



CORAF

Leader de l'Innovation agricole en Afrique de l'Ouest
Leading Agricultural Innovation in West and Central Africa

MAIN PROJECT COMPLETION REPORT

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As a guide, the main body of the Project Completion Report should not be more than 10 pages, plus selected attachments. It is important to be accurate, concise and to include all the relevant information.

1. Background

The main objective of the project is to promote efficient and proven drying technologies for sustainable food security and poverty alleviation in west Africa. In the context of MDGs to halve poverty by 2015, it is imperative to increase benefits from agricultural sector, as there are volumes of evidences that increased agriculture productivity is the key to reduce poverty. As such, continued agricultural growth is a necessity, not an option, for West African countries. Efforts from within the West African region to sustain agro-food production is limited by poor post-harvest and agro-processing diversification strategies, poorly coordinated regional extension services, dearth of information on proven and sustainable postharvest preservation technologies, weak market linkage and poor network of proven commercialisable drying technologies and insufficient expertise. This leads to lack of institutional and human resource capacities. There is need to adopt an innovative approach in addressing this common problems. Hence, this project seeks to minimize postharvest losses of R&T crops (cassava, yam, cocoyam, etc) through development, pilot scale demonstration, adoption and dissemination of innovative and adaptable drying technology in West Africa. Tropical root and tuber crops are major staples in most parts of West Africa. In spite of several government initiatives within the region aimed at addressing food insecurity, poverty and unemployment such as Agricultural Transformation agenda in Nigeria, Presidential Initiatives on cassava in Ghana, Benin Republic and Sierra Leone; much effort is still needed to curtail post-harvest losses of root and tuber crops which have been estimated to be between 25 and 55% in West Africa. Postharvest losses can be curtailed through sustainable drying and value addition of commodities. The traditional drying systems are characterized by drudgery and high processing losses. Recent efforts from international donor driven projects and government interventions have resulted in efficient flash drying systems for cassava flour with higher industrial drying efficiency, 20-23% internal rate of return and 50% fuel reduction. Other countries in west Africa are yet to experience this sustainable drive. Therefore, promoting commercialized postharvest drying technologies will achieve significant reduction in post harvest losses; promote regional integration and networking, value addition to root and tuber crops for income/employment generation and improved rural livelihood. It will also have trickle effects on households' income of farmers/processors that will result into sustainable food security and poverty reduction among smallholder farmers. The project target groups include:

- i. Local and national agro-processing equipment fabricators. We have already established working relationships with Nigeria Association of Agricultural Equipment fabricators, National Centre for Agricultural Mechanization, Food Research Institute, Ghana and Sierra-Leone Agricultural Research Institute.
- ii. Rural and urban root/tuber processors, mostly female household heads and women entrepreneurs, existing SMEs especially those involved in drying and value addition to crops. Many village and community groups will be selected to explore collective action and group dynamics within groups in conjunction with the Agricultural Development Agencies in the selected countries.
- iii. Regional, national and local agricultural extension institutions.
- iv. Policy makers both at national and regional levels.
- v. Young scientists/researchers within the selected countries.

2. Implementation performance

This section is **not** meant to be a detailed description of the project's methodology [Research or extension] or the results.

Based on information contained in the *quarterly* reports, other project records and the knowledge of team members, this section should briefly highlight:

The research and development *Activities* completed, such as data collection/literature review, farmer trials, field trials, training, field work, workshops, publications;

The scoping study on root and tuber drying technologies in west African countries was successfully completed in all the project countries. The results showed that West Africa is still characterized by drudgery, poor and inconsistent product quality. The dominant drying system/technology in all the countries surveyed was sun drying with pockets of artificial drying systems. There still exist a huge capacity training gaps and needs on drying equipment fabrication across the countries.

The study conducted on the effect of yam variety, pretreatment and drying methods on some properties of pondo yam flour showed that yam variety, pretreatment and drying methods had significant effects on the functional, pasting, proximate and antinutritional properties of pondo yam flour. However, oven dried samples possessed the best functional properties important for pondo yam flour.

There has been increased demand for good quality unripe plantain flour because of its health benefits and industrial applications. A study was conducted to investigate the effect of pretreatment and drying methods on some quality attributes of unripe plantain flour. Results from the study showed that the effect of blanching temperature, blanching time and potassium metabisulphite concentration on functional, pasting, colour and chemical properties of plantain flour can be adequately described by a regression model. Functional, pasting, chemical and colour properties of unripe plantain flour were significantly affected by pretreatment and drying method.

Another research aimed at evaluating the effect of size reduction of raw cassava roots and drying methods on some quality attributes (functional properties, nutritional and physico-chemical properties) of High Quality Cassava Flour was also conducted. The results showed that drying methods significantly affected the amylose, amylopectin, sugar, oil absorption capacity, dispersibility, angle of repose, pH, particle size distribution, pasting properties and hydrogen cyanide content of the flour sample.

Hands on capacity training were organized for drying equipment fabricators. The total number of person trained was 33 comprising 5 women and 15 youths. Participants were from Nigeria, Ghana, Sierra-Leone and Republic of Benin. Investment fora (Open day, exhibition) for the adoption, uptake and dissemination, of the flash dryer was done in all the participating countries with huge success. The forum was highly publicized in print and electronic media.

Some of the publications from the project are:

- i. UDESWA (2016). Report of the scoping study on root and tuber drying technologies in West African countries. Published by Upscaling the Nigerian Flash Drying Experience for Sustainable Regional Trade and Income Generation in West Africa [UDESWA] Project, Federal University of Agriculture, Abeokuta, Nigeria.
- ii. UDESWA (2016). Maintenance Manual for Flash Dryer Operation. Published by Upscaling the Nigerian Flash Drying Experience for Sustainable Regional Trade and Income Generation in West Africa (UDESWA) Project, Federal University of Agriculture, Abeokuta, Nigeria
- iii. UDESWA (2016). Standard Operating Procedure for Flash Dryer Operation. Published by Upscaling the Nigerian Flash Drying Experience for Sustainable Regional Trade and Income Generation in West Africa [UDESWA] Project, Federal University of Agriculture, Abeokuta, Nigeria
- iv. Research and Policies for proven commercialisable drying technology in West Africa.

- v. Gender Reality and Imperatives behind Existing Drying Technologies of Root and Tuber Crops in West Africa

3. Situation regarding delivery of *Results/results*

1. **Project inception workshop:** Held from Tuesday 01 to Thursday 03 October 2013 at the Mensvic Grand Hotel, Accra, Ghana. The Vice-chancellor, Federal University of Agriculture, Abeokuta, Nigeria officially declared the commencement of the project. Dr. Alfred Dixon, acting Chairman of CORAF/WECARD Governing Board chaired the occasion. Other dignitaries at the project lunch include; Prof. Lateef Sanni (Project Resource Person), Prof. Tomlins Keith (Project Director, GRATITUDE, NRI, UK), Dr. Nanam Dziedzoave (Director CSIR-FRI and Country Manager UDESWA, Ghana), Dr. Sahr Fomba (Director SLARI and Country Manager UDESWA Sierra-Leone), Prof. Alexandra Dansi (Country Manager UDESWA, Benin Republic), among others.
2. **Report of the scoping study on existing drying systems, capacity training gaps and needs in west African countries:** The report of the survey showed that; 87% of the respondents were female while only 13.0% were male, connoting that processing activities in these areas were dominated by the female gender. Root and tuber products drying in West Africa is still characterized by drudgery, poor and inconsistent product quality. The dominant drying system/technology in all the countries surveyed was sun drying with pockets of artificial drying systems. There still exist a huge capacity training gaps and needs on drying equipment fabrication across the countries. Nigeria is conspicuously ahead of other countries in flash dryer design, fabrication and use. One of the most important constraints being faced by these fabricators is that of funding. This could be addressed by the provision of soft loans by the government.
3. **Develop brochures on constraints to drying systems and profitable investment:** *The constraints identified in the participating countries include: lack of capital for modern harvesting, processing and drying equipment; The inadequacy of relevant authority and related centrally planned policies and investments, coupled with almost non-existent development interventions, provide limited room for much needed economic growth and diversification in this sector, etc.*
4. **Conduct hands-on capacity building trainings for drying equipment fabricators:** This was conducted from Monday 13th – Friday 17th July 2015 in Lagos, Nigeria. The total number of person trained was 33 comprising 5 women and 28 men. Participants were from Nigeria, Ghana, Sierra-Leone and Republic of Benin. Feedback obtained from the participants revealed that the capacity of the trainees were grossly enhance at the end of this activity.
5. **Investment forum (Open day, exhibition) for the adoption, uptake and dissemination, of the flash dryer in the project countries:** This was done in all the participating countries with huge success. The forum was highly publicized in print and electronic media. Some of the papers presented at the forum include; Operational challenges of flash dryer in Nigeria, Business model and investment of flash dryer technology, Challenges of Flash Dryer Installation and Maintenance and Overview of UDESWA Project
6. **Installation and pilot scale testing of the flash dryer:** 6-cyclone flash dryer was in installed and tested in Nigeria, Ghana, Sierra Leone and Benin Republic.
7. **Supervise research students on value chain analysis and product quality using installed drying facilities in each country:** Four M.Sc. students from Nigeria and 3 M.Sc. students from Republic of Benin were trained and their thesis is ready for final defense.

8. **Policy issues for national and regional trade developed and promoted:** Two policy briefs titled; (i) Research and Policies for proven commercialisable drying technology in West Africa, (ii) Gender Reality and Imperatives behind Existing Drying Technologies of Root and Tuber Crops in West Africa were developed. A policy dialogue meeting comprising of experts was conducted and inputs from expert are being incorporated into the report for final publishing.

4. Prospects for the adoption of the new technology and achievement of Specific Objective

The major dissemination/uptake pathway in the project has been direct engagement with stakeholders, target beneficiaries and end users of the project results and outcomes. Some of the activities in this regards are: A special session with the team "Status of Drying Technology in Nigeria" was organized at the 39th Annual Conference of the Nigerian Institute of Food Science and Technology (NIFST) held between 12 and 16 October 2015. Special session on policy dialogue at the 40th Annual NIFST conference and AGM, October 23 2016 at government house, Kano, Nigeria. Investment forum was also organized on the business feasibility of the flash dryer in all the project countries. . Arising from all this especially the investment forum, about 10 investor had invested in flash dryer in Nigeria within the last 2 years. In Ghana, the flash dryer had been on continuous use under public private partnership arrangement and many potential investors have signified their wish to invest in the flash dryer developed. Also, the flash dryer fabricator also exports 1 of the developed flash dryer to Uganda. Plan is almost completed to install another 2 dryer in Tanzania. Another sister project by WAPP have also engaged the flash dryer fabricator to design a mango dryer. The potentials of more investors adopting the flash dryer technology within the region and beyond are huge.

5. Key indicators of potential impact identified by project stakeholders

A follow up assessment of the impact of the project in the next five years would witness marked reduction of postharvest losses of root and tubers in the project countries. This will have a positive impact in the livelihood of roots and tuber farming households. A high return on investment is also expected from investors using the flash dryers. It is also anticipated that the flash dryer fabricators in Nigeria would continue to enjoy more patronage from other African countries and beyond the region. It is also anticipated that the fabricator trained from other countries would start producing flash dryer in their respective countries. Prominent among these fabricators is FINIC engineering in Sierra-Leone. In fact one of the fabricators trained in Nigeria (FATAROY Engineering) is almost completing his flash dryer prototype. Also, FRI Ghana is seriously working on scaling down of the flash dryer for village level processing units. We believe that CORAF would be willing to sponsor an impact assessment study of the flash dryer adoption in the next 3-5 years.

6. Proposed follow-up

The UDESWA project team will continue to mentor our fabricators in all the countries. The installed flash dryer will continue to be put into good use. Results from the project would continue to be disseminated in print and electronic media such as regional and international conferences/symposia/seminar/workshops, peer reviewed journal articles, books, periodicals, policy briefs and bulletin. We are also planning to mentor all M.Sc. students trained by the project to Ph.D. level.

7. Lessons learned

Lack of relevant technical and financial skills in some countries are impediments to sustainable technology transfer and adoption of productivity increasing technologies.

Group dynamic and coordination of multi-disciplinary project was leant.

The project team also exhibits high level of teamwork although not without some lull due to individual differences in terms of competence and experience in managing donor driven project/interventions.

It was also leant that a huge potentials exist in regional trade and integration within west African countries

Government policy are key factors to successful implementation

8. Publications and contacts

List of publications and internal reports produced by the project:

- i. UDESWA (2016). Report of the scoping study on root and tuber drying technologies in West African countries. Published by Upscaling the Nigerian Flash Drying Experience for Sustainable Regional Trade and Income Generation in West Africa [UDESWA] Project, Federal University of Agriculture, Abeokuta, Nigeria.
- ii. UDESWA (2016). Maintenance Manual for Flash Dryer Operation. Published by Upscaling the Nigerian Flash Drying Experience for Sustainable Regional Trade and Income Generation in West Africa (UDESWA) Project, Federal University of Agriculture, Abeokuta, Nigeria
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- iv. Research and Policies for proven commercialisable drying technology in West Africa.
- v. Gender Reality and Imperatives behind Existing Drying Technologies of Root and Tuber Crops in West Africa were developed.

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