: Past, Present, And Future. Available at: <<https://www.fao.org/3/i3304e/i3304e.pdf>> (Accessed: 11 November 2021).

18. International Institute of Tropical Agriculture, IITA (2013). Roadmap for Cassava-Based Animal Feed System in Africa To Be Drawn in IITA. Available at: <<https://www.iita.org/news-item/roadmap-cassava-based-animal-feed-system-africa-drawn-iita/>> (Accessed: 11 November 2021). CGIAR (2020): Scaling up the use of cassava peel as animal feed in Nigeria. Available at <<https://www.rtb.cgiar.org/news/scaling-up-the-use-of-cassava-peel-as-animal-feed-in-nigeria/>>

that could otherwise have gone into the animal feed sector. Cassava roots, peels, and leaves can be directly fed to livestock or used in producing commercial animal feed.

In 2015, the International Livestock Research Institute (ILRI) and the International Institute of Tropical Agriculture (IITA), supported by the CGIAR Research Program on Roots, Tubers, and Bananas (RTB), together launched the Cassava Peel Project, to address the problem of cassava waste. Under this project, a procedure was developed by Dr. Iheanacho Okike and other researchers which converts wet cassava peel into energy-rich, high-quality animal feed.

Cassava Peel to Feed Process Cycle



Source: CGIAR (2020). Scaling up the use of cassava peel as animal feed in Nigeria

Initial testing has shown that the fine cassava mash effectively replaced 10% of maize in poultry and fish feed, while the coarse mash could be included in cattle, sheep, goat, and pig rations without affecting growth performance. 15 million tons of peel waste can be converted into 3.3 million tons of fine mash and 1.7 tons of coarse mash. With a moisture content of about 10-12%, the final product can be stored for about 6 months.



Photo by: I. Okike/ILRI/

Feed millers valued High-Quality Cassava Peel (HQCP) fine mash at \$150 per ton, coarse mash at \$100 per ton, and unseparated whole mash at \$133 per ton. In 2019, 26,000 tons of High-Quality Cassava Peel (HQCP) fine mash was introduced and piloted in the Nigerian poultry and fish feed industry. Feed millers in Nigeria mentioned that High-Quality Cassava Peel (HQCP) was ~30-40% cheaper than other sources of energy such as maize and soybeans, profitable to farmers through reduced feed cost, and a good, nutritious source of animal feed. In addition, feed millers did not incur extra costs in purchasing lighter ingredients like with the use of maize¹⁹.

Ensuring The Sustainable and Successful Use of Cassava-Based Feed in Africa

Below are a few strategies to consider by the government and other key actors in the animal feed industry to promote the adoption and use of cassava-based feed resources in addressing gaps in Africa's animal feed production:

- Sensitization on the Benefits of Cassava-based Animal Feed:** Research institutions - such as the International Livestock Research Institute (ILRI)- and development organizations should collaborate with animal feed industry stakeholders to organize training programs that sensitize feed millers on the use of appropriate cassava-based feed formulations to produce quality feed at lower cost thereby improving the income of feed producers and farmers. The government, research institutes, and private sector actors should engage in awareness programs such as workshops and media engagements on the potential and economic benefits of using cassava for livestock feed.
- Provision of Machinery and Technologies:** The government should encourage the use of appropriate technologies and machinery by feed millers to produce a cassava-based feed of guaranteed quality that meets the nutritional needs of fast-growing livestock. It is also important for the government to back up the introduction of new technology and machine with development funds for the animal feed industry to support the procurement of equipment for processing cassava peels as animal feed. This will enable more smallholder farmers, small- and large-scale processors, and feed millers to invest in adopting new technology. Investors should also consider the opportunity in providing funds to feed millers within the emerging cassava-based feed industry. Donor organizations should champion incentives and initiatives that encourage smallholder farmers, small- and large-scale processors, and feed millers in playing key roles within the feed industry.
- Creation of Enabling Environment:** Government should create an enabling environment to encourage small-scale farmers, cassava processors, and feed millers to take up the large-scale production of good-quality and standardized cassava-based feed products. Government policies and strategies can influence the use of cassava as

19. Iheanacho Okike (2020). Cassava Peels: From Want-Not to Waste-Not. Available at: <https://agrilinks.org/post/cassava-peels-want-not-waste-not> (Accessed: 11 November 2021).

livestock feed. This would stimulate increased feed production, ensuring quality animal feeds on the market, reducing production costs, and building capacity among the private and public sectors for the development of the animal feed industry.

- **Capacity Building:** The government, research institutes, and public sector actors should support capacity building for farmer groups, processors, and feed millers on the formulation of cassava-based feed production and rationing. It will be necessary to improve farmer training, access to information and strengthen linkages with stakeholders. However, this approach needs to be accompanied by participatory approaches that will allow policy interventions to be developed along with farmers' and other stakeholders' input for a relevant and sustainable cassava-based feed industry.

Conclusion

A new opportunity in the animal feed industry using cassava peel waste is emerging. The new cassava-based feed is generating income and employment, especially for women. The unsightly, stinking mounds of cassava peel are being turned into a product that smallholder farmers, small- and large-scale processors can sell. The use of cheaper and readily available local feed resources has great potential to increase livestock productivity. Converting the waste from cassava into a safe livestock feed is a game-changer and has the potential to be scaled out in other African countries.

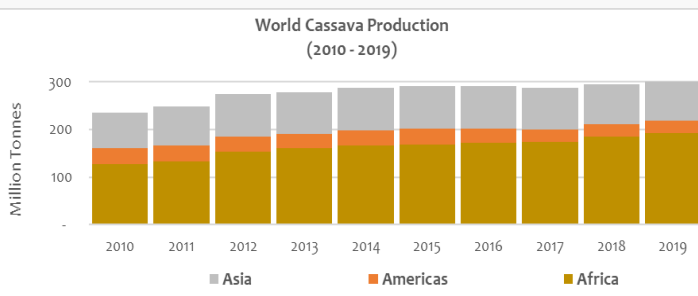


THE CASSAVA VALUE CHAIN IN AFRICA: ASSESSING EXPORT READINESS

BY UYAIETIENO OKONNAH

Introduction

The export outlook for cassava in Africa shows great potential and possibilities as the continent is the world's largest cassava growing region and is home to the largest producers of the crop. However, it is still yet one of the least exporters of the commodity, capturing less than one percent (1%) of the total value of cassava exports globally.



How can a continent that produces so much, not export?

Cassava is a Food Crop Crucial to Food Security

A 2018 FAO report shows that cassava is principally a food crop in Africa and is a strong stimulus for rural development, poverty alleviation, economic growth, and ultimately, food security²⁰. As we strive to boost and increase intra-African trade and trade with other parts of the world, a key factor that should not be neglected is the ability of the continent to feed itself and to ensure food security. FAO reports that food insecurity has been rising in Africa and the continent is not on track to eliminate hunger by 2030²¹.

In Nigeria, the largest cassava-producing country, cassava is the second most important food staple after maize and is crucial for attaining food security and improved nutrition. Consumption of cassava in the country is dominated by traditional foods with Garri representing about 70% of the total consumption²². Other West African countries like Ghana report that about 85% of total cassava production is eaten as food with the remaining being processed into 'gari' for local consumption and dry chips for export²³. Likewise in the Democratic Republic of Congo (DRC), only 20% of cassava production is available for processing²⁴.

Satisfying Local Demand for Cassava and Exploring Its Export Potential

A plausible reason why the continent's export of cassava products is relatively low or non-existent is that the local demand for the crop and its derivatives within the continent exceeds the supply. This trend is likely to continue as local demand-driven by annual population growth is estimated to only increase. Africa records an annual population growth rate of 2.63%²⁵ and an urban population growth rate of 3.99%²⁶ which implies that the demand for food and consequently, cassava products are only going to increase given its popularity as a food crop. Besides its primary consumption as food, cassava products are also increasingly gaining importance as key industrial inputs crucial to the export market and industrial growth and development.



20. FAO (2018). Food Outlook - Biannual Report on Global Food Markets – November 2018. Rome. 104 pp. Available at: <<https://reliefweb.int/sites/reliefweb.int/files/resources/ca2320en.pdf>> (Accessed: 29 October 2021).

21. FAO, ECA and AUC (2020): Africa Regional Overview of Food Security and Nutrition 2019. Accra. Available at: <<https://doi.org/10.4060/CA7343EN>> (Accessed: 29 October 2021).

22. Oluwatosin A & Barbara S (2019). 'Cassava, a 21st Century Staple Crop: How can Nigeria Harness Its Enormous Trade Potentials?' ACTA Scientific Agriculture, vol. 3, no. 8, pp 194 – 202. Available at: <<https://actascientific.com/ASAG/pdf/ASAG-03-0586.pdf>> (Accessed: 29 October 2021).

23. Angelucci F. (2013). Analysis of incentives and disincentives for cassava in Ghana. Technical notes series, MAFAP, FAO, Rome. Available at: <<https://gatesopenresearch.org/documents/3-1013/pdf>> (Accessed: 29 October 2021).

24. Sara M. & Gérard B. (2013): Improving cassava production and supply systems. Available at: <https://snv.org/cms/sites/default/files/explore/download/improving_cassava_production_and_supply_systems_in_dr_congo.pdf> (Accessed: 2 November 2021).

25. World Bank (2021): World Bank Data – Population Growth (Annual %) – Sub-Saharan Africa. Available at: <<https://data.worldbank.org/indicator/SP.POP.GROW?locations=ZG>> (Accessed: 2 November 2021).

26. World Bank (2021): World Bank Data – Urban Population Growth (Annual %) – Sub-Saharan Africa. Available at: <<https://data.worldbank.org/indicator/SP.URB.GROW?locations=ZG>> (Accessed: 2 November 2021).

In Nigeria, a 2020 PwC²⁷ report shows that the demand for cassava derivatives, ranging from High-Quality Cassava Flour (HQCF), cassava starch, ethanol, cassava-based constituents in sugar syrup, garri, fufu, to cassava chips far exceeds the supply. The demand gap for some of these derivatives is as high as 290,000 MT for cassava starch and 485,000 MT for

High-Quality Cassava Flour (HQCF). For ethanol, the report also estimates a potential demand of over 1 billion litres for industrial and domestic purposes where the current supply is very low. PwC also estimates that over 28 million metric tonnes (MMT) of fresh roots would be required to meet the demand for these select use cases.

Potential Demand for Selected Cassava Products



500,000 MT

High Quality Cassava Flour (HQCF) in bread biscuits and snacks



350,000 MT

Cassava-based constituents in sugar syrup



400 million Litres

Over 400 million litres of ethanol is needed for industrial uses



400,000 MT

Cassava Based Adhesive (cassava starch, caustic soda, formaldehyde, hydrochloric acid, and sodium silicate)



2.1 MMT

Per capita consumption of Garri in Nigeria is about 12.5kg. The total demand based on the estimated total population of 167 million people is 2.1 million metric tonnes per annum



1.5 MT

The demand for cassava chips as an industrial product is wide and cuts across multiple manufacturing industries such as distilleries, pharmaceutical, etc.



750,000 MT

The potential demand for fufu in Nigeria is estimated at 750,000 metric tonnes.

Source: PwC (2020): Harnessing the Economic Potential of Cassava Production in Nigeria

While cassava plays a crucial role in achieving food and nutrition security in Africa, the cassava value chain can and should aspire to attain self-sufficiency status and record increasing levels of intra-African trade. Beyond food security, cassava possesses an immense potential to radically increase the value offering and trade status in its producing regions and create a positive ripple effect on the entire economy of Africa.

To satisfy the increasing demand for cassava products in the export markets, data from the Food Outlook shows that countries like Cambodia, the Lao People's Democratic Republic, and Vietnam have successfully increased local production of the crop by increasing the land size cultivated for the crop. While this may work for these countries, increasing local production by increasing the area cultivated in Africa may not yield the desired results as the area cultivated for cassava in Africa has steadily increased over the years but is yet to achieve targeted levels. A sustainable solution could be to increase production by improving production practices as the yield performance of the crop in

Africa is far lower than what is obtainable outside the region.

Trade has proven to be an important instrument for driving growth and development and combating poverty. In a report titled, "The Role of Trade in Ending Poverty", the World Bank highlights that trade is central to ending global poverty, and countries that are open to international trade tend to grow faster, innovate, improve productivity, and provide higher income and more opportunities to their people²⁹. This is particularly crucial to a region home to forty-three (43) economies with the highest poverty rates in the world and yet is the youngest continent in the world as more than

27. PwC (2020). Harnessing the Economic Potential of Cassava Production in Nigeria. Available at: <<https://www.pwc.com/ng/en/publications/economic-potential-of-cassava-production-in-nigeria.html>> (Accessed: 2 November 2021)

28. World Bank Group and World Trade Organization (2015). The Role of Trade in Ending Poverty. World Trade Organization: Geneva. Available at: <<https://documents1.worldbank.org/curated/en/726971467989468997/pdf/97607-REPLACEMENT-The-Role-of-Trade-in-Ending-Poverty.pdf>>

400 million of its people are aged between 15 and 35²⁹.

Recommendations

It is expedient that the regional production rate of cassava is increased to grow the cassava value chain within the continent and expand its product offerings to other parts of Africa, leveraging trade facilitators such as the African Continental Free Trade Area (AfCFTA). Some recommendations to contribute to achieving this include:

- **Developing Favourable Policies that Promote Value-Addition through Industrial Processing:** In Nigeria, the industrial cassava processing landscape is growing but requires favourable policies from the government to thrive. Industrial processing in the country can potentially absorb excess production and minimize price fluctuations in specific seasons such as the three-year burst-boom (glut cycle) cassava cycle in the value chain.

PWC reports that “Adding value to the commodity to produce derivatives and by-products (such as sweeteners, ethanol, cassava starch, etc.) through local manufacturing and processing to meet local industry need and direct consumption is strategically important to the growth of the agriculture sector and the overall economy.”

To ensure that the budding industrial cassava processing landscape thrives, favourable policies to promote local production by infant industries and discourage the consumption of cheaper imported substitutes by institutional consumers such as the FMCGs are crucial. Over time, this will build the capacity of local processing industries to satisfy local industrial demand within the country, engage in intra-continental trade and ultimately inter-continental trade.

- **Fostering Increased Access to Inputs:** This is to ensure that key inputs such as demand-driven climate-smart cassava varieties developed are taken up by smallholder farmers across the continent for production. Interventions by donor organizations such as the BASICS project over the past five years have seen improvements in the Nigerian and Tanzanian cassava seed system such as the participatory development of improved varieties, the establishment of competitive seed entrepreneurs or foundation seed growers to multiply, distribute, and sell high quality cutting to farmers. These results need to be scaled to reach more smallholder farmers across the continent to ensure increased production and processing rates.
- **Mechanization of Processing Activities:** Manual and labour-intensive processes in production and processing such as the peeling and roasting steps which are currently the least mechanized but represent the largest costs and biggest bottlenecks in gari processing should be mechanized to save time, and money.

Conclusion

The cassava value chain possesses the immense potential to not only contribute significantly to achieving nutrition and food security in Africa but also attain self-sufficiency and foster intra-African trade. By improving production systems to guarantee better yields and quality of roots, mechanizing manual production and processing techniques for efficiency, and implementing policies that support infant cassava processing companies to thrive and scale amongst other factors, the continent will see a more effective and efficient cassava value chain.



29. African Union (2021): Youth Development. Available at: <<https://au.int/en/youth-development>> (Accessed: 2 November 2021).

THE POTENTIAL OF CASSAVA TO SERVE AS AN EFFECTIVE WEAPON IN THE WAR AGAINST HIDDEN HUNGER

BY MUHAMMAD MUZZAMIL

Introduction

The global burden of malnutrition remains an issue of public health concern with Africa and Asia at the helm of it. Globally, the number of people that experience hunger is alarming with reports showing that one in every nine people are facing hunger³⁰. Hunger leads to food insecurity, undernourishment, and malnutrition. According to a recent report, more than half of the world's stunted children are in Africa (30.7%) and Asia (21.8%)³¹. The complication of malnutrition in Africa is quite worrisome as most of the regions (and countries) of the continent suffer from the burden of micronutrient deficiency.

Micronutrients comprise nutrients in the form of minerals and vitamins which are required by the body in small amounts to carry out basic physiological functions. Micronutrients are essential for the proper physical, cognitive, and mental development in children, especially at the early stages of life. The unavailability of any of the essential micronutrients for use by the body leads to micronutrient deficiency. Micronutrient deficiency is usually not acutely visible, and hence it is sometimes referred to as 'hidden hunger'. Some of the micronutrients that are of public health concern include iron, vitamin A, zinc, and iodine. Micronutrient deficiencies have an impeding effect on health that sometimes even leads to death at chronic stages.

The Global Hidden Hunger Index (GHHI), a tool that measures the severity of malnutrition in relation to the prevalence of stunting (a proxy for zinc), iron-deficiency anemia (IDA), and vitamin A deficiency in a country, further shows the urgent need for action, especially in Africa. According to the GHHI, out of the 20 countries affected with multiple micronutrient deficiencies, 18 were from sub-Saharan Africa and two from Asia³². Nigeria ranked 30th out of 149 countries considered with a Hidden Hunger Index (HHI) score of 36 (on a scale of 100), which is classified as being severe. Another concern for the malnutrition burden in Africa is the inequality and its disproportionate distribution amongst several socio-demographic characteristics (age, sex, socio-economic status) within a particular population. In Nigeria, the difference of malnutrition between the two ends of the socio-economic ladder is quite significant with 62.8% of the poorest population suffering from stunting compared to 18.3% of the richest population³³.

Relevance of Cassava Biofortification for Africa

Foods that are commonly consumed by a large proportion of the population serve as suitable vessels for fortification with micronutrients to ensure nutrition security. In Africa, roots and tubers are one of the most consumed food groups and cassava is an ideal crop to fight the scourge of malnutrition given its high rate of consumption by rural and urban populations. Cassava is processed into various forms and consumed widely across Africa. Some of the forms in which cassava is consumed include 'kpokpogari' and 'abacha na aku oyibo' in Nigeria, 'Agbeli kaaklo' and 'kouti' in Ghana, cassava chips, and tapioca amongst others.

Although cassava does not have a high nutritive value, especially for certain micronutrients, the crop has benefitted from several initiatives focused on increasing its nutrient load through biofortification. In the past decade, organizations like HarvestPlus have made great strides towards improving the nutritive value of cassava through the development of vitamin A-rich cassava and its promotion for adoption into the food systems of several African countries like Nigeria, Ghana, Cameroon, and DRC. The biofortification of a staple crop that is commonly consumed, affordable, and assessable to all, especially the vulnerable population at the lower end of the socio-demographic spectrum, not only addresses micronutrient deficiency but also ensures equality in the fight against malnutrition. This elucidates the great potential of cassava as a power crop for the African nutrition and agricultural landscape.

30. WHO, 2018; Global hunger continues to rise, new report says. Available at: <<https://www.who.int/news/item/11-09-2018-global-hunger-continues-to-rise-new-un-report-says>> (Accessed: 5 November 2021)

31. FAO, IFAD, UNICEF, WFP and WHO. 2021. The State of Food Security and Nutrition in the World 2021. Transforming food systems for food security, improved nutrition and affordable healthy diets for all. Rome, FAO. Available at: <<https://doi.org/10.4060/cb4474en>> (Accessed: 5 November 2021)

32. Muthayya, S., Rah, J. H., Sugimoto, J. D., Roos, F. F., Kraemer, K., & Black, R. E. (2013). The global hidden hunger indices and maps: an advocacy tool for action. PLoS One, 8(6) <<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0067860>> (Accessed: 5 November 2021)

33. 2020 Global Nutrition Report: Action on equity to end malnutrition. Bristol, UK: Development Initiatives. Available at: <<https://globalnutritionreport.org/7397fe#section-2-5>> Accessed on: (Accessed: 5 November 2021)

Gaps and Challenges for Cassava Biofortification/ Fortification

To fully tap into the potential of cassava as a weapon to combat hidden hunger, there is a need to understand the gaps and challenges for biofortification of the staple or the fortification of its products. Sahel Consulting interviewed Mr. ThankGod Ogwuche, a cassava research supervisor at the International Institute for Tropical Research (IITA), to gain insights into the gaps and challenges for cassava biofortification. According to Mr. ThankGod, the key challenges affecting the scale and coverage of the vitamin A-rich cassava, revolve around poor public awareness, unavailability of sufficient planting materials, and continuous breeding research. Box 1 highlights a insights from the discussion with Mr. ThankGod.

Box 1: The Challenges of Vitamin A Biofortified Cassava in Nigeria

It is one thing to breed, test and release biofortified cassava varieties into the food system, and it is another to change public preference and perception from their traditional varieties to the newly introduced biofortified varieties. Institutions like HarvestPlus are working to commercialize and scale the use of vitamin A-rich cassava through awareness creation amongst other means. However, the gap in awareness is still quite significant and disproportionate across the various zones of the country. The adoption or acceptance of more farmers to produce biofortified cassava and the willingness of consumers to consume the nutrient-rich cassava products, is a major gap that needs to be bridged.

The vitamin A-rich cassava is mainly made available through breeding and multiplication of the bred stems. There are not enough planting stems in circulation to meet the demand of the available farmers. The availability of these planting materials is also affected by the seasonality and climate. Farmers usually harvest cassava in the dry season and might not be able to store stem cuttings until in the rainy season when the weather and soil conditions are more suitable for planting. Farmers are also not willing to purchase the stem cuttings of vitamin A-rich cassava, when they can easily obtain and plant the traditional variety at no cost. This further decreases the proportion of farmers that produce biofortified cassava, which inadvertently leads to a shortfall in the availability of raw materials for processing industries that use these biofortified cassava as raw materials.

Considering the varying landscape and geographical characteristics of the different parts of the country, suitable biofortified cassava varieties need to be produced to withstand the different geographical conditions. Even after these varieties have been bred and released, climate change still poses a challenge to the sustainability of these varieties. While this insinuates that there is a need for continuous breeding research for suitable biofortified cassava varieties, there is a gap of limited funding for such research.

Recommendation

- **Improving Smallholder Farmers' Access to Planting Materials Through Community Based Approaches:** Behaviour change initiatives have often used strategies centered around the communities, grassroots, or target population. A similar approach can yield positive results for the biofortified cassava value chain. One of the HarvestPlus approaches towards increasing the awareness for vitamin A-rich cassava is the identification of youths within the communities who are willing to serve as seed entrepreneurs. These youths are trained on the multiplication of cassava stem cuttings in a bid to make planting materials accessible and available for farmers, thereby increasing the possibility of farmers purchasing the biofortified cassava stem cuttings.

Another initiative is the Building an Economically Sustainable, Integrated Cassava Seed Systems, phase II (BASICS-II) project. This project employs an effective strategy to improve farmers' acceptance of improved cassava seeds by using demonstration plots to show the farmers the agro-economical benefits of using improved cassava planting materials against the traditional varieties.

- **Leveraging Existing Initiatives to Scale Up the Adoption and Acceptance for Biofortified Cassava:** One of the barriers to the cassava biofortification value chain is the lack of awareness by will-be consumers, especially those categorized as the vulnerable population. This emphasizes that more work needs to be done in spreading the news of the nutritional benefits of biofortified cassava against the traditional 'white' cassava. Several nutrition-specific and nutrition-sensitive interventions are being implemented across various locations within the African landscape, this can serve as an avenue to promote the consumption of biofortified staples such as cassava.

Other small-scale or community-based initiatives which are not nutrition-sensitive such as youth programmes, religious programmes, and gatherings, community sensitization programmes, can also be leveraged upon. The integration of key messages on the benefits and deficiencies of micronutrients into these initiatives can help to improve the consumption of biofortified cassava within community clusters. To achieve improved utilization of biofortified cassava in minimizing hidden hunger, these initiatives need to be scaled up across the board.

- **Market Innovation and Processing Diversification:**

Various actors ranging from food industries, cottage processors, and other SMEs have introduced vitamin A-rich cassava products into the market. There is an opportunity to do more. Several locally-produced cassava products can benefit from fortification with essential micronutrients or the use of biofortified cassava for their production. HarvestPlus is actively engaged in this area by demonstrating how household snacks can be produced using biofortified cassava. To scale up this market entry initiative, SMEs that are into food processing can be introduced to development schemes such as innovation funds, capacity building programmes, or soft loans to attract youths, women, and SMEs to produce a diverse variety of foods from cassava that will be rich in micronutrients.

- **Increased Investment in Breeding and Biofortification**

Research: There is a need for continuous breeding research to identify the most suitable biofortified varieties. This research requires funds from donor agencies, development partners, and investments from the private sector and other relevant institutes. Increased funding can open the door for the advent of new cassava varieties fortified with other micronutrients such as iron

and zinc. Cassava is commonly consumed by virtually all populations regardless of socio-economic status. This presents a unique opportunity in decreasing the hidden hunger index of African countries through the creation of biofortified varieties with varying compatible micronutrients of public health importance.

Conclusion

Africa is the largest producer of cassava and also suffers a high prevalence of micronutrient deficiencies. The biofortification of commonly consumed staples like cassava, and the fortification of its products, can be an effective way to address this burden of micronutrient deficiency in Africa and change the African narrative of malnutrition. The continent has less than nine years to achieve the sustainable development target, and it is not on track for the second goal of zero hunger. Stakeholders from every institution and sector need to work together to drive initiatives with the potential of eliminating hidden hunger. The fight against micronutrient deficiency and malnutrition is for everyone. There is no development without good nutrition. Africa needs to be intentional in its efforts to work together in leaving no country behind as it strives to achieve food and nutrition security.

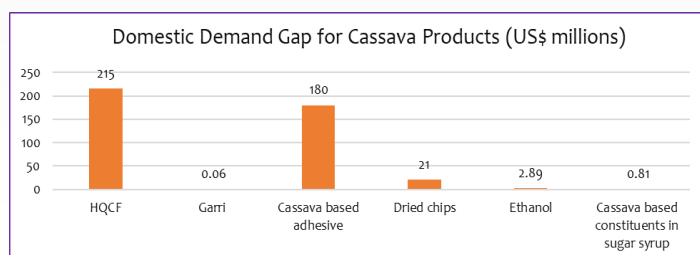


PROMOTING VALUE ADDITION IN THE CASSAVA VALUE CHAIN IN NIGERIA: CHALLENGES IN THE CASSAVA PROCESSING LANDSCAPE AND POTENTIAL MITIGATION STRATEGIES

BY ABIMBOLA SCALE

From garri and fufu to sorbitol and ethanol, cassava in its processed form presents vast opportunities for investors and entrepreneurs (Figure 5). According to PWC (2020), the demand gap in the domestic cassava derivatives market could potentially yield US\$427.3 million³⁴ in revenue (Figure 5). It has thus become imperative to boost industrial processing and fully harness the profit-making potential in the cassava industry.

Figure 5: Domestic Demand Gap for Industrial Cassava Products (US\$ '000000)



Source: PWC, 2020

While it shows great promise, the cassava processing industry is impeded by several challenges which must be addressed with innovative solutions involving all critical stakeholders. One of such challenges is the industrial processing supply gap. Nigeria is the world's largest cassava producer but 90³⁵ of total production is consumed as traditional food products. This leaves industrial processors with a limited supply of cassava roots for their factories. The industrial processing potential supply gap is estimated at ~6.82 million Metric Tonnes (MT) per annum.

Industrial processing is also hindered by low yield and low starch content. The average yield in Nigeria is 8.20MT/ha per hectare, a deviation of 75% from the global best practice of 33.8MT.³⁶

This and the high perishability of cassava roots results in uncompetitive pricing for cassava roots. In addition, the starch content in the cassava roots supplied by farmers is low at an average of 20%, and maybe lower in certain terrains and periods. For instance, in Kogi State, starch content in locally sourced cassava roots is as low as 15% - 17%.³⁷

Most smallholder farmers use saved or recycled cassava stems which are rarely improved varieties. The use of quality stems of improved cassava varieties developed by research institutes in Nigeria, such as the International Institute of Tropical Agriculture (IITA) and National Root Crops Research

Institute (NRCRI), could increase the yield per hectare and raise the starch content by about 5 - 10%. With higher yield and starch content, processors will generate a higher starch yield (starch content * yield) which will increase the profitability of their factories.

The Sahel Consulting team interviewed Seyi Oyenuga, Executive Director of ATMANCorp Nigeria Limited, one of its partners in the Building an Economically Sustainable, Integrated Cassava Seed Systems, phase II (BASICS-II) project, to gain some practical insights on the cassava processing landscape in Nigeria, its challenges, and potential mitigation strategies.

Below are the highlights from the interview:

Q: ATMANCorp is recognized as a top-grade industrial cassava processing company in Nigeria, please tell us about the vision behind your organization and the critical role cassava processors play in contributing to economic development.

A: ATMANCorp Nigeria LTD was founded on the principle of maximizing the potential of cassava-based value-added products in Nigeria. We achieve this by adopting and implementing the best technology at the farm and factory levels to increase yields and output. Our company provides several products for the local and international market. Our products include High-Quality Cassava Flour, High-Quality Cassava Peels, and Premium Garri. All our products are produced in our state-of-the-art factory utilizing mechanical processes to ensure quality and hygiene. We believe that cassava has the potential to impact the lives of millions in Nigeria with the continued industrialization of the sector.

Q. What were the major challenges you faced when setting up ATMANCorp and how did you address them?

A: There are several challenges with setting up a company in Nigeria and especially in the rural areas. Infrastructure is the most significant challenge with issues including in adequate

34. PWC (2020): Harnessing the Economic Potential of Cassava Production in Nigeria. Available at: <https://www.pwc.com/ng/en/publications/economic-potential-of-cassava-production-in-nigeria.html>

35. Oluwatosin A & Barbara S, 2019, 'Cassava, a 21st Century Staple Crop: How can Nigeria Harness Its Enormous Trade Potentials?' ACTA Scientific Agriculture, vol. 3, no. 8, pp 194 - 202.

36. FAOSTAT, 2019

37. Commodity Africa, 2019. Available at <http://www.commodityafrica.com/22-05-2019-tunde-solaja-more-50-cassava-nigeria-wasted>

road networks, lack of consistent and available electric supply, and poor or non-existent telecommunications. We address these issues by constructing or using technology to alleviate the challenges. We maintain and build road networks to our factory to ensure cassava root is supplied. To access the national power grid, we extended the electrical lines 3 km to our factory. Due to the poor cell phone network, we incorporate radios to communicate with each other.

Q. What are the current challenges you face in running and maintaining your business in Nigeria and how do you address them?

A: We are constantly challenged with rapid fluctuations in the pricing of raw materials. The price for cassava increased by a factor of 10 in less than a year due to supply shortages. At one point in 2021, material for sack production was limited and the cost increased by nearly 100%, the same has occurred in diesel fuel pricing in the last year. We attempt to mitigate this by incorporating innovative technology and solutions that can be sourced locally. We aim to be 100% self-sufficient with our energy needs by 2023 by utilizing biomass generated from agricultural waste. Solutions such as this help us mitigate cost increases while also promoting the development of the local economy.

Q. What roles can critical stakeholders play in addressing the challenges of cassava processors?

A: Increasing the dialogue of key stakeholders is critical to developing and growing the usage of cassava-based products in Nigeria. The government should continue to foster the development of the cassava industry by promoting local processing and decreasing the country's dependency on imported cassava products. One way this can be achieved is by enabling a new age of commercialized farming utilizing our youth and graduate population. Larger and more productive farming is necessary for the industry to grow and provide more consistent crop pricing from year to year.

Q. What advice would you give prospective entrepreneurs?

A: Start small. The numbers always look good on a spreadsheet, but the cassava processing industry is difficult. Many companies install large systems with the expectation that it will be easy to source cassava. The dynamics are different in Nigeria, we are the world's largest producer of cassava, but we are also the world's largest consumer of cassava-based products too, and that was before the industry started demanding cassava-based products.

Q. Would you be willing to share some information on the cost of starting up a cassava processing business and the potential margins?

A: It's very difficult for me to answer that question because our company performs many services with our in-house team for construction, fabrication, and engineering. Potential margins in the industry are 30% but can be even higher if a processor can cultivate his farm.

Conclusion

The cassava processing industry is a potential catalyst for economic development in Nigeria. By closing the demand gap locally, Nigeria can reduce the import of cassava derivatives and their adverse effects on the naira, and about 1.64 million³⁸ youths could be gainfully employed. This implies that critical stakeholders must act rapidly and cohesively to improve the cassava processing landscape.

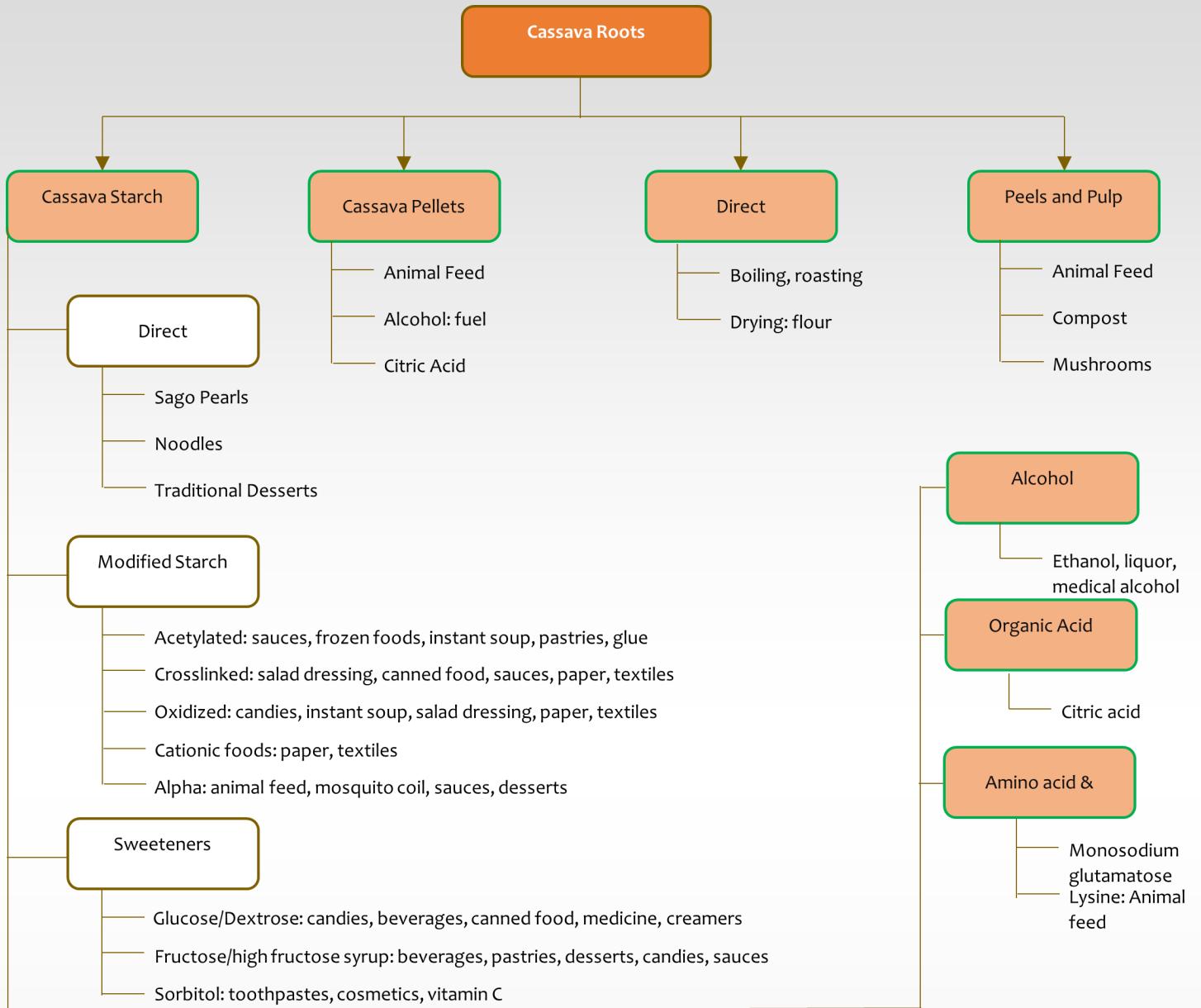
The government must increase access to low-interest finance for both farmers and processors. There is also a need to increase funding to research institutes to promote the development of new varieties of cassava. Farmers must also continue to be trained on the use of Good Agricultural Practices (GAP) in producing cassava through extension services. Cassava perishes within three-four days and many farmers lose their harvest due to poor road networks. This implies that there is a critical need for rural infrastructural development including road, water, and electricity.

Processors are also encouraged to cultivate their own farms while integrating smallholder farmers through out-grower schemes. This would abate the negative impact of low supply and the fluctuations in the price of cassava roots.

The international community is not left out as the cassava value chain requires investment finance and grants across all stages. One such investment by the international community is the BASICS-II project which focuses on building an economically viable cassava seed system. It aims to provide farmers with access to affordable, quality-assured seeds of the cassava varieties in demand by local food and processor markets through the establishment of a commercially viable seed value chain operating across breeder, foundation, and commercial seed levels. The increased access to improved varieties would lead to higher yields and higher starch content in cassava roots. Sahel Consulting is leading the Processor-Led Model (PLM) of the BASICS-II project which supports backward integration into seed production by cassava processors using a rapid multiplication technology known as the Semi-Autoproponics Hydroponics (SAH) system.



Figure 6: Cassava Derivatives



Source: Research Gate, PWC



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SAHEL CONSULTING SPEAKS

Sahel Scholars' Conference

Aisha Hadejia hosted the 2021 Sahel Scholars' Conference with the theme "Shaping the Future of Food in Africa – The Role of the African Youth" on July 2, 2021.

2021 Nigeria Agribusiness Dealroom Launch

Chinedu Agbara spoke on "Developing and Delivering Pitch to Investors" at the 2021 Nigeria Agribusiness Dealroom launch themed "Strengthening and Sustaining Resilient Food Systems in Nigeria" on August 12, 2021.

Nigeria Agricultural Investment Summit

Chinedu Agbara spoke on "Improving the Productivity of the Nigerian Farmer" at the Nigerian Agricultural Investment Summit on August 24, 2021.

World Economic Forum

During the 2021 Sustainable Development Impact Summit, Ndidi Nwuneli moderated the launch of the "100 Million Farmers" Initiative on September 22, 2021.

USAID Private Sector Engagement Learning Series

Ndidi Nwuneli served as the guest speaker at the Private Sector Engagement Learning Series for USAID. She spoke on "Representation Matters: Local Entrepreneurship and Transforming Africa's Agriculture and Nutrition Landscape" on September 22, 2021.

2021 National Animal Feed Summit

Fisayo Kayode facilitated a breakout session on "The Production and Commercialization Of Ruminant Feeds In Nigeria" on September 24, 2021. The summit was organized by the Federal Ministry of Agriculture and Rural Development (FMARD) to facilitate the development of the National Animal Feed policy draft between November 23 – 24, 2021.

Segal Family Foundation & BMW Foundation

Ndidi Nwuneli curated and moderated a session on "Africa's Role in Shaping the Future of Food" on October 7, 2021.

Interconnected Food Feature Chamber (IFFC)

Temitope Adegoye spoke in the virtual launch of the interconnected Food Feature Chamber which is a start-up addressing the imbalance and discrimination in the Nigerian food systems on October 16, 2021.

The 5th Food Security Future Summit

Adekunle Adeoye served as a panelist to discuss the "Our Actions are our Future" organized by Community Action for Food Security in commemoration of World Food Day 2021 on October 21, 2021.

The Kingdom Summit

Temitope Adegoye gave a presentation on the "Opportunities in Livestock and Dairy Sector in Nigeria" during the virtual event organized by RCCG The King's Court on October 22, 2021.

27th Nigerian Economic Summit

Ndidi Nwuneli served on the opening plenary during the 27th Nigerian Economic Summit with the theme “Securing our Future: the Fierce Urgency of Now” on October 25, 2021.

UN Food Systems Summit

Ndidi Nwuneli Moderated a virtual conference – “Food is the Future,” organized by the Global Alliance for Improved Nutrition on the sidelines of the UN Food Systems Summit on October 25 – 26, 2021.

Plant Variety Protection Act (2021) and its Potential for Agricultural Transformation in Nigeria

Chinedu Agbara spoke on the Collaborative Seed Programme (CSP) at the “CSP webinar on Plant Variety Protection Act (2021) and its Potential for Agricultural Transformation in Nigeria” on October 26, 2021.

Syngenta Foundation for Sustainable Agriculture

Temitope Adegoroye presented the findings from the agricultural research and development in Nigeria study which was sponsored by the Syngenta Foundation. This presentation was done at an event organized in Abuja on October 27, 2021.

Convening on Reorienting Public Agriculture Research and Development in Nigeria

Ndidi Nwuneli spoke on the “Critical Role of Agriculture Research And Development For Data-Driven Decision-Making By The Government And The Important Role Of The Private Sector To Drive Investment And For Non-Profit Organizations To Engage In The Process”. The event was organized by Sahel consulting and Syngenta Foundation for Sustainable Agriculture on October 27, 2021

Global Agriculture Innovation Forum

Ndidi Nwuneli served as a speaker on “Innovations in Women’s and Youth Entrepreneurship” at the Global Agriculture Innovation Forum organized by Purdue University on October 27, 2021.

Financial Inclusion Week

Tolulope Babajide moderated the panel discussion session during the financial inclusion week powered by Center for Financial Inclusion on the theme “Inclusive Finance: A Bedrock for Economic Prosperity of Nigerian Women” on November 2, 2021.

National Cassava Summit

Ndidi Nwuneli delivered a communique on “Catalysing and Scaling Private Sector-Led Cassava Seed Development in Nigeria” during the National Cassava Summit organized by International Institute for Tropical Agriculture (IITA) and PIND, in Abuja on November 4, 2021.

African Summit on Entrepreneurship and Innovation

Temitope Adegoroye presented the opening remarks during the virtual agri-business session at the African summit on entrepreneurship and innovation hosted by Nourishing Africa on November 5, 2021.

4th Nigeria Diaspora Investment Summit

Aisha Hadejia moderated an Agribusiness Pitching Session at the Nigeria Diaspora Investment Summit hosted by Nigerians in Diaspora Commission between November 16 -17, 2021.

Global Agriculture Innovation Forum

Ndidi Nwuneli delivered a speech on “Scaling Innovations and Innovations in Scaling: transforming Food Systems” at the Global Agriculture Innovation Forum on November 16, 2021.

2nd International Agrobiodiversity Congress

Fisayo Kayode served as a panelist at the 2nd International Agrobiodiversity Congress, during the policy and business forum roundtable held on November 16, 2021.

Cracking the Nut 2021 Conference: Building Resilient Food Water and Energy Systems

Aisha Hadejia and Ify Ummuna co-facilitated an insightful session on “Strengthening Food, Water and Energy Systems through Urban Agriculture in Nigeria” hosted by Connexus Corporation on November 18, 2021.

Inclusion for All Programme

Tolulope Babajide delivered a speech on “ID as an Enabler to Financial Access: Insight and Policy” hosted by AfricaPractice on November 23, 2021.

Launch of ECOBASIC Seed Company

Aisha Hadejia delivered a goodwill message at the launch of ECOBASIC Seed Company Ltd, which is an early generation seed (EGS) company in Nigeria, which was held on November 24, 2021.

Feeding African Cities: Agritech in the Hands of Empowered Youths

Adedeji Ojo delivered a speech at the “Feeding African Cities: Agritech in the Hands of Empowered Youths” hosted by The Bulb Africa on November 26, 2021.

India-Africa Workshop

Temitope Adegoroye served as a panelist and delivered a speech at the India-Africa workshop which was held on November 26, 2021.

2021 National Animal Feed Summit

Fisayo Kayode facilitated a break-out session on “Sustainable Animal Feed Production in Nigeria” at the 2021 National Animal Feed Summit hosted by FMARD between November 23 – 24, 2021.

Seed Connect Africa 2021

Chinedu Agbara delivered a presentation on the National Seed road Map and the Collaborative Seed Programme (CSP) at the Seed Connect Africa Conference hosted by NASC between November 29 – December 3, 2021.

Temitope Adegoroye was a panelist on “Scaling the Seedtracker to Maize and Rice for Improved Traceability and Seed Quality Assurance” at the Seed Connect Africa Conference hosted by NASC between November 29 – December 3, 2021.

SAHEL CAPITAL SPEAKS

Virtual Agric Series

Olumide Lawson spoke on the ‘Access to Finance’ on the October edition of the virtual Agric Series organized by the delegation of German Industry and Commerce in Nigeria and Welcome2Africa Intl on October 6, 2021.

NOURISHING AFRICA SPEAKS

Nourishing Africa Virtual Country Roadshows

Ify Umunna, Rahmat Eyinfunjowo, and Victor Mugo served as speakers for several sessions on the “Virtual Country Roadshow” hosted by Nourishing Africa in Kenya, Cote d’Ivoire, Senegal, South Africa, Mozambique, and Angola from June 18 – July 22, 2021.

Victor Mugo attended and spoke during the Kenya National Landscape Restoration and Scaling Conference which was held on July 13, 2021.

Ify Umunna spoke on the Third African Transformation Forum which was held virtually on July 15, 2021.

Ify Umunna spoke on “The Impact of COVID On Farming Communities” in a virtual event hosted by Olam International on July 17, 2021.

Agri-SME Training

Rahmat Eyinfunjowo spoke on “The Types Of Financing And Agri SME Digital Finance Platforms”, during the Agri-SME training which was held virtually on July 22, 2021.

UN Food Systems Summit

Victor Mugo participated in the pre-summit session of the UN food systems summit on July 27, 2021.

Nourishing Africa in partnership with the Ogun State Ministry of Agriculture hosted the Entrepreneur Support Program Agribusiness Development Seminar Certificate Ceremony in Ogun State. Ify Umunna served as one of the speakers during the event which was held on August 16, 2021.

Nourishing Africa in collaboration with the Delegation of German Industry and Commerce in Nigeria organized a virtual session on September 1, 2021, where Rahmat Eyinfunjowo gave a talk on “Climate-smart Agriculture”.

Rahmat Eyinfunjowo spoke during a virtual discussion on “Harnessing Technology to Strengthen Food Security in Africa” on September 3, 2021.

AGRF 2021 Summit

Ify Umunna spoke during the AGRF Summit which was titled “Technology Brokerage: Perspectives from Private Sector”. This summit was held virtually on September 6, 2021.

Ify Umunna participated during the AGRF 2021 Youth Town Hall session, which was held virtually on September 9, 2021.

Ify Umunna participated in a virtual session to discuss a new funding model for African innovation on September 21, 2021.

Changing Narratives Africa

Rahmat Eyinfunjowo spoke about Nourishing Africa during a virtual session organized in collaboration with Changing Narratives Africa and Sahel Consulting, to discuss “Africa’s Pivotal role in Shaping the Global Food Ecosystem” on September 21, 2021.

Rahmat Eyinfunjowo participated in the Alliance for African Partnership (AAP) public dialogue series, which was held virtually on September 22, 2021.

Rahmat Eyinfunjowo participated in the pre-summit side event of the UN Food Systems Summit organized by Food is the Future virtually on September 23, 2021.

Nourishing Africa hosted a side event at the World Food Forum, titled, “Coordinating Youth Action: Toward a Resilient and Sustainable Food System in Africa”. Ify Umunna, Rahmat Eyinfunjowo, and Victor Mugo were speakers during this event which was held on October 4, 2021.

Victor Mugo participated in the virtual session on “Advancing ICT4D For Sustainability And Smallholder Impact In Agriculture” on October 5, 2021.

Nourishing Africa in collaboration with Digivate 360 hosted a 5-day workshop on "Building your Business with Facebook Tools". Rahmat Eyinfunjowo was a speaker during this event which was held from October 11 – 15, 2021.

5th Annual Tropics Business Summit

Rahmat Eyinfunjowo spoke during the 5th Annual Tropics Business Summit on "Accelerating the Transition to Circular Economy" on October 12, 2021.

Nourishing Africa served as execution partners for the Jobberman Agriculture Sector Roundtable 2021, where Rahmat Eyinfunjowo was a speaker. The event held on October 14, 2021.

Ify Umunna served as a speaker during the virtual conference on "Sustainable Financing As The Channel To Africa's Sustainable Development" on November 3, 2021.

Milken-Motsepe Prize in AgriTech and GIC Speaker Series

Ify Umunna delivered a speech in a speaker series organized by Milken Institute and Global Innovation Catalyst on November 3, 2021.

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