

Enhancing research impact for food security
Strengthening knowledge co-creation and research uptake
Food & Business Applied Research Fund / Call 2 projects workshop



Cotonou, Benin

Wednesday 26 October 2016 – Friday 28 October 2016



Ministry of Foreign Affairs of the
Netherlands



**Agri
Pro
Focus**



Ministry of Foreign Affairs of the Netherlands



Agri
Pro
Focus

Dear participants,

Welcome to the second workshop of the Food & Business Applied Research Fund (ARF) that takes place in Cotonou Benin! This international workshop is organised for all second Call projects, as it is organised for each Call of ARF. We – NWO-WOTRO Science for Global Development and the Office of the Food & Business Knowledge Platform (F&BKP) – are very pleased to jointly organise this event together with the outstanding Beninese organizations: the Université Abomey-Calavi, Faculté des Sciences Agronomiques (UAC/FSA), in collaboration with AgriProFocus Benin (APF).

The main organizers of this workshop are:

- Cora Govers and Sonja Döpp (NWO-WOTRO)
- Vanessa Nigten and Nynke Humalda (F&BKP)
- Joseph Hounhouigan, Flora Chadare, Yann Madode and Harold Hounhouigan (UAC/FSA)
- Marcel Djihoun and Tania Attiba (APF)

This workshop, however, needs the efforts of all the participants from the 15 ARF Call 2 projects to become a successful learning environment where we can all exchange our ideas, challenges and successes to learn from each other how to improve the impact of our research.

This booklet joins the first effort of all participants by presenting all the interesting posters we have received, to share the work of the projects so far. It shows the variety of topics addressed and of the partners engaged in the projects. What we nevertheless hope to share is a common interest in how to make research work for improving one of the main challenges we face: food and nutrition security for the most vulnerable populations.

Next to the posters you will find in the booklet background information on the workshop for the three main subjects of the sessions: Strengthening knowledge co-creation, Enhancing knowledge sharing and research uptake and Linking nutrition and agriculture. Furthermore, information is provided on ARF and on the organizations mentioned above.

Further information is available via:

www.nwo.nl/foodandbusiness
<http://knowledge4food.net/research-projects/>

Kindest regards from the organizing team,

NWO-WOTRO Science for Global Development
 Food & Business Knowledge Platform
 Université Abomey-Calavi, Faculté des Sciences Agronomiques
 AgriProFocus Benin

Table of Contents

Table of Contents	4
I. The Food & Business Applied Research Fund	5
II. The workshop organizing team organizations	6
III. Posters – Project teams ARF Call 2	7
Improving the resilience of the inland fisher communities and aquatic systems to overfishing and water resource degradation - Benin	8
Technology Innovations Towards Sustainability in Indonesia’s Tuna Supply Chains	9
Ensuring Sustainable and Sustained Food Security by enhancing local parboiled rice value-Chain Competitiveness in Gogounou and Banikoara areas in Benin (PARCR)	10
Designing appropriate agronomic and processing practices for pineapple supply chains in Benin (DAPIS).....	11
The application of Lemna and biogas to enhance profitability of sustainable integrated farming (PROFARM), Indonesia.....	12
Development, Validation and Dissemination of Integrated Pest Management Packages for Tomato Leafminer (<i>Tuta absoluta</i>) and Fusarium wilt-root knot nematode complex affecting tomato production in Kenya.....	13
Matching grain quality attributes to the requirements of soybean processors – PROSESS – in Benin	14
Ground Cover App to Drive an Irrigation Scheduling Service in the Delta Region of Bangladesh	15
Unravelling the potential of farmer led irrigation development in the BAGC, Mozambique	16
Improving smallholders’ food and income security through non-timber forest products in a reforestation scheme and tree farms – a collaborative learning process in Ghana	17
Applied Cassava Research for Food Security in Northern Uganda - Uganda	18
Strengthening Agribusiness Ethic, Quality Standards and ICT Usage in Uganda’s Value Chains - AGRI-QUEST Uganda.....	19
Enhancing Rice Markets In Uganda through Smart Micronutrient Fertilization (ENRICH)	20
Farmer-led Agroforestry Innovation in Ethiopia: Improving livelihoods and food security by utilising <i>Acacia saligna</i>	21
Innovations for Sustainable and Profitable Intensification of Smallholder Dairy in Kenya (ISPID)	22
IV. Posters – Project teams Beninese ARF Call 1	23
Utilizing the genome of the vegetable species <i>Cleome gynandra</i> for the development of improved cultivars for West and East African markets – Benin, Kenya, The Netherlands	24
Infant food from local resources as pathway for a better food and nutrition security in Benin (INFLOR)	25
V. Background information.....	27
Enhancing research impact for food security	28
Enhancing research impact for food security	30
Public seminar - Linking nutrition and agriculture	32

I. The Food & Business Applied Research Fund

The Food & Business Applied Research Fund (ARF) is a subsidy scheme of the Dutch Ministry of Foreign Affairs. It is created to underpin the Ministry's food security policy by making more effective use of knowledge and encouraging innovation for development impact in the partner countries of Dutch development cooperation. The ARF is implemented by The Netherlands Organisation for Scientific Research (NWO), department WOTRO Science for Global Development.

The Office of the Food & Business Knowledge Platform (F&BKP or the Platform) and NWO-WOTRO work together in increasing the impact of research for food security implemented under the Food & Business Research (FBR) programme. FBR connects the Food and Business Knowledge Agenda of the Ministry of Foreign Affairs with the top sector approach of the Ministry of Economic Affairs, more specifically in relation to the top sectors Agri & Food and Horticulture & Propagation Materials. The F&B Applied Research Fund (ARF) is one of the funding mechanism under FBR, the other instrument is the F&B Global Challenges Programme (GCP). ARF is the principal modality for meeting the objective of promoting innovations in partner countries. GCP is the principal modality for the objective of promoting advanced understanding of emerging key issues in the field of global food security. Co-creation and Research uptake, amongst which capacity development, are supplementary objectives for both programmes.

ARF Calls

The aim of ARF is to provide grants for applied and relatively short term research (maximum three years) that contributes to food security and private sector development as formulated in the Food & Business Knowledge Agenda of the Ministry of Foreign Affairs. The first three Calls for proposals invited consortia composed of private and public practitioners organisations and research organisations, from the Dutch development partner countries and from the Netherlands, to submit project proposals for applied research for innovation. Proposals must be driven by the demands of local practitioner organisations and align with the Multi-Annual Strategic Plans (MASPs) of the Dutch embassies in the partner countries.

The food security policy of the Dutch Ministry of Foreign Affairs of 2011 has four main objectives (pillars) which form the foci of second Calls for proposals of the Applied Research Fund:

- Increasing sustainable agricultural production;
- Ensuring equitable access to better nutrition;
- Improving inclusive access to markets;
- Enabling a better business climate.

The specific objectives of the ARF are:

- Contributing to development: contributing to the enhancement of sustainable food security for the most vulnerable populations in partner countries;
- Contributing to innovation: integrating practitioners' and scientific knowledge in joint research (co-creation) in order to generate new knowledge and insights that add new value to products, services, technologies and policies that are readily available to governments, markets and society.

ARF Projects

The projects are implemented by a consortium with at least one private (for profit and/or not-for profit) or public partner and a knowledge institute. Projects should integrate research with knowledge sharing. This implies co-creation and research uptake activities, those are activities that encourage active involvement of the different consortium partners throughout the implementation of the project, as well as participation of relevant stakeholder groups. In each of the first two Calls 15 projects received a grant. The third Call is now open. In this booklet, the project posters provide further information on the 15 projects of the second Call that will participate in the workshop.

Roles and activities of NWO-WOTRO and F&BKP in ARF

NWO-WOTRO organises the tendering and granting process, manages the financial and reporting administration, monitors progress as well as meeting conditions and requirements. The F&BKP Office supports projects in realising structural involvement of target groups and the back flow of research results into society, in particular into policy and practice. Knowledge generated through the projects could additionally strengthen the F&BKP Knowledge Agenda.

High up on the agenda of the F&BKP and NWO-WOTRO is enhancing impact of the research. The F&BKP and NWO-WOTRO structure impact enhancement in four research uptake components: stakeholder engagement, capacity building, communication, and monitoring & evaluation. These components are also part of the project proposal set-up and explained in the NWO-WOTRO Calls.

Cooperation within and between the FBR projects, and additionally with actors from the broader context, will be given attention, in particular in trainings and meetings facilitated by the Office and/or NWO-WOTRO. In that context, for each Call of ARF one international workshop is organised for all the projects of that Call. For the second Call this is the Benin session of 2016.

II. The workshop organizing team organizations

Agri Pro Focus Benin

AgriProFocus (APF) Benin is part of the global AgriProFocus network. As an international network APF believes that primary producers are key to local economic growth, sustainable agri-food systems, and food security for all. AgriProFocus convenes stakeholders from the private and public sector and civil society that are committed to work with entrepreneurial farmers. As part of its business and partnership brokering service, APF supports parties to apply for relevant Calls such as ARF by linking them with potential Dutch organisations.

Food & Business Knowledge Platform

The Food & Business Knowledge Platform (F&BKP) was set up by the Dutch Ministry of Foreign Affairs in September 2013 as an open and independent initiative, in which representatives from (inter)national networks and organisations of business, science, civil society and policy come/work together to contribute to food security. These stakeholders identify relevant knowledge issues, and initiate learning and research. The Platform facilitates knowledge exchange, disseminates lessons learned, and highlights promising innovations. As a gateway to knowledge the F&BKP aims to stimulate long-term changes, in order to increase food and nutrition security in emerging economies and developing countries. It does so by focusing on Dutch, local and international players. Knowledge is central to the Platform's activities: it promotes inclusivity, coherence, relevance and effective use of knowledge; it facilitates and translates knowledge for better food and nutrition policies and practice, and brokers knowledge that suits entrepreneurs, traders and investors.

NWO-WOTRO

NWO-WOTRO Science for Global Development is a research granting organisation focusing on programming, funding and monitoring research for equitable development. NWO-WOTRO is a division of the Netherlands Organisation for Scientific Research (NWO), an independent public agency, established by law, to allocate funding for research. A number of characteristics hallmark NWO-WOTRO funded research: International and intercultural research collaboration; Inter- and trans-disciplinary cooperation to tackle complex development challenges; Public-private partnerships and multi-sector stakeholder involvement in all stages of research; A focus on knowledge sharing, research uptake and innovation. NWO-WOTRO believes that development-oriented research needs to be anchored in both academia and society. For this NWO-WOTRO develops demand-driven programmes, funding instruments, and procedures with external partners.

Université Abomey-Calavi, Faculté des Sciences Agronomiques

Faculty of Agronomic Sciences of the University of Abomey-Calavi (FSA/UAC) is the oldest institution in higher agricultural education in Bénin, created in 1970. Its mission is to contribute to the improvement of living conditions of rural households and the prevention of food insecurity and malnutrition in the population through the training of young agronomists, research-development, dissemination of scientific knowledge in all aspects of agricultural sciences as well as expertise for local agribusiness enterprises and development agencies. To achieve this mission, FSA/UAC implements various educational programs to students and technicians that lead to BSc, master and doctoral degrees through its five schools and one Institute, namely (1) the School of Crop Production, (2) the School of Animal Production, (3) the School of Economy, Sociology, Anthropology and Communication for Development, (4) The School of Environmental Development and Management, (5) the School of Nutrition and Food Science and Technology and (6) the Institute of Food Security.

III. Posters – Project teams ARF Call 2

Improving the resilience of the inland fisher communities and aquatic systems to overfishing and water resource degradation - Benin

Consortium members

Frejus Thoto, Project Coordinator | Actions pour l'Environnement et le Développement Durable (ACED)

Ben Sonneveld, Researcher | Centre for World Food Studies of the VU University of Amsterdam (SOW-VU)

Philippe Laleye, Researcher | Laboratory of Hydrobiology and Aquaculture of the University of Abomey-Calavi (LHA/UAC)

Project description

The overall objective of the project is to explore the vulnerability of the inland fishing sector to the increasing pressure on water resources that is caused by a mounting population, pollution from urban areas and climate change.

We use a multidisciplinary approach where biophysical conditions, socio-economic characteristics and institutions are formally integrated to analyse the resilience and food security situation of the fisher communities.

In the end, the project expects a sustainable use of water resources for inland fishing with increased resilience against external factors that should increase fish production and improve livelihoods of fishers' communities (men and women).

Impact activities and preliminary results

Activities

- Kick-off workshop with stakeholders (researchers, practitioners, fishermen).
- Literature review, questionnaires development and data collection.
- Study on the impact of water degradation on fishery production potential.
- Technical and market analysis of new/improved techniques.
- Development of Research Papers/Policy Briefs.
- Workshop on regulatory rules of shared water resources for inland fishing.
- Workshop on extension materials produced for new/improved techniques.

Preliminary results

- A multi-stakeholder committee has been established during the inception workshop to exchange information and participate in the research activities.
- 841 fishermen and 227 women involved in fishery activities were surveyed. Data collected encompass formal rules, ownership, rules sharing water resources, fish trading and constraints and mitigation.
- The average values of physic-chemical parameters of the two lagoons complex are as follows: Depth: 0.7-3.2 m; Transparency: 0.21-0.89 m; Temperature: 25.9-27.30C; pH: 6.15-7.57; Dissolved oxygen: 4.6 mg/l-5.2 mg/l; Salinity: 0.5 g/l -16 g/l.
- A total of 45 fish species distributed in 39 genera belonging to 28 families were recorded in the complex.
- Fish fauna of the complex Nokoué-Lake/Lagoon Porto-Novu experiences a high stress due to the anthropogenic activities.



Opportunities and challenges

Benin has recently elected a new President with a new government. Some changes may happen in the institutional framework and governance of the inland fishery sector and are likely to influence the implementation of the project. This is quite relevant to the project as it relates to formal and informal regulations in the fishery sector. Therefore institutional changes may positively or negatively influence the implementation and/or results of the project. The consortium members are closely monitoring these changes and will adapt the project accordingly to keep the momentum on achieving the expected results.

Technology Innovations Towards Sustainability in Indonesia's Tuna Supply Chains



Consortium Members

- **Aditya Utama Surono**, Director Masyarakat dan Perikanan Indonesia
- **Megan Bailey**, Assistant Professor Dalhousie University
- **Simon Bush**, Professor Wageningen University
- **Blane Olson**, Director BHLN Technical Services
- **Budy Wiryawan**, Professor Institute Pertanian Bogor
- **Robert Tjoanda**, Company Director PT Harta Samudra
- **Momo Kochen**, Project Manager, Masyarakat dan Perikanan Indonesia

Project description

This project will implement traceability-based technologies (TBTs) that facilitate bidirectional information exchange between Indonesian fishermen, processors and traders. We want to understand if and how TBTs can link fishermen with fisheries information and global markets, and help processors and traders to meet informational requirements originating from importing regions.

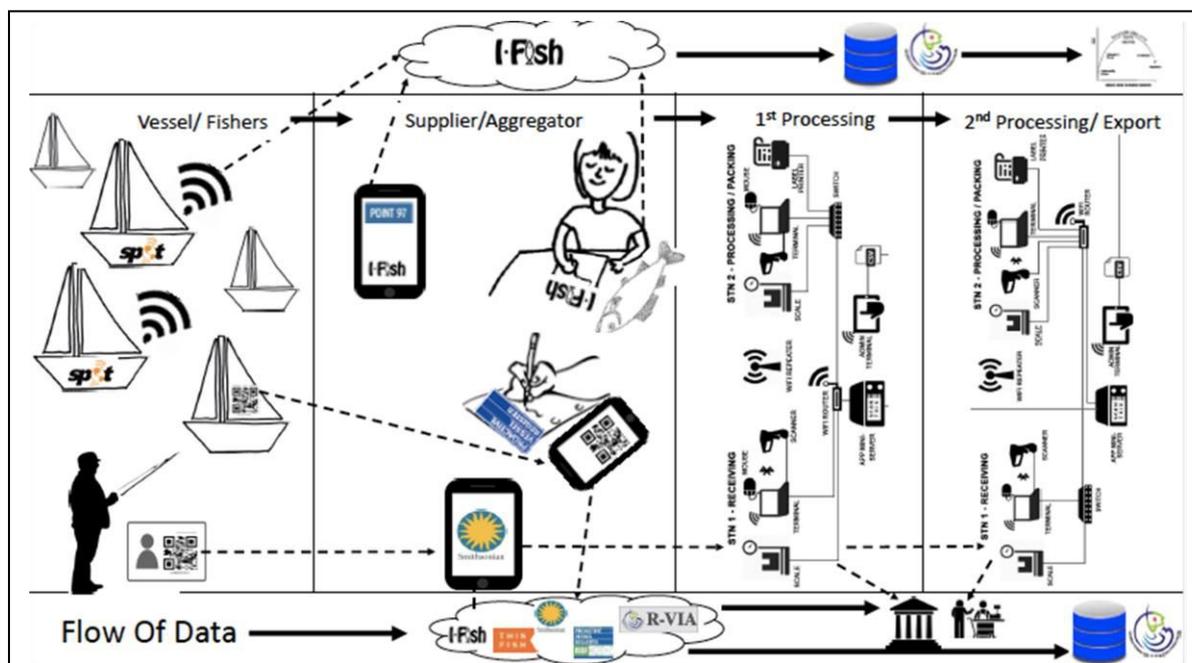
Impact activities and preliminary results

1. Meetings held to determine technology needs and expectations for fishermen, middlemen and processors (paper forthcoming).
2. Four TBTs implemented: OurFish, Dock, Spot Tracers and Tally-O.
3. Masters internship: Paper based versus technology for traceability
4. Over 20 meetings with government this past year to communicate different aspects of the project (including enumeration and traceability).
5. Booth set up at International Coastal Tuna Business Forum in Bali, showcased technology.
6. Project video:

<https://www.youtube.com/watch?v=KKpEwfA001w>

Opportunities & challenges

- **Challenges:** Sourcing hardware for the Indonesian context has been difficult; time lag research to implementation a challenge.
- **Opportunity:** Link with US IUU Task Force and USAID Oceans.
- **Opportunity:** Expand system throughout Indonesia by hiring Indonesian-based programmer.



Various TBTs, including GPS Spot Tracers (on boats), Dock (enumeration), OurFish (middlemen), and Tally-O (processors), are being implanted in an integrated platform in Buru and Ambon, in Maluku Islands, Indonesia.

Ensuring Sustainable and Sustained Food Security by enhancing local parboiled rice value-Chain Competitiveness in Gogounou and Banikoara areas in Benin (PARCR)



Consortium members

Jean KPETERE: National Coordinator of DEDRAS, Consortium Coordinator

Wim SIMONSE: Agro-economist, representative of Woord en Daad and advisor on the agri- business process.

Prof Jacob YABI: Lecturer in Faculty of Agronomy of the University of Parakou, Agro-economist, in charge of the economic and marketing aspects in the project.

Prof Ismaïl MOUMOUNI: Lecturer in Faculty of Agronomy of the University of Parakou, Agri- sociologist, in charge of learning and organizational processes in the project.

Dr Paul HOUSSOU: Researcher in Food and Agricultural Technologies Programme (PTAA/INRAB), in charge of the rice processing component of the project.

Ir. Cyriaque AKAKPO: Researcher, ex-Chief of Rice Sub-programme of INRAB, in charge of the development of rice production systems in the project.

Project description

Local rice competitiveness in urban markets is still weak, despite increased demand, potential of local production and the numerous supports to this crop's production in Benin.

Overall objective: To develop a national partnership on innovative practices promoting local rice that contributes to ensuring a market-oriented food security. Specifically, to enhance local rice competitiveness on the urban markets in Benin through upgrading players' knowledge.

Method: Development of Farmer Fields School approach, where producers and technicians adapt the System of Rice Intensification (SRI) to local conditions; Development of knowledge on rice parboiling, through participatory methods women rice processors learn how to obtain quality parboiled rice with the processing-tray; Development of Innovations Platform (IP) that include various stakeholders. The innovations are related to production, processing, marketing, access to production factors and financing; Advocacy to authorities for better rice channels.

Impact: Increase of the availability and the quality of local parboiled rice; Improvement of the stability of the local parboiled rice supply in the towns of Borgou and Alibori; Improvement of the accessibility of quality local parboiled rice with competitive cost.

Opportunities

Rice plays an important role in the food security in Benin. It is one of the basic foods of the households and there is a recourse to imported rice, indicating a good market opportunity for local rice. Neighbouring countries Nigeria, Burkina Faso and Niger have annual cereal deficits and therefore have interesting market potential. These countries are near to Gogounou and Banikoara.

Challenges

(1) The labelling of the local parboiled rice for the penetration of the market. A system of centralization of the rice for homogeneity of the quality is needed to solve the marketing problem; (2) The sustainability of the IPs in terms of financing and leadership; (3) The adaptation of rice production to climate change. The project faces challenges in implementation due to rainfall variation; (4) The financing of the rice production and rice processing. Micro Finance Institutions are reticent to give credit to these actors of the rice chain.

Impact activities and Preliminary results

- Study on the rice added value chain in Gogounou and Banikoara: the baseline study gave more insight on the organization of the rice sector; the economic aspects of production, processing and marketing; access to production/processing factors; and discovered that the organization is still weak due to weak links between various stakeholders.
- Continuous learning of SRI technology in 20 Farmer Fields Schools: a learning guideline was created jointly with INRAB, DEDRAS, the technicians of Communal Unions of Producers (UCP), the technicians of the Communal Sector of Agricultural Development (SCDA) and the producers. This guideline is used to facilitate the FFS for adaptation of SRI to local conditions.
- Organization of 2 workshops for the establishment of 2 Innovations Platforms in Gogounou and Banikoara which regroup several actors (producers, processors, traders, inputs suppliers, solders, restaurant owners, etc.). After this an action plan was developed for each IP.
- Training of 20 local solders on manufacturing of rice parboiling-tray in Gogounou and Banikoara. They are now able to produce rice processing-tray and sell them to the women rice parboiling. This facilitates the access to that material to the women.
- Continuous training and follow-up of women rice parboiling of 20 cooperatives of Gogounou and Banikoara. Net improvement of the quality of the rice parboiled by the women themselves is achieved.



Photo n°1: Participatory learning of rice sowing in FFS



Photo n°2: Participatory learning of rice parboiling



Photo n°3: Training of local solders on parboiling-tray manufacturing



Photo n°4: Parboiled rice obtained at the end of a learning session



Ministry of Foreign Affairs of the Netherlands



Netherlands Organisation for Scientific Research
WOTRO Science for Global Development



Agri
Pro
Focus

Designing appropriate agronomic and processing practices for pineapple supply chains in Benin (DAPIS)



TABLE FILIERE
ANANAS

Consortium members

- **Mahoutondji Félicité Djivoh**, Eng., Etablissement Magnificat, "Allotcheou" Fruit beverage company (Benin)
- **Athanase Akpoe**, Ir, Pineapple producer, Chairman of "Table Filière Ananas"
- **Joseph Hounhouigan**, Professor of Food Science and Technology, Faculty of Agronomic Sciences, University of Abomey-Calavi (FSA/UAC)
- **Paul Struik**, Professor of Crop Physiology, Head of the Centre for Crop Systems Analysis, Wageningen University (WU)

Project description

The project aims at improving the quality of fresh pineapple and pasteurised pineapple juice by chain optimization to advance the livelihoods of stakeholders.

The project combines agronomy and food sciences to determine:

1. best agronomic practices to obtain pineapple fruits that meet markets' requirements
2. best processing technologies to deliver tasty and shelf-stable pasteurised pineapple juice for local and regional markets.

Through this project, stakeholders in pineapple value chains will become better informed about different market preferences and obtain tools (agronomic and processing practices) to meet those preferences.

Impact activities (A) and Preliminary results (R)

A1. Workshops with pineapple stakeholders on their preferences concerning fresh pineapple quality attributes

R1. Producers, traders and processors preferred cv. Sugarloaf. Whereas producers are not concerned about the taste of the pineapple, it matters to juice producers and traders. Juice processors preferred naturally matured pineapple i.e. without the application of growth regulator, and without damage.

A2. Meeting with pineapple producers to fine-tune experimental factors

R2. At present, the amount of potassium supplied to the crop is low (about half of the amount of nitrogen)

A3. Survey on the identification of existing pineapple processing technologies (ongoing)

A4. Various meetings (steering, launching workshop, follow up)

Opportunities (O) and challenges (C)

O1. High interest of the Beninese government to improve the value chain of pineapple and to better link stakeholders.

O2. High demand for Beninese pineapples in Nigeria.

C1. Long development and growing cycle of the pineapple crop.

C2. Standardization of pineapple pasteurization technology in a context of large variability in terms of (i) processing equipment and (ii) processing methods used by processors.

C3. Reduction of the existing variability in the organoleptic quality of pasteurised pineapple juice.



The application of Lemna and biodigestate to enhance profitability of sustainable integrated farming (PROFARM), Indonesia

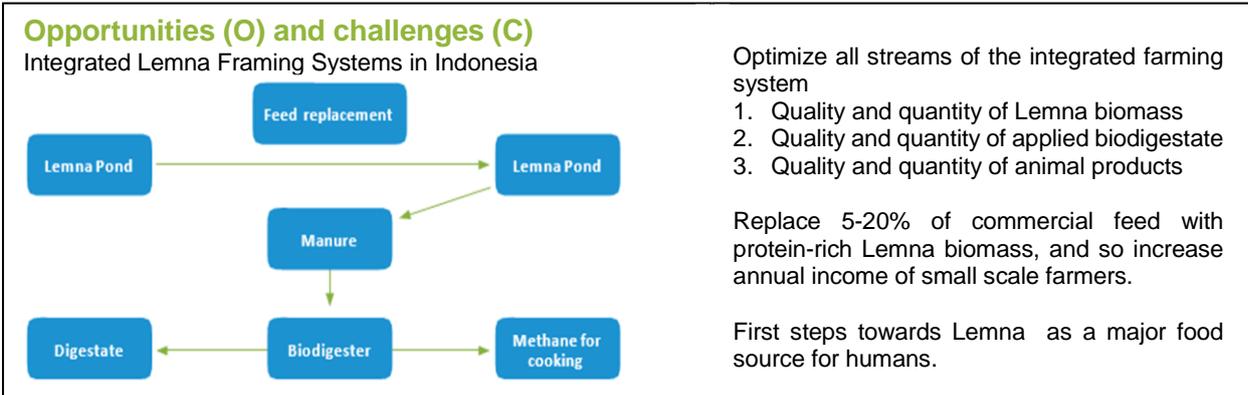


Consortium members
Hivos: Robert de Groot (Coordinator Green Energy Hivos SEA), Husnul Maad (Programme Manager Hivos SEA)
Rumah Energi: Lina Moeis (Executive Director)
Wageningen University & Research: Dr. Ingrid van der Meer (Senior Scientist and Mgr Business Unit Bioscience), Dr. Adrie van der Werf (Senior Researcher)
Padjajaran University: Dr. Ir. Iskandar, M.Si (Dean of Fisheries and Marine Science).

Project description
 PROFARM aims at the application of *Lemna* sp. (floating waterplant also known as Duckweed) and biodigestate to enhance profitability of sustainable integrated farming in Indonesia. This high protein aquatic plant will be introduced to five farming households in combination with a bio-digester and a fish pond to assess the profitability of producing *Lemna* sp. (duckweed) to enhance the growth and product quality of animals (cows and fish) and the quality of biodigestate to increase crop yields. To optimize all streams within the integrated farming system *Lemna* sp. and bio-digestate will be analysed in labs and yields will be monitored while the research results will be used to guide farming families through the process in order to reach a profitable, sustainable mixed farming system.

Impact activities and Preliminary results

- When grown under Dutch conditions Lemna may produce 15-20 ton dry weight per ha per annum with a protein concentration of 30-40% of dry weight.
- Protein productivity per hectare is far higher than that of soybean.
- Amino acid composition is comparable or even better than that of soybean.
- Biodigestate grown Lemna gave similar productivities than when grown on nutrient solution.
- Based on literature data and the prevailing climate, it is expected that productivity of Lemna in Indonesia will be far higher than in The Netherlands.
- Preliminary results obtained in The Netherlands are now being used to advice small scale farmers in Indonesia on biodigestate application and harvest regimes.
- First reactions of farmers look promising: 1) more milk productivity when Lemna is applied daily to cows, 2) Egg yolk color is improved.
- The farmers in four provinces are enthusiastic in growing lemna in their ponds as it will reduce their cost on commercial fodder and increase of the quality of animal products.



Development, Validation and Dissemination of Integrated Pest Management Packages for Tomato Leafminer (*Tuta absoluta*) and Fusarium wilt-root knot nematode complex affecting tomato production in Kenya

Consortium members

Geoffrey Ongoya Wafula

Technical Manager
Koppert Biological Systems (K)
Ltd.

Dr. George Muhia Kariuki

Lecturer and Chairman
Department of Agricultural
Science and Technology
Kenyatta University

Ing. Rick van der Pas

Product Manager
Koppert BV

Project description

Tomato plays a critical role in meeting domestic and nutritional food requirements, generation of income and creation of employment for both the rural and urban populations in Kenya. Currently, tomato production is facing major challenges with Tomato leafminer (*Tuta absoluta*) and Fusarium wilt-root-knot nematode complex which causes 80-100% erop loss if not managed. Efforts to manage the pests using chemical pesticides and resistant varieties have not been very successful. Through this project the current status of diversity and identity of tomato leafminer (*Tuta absoluta*) and Fusarium wilt-root-knot nematode complex will be established. This will provide baseline information for development, validation and dissemination of IPM packages that are effective, sustainable and adoptable for management of the target pests. A cross-sectional survey to document current status of the pests will be carried out. Identification of the fusarium wilt, root knot nematode isolates and *Tuta absoluta* will be done through morphological and molecular characterization. Development and validation of the IPM packages for management of the above pests will be achieved through on-farm scientific trials. Sealing out and dissemination of the best technologies to the target groups will be accomplished through demos, farmer field days and stakeholder workshops. This is expected to result to improved livelihoods of smallholder farmers and improved food security due to improved tomato production.

Impact activities	Preliminary results
Project Inception workshop	>> Key stakeholders in the tomato value chain involved and their input included
Cross-sectional survey in Kirinyaga County-Kenya	>> Key information generated for strategic decision making both at farm level and policy level >> 2 scientific papers being reviewed for submission to open access journals
Morphological and molecular characterisation of isolates	>> Results being utilized for development of IPM packages
Farmer field days and trainings	>> 2 field days organized, 300 smallholder farmers and 5 MoA officials trained on IPM & Biological control
On-farm scientific trials	>> Development and validation of IPM packages on-going

Opportunities

- Thirst for knowledge on IPM by smallholder farmers.
- Potential high demand for alternative and sustainable solutions for insect pests and diseases.
- Partnerships and collaborations with relevant stakeholders both in government, NGOs and private sector in the quest to improve the livelihoods of smallholder farmers.

Challenges

- Intense knowledge gap among smallholder farmers on IPM and biological crop protection.
- Unstructured extension service systems and mechanisms.



Fig 1: Project Inception workshop; participants group photo



Fig 2: On-farm trial site



Fig 6: Root knot nematodes



Fig 11: Fusarium wilt damage on roots

Matching grain quality attributes to the requirements of soybean processors – PROSESS – in Benin

Consortium members

- **Patrice L. SEWADE**
Coordinator, SOJAGNON NGO
- **D. Joseph HOUNHOUIGAN**
Professor, University of Abomey-Calavi
- **Manuele TAMO**
Senior researcher, IITA-Benin
- **Paul INGENBLEEK**
Associate Professor, Wageningen University
- **Frédéric AHOUEDEHOU**,
Executive director, REDAD-Benin

Project description

Aim: Improved quality and yield of soybean produces

- Soybean seeds available on the Beninese market;
- A better understanding of the needs and constraints of the soybean marketing actors;
- A selection of soybean varieties adapted to specific end-products and approved by processors.

Methods: Participatory rural appraisal, in-depth survey, participatory selection of varieties with farmers and processors, chemical characterisation.

Anticipated impact: Increased income for processors and farmers; women economic empowerment; employment.

Impact activities and preliminary results

Launching workshop and technical meetings

1. Newspapers and social media articles
2. Detailed methodology

Appraisal to collect soyabean accessions

1. Descriptive data on collected accessions
2. Low variability with the collection

Characterisation of soyabean accessions

1. Early flowering and maturing varieties
2. Literature review on leguminous grain properties

Surveys on: 1) Soyabean seed systems and 2) Marketing systems

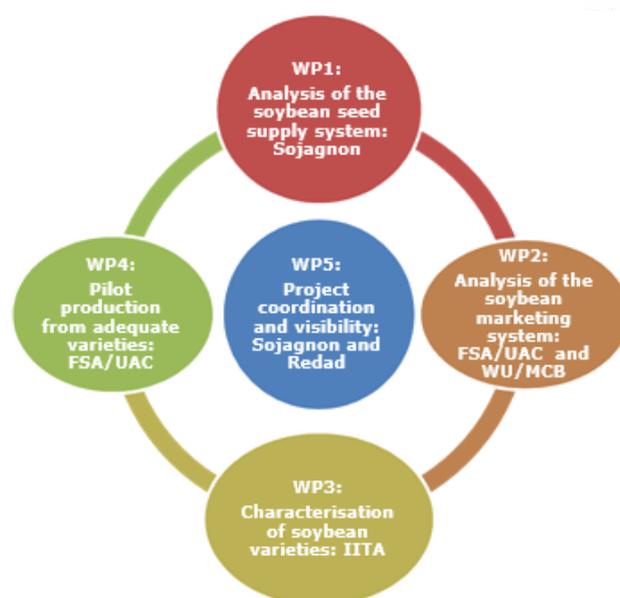
1. Level of formality
2. Organizational barriers
3. Action plan developed

Opportunities

- Strong relationship established between researchers and processors will ensure adoption of developed technologies.
- Creation of Benin Agri-business Incubation Hub (BAIH) to incubate young agro-enterprises.
- ProSeSS was brought to the attention of high-level policymakers: The Minister in charge of Agriculture.
- Existence of an online seed marketing platform in West Africa (www.wasix.net).

Challenges

- Adoption of improved varieties.
- Purchase of certified seeds to support seed enterprises.
- Implementation of the elaborated soybean seed strategy plan.



Ground Cover App to Drive an Irrigation Scheduling Service in the Delta Region of Bangladesh

Consortium members

- Shahid Akbar - Bangladesh Institute of ICT in Development (BIID)
- Dr. Raul Zurita-Milla - University of Twente. Faculty of Geo- Information Science and Earth Observation (ITC)
- Dr. Urs Schulthess - Centro Internacional de Mejoramiento de Maíz y Trigo (CIMMYT/CGIAR)

Project description

Aim: The aim of the project is to develop a smartphone application to drive irrigation services of farmers of the southern delta of Bangladesh during the dry season.

Objectives: Develop a user friendly app that enables farmers to capture photos of their fields/crops with standard smartphones; Analyse the photos to estimate the percentage of ground cover; Transmit the ground cover estimates to a server and integrate them into an advisory system to schedule irrigation requirements in real time; Ensure that women and illiterate farmers get access to the technology, including them in the training.

Method: A mobile app will be developed to enable farmers to take RGB photos of their fields and to get the percentage of ground covered by crops. Various machine learning approaches will be tested to calculate the ground cover estimates. These estimates will be integrated into the Irrigation Advisory System of CIMMYT, which will notify farmers about the water requirements and inform about available irrigation service providers.

Anticipated Impact: The project is anticipated to increase food production and, hence, improve food security. In the long run, it will be an integrated service for farmers, input suppliers and buyers.

Opportunities

- Because of small land parcel sizes, satellite data has limited applicability on farmers' fields in Bangladesh. The use of smartphone derived ground cover data will make the irrigation advisory system independent from satellite data.
- Positive synergies with the STARS project conducted by the same consortium members and that provided CIMMYT all the necessary equipment, and an octocopter equipped with a multispectral camera.
- Grounded on existing research for which on farm demonstration trials have been conducted by CIMMYT, which give access to many farmers and irrigation service providers.
- ITC has extensive expertise in developing solutions to spatio- temporal problems in emerging economies. Spill overs to other regions possible.
- Surface water based irrigation will ensure sustainable intensification and diversification of high yielding crop production in the delta region of Bangladesh.
- Proposed co-creation of knowledge involving both local and outsider actors will enhance local capacities.

Challenges

- The target audience are disadvantaged groups. The overall success depends on the effective training on operation of smartphone by this group.
- The robustness of the ground cover algorithm is challenged by confounding factors such as soil surface wetness, illumination conditions, shadows, and crop residues.
- The algorithm will also have to work for crops with contrasting leaf shapes and canopy architectures as three types of crops are involved i.e. wheat, maize and mung bean.
- The best option for image processing and data transfer to the irrigation server have to be chosen by running various tests with farmers through (i.e. trial and error approach).

Impact activities and preliminary results

- The accuracy and robustness of the ground cover estimation algorithm will be tested using various mobile phones and for various crops.
- After development of an interface for the ground cover app, a training program will be organized with farmers, irrigation service providers and agricultural extension agents.
- The pilot testing of the ground cover app under field conditions will be done by the end users.
- Official government endorsement will be gained by validation of the irrigation scheduling algorithm in collaboration with the Bangladesh Agricultural Research Council (BARC).
- An integrated service program will be established by the participation of NGOs, Department of Agricultural Extension (DAE), Irrigation service providers (ISP) and farmers.
- Two coordination meetings will be organized to ensure successful execution of the project.



RGB image of ground cover



Estimation of groundcover

Unravelling the potential of farmer led irrigation development in the BAGC, Mozambique

Consortium members

Ir, P.W., Wouter Beekman, Project Coordinator, Resilience BV

Dr. Ir./MSc., J.W. Jan Willem Liebrand, Postdoc Researcher, WRM Group – WUR

MSc, A.M. Ângela Manjichi, Researcher, ISPM

MSc, N.S. Nicky Schepers, Researcher, Resiliência Moçambique Ida.

Impact activities and preliminary results

This research project started in March 2016 and is led by a local Research and Irrigation company: Resiliência Moçambique Ida (represented by Nicky Schepers). The project has primarily been active in recruitment of the field staff and start-up of the research in the field, with the first promising field reports coming in.

As start-up activities two workshops were held/attended where the main result (apart from defining the exact research topics and methodologies) was the coupling of this research to the Oxford University led SAFI research program, Studying African Farmer-led Irrigation. This links us up to research in Tanzania and Mozambique with clear policy engagement agenda's. In Mozambique this led closer collaboration with the government agricultural research institute (IIAM, represented by Ana Lidia Gungulo)

Simultaneously to the ARF-Benin workshop the project coordinator will be attending the 17th WaterNet Conference in Gaborone, an annual Symposia held in Eastern and Southern African regions to promote interaction among policymakers, academics, practitioners from water and related sectors, and cooperating partners.



Project description

Farmer led innovation processes in irrigated agriculture are poorly understood despite their substantial contribution to rural and economic development, food security and poverty alleviation. Research in Mozambique suggests that over 100,000 hectares of irrigated agriculture have been developed by small Mozambican farmers, often through local initiatives and innovations. Most of which are not recognized/invisible by/to the private sector, donors, and governments. The project aims to contribute to a better understanding of the processes, triggers and impacts of these developments through: a) the co-production of innovative research and assessment methodologies, b) the identification of key (f)actors that either facilitate and/or constrain these developments and c) the development of effective strategies and tools that foster and strengthen the unrealized potentials of smallholder entrepreneurship and their engagement with the private and public sector. The results will be of great relevance for interventions aimed at catalysing Mozambique's irrigated agro-productive sector.

Opportunities

Currently the Government of Mozambique (GoM) is running a World Bank funded program, PROIRRI, a sustainable irrigation project in the Beira Agricultural Growth Corridor (BAGC), aiming at smallholder irrigation development. All of the consortium partners are involved in this project, which does not only offer the opportunity to add to it with the ARF research efforts in identifying smallholder irrigation areas, but also allows to try and change the discourse from developing "new" smallholder irrigation to supporting and enhancing existing farmer-led irrigation efforts.

Simultaneously, this ARF-research gives the opportunity to position Resiliência Moçambique, with its partners ISPM and IIAM, as a critical group with grounded tools to engage with smallholder irrigation development in the field. Not only supporting the policy discourse with research outputs but also through engagement with the markets and companies in out-grower modalities and project execution.

Challenges

The diversity of the characteristics of farmer-led irrigation possess challenges in its identification efforts and modes of engagement. Fiscally as dispersed groups and areas of production, spread over huge regions, which cover many hectares summing them all up (estimated to be more than 100.000 ha) but individually remain small units (0.5-20 ha). And institutionally as different social-technical entities, with their own drivers that led to its development, rules of operation and social coherence, that does not allow for a singular response from external agencies, but requires stratified modes of engagement and corresponding tools.

This clearly demonstrates the need for this ARF-research.

Improving smallholders' food and income security through non-timber forest products in a reforestation scheme and tree farms – a collaborative learning process in Ghana



Consortium members

Resource Management Support Centre (RMSC) of the Ghana Forestry Commission

- Mr Edward Obiaw, Project Coordinator
- Mrs Valerie Fumey-Nassah, Project Officer
- Mr Hamza Mohammed, Accountant

University of Amsterdam, The Netherlands

- Dr Mirjam A.F. Ros-Tonen, Associate Professor, Amsterdam Institute for Social Science Research
- ### University of Energy and Natural Resources (UENR), Sunyani, Ghana

- Dr Mercy Derkyi, Lecturer Dept. of Forest Science, Acting Head Centre for Climate Change and Gender Studies
- Dr Simon Abugre, Lecturer Dept. of Forest Science
- Dr William Quarmin, Lecturer Dept. of Forest Science

Rural Development Youth Association (RUDEYA)

- Mr Kofi Kyeremateng, Director
- Dr Harris Andoh, Development Practitioner

Project partners

Ministry of Food and Agriculture (MOFA)

- Mrs Beatrice Asante Mante, Director Agric
 - Mr Peter Kwame Amoako, Extension Officer
- ### Agribusiness in Sustainable Natural African Plant Products (ASNAPP)
- Mr Larry Amekuse, Director

Project description

Duration: 3 years (2016-2019)

Overall objective: To enhance food and income security of farmers in the modified taungya system (MTS) and tree farmers in off-reserve areas after canopy closure.

Specific objective: To generate knowledge and build capacity that enables the integration and production of shade-tolerant non-timber forest products (NTFPs) (black pepper, grains of paradise and honey) in on- and off-reserve tree farms and their successful processing and marketing.

Sub-objectives:

1. To take stock of the current status of NTFPs in MTS/tree farms and problems that farmers encounter to sustainably manage, harvest and market them.
2. To improve yields of NTFPs in the MTS through participatory seedling production and on-farm trials.
3. To explore the potential of integrating NTFPs in off-reserve tree farms.
4. To examine and improve market opportunities/constraints and profitability.
5. To enhance entrepreneurial skills, farmer groups, and group enterprises.
6. To enhance collaborative learning processes on sustainable NTFP production and marketing, involving farmers, policy-makers, practitioners, and researchers.

Impact activities and Preliminary results

- Project infosheet disseminated, emphasising the need to enhance income opportunities from the modified taungya system (MTS) and tree farms after canopy closure.
- Survey among 147 MTS and off-reserve tree farmers in three forest districts revealed importance of food crops in the MTS and need to find profitable markets for NTFPs.
- Inventories in on- and off-reserve tree farms revealed occurrence of un-planted NTFPs and medium to high survival rates of planted NTFPs under both open and closed un-burnt canopies, but no NTFPs in plots affected by wildfires.
- MSc students affiliated to Ghanaian partner institutions recruited to enhance capacity building for sustainable results.
- Inception workshop organised for stakeholders.
- Writeshop for staff and MSc students affiliated to consortium partners.
- Project enhanced a firmer position of the MTS in Ghana's new plantation strategy.

Opportunities

- Ghana's National Plantation Strategy highlights the MTS as one of the main plantation development strategies.
- Recognition of NTFPs as an integral part of the plantation strategy.
- MSc students selected among staff of consortium partners guarantees sustainable project results

Challenges

- Erratic rainfall pattern might affect NTFP plot establishment.
- The most common tree species in the MTS do not allow for undergrowth.
- Disbursement scheme of funds challenges the implementation of activities scheduled for year 1 (e.g. nursery and experimental plot establishment).
- Profitable markets for NTFPs.



Applied Cassava Research for Food Security in Northern Uganda - Uganda



Consortium members

- Oxfam Novib in Uganda – an international NGO working on engendering agriculture and value chain
- National Agriculture Research Organisation - National Crops Resources Research Institute (NARO-NaCRRRI) - A Government of Uganda institution for agriculture research and extension
- Africa 2000 Network – an Uganda civil society organisation working in Northern Uganda on strengthening sustainable livelihood

Impact activities & preliminary results

The project, implemented in 3 sub counties, works with 12 farmer groups each hosting a demonstration plot, a field trial and multiplication garden. On-going and planned activities are:

- **Demonstration plots for two existing cassava varieties:** 6 out of the planned 12 demonstration gardens for two existing cassava varieties were set up in farmers' fields. This aims at increasing farmers' knowledge on cassava production & disease management. 6 farmer groups with about 30 members each were trained on cassava agronomic practices such as spacing, choice of stem cuttings & disease management.
- **Evaluation of near-release six cassava varieties:** 6 promising cassava genotypes have been planted in farmers' fields at other 6 locations. These will be evaluated with farmers to determine their suitability regarding cooking quality, agronomic performance (yield & architecture). Results of the participatory evaluation will be used for variety release.
- **Multiplication centres to increase farmer access to quality planting materials:** Improving access to quality planting materials will be enhanced through setting up community based multiplication centres. 6 out of 12 multiplication gardens have been established. Each centre is between 1-1.5 acres and planted with 3 disease resistant varieties. From each acre, the expected harvest is a minimum of 21,000 stem cuttings, enough to plant 5 new acres by the farmers. This has a huge potential for farmers to grow cassava stem cuttings as a business. Farmers will be trained in business planning to enhance income generation.



Participatory planting of experimental plots (left) and farmers learning about virus disease symptoms on cassava storage roots (right)

Project description

The project aim is to boost cassava production, utilisation and improve market access for farmers in northern Uganda where it is the most important staple crop. The specific objectives are to:

- Evaluate near-release cassava genotypes together with farmers
- Increase farmers' knowledge on cassava disease management
- Increase farmer access to quality cassava planting materials
- Improve quality of cassava products for better markets

The project is using a co-creation approach which brings together implementers and farmers to develop the cassava value chain. The anticipated impact of the project is: Improved food and income security situation of 2,500 direct participants -60% women - in the districts of Oyam and Pader in Northern Uganda by 2018.

Impact activities & preliminary results

- Set up demonstrations for chippers and dryers in at least two groups in each district.
- Establishing collection centres in each sub county and each will be equipped with drying and storage facilities
- Institutional strengthening at local government, farmer level and consortium members.
- Training, exposure visits and networking of cassava stakeholders to assist small scale cassava farmers strengthen their operational structures, necessary for self-reliance and sustainability.
- Strengthening district level Cassava Multi Stakeholder Platforms (CMSP).
- Data collection, compilation and dissemination through websites, scientific papers and newsletters. Information generated will also be disseminated through seminars and workshops at national level, organised with consortium members, farmers and other relevant stakeholders such as MAAIF, the Civil Society and other local and international NGOs for results validation.

Based on results obtained, booklets with success stories will be produced and distributed to key stakeholders such as line ministries, CSOs, private sector, extension institutions, research & academic institutions, and farmer organizations among others.

Opportunities and challenges

- Increased interest of private sector players using cassava as a raw material for commercial products
- Increased demand for cassava planting materials motivates farmers to become cassava seed entrepreneurs.
- Cassava is a priority crop by government for the whole country (Active cassava research programme)
- Lack of cassava policy limits cassava value chain development
- Climate change effects
- Emergence of pests and diseases is a challenge

Strengthening Agribusiness Ethic, Quality Standards and ICT Usage in Uganda's Value Chains - AGRI-QUEST Uganda

Consortium members



Strengthening
Agribusiness Ethics,
Quality Standards,
& ICT Usage in
Uganda's Value Chains

- David Katamba, Lead Researcher
- Dr. James Ssemwanga (PhD)
- Assoc. Prof. Christopher Wickert (PhD)
- Ms. Janet Namuddu (Esq)

Project description

Problem statement: There is a considerable lack of attention to these two issues in agribusiness value chains in Uganda: (i) Ethical behaviour and (ii) Quality standards with respect to accelerating transformation, competitiveness, and sustainability of a vibrant food security program and agri-business.

Purpose: AGRI-QUEST aims at addressing a fundamental question: How can we have a better business climate in Uganda that fosters a permanent and positive gradual change in practices and attitudes in agribusiness towards ethical behaviour and quality standards in food security and agri-business initiatives?

Research methodology: AGRI-QUEST uses these engagement processes: capacity building of farmers/value chain players, wide consultations and stakeholder engagement to ensure buy-in, uptake of research outcomes and knowledge exchanges.

Impact activities

1. Generated 7 Research Briefs and 5 Policy Briefs (available at F&BKP website)
2. Facilitated student exchange with VU University and MUBS (1 intern, 7 master students) to finish their research guided by AGRI-QUEST methodologies
3. Facilitated, present and participate in various agribusiness Stakeholder engagement workshops organised by AgriProFocus Uganda and other agric. networks.
4. Compiled Fact Finding Mission Report (FFMR) that shows the state of the issues we are researching about.
5. Developed online change facilitation platforms (www.agriquestuganda.com and Facebook, LinkedIn).

Opportunities

- Increasing need in Uganda for ethical business behaviour.
- The knowledge platforms (esp. AgriProFocus Uganda) are very receptive i.e., over engaging AGRI-QUEST.
- AGRI-QUEST intervention is seen as a breakthrough in to the neglected aspects of agribusiness (ethical practices).
- A sensitization drive of AGRI-QUEST aims and objectives with the stakeholders has proved necessary so as to expedite their full engagement and a clearing understanding of expectations.

Challenges

- Time allocated (budgeted) for the field visits to collect data and interact with targeted audiences was inadequate.
- Most stakeholders expect AGRI-QUEST to meet their costs for participating in the research project (providing data, transport, airtime and seed drying materials (for quality improvement)). Failure to meet these, blocks window for other upcoming innovation projects; buy for them mobile phones that are internet enabled especially ahead of our ICT App and Farmer-to-buyer platform to be developed.
- Language barrier .
- Farmers don't see short and medium term value of committing ethical practises.
- Prevalence of corruption which impacts heavily on Integrity and transparency in value chains.

Preliminary results

- Most stakeholders have an idea of agricultural related standards, with the exception of UNBS (standards body in Uganda). However, they have never thought of defining ethical practices in the context of value chains.
- Promising though, the agribusiness and value chain players feel that it is important to have ethical agricultural practices and voluntary 'house quality standards' (e.g. how to store rice and keep it safe from rats).
- Most agribusiness and value chain players at the lower levels of the value chain are not aware that they are part of the international food value chain.
- Some farmer groups organized sharing and learning of good agricultural practices, however farmers did not follow them.



Rice packaging as a family business in **Buwala**



Workers in **Mbale** District drying rice while directly stepping in it



Road side in **Budjala** District
Cassava being dried by the



AGRI-QUEST members participating in one of the AgriProFocus - **Lira** workshops

Enhancing Rice Markets In Uganda through Smart Micronutrient Fertilization (ENRICH)

Consortium members

- Prof. Dr. G.W. Otim-Nape, Agricultural Development Expert & CEO, Africa Innovations Institute
- Dr. Peter Alele, Soil Scientist, Africa Innovations Institute
- Dr. Jimmy Lamo, Rice Breeder, Africa Innovations Institute
- Dr. Kalimuthu Senthilkumar, Agronomist, Africa Rice Centre
- Dr. Tjeerd Jan Stomph, Agronomist & Crop Physiologist, Wageningen University
- Dr. Christian Dimkpa, Micronutrient Fertilizer Specialist, IFDC
- Dr. Bas Kempen, Soil Mapping Specialist, ISRIC-World Soil Information
- Mr. Thomas Awio, Agronomist, Africa Innovations Institute
- Mr. Ivan Okori, Rice Marketing Specialist, WindWood Millers Ltd
- Dr. Narcis Tumushabe, Agricultural Economist, FICA Seeds Ltd

Activities completed/ongoing

- Stakeholders' analysis and planning workshop conducted with participation of all stakeholders along the rice value chain.
- Farmers' research group (FRG) identified and trained. FRG members now actively involved in trial set-up and monitoring.
- Micronutrient fertilizer trials set-up in two different agro-ecological zones with the involvement of FRG.

Project description

Rice has become an important food staple and a major source of income for many smallholder farmers in Uganda yet yields remain low at 1.5-2.5 t/ha. The goal of this project is to increase food and nutrition security and income of smallholder farmers producing lowland rice with the main objective to significantly increase lowland rice productivity in Eastern and Northern Uganda. The project aims to fine-tune the composition of micro-macro-nutrient fertilizer combinations and their mode of application for optimum rice yields and improved nutritional quality.

Objectives

1. Understand the current situation and rice fertility challenges in the region.
2. Evaluate and identify the appropriate composition and mode of application of micronutrients (SmartFert) for optimum yield of lowland rice
3. Integrate and out-scale SmartFert into ongoing development programs and production practices.

Research Methodology

A number of activities are being and will be undertaken including stakeholders' analysis and planning workshops; focus group discussions (FGDs) and key informant interviews; household surveys; replicated field experiments with participation of Farmers' Research Groups (FRG); participatory on-farm trials with communities and, demonstrations of SmartFert innovations to compare SmartFert innovations with the current local practices.

Expected Impact

It is anticipated that the project impact will be high and more stable yields and production of good quality rice as a result of adoption and use of smart fertilizer innovations and other packages; increased income and food security from rice production, milling and trade and; increased sustainability of rice production systems in Uganda.

Opportunities and challenges

- Micronutrients are proven to be beneficial on increasing yield, improving grain quality, increasing uptake efficiency of NPK and economic returns.
- Developing technologies aimed at enhancing production and commercialization of rice by smallholder farmers would have full government support as this is in line with the Multi-Annual Strategic Development Plan of the government of Uganda.
- However, adoption of the new technologies by smallholder farmers may take a long time as farmers are always conservative and unwilling to change from their traditional production and management practices.



Stakeholders' Analysis and Planning Workshop, Mbale, Eastern Uganda



FRG Planting Micronutrient Fertilizer Trial at Doho Rice Scheme



FRG members involved in soil and foliar application of micronutrient fertilizers under close supervision of technical staffs



Ministry of Foreign Affairs of the Netherlands



Netherlands Organisation for Scientific Research
WOTRO Science for Global Development



Agri
Pro
Focus

Farmer-led Agroforestry Innovation in Ethiopia: Improving livelihoods and food security by utilising *Acacia saligna*



WAGENINGEN UR
For quality of life



Consortium members

• Dr Abbadi Girmay Reda

Senior Researcher and Director of Natural Resources Research
Tigray Agricultural Research Institute (TARI),
Mekelle, Tigray, Ethiopia

• Dr Emiru Birhane Hizikias

Associate Professor in Ecology
Mekelle University College of Dryland
Agriculture and Natural Resources,
Mekelle, Tigray, Ethiopia

• Prof. Frans Bongers

Professor of Tropical Forest Ecology
WU Environmental Sciences, Wageningen,
University Wageningen, The Netherlands

• Mr Tony Rinaudo

Natural Resources Advisor, Food Security &
Climate Team

World Vision Australia Melbourne, Australia

• Mr Kibret Mamo Bahiru

Climate Change and Environment Specialist
World Vision Ethiopia Addis Ababa, Ethiopia

Project description

Aim and objectives

- Research results to enhance landscape restoration and sustainable natural resource management, leading to better food security and economic growth.
- Evaluate the adaptability, biomass production, silvicultural management and multi-purpose function of *A. saligna*.
- Identify improved types of *A. saligna* suitable for multipurpose use (biomass, fodder, green manure, wood, and seed) and for poles /wood production.
- Study and formulate optimal supplementary feed for poultry/ruminants from *A. saligna* dried leaves or seeds.
- Conduct Value Chain analysis, utilization and scaling out of best practices.

Methods

- Work with and through FREGs to ensure the relevance of research, give inputs into the research agenda and keep scientists accountable for issues that benefit farmers.
- Knowledge flows to and between farmers and researchers by using participatory research, which fosters deep collaboration and partnership between FREGs and researchers.
- Trial sites at Tigray Agricultural Research Institute (TARI) for seed production, and to serve as visual cues during field days.
- Feed trials due to commence in January 2017.

Activities and results

- Conducted launching workshop. with a broad range of stakeholders, farmers and extension workers.
- Integrated *A. saligna* agroforestry systems of smallholder farmers are in place for testing and optimizing production.
- Selection of breeds and establishment of nursery in order to establish a bit best provenance resource stand for various purposes.
- On-farm agroforestry trials where visited and discussions held with Farmers Research Extension Groups (FREGs).
- Preparing surveys to better understand value of *A. saligna* for smallholders.
- Conduct literature review of the benefits and management requirements of *A. saligna* for different agroforestry systems.

Opportunities

- *A. saligna* is increasingly being recognized as a suitable multipurpose species capable of restoring degraded landscapes and intensifying agricultural production.
- *A. saligna* can increase crop and livestock productivity, as demonstrated by farmers groups during recent drought.
- Provide resources which can be sustainably harvested for fuel, poles, feed supplements.
- Community can potentially improve their income through bee keeping, poultry production and fattening through the use of *Acacia* agroforestry.
- Pollen production takes place twice per year and ensure bees may continue to forage and sustain bee colonies during dry season.
- Support Nitrogen fixation and organic matter to restore soil health, and contribute towards land restoration efforts.

Challenges

- The limited release of funds and cash flow in years 1, 2 and 3 (20%, 30%, 50%) may cause serious problems for key activities that require significant funds. While the project leadership needs 30% - 50% - 20% fund release for 2016 -18. Thus the activity should be given the highest level of priority.



A potential of *A. saligna* seed for poultry feed formulation



A. saligna
nursery
site for
seedling
production

Innovations for Sustainable and Profitable Intensification of Smallholder Dairy in Kenya (ISPID)



Consortium members

• Godfrey Nyang'ori

Project manager
Mt Clara Mtakatifu Mwangaza Centre

• Bockline Omedo Bebe

Egerton University
Deputy Director of Extension & Outreach

• Jan vander Lee

Senior Livestock Advisor
Wageningen UR Livestock Research

Project description

Goal is to secure food, health and wealth with minimal externalities for smallholder farmers in dairy intensification process.

Objective is to empower smallholder farmers to practice sustainable and profitable dairy intensification that minimize health and environmental externalities.

Methods applied are action research, participatory feedback validation, targeted training in farmer priority needs, lesson learning tours, postgraduate training.

Impact anticipated

1. Farmers produce and trade quality and safer milk.
2. Farmers optimize resource use efficiency, reduce production costs and maximize profits.
3. Development agents promote inclusive intervention approaches in dairy intensification process.
4. Farmers are more resilient to shocks of climate, disease incidences, and seasonal fluctuations in feed and milk prices.
5. Farmers reduce postharvest milk losses and add value to milk.
6. Farmers increase herd productivity, food, incomes and agrobiodiversity.

Impact activities

1. Stakeholder inception workshop
2. Baseline survey
3. Dairy campus construction
4. Farmer knowledge and skills empowerment
5. Postgraduate action research
6. Farmer extension materials production
7. Farmer lesson learning excursions

Opportunities

1. Technical support from Dutch organization- SNV.
2. Student internship placement facility
3. Capacity building in Agribusiness, skills and competency, and climate smart agriculture practices.
4. Formation of farmer cooperative society.

Challenges

5. Upscaling best practices.
6. Weaning farmers off external support.



IV. Posters – Project teams Beninese ARF Call 1

Utilizing the genome of the vegetable species *Cleome gynandra* for the development of improved cultivars for West and East African markets – Benin, Kenya, The Netherlands

HORTITECHS



WAGENINGEN UR
For quality of life



NATIONAL INSTITUTE OF RESEARCH
NIGERIA

AOCC

AVRDC
The World Vegetable Center

Consortium members

- **Deguenon Edgar** - Coordinator, NGO Hortitechs Developpement.
- **Patrick Maundu** - Senior Researcher, Kenyan Resource Center for Indigenous Knowledge.
- **Achigan-Dako Enoch** - Associate Professor, Faculty of Agricultural Sciences, University of Abomey-Calavi.
- **Eric Schranz** - Chair Holder, Biosystematics Group, Wageningen University.
- **Allen Van Deynze** - Professor Coordinator of the African Orphan Crops Consortium
- **Svein Solberg** - Genebank Manager, Headquarters, AVRDC-World Vegetable Center

Project description

Aim

Developing improved cultivars of ***Cleome gynandra*** in Kenya and Benin in order to improve access to healthy diets for the vulnerable people living in marginal lands.

Methods

- Germplasm collection in West Africa and Kenya
- Phenotypic and metabolomics characterization of 100 accessions in controlled conditions
- Participatory characterization and selection for leaf yield potential and drought-tolerance in Benin and Kenya
- Re-sequencing of ***C. gynandra*** genotypes to facilitate future molecular breeding strategies for improved cultivars
- Creation of new adapted ***C. gynandra*** cultivars and development of technologies to grow and distribute them effectively

Impact activities and preliminary results

- Germplasm collection conducted in West Africa (174 accessions) and Kenya (52 accessions) to complement AVRDC collection
- Demonstration plots on experimental sites and pilot farmers' fields in Benin and Kenya: Forty (40) urban farmers in Benin and Kenya adopted the species and already sell it on local markets.
- Participation to two fairs in Benin with posters displayed and tasting sessions of *Cleome*
- On-going participatory phenotypic characterization in Benin and Kenya
- Documentation of traditional knowledge of 55 ethnic groups and 52 local recipes in total in Benin and Kenya
- Development of germination protocols for *Cleome* seeds
- Metabolic diversity in 48 accessions at Wageningen University (contrasting metabolic profiles between African and Asian lines)
- Re-sequencing of 48 East-African and Asian lines

Opportunities

- Additional funding for metabolic analysis (vitamins A, C, E, phenolic compounds, volatile compounds etc.) of 100 accessions of ***C. gynandra*** at Wageningen University
- Enthusiasm of farmers and consumers who adopted or rediscovered ***C. gynandra***
- MSc students in Benin, Kenya and the Netherlands are investigating ethnobotany, reproductive biology, best agronomic practices, QTL analysis for leaf yield, drought tolerance and photosynthesis efficiency in ***C. gynandra***.

Challenges

- Poor germination of *Cleome* seeds.



Fig. 1. Farmers' preferences in Benin and Kenya taken into account at every step of the breeding program



Fig. 2. Tasting sessions of *Cleome gynandra* at National Agricultural Fair organized by ProCAD-Benin (25-30 April 2016, Cotonou)

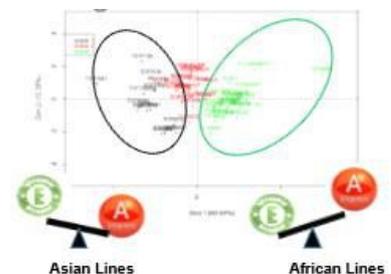


Fig. 3. Principal Component Analysis based on carotenoids, tocopherols and chlorophylls content in *Cleome gynandra*

Infant food from local resources as pathway for a better food and nutrition security in Benin (INFLOR)

Consortium members

- **Mrs Sébastienne ADJADOGBEDJI-AVOUZOUKAN**, Director, Groupe Pépité d'Or
- **Prof. D. Joseph HOUNHOUIGAN**, Dean, Faculty of Agronomic Sciences, University of Abomey-Calavi
- **Dr. Anita R. LINNEMANN**, Assistant Professor, Food Quality and Design group, Wageningen University
- **Ir. Mamam TOLEBA**, Quality control agent, Benin Food Safety Agency

Project description

Objective: Nutritionally improved, safe and affordable infant foods from local resources for urban and rural consumers' communities

Expected impact: Healthy infants with increased resilience to morbidity and mortality

Methods: Use of socio-anthropometric and participatory approach combined with analytical methods and advanced foodtech.

Impact activities and preliminary results

- 45 promising local food ingredients identified, characterized and mapped by agroecological zones of Benin
- 314 infant flours listed on local markets and at household level
- Ingredients used to formulate these existing flours are in the range of cereals, legumes and fish
- Local food resources are not yet fully valorized in the infant food formulas both at industrial and household levels
- 03 novel food formulas developed: 1 for industrial exploitation and 2 generic formats for agroecological zones
- 01 launching workshop; 04 steering committee meetings and 03 follow up meetings organized
- 02 participatory sensorial evaluations of developed products realized
- 03 manuscripts prepared for publication in refereed scientific journals
- 03 posters prepared for presentation at international workshops

Opportunities & challenges

- Existing consortium organization with adequate expertise to conduct an applied research on infant foods development based on interdisciplinary approach
- Existing market for selling improved local infant flours
- Availability of a wide diversity of food ingredients to be valorised
- Ensuring that the nutritionally-adequate formulated infant foods are sensorially and culturally acceptable and affordable to vulnerable groups who need them most



V. Background information

Enhancing research impact for food security Strengthening knowledge co-creation and research uptake

Food & Business Applied Research Fund / Call 2 projects workshop

Wednesday 26 October 2016 - Workshop Session 1 - Cotonou, Benin

Strengthening knowledge co-creation

Enhanced awareness of the importance of science for development has resulted in growing demands on researchers from policy makers and research donors to guarantee and demonstrate the actual or potential use and/or impact of research outcomes. As a consequence, research is increasingly interdisciplinary and inspired by the needs of society or is explicitly problem- and solution-oriented. This often concerns, however, a collaboration that remains within the scientific boundaries. Yet research is increasingly embedded in wider innovation systems that transcend the boundaries of academia and allow stakeholders to participate in the knowledge co-creation process. This is known as trans-disciplinary or impact oriented research.

NWO-WOTRO works with trans-disciplinary research partnerships, which means research involves non-scientific actors (policy makers, enterprises, civil society, consumers and others) who stand to benefit from the outcomes of this research. This implies that knowledge co-creation takes place between researchers, practitioners (private and public), target groups and stakeholders. Knowledge co-creation not only includes different types of knowledge (next to scientific knowledge) and different kinds of partners (next to researchers), but also transcends the boundaries of research to deal with innovation and application. For ARF this means that practical problems of practitioners and those that potentially benefit from scientific research are central to the research process itself. This is exemplified by a consortium of practitioners and researchers (the immediate target group) where the practitioner is the lead collaborator/main applicant with the involvement of ultimate and intermediate target groups as stakeholders. *ARF aims at solving real problems by combining different knowledge sources.*

From the ARF Call for Proposals: some definitions

Applied research is a form of systematic inquiry involving the practical application of science. Applied research deals with solving practical problems and generally employs empirical methodologies. (source: OECD)

Innovation is the process of developing new value adding ways to meet existing, new or inarticulate needs. Innovation is accomplished through more effective products, processes, services, technologies, policies or ideas that are readily available to governments, markets and society.

Co-creation is a form of cooperation in research where different parties (stakeholders, target groups) in the knowledge (demand and supply) process are engaged in interaction and joint learning on the problem definition, formulation of possible solutions, design of the research, conducting the research, the assessment of the results, and the translation of these in new practices and products. The diversity of perspectives and of the type and level of knowledge is seen as an asset that can be addressed in a constructive way of mutual learning and design.

The ultimate target group to reap the benefits of this programme consists of the most vulnerable segments of the population in developing countries, i.e. the poor, food insecure people and people suffering from malnutrition, especially women and children.

The intermediate target group consists of those individuals, organisations and networks that will be directly impacted by the outcomes of the programme, that is to say those that will adapt, adjust and apply newly generated knowledge and insights in order to wield new tools and technologies and apply new perspectives for action for pro-poor sustainable development.

Knowledge co-creation is a process that needs to give special attention to emerging dilemmas and challenges, as well as to the potential opportunities. For ARF knowledge co-creation is intended to enable the more effective use of knowledge and to encourage innovation which results in development impact.

With partners from various backgrounds and with different knowledge input and expectations, this can be a complicated endeavour.

NWO-WOTRO has identified several dilemmas and challenges that inter- and transdisciplinary project teams encounter in working with various partners on creating new knowledge (in various research programmes):

- Different expectations on goals and results in research, while aiming at societal and policy relevance, from the wide range of partners involved;
- Even when sharing transdisciplinary goals, benefits from the research may be very different for the various partners (let alone the target groups);
- The sometimes conflicting wish for short term success and the aim at long term benefits and impact that exists between various partners and donors;
- Participating in a joint research project yet using different terminologies and concepts, or similar ones that have a different meaning;
- The different outputs that are needed in different environments, most notably the need for scientific publications for researchers, and the need for practical output for practitioners;
- International collaboration involves various national requirements, cultural differences and a variety of expectations in working together;
- Working together in a public-private partnership project or programme while experiencing differences in influence and position.

Nevertheless, the rewards are worth the effort. No blueprint can exist on how to deal with knowledge co-creation. It is crucial therefore to share experiences and to have input from experts to enable 'learning by doing'. For this reason the session will start with a keynote and experiences from two projects, followed by discussions and sharing between participants.

Objective and outline of Workshop session 1

The session will explore and share experiences to learn and improve knowledge co-creation and take this back to the project teams, to enable all the partners to contribute and to discover together what the most appropriate collaboration looks like.

Enhancing research impact for food security Strengthening knowledge co-creation and research uptake

Food & Business Applied Research Fund / Call 2 projects workshop

Thursday October 27 2016 - Workshop session 2 - Cotonou, Benin

Enhancing knowledge sharing and research uptake

The ARF research projects focus on research for (local) impact on food security and poverty alleviation. For this reason they work on improving the enabling environment by embedding the research in the local context, capacity development, and widely sharing intermediary and final results. Active involvement of different partners throughout the research implementation process is key as well as organizing activities with broader relevant stakeholder groups. The Theories of Change and Research Impact Pathways as formulated in the NWO-WOTRO proposals are helpful tools and critical elements in this regard. Enhancing research impact for NWO-WOTRO and F&BKP is based on four components of knowledge sharing and research uptake strategies¹: stakeholder engagement, capacity building, communication, and monitoring & evaluation.

Stakeholder engagement

“Stakeholders are the scientific and other collaborators, targeted users, beneficiaries or other stakeholders who are participants in social, economic, legal, environmental or political processes in the local context and who are key persons in enabling the introduction and putting to work of new solutions and insights.” (NWO-WOTRO 2014)

In all ARF (WOTRO) project proposals an initial mapping of all relevant stakeholders is crucial from the research proposal development stage onwards. Stakeholder engagement is an ongoing process requiring regular updating and further development of context analysis, stakeholder groups and stakeholder engagement strategies. Two main stakeholder groups can be distinguished. The first group is the *inner circle*: stakeholders who are important for the specific research uptake and who are involved from the beginning (including in the development of the proposal, its modification and adaptation if needed, the implementation of the project, training, etc.). The second group the *outer circle* consists of those actors critical in up-scaling and out-scaling (i.e. actors who are able to intervene in the wider enabling environment). For ARF, the process is led by a practitioner (non-research inner circle stakeholder) to ensure stakeholder involvement in the process and consequently the inclusion of issues and concerns that will ultimately lead to the use of research results. Such a stakeholder is more closely linked to the project as a consortium partner.

Capacity building

“Activities directed at improving the capabilities of individuals, networks, and institutes to learn and innovate, based on sustainable partnerships and the ability to both generate and build on knowledge.” (NWO-WOTRO 2015)

From an early stage on ARF consortia are expected to map existing capacities in the context of their research focus. Each research project defines how the project itself and the results could contribute to targeted strengthening of the capacities of relevant groups, organizations, enterprises and government institutions related to the project. Together with their research team and stakeholders, the consortia develop activities accordingly during the execution of the research. This will address specific knowledge needs in order to design and implement plans for achieving impact in terms of capacities to be developed, strengthened, maintained and adapted. Capacity within the projects will be built by joint conduction of the research, development of knowledge and learning within the research projects. Besides, the consortia will link their project to external local and national (civil, government and business) actors and eventually international, who can be defined as outer circle project target groups, for and with whom capacity

¹ Four components adopted from “Research Uptake. A guide for DFID-funded research programmes” updated April 2016.

strengthening strategies will be developed. As such, capacity development could, for example, contribute to evidence-based policies.

Communication

“ARF projects are asked to gain, apply and share enhanced insights of the potential for local, national and regional market integration and integrated chain approaches. They are requested to indicate various target audiences, communication objectives, subjects and means of communication with reference to: Output dissemination (the anticipated results in terms of scientific and non-scientific publications and other output, as well as enhanced capacity and skills) and International collaboration (intended communication with communities, institutions, networks and platforms who would be interested in linking up with the consortium.)” (NWO-WOTRO 2014)

Projects are expected to inform audiences by continuously communicating research process and results and relate these to existing practices and knowledge. Communication can be the base for capacity building trajectories and specifically policy briefs, but is often also targeted at broader and more general audiences. An initial communication plan including specification of target groups, communicating messages and means of communication should be developed by ARF projects. Communication plans target stakeholders from “outer circle” as described above. At a later stage, communication initiatives are to be developed further by the project team into more sustained and elaborated strategies. Knowledge sharing partly takes place via the F&BKP (website).

Monitoring and evaluation

ARF project teams have formulated a Research Impact Pathway during their proposal writing. Those Pathways are related to the overall Theory of Change of ARF. Project teams are expected to formulate research uptake objectives and adjust them according to emerging results and shifting knowledge needs; this is a cyclical approach that requires continuous effort. Changes are mentioned in the annual reports.

Objective and outline of Workshop session 2

Plans for knowledge sharing and research uptake are an integral part of the ARF research projects. These should make knowledge work for practitioners and policy makers. Where the prime responsibility for enhancing research impact lies with the consortium partners and stakeholders, the F&BKP Office and NWO-WOTRO may facilitate those activities. *This second workshop day aims to provide better insight in the various possible components of knowledge sharing and research uptake and to inspire the participants to come up with ideas for knowledge sharing and research uptake they can further develop with the research team and others.* The second session is a follow-up of the first day, which focuses on co-creation. Here, attention will also be given to the link of the Impact Pathway with knowledge sharing and research uptake, and the role of co-creation.

During the workshop session a presentation on Knowledge Sharing and Research Uptake will be followed by group work on one of the component of this topic: how to improve stakeholder engagement.

This will be followed by a short introduction by the F&BKP Office on potential activities and expected deliveries. A subsequent brainstorm session will look at possible research uptake activities by the projects and how these could be conducted in collaboration with each other, with external actors and/or the Food & Business Knowledge Platform or NWO-WOTRO. In the afternoon during a field visit to the Beninese Regional Training Centre Songhai for small agricultural enterprises practices of research uptake will be explained and experienced.

Public seminar - Linking nutrition and agriculture Knowledge exchange for better informed policies and practices

Food & Business Applied Research Fund / Call 2 Public Seminar

Friday 28 October 2016

To achieve food and nutrition security for all, the various actors related to food value chains should review their strategies and actions from farm-to-fork, and adapt to changing circumstances in a combined effort and on a regular basis. Yet in everyday practice, the exchange and synchronization of information and knowledge between different food value chain actors (such as farmers, transporters, packagers, middlemen and consumers) is often limited and the theme of nutrition is getting even less attention. This seminar focuses **on how knowledge sharing, specifically on nutrition and agriculture linkages throughout the food value chain can be improved in order to contribute to food and nutrition security**. The seminar will explore nutrition-sensitive approaches e.g. interventions into the underlying and basic determinants of people's nutritional status (children's in particular) that incorporate specific nutrition goals and actions, such as maximizing agriculture's contribution to nutrition. Benin will be used as a case study to illustrate the possible bottlenecks and opportunities for linking agriculture and nutrition through better information and knowledge exchange.

The need for knowledge exchange and co-creation for better nutrition

In many low and middle income countries, and also in Benin in West Africa, the **problem of undernutrition is profound and pervasive**, and affecting almost half of all children under the age of five. This includes serious consequences for physical and cognitive development of affected children in the short-term, but also the economic development of a country in the longer term ([World Bank, 2013](#)). The nutritional status of people is influenced by three broad factors: (1) food and nutrition security (access to sufficient, safe and nutritious food to support a healthy active life); (2) health (including the health environment in terms of pathogens and environmental contaminants, water, sanitation and access to health services); and (3) care (child feeding and care practices of children and women). The seminar will focus on the first factor and more specifically on how different actors along the food value chain can contribute and collaborate to improve the nutritional status of individuals. As such, the seminar focuses less on nutrition-specific approaches such as increasing exclusive breastfeeding practices.

The causal pathways of the various forms of malnutrition – varying from short stature (stunting), wasting, low birth weight, micronutrient deficiencies, and under or overweight – are multifaceted and not attributable to one single factor. Therefore, a **multi-sector approach is essential to tackle the burden of malnutrition** effectively. For example, to deliver more local food of high nutritional value to domestic markets, public and private sector cooperation is needed to boost the investment in greater productivity and food value chain efficiency. However, knowledge and information exchange and co-creation by multi-sectoral actors can be difficult, in particular when linking agriculture to nutrition. Most farmers and development or policy professionals are not trained in both agriculture and nutrition and this makes awareness raising on the relationships between agriculture and nutrition security a challenge. This seminar aims to make a head start by bringing together representatives from different sectors to interactively share knowledge between them. This can ensure more effective food value chains functioning and improvements in the nutritional status of individuals.

The challenge of linking agriculture and nutrition

So how do nutrition and agriculture link? The so called “nutrition-agriculture linkages” is a term used to describe the relation between nutrition, health, and agriculture and their interdependencies. It acknowledges that just producing more food will not immediately trickle down to improved nutrition, and that more inventive and integrated programs and interventions are needed to reach nutritional goals. Just investing in enhancing agricultural productivity will not directly solve the problems of the scarcity of nutritious foods and the lack of diet diversity that poor people face. A focus on productivity might even seriously affect food quality and health status ([FAO, 2015](#); [Carvalho, 2006](#)). However, recent studies indicate that specific investments in agricultural developments to enhance nutrition-agricultural linkages could have a long-term impact on people's nutritional status, health and well-being ([Balz et al., 2015](#); [Chung, 2012](#)). Therefore, if change in nutritional status of farmers and consumers is the end goal, it is necessary to incorporate nutrition goals throughout the value chain. This can be supported by **good knowledge and information exchange**

and co-creation between the various actors in and related to different parts of the food value chain.

The actors should incorporate collective nutritional goals into their day-to-day practices. Using “nutrition-sensitive value chain approaches” could be helpful considering it goes beyond agricultural production into food storage, transport and trade, transformation, and retail ([GLOPAN, 2016](#)). However there is still little documented experience on these approaches and the remaining evidence gaps restricts the understanding of the feasibility of the value-chain-for-nutrition approach ([Hawkes & Ruel, 2011](#); [Brauw et al., 2015](#)). As for limitations, value chains have a commodity specific focus and take into account the nutrient content of individual food, while better overall nutrition status can only be achieved through improvements in people’s overall dietary quality ([Brauw et al., 2015](#)). Also, it is debatable whether markets are the most effective ways of reaching the poorest, most vulnerable and most isolated populations, and the importance of informal markets and food exchanges is often neglected in the food value chain approaches ([IDS, 2016](#)). However when these limitations are taken into account, this broader scope that includes all actors in the value chain can be helpful when addressing this multifaceted and complex issue of ensuring nutrition security.

Jointly linking value chain activities with nutrition

Value chain activities could thus be improved by incorporating nutrition goals on different levels. Policies and practices aimed at the farmer-level could focus their interventions on reducing transaction costs or risks along the value chain, or by increasing the supply of raw materials to support an increased nutritious food availability and affordability, as well as supporting the fortification of selected processed foods ([Brauw et al., 2015](#)). With regards to transportation and the middlemen-level, the dissemination of results of willingness-to-pay studies to traders has had a positive impact in Uganda and Mozambique ([Hawkes & Ruel, 2011](#)). At the storage/cooling-level, better storage facilities could ensure that foods retain their nutritional levels. Within the food value chain, processing can both support dietary quality through increasing food availability, extending seasonality through the hunger gap, and make food safer to eat. Yet it can also lower the nutritional quality of products, for example, through producing trans fats from soya oil, chicken nuggets from plain chicken and producing ultra-processed foods that are high in energy, sugars, unhealthy fats and salt and low in dietary fiber ([GLOPAN, 2016](#)). Studies also show the importance of street foods and this raises specific challenges towards increasing street food vendors awareness to adopt processing techniques that retain the nutritional value of these foods ([Riet et al., 2001](#); [Mboganie Mwangi, 2002](#)). On the level of markets and retailers, more nutritious foods could be commercialized if retailers are aware of the benefits. On the consumer-level, interventions could stimulate increased consumption of nutritious foods, and thereby improve diets by raising awareness and providing nutritional information; or through increased income which could increase the demand for nutritious foods ([Brauw et al., 2015](#)). However, it is important to keep in mind that to improve nutritional status of these people, the actors of the different levels should jointly exchange knowledge and take the limitations of a value chain approach into account.

Multi-sectoral experiences from Benin

In 2015, stunting prevalence in Benin was 34% and wasting prevalence was 4.5% ([Global Nutrition report, 2016](#)). One of the causes of malnutrition was the lack of access to enough diversified foods of high nutrient value throughout the year. An additional problem regarding the difficulty of communication between agricultural experts and nutrition experts is that not all local farmers speak French but often only their local language, of which there are many. In addition, researchers and the food production sector are often not well connected. The government of Benin has created a Strategic Plan for Food and Nutrition Development (PSDAN) that identifies two broad strategic axes: a nutrition-specific; and a nutrition-sensitive route to combat malnutrition ([CGNB, 2009](#); [Unicef, 2013](#)). The government is actively working on nutrition and in addition to joining the [SUN Movement](#), it has established a multi-sectoral, multi-stakeholder platform, the National Council of Food Security (CAN). Lessons learned from this platform will be shared in the keynote address by Professor Roch Mongbo.

Furthermore, examples of strategies and interventions linking nutrition and agricultural interventions will be highlighted in a panel discussion. A critical discussion will also be facilitated on this theme from the perspective of (knowledge) exchange between participants. This event offers participants the opportunity to learn and reflect on possible strategies to better connect actors within food value chains at stake, and to identify best practices, challenges and bottlenecks for knowledge sharing on nutrition-agriculture linkages. Recommendations resulting from the seminar will be reported and communicated through various relevant media channels in Benin, and the websites of the [Food & Business Knowledge Platform \(F&BKP\)](#), [NWO-WOTRO Science for Global Development](#) in the Netherlands and [AgriProFocus](#).



Ministry of Foreign Affairs of the
Netherlands



Agri
Pro
Focus