

# Harvesting the benefits

*of African-European research partnerships*

**Insights** from a  
selection of LEAP-  
Agri projects with  
Dutch consortium  
partners



A Long-term EU-Africa research and innovation Partnership on food and nutrition security and sustainable Agriculture



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## PREFACE

# Dear readers,

It is projected that by 2050, we will have to feed an additional two billion people living on our planet. At the same time, the impacts of climate change are affecting agriculture, while conflicts and crises like the Covid pandemic expose the vulnerabilities in the global food system. We are aware that none of this is new to you. But we cannot repeat the message enough: to achieve the goals of the 2030 Sustainable Development Agenda, we must transform our global food systems. Africa and Europe are facing different challenges, and yet both continents will have to adapt their agricultural and food policies and practices towards more healthy, sustainable, and resilient food systems.

This transition will require – and at the same time trigger – a great deal of new science and innovation. It is a challenge and opportunity that we should grasp together. This is exactly why the Dutch government is proud to have supported the joint Africa – Europe Research and Innovation programme, LEAP-Agri, on Food and Nutrition Security and Sustainable Agriculture. In 2017, the 24 funding partners from Africa and Europe launched a joint research call. 27 joint African-European transdisciplinary consortia were selected and supported to create new knowledge and innovations on urgent food system challenges. These ranged from the development of new food products from climate resistant crops or the ecological intensification of dairy farming, to the strengthening of inclusive value chains and policy development for healthy urban diets. The European Commission supported this Horizon 2020 programme with a budgetary top-up.

Dutch research institutes and businesses were partners in 14 of the 27 LEAP-Agri consortia. In this magazine, we showcase a selection of six of these projects which were designed and implemented by consortia that included Dutch partners with a strong track record on food system and agricultural research. While this small selection can't possibly do justice to the efforts and outcomes of all 27 LEAP-Agri projects, we believe they clearly illustrate the purpose of this magazine: to highlight the significance of this type of African-European research collaboration for creating knowledge, innovations and solutions for some of the most urgent global challenges of our time.

We would like to thank everyone who contributed to this magazine. We are grateful to the European Commission for the opportunity to create this AU-EU research and innovation programme, which has already paved the way for new collaborations. We would also like to thank the Agence Nationale de la Recherche (ANR) for their role in inter-agency coordination and cooperation.

We wish you an inspiring read!

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## PIONEERING AU-EU JOINT FUNDING

# The added value of LEAP-Agri



*Dr Hans-Jörg Lutzeyer served as the responsible policy officer of LEAP-Agri and co-chaired the EU-AU FNSSA Working Group, in his capacity as Senior Research Policy Officer for the EC's DG Research and Innovation*

LEAP-Agri was the first initiative jointly funded by the European Commission and European and African countries within the AU-EU High Level Policy Dialogue on Science, Technology and Innovation and its first priority on Food and Nutrition Security and Sustainable Agriculture (FNSSA). For the FNSSA priority, we are pursuing a 10-year roadmap (2016-2026).

The LEAP-Agri ERA-Net involved substantial pioneering work. In the lead-up, we invested in science diplomacy with the African partners to achieve a common understanding of the objectives of the collaboration and to make joint funding possible. Looking back, this joint funding remained a challenge throughout the administration of the ERA-Net and made us realise the importance of flexibility, especially for securing sufficient funding and organising the financial flows. At the same time, the EU-AU joint funding was a major condition for success and helped to deepen the partnership for future joint funding initiatives, such as the International Research Consortium.

Another strength of the LEAP-Agri programme was its transdisciplinary approach. LEAP-Agri was designed to encourage collaboration between committed scientists, corporate and public agencies involved in agriculture and food systems, and farmers and their local networks. The exchange of expertise and experience between these multiple actors enabled the development of innovations that work in practice. Within Europe we also highlight the diversity of Agricultural Knowledge and Innovation Systems and make multi-actor research and innovation processes an eligibility criterion for funding in many Horizon Europe projects.

LEAP-Agri also showed the added value of linking scientific and local expertise. Scientists can analyse insights that build on local experience and practices in one country to devise and communicate solutions for similar problems in other countries. To capitalize on these processes, I think we benefit from strong linkages to development cooperation and possibilities at local level to foster participatory development processes for technologies and social values.

Despite its relatively short programme duration, LEAP-Agri delivered many interesting insights and innovations that can contribute to achieving more inclusive and sustainable food systems. However, to fully capitalize on the results of the joint EU-AU research investments, we will need to increase our support for the scaling of research-based innovations. Events such as the AU-EU Innovation Festival that will take place in Cape Town, South Africa in June 2023 are very helpful in this regard. By bringing together investors and innovators, it offers a platform for discussions on scaling bottlenecks, such as for women- and youth-led innovations, and enables the blending of different funding approaches. As this is part of the EU-AU Innovation Agenda, the EC and the EU-AU partners will continue to invest in such events.

Finally, the value of a programme like LEAP-Agri also lies in its capacity to support policy development, at both national and EU/AU level. Research funding is often determined by policy priorities, as was the case with LEAP-Agri and other programmes such as the cluster of projects on 'Food Cities Africa'. We are very pleased to see that many LEAP-Agri partners provided input for policy development and future research design by participating in the policy dialogues organised by the European Commission. We are grateful for their expert contributions that have strengthened EU policies, including the 'Farm to Fork Strategy' for a fair, healthy and environmentally friendly food system, and 'Food 2030', the EU's research and innovation policy to transform food systems and ensure everyone has enough affordable, nutritious food to lead a healthy life. ■



# LEAP-Agri in a nutshell

The LEAP-Agri programme (2016-2022) is an African Union-European Union partnership aimed at research and innovation for food and nutrition security and sustainable agriculture. This long-term, jointly funded Research & Innovation (R&I) Partnership was launched by the AU-EU High Level Policy Dialogue on Science, Technology and Innovation. The aim was to contribute to the United Nations Agenda 2030 and the Sustainable Development Goals on the priority topic of 'Food and Nutrition Security and Sustainable Agriculture' (FNSSA).

## Two pillars

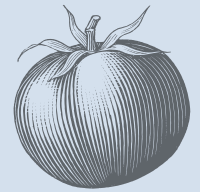
LEAP-Agri was launched under the European Union's Horizon 2020 programme for research and innovation. It had two pillars:

**I** Funding of AU-EU collaborative, transdisciplinary R&I projects on FNSSA

**II** Supporting and contributing insights and innovations for a long-term EU-AU partnership on FNSSA

## Three objectives

The R&I projects were expected to contribute to the following objectives:



→ Solving complex economic, ecological and social challenges to improve local nutrition in a sustainable way using system-oriented approaches.

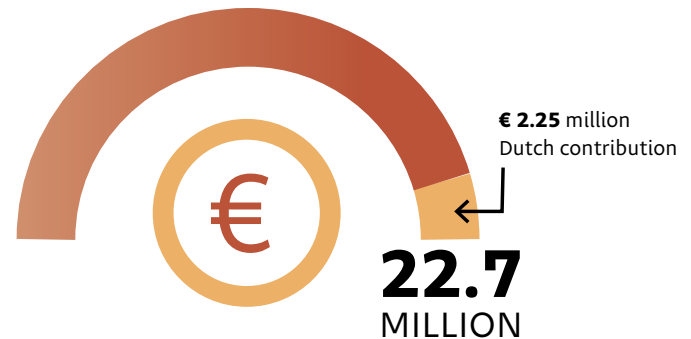
→ Developing evidence and solutions for policy change, positive agricultural and nutritional outcomes, and significant improvements in economies, wellbeing and resilience.

→ Delivering impact at national or regional scale through scalability of R&I.



## Duration

December 2016 – December 2022 (5 years plus one year extension due to the covid pandemic)



## Budget

- € 22.7 million for 27 R&I projects
- Contributed by **24** Ministries and funding agencies from **18** European and African countries, and one international organisation (CIHEAM)
- **33%** top-up by the European Commission
- € 2.25 million Dutch contribution (MoFA, MoA, NWO-WOTRO)

## 27 Research & innovation projects

- Implemented by consortia involving **160 African and European partners** (universities, research institutes, companies and civil society organisations)
- **14** of the 27 R&I project consortia included **Dutch partners**

## Outputs & results

Visit the LEAP-Agri [website](#) for information on the numerous scientific publications, innovation products, workshops, seminars and other dissemination and collaboration activities organised and produced by the 27 projects.



## Countries



- Algeria
- Belgium
- Burkina Faso
- Cameroon
- Egypt
- Finland
- France
- Germany
- Ghana
- Kenya
- The Netherlands
- Norway
- Portugal
- Senegal
- South Africa
- Spain
- Turkey
- Uganda

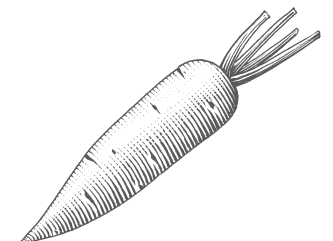
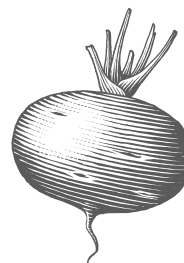
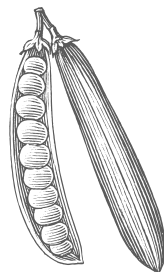
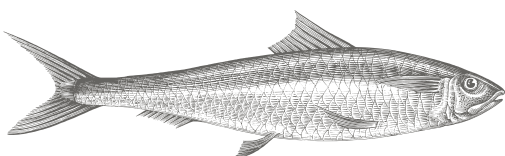
## Why does the Dutch government invest in LEAP-Agri?

The thematic focus and aims of the LEAP-Agri programme match perfectly with the Dutch Food and Nutrition Security (FNS) policy of the Ministry of Foreign Affairs and the Ministry of Agriculture, Nature and Food Quality. The aim of this policy is to boost food security, sustainable agriculture and effective water management worldwide. The LEAP-Agri programme can therefore be considered an implementation instrument of Dutch government policy.

The global FNS challenges are huge and concern the full breadth of the food system. Tackling these challenges effectively requires international and cross-sectoral commitment and collaboration. The Dutch government chooses to fund the research partnerships of Dutch scientists with international colleagues across disciplinary boundaries, to enable and catalyse the breakthroughs in science and innovation that are so urgently needed. The close African-European collaboration in programme funding, design and execution that the LEAP-Agri programme made possible, leverages the positive impact of the Dutch FNS policy.

This international research cooperation at the same time strengthens the Dutch knowledge and innovation infrastructure, including the Dutch position in international networks. New knowledge, insights and experience gained through international research and innovation can also be used to feed future Dutch FNS policy and research programmes.

Lastly, international knowledge and innovations developed can benefit the Dutch corporate or industrial sector, in particular the agri-food sector which took part in some of the LEAP-Agri project consortia. ■





## CASE

Uganda's capital Kampala counts more bakeries every year. Like in many African countries, the consumption of bread, cakes and other wheat products is rapidly increasing and replacing meals prepared from locally grown crops. In contrast, 95% of the wheat consumed in Uganda is imported. This trend makes the country's food system highly vulnerable, as the war in Ukraine made painfully clear. The NUTRIFOODS project focused on developing attractive new bread products using locally available climate-resilient crops. It aims to support both healthy diets and local economies.

# No need for wheat

## A NEW FLOUR FROM CLIMATE-RESILIENT AFRICAN CROPS



### NUTRIFOODS PROJECT

**Consortium:** Wageningen University & Research and Bakker Wiltink and Bbrood, *the Netherlands*; Makerere University and Nutreal Ltd., *Uganda*; University of Pretoria and University of Venda, and *BISCA, South Africa*; *KIRDI, Kenya*; VTT Technical Research Centre, *Finland*

> [Website NUTRIFOODS](#)

### From scratch

The project was conceived by a consortium of European and African scientists in close collaboration with bakeries operating in the Netherlands and East Africa. They opted for an unconventional approach: rather than partially replacing wheat flour by mixing in other crops, as classical food technology dictates, they decided to exclude wheat altogether. Food scientist Stefano Renzetti (WUR) explains, 'We said, let's start from scratch and look at the characteristic properties of flours from different African crops. By best matching their properties, we can obtain a flour mixture with all the desired functionalities for a perfect dough.' The wish list for new products made from this dough was ambitious: climate-resilient, affordable, nutritious – and delicious.

### Food system analysis

The project highly benefited from the expertise of the Ugandan and South African scientists, who collected a wealth of information on the agronomic properties, nutritional qualities, availability, cost, transportability, processing prospects, etc. of a range of African legumes, tubers, pulses and cereal crops. Renzetti and Martijn Noort, also from the WUR food technology department,



then turned to their social science colleagues to help them plot these many variables into a food systems framework. Noort: 'For us who are most at home inside the lab, reflecting on socio-economic and environmental drivers in the food system was outside our comfort zone. But it proved extremely helpful for analysing which of the candidate crops could most likely be included in value chains. In the end we chose to go for a blend of sorghum, cowpea and cassava.'

## Climate-resilient African crops might find a future export market

### Old crops, new blends

Then into their labs the food scientists went – in Wageningen, Espoo, Pretoria, Venda and Kampala. After three years of experimenting to improve the chemical and physical properties of the chosen crops, a brand new sorghum-cowpea-cassava flour blend was a fact. The project's industrial partners meanwhile contributed know-how on the commercial production of gluten-free breads (Bakker Wiltink) and insights into the African consumer market (BBrood). 'The formula we developed is technologically versatile, exactly as we had hoped,' says Renzetti. This means it can be used and tweaked – a little more sorghum for boosting volume, a little less cowpea for a less beany taste – according to local preferences and purposes. The application ranges from loafs or buns bought by middle-class urban customers to chapatis prepared at bustling town markets. The flour blends can also be used for gluten-free products that are increasingly demanded in Europe, which suggests that the climate-resilient African crops might find a future export market.

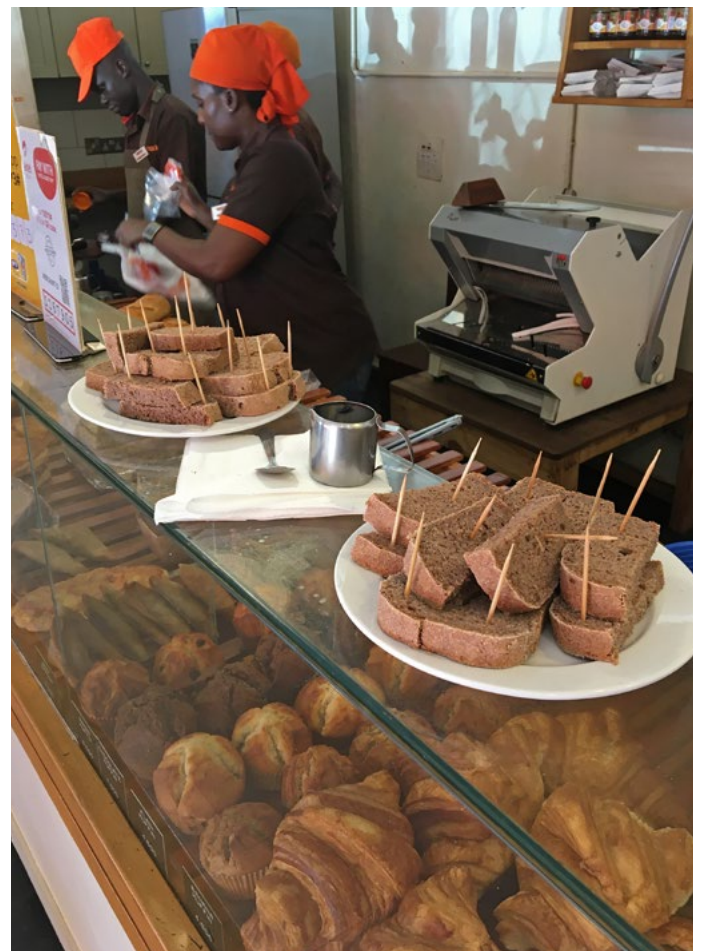
### First steps onto the market

Noort and Renzetti are captivated by the project, especially after seeing the flour's potential for stimulating climate adaptation as well as creating local entrepreneurship and value chain development in Uganda. The subsidiary of BBrood in Kampala has started producing the climate-resilient flour blends, selling wholesale bags to chapati vendors. The Bake for Life foundation, with technical support from BBrood and Bakker Wiltink, is testing recipes for chapatis and cakes using the flour blends as well as training micro-bakeries to prepare and market these new and healthier products. For the Ugandan micro-entrepreneurs the key advantage is that the flour blends made from local crops are cheaper than wheat flour. The Ukraine war-induced price spikes

for imported wheat had previously forced them to reduce the size of their chapatis, the only way to keep them affordable for their low-income customers.

### Seed money

The first consumer tests conducted by the NUTRIFOODS project are promising. Yet plenty hurdles remain to increase the availability, affordability and uptake of climate-resilient crops (CRC) and products. Using their food system analysis, the consortium partners have listed some of the critical interventions required – from investments in CRC-specific agriculture and processing technologies, to valorising indigenous knowledge on CRCs, and creating short food supply chains in urban areas. In early 2023, the Dutch Topsector Agri-Food awarded seed money to the NUTRIFOODS partners for the development of an extensive follow-up programme, which is meant to cover Uganda as well as other countries affected by the wheat and climate crisis. It will focus on developing commercial products from the innovative flour blends and setting up supply chains for their ingredients. The unique consortium of scientists and bakeries has meanwhile attracted new partners from the agri-food sector to work towards their ambition of bringing healthy products made of climate-resilient African crops to both African and European markets. ■



An interview with  
**Dr Asaah Ndambi**



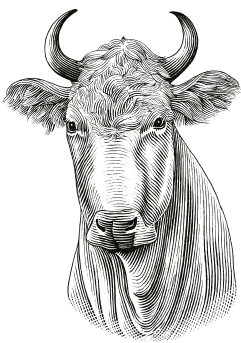
The demand for dairy products in Africa is rising. This is good news as dairy consumption contributes to food and nutrition security. However, the volume and quality of milk produced by African dairy farmers does currently not meet this rising demand.

Dr Asaah Ndambi, researcher at Wageningen Livestock Research (WUR), was one of the principal investigators on the Africa-Milk project that was implemented in four countries: Kenya, Madagascar, Senegal and Burkina Faso. The project focused on co-designing and implementing solutions for increasing local milk production through agroecological intensification, and creating sustainable and inclusive dairy value chains.



# Research across the African continent

**FOR STRENGTHENING SUSTAINABLE DAIRY VALUE CHAINS**



## AFRICA-MILK PROJECT

**Consortium:** Wageningen University & Research, *the Netherlands*; cirad, France; FIFAMANOR, *Madagascar*; INERA, *Burkina Faso*; ISRA, *Senegal*; University of Nairobi, *Kenya*

*How was it to be part of a research consortium that spanned the African continent?*

For me it was the first time to work so closely as a team with researchers from English-speaking and French-speaking countries. It was a great experience to work together in all phases, from writing the proposal and developing the methods to implementation and reporting. We each brought our particular expertise and strengths to the project and each work package was led and

co-led by researchers from different countries based on their expertise. Our team at the University of Nairobi and Wageningen University supported the West African researchers with the formidable task of data ‘cleaning’ and analysis. The West-African universities together with the French institute CIRAD contributed what became a key success factor of our work in Kenya: the Dairy Innovation Platform (DIP). These platforms comprise several actors discussing and prioritizing



development of the dairy chain. The bottom-up model had been tested in Burkina Faso and Senegal, and we adapted it to the Kenyan situation.

#### *What made the Dairy Innovation Platforms so successful?*

They brought more cohesion among different stakeholders along the dairy value chain within our research area. Farmers and their cooperatives, milk graders and processors, transporters, extension workers, local governments – they came together to discuss their challenges and needs. The Netherlands Development organisation (SNV) helped us in designing training packages tailored to these needs, for instance on different aspects of farm management such as fodder production and preservation, optimising feed rationing, calf rearing, improving milk hygiene and milk collection. Meanwhile, we strengthened institutional and organisational aspects of the DIP by helping cooperatives negotiate supply contracts with milk processors, or connecting farmers with service providers including companies or NGOs providing insurance policies, credit schemes and small biogas plants for sustainable manure management.

## I am convinced that this South-South collaboration is the way forward

#### *The research in Kenya focused on the introduction of improved forages. Why?*

The simple answer is that cows that are well fed produce more and better quality milk, which has a strong connection to our project objective. We therefore set up demonstration farms to promote new forage varieties with a higher biomass yield and better nutrition profile than the commonly used forages. We also taught the farmers ecologically friendly cultivation methods for these forages. The farmers who adopted the improved feed reported increases in milk production. This meant more milk consumption within their households and more income from milk sales. We are now conducting a study to quantify this impact.

Another positive effect that the farmers may not have noticed, yet which is very relevant for climate change mitigation, is the better digestibility of the forages we introduced. This means lower levels of enteric methane emissions. These ‘cow burbs’ as we jokingly call them, are responsible for a very large part of greenhouse gas emissions from ruminants. In West Africa, our consortium



partners also focused on the importance of dairy feed. They introduced an IT tool called Jabnde, which can calculate the forage rations needed for livestock, taking into account milk production levels as well as methane emission levels.

#### *The Africa-Milk project was evaluated as one of the most promising LEAP-Agri projects, having a high business potential. How do you plan to proceed?*

We received some funding to work together with the Association of Commonwealth Universities to assess the drivers of success and sustainability of the DIP approach. The outcomes of this study will hopefully help us develop a proposal for a substantial follow-up project. I personally feel very strongly that we should build on this momentum. Farmer organisations and milk processors are eager to expand the activities. Cooperatives are requesting more demonstration farms and seeds of the forages we piloted. They feel the impact is tangible.

#### *How important has the African-European partnership been for the project's success?*

It is key. We all learned and gained from this collaboration. While the language barrier often hinders West and East African countries working together, I am convinced that this South-South collaboration is the way forward. I'm from Cameroon and during my time in Kenya for this project, I realised how much knowledge and experience from the East African dairy and agricultural sector is relevant to West Africa. However, if the LEAP-Agri programme hadn't provided this opportunity, I doubt that we as researchers from Kenya, Burkina Faso, Madagascar and Senegal would now be working and publishing together on these urgent issues of food security and climate-smart farming that feature so high on both African and European development agendas. ■





# The big deal about small fish

## CASE

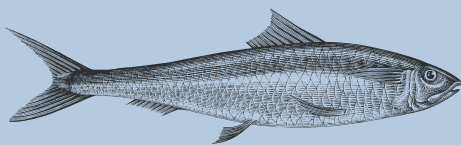
## EXPOSING POLICY BLIND SPOTS

In markets across Africa, you will often find stalls displaying heaps of tiny, dried fish. These small indigenous fish are a precious ingredient in low-income household diets. They are also a booming business. For instance, around 600,000 tons of small fish is caught on Lake Victoria each year, making it the world's second largest freshwater fishery in terms of volume. However, policy attention for the significance of small fish for global food security is almost entirely lacking – both in Africa and Europe. The SmallFishFood project addresses this blind spot.

'It is not just because they are caught at night or in the early morning hours that small fish have remained invisible,' says Paul van Zwieten (WUR). 'Small fish go unrecorded in catch statistics and are underrated due to the dominant way in which we look at fish: as a model for revenue.' Nile perch and tilapia, on the other hand, which are also caught in Lake Victoria, receive plenty attention from both African policymakers and international investors. These species are popular among middle-class consumers and a profitable export product. Van Zwieten: 'But small fish are not interesting from a macroeconomic perspective as their profit margin is small. They have a low status and are considered, just like sardines in Portugal used to be, "poor man's food".' 'And that,' Joeri Scholtens (UvA) adds, 'is exactly why our project puts these small fish in the limelight.'

### Super food

Small fish are extremely relevant in light of the international community's promise of Zero Hunger. They are not only abundantly available and affordable for the poor, but also highly nutritious. The small fish are consumed whole, which ensures the maximum intake of their healthy fatty acids, animal protein and micronutrients. Small fish have two more unique selling points: first, they are an important source of income for millions of poor fishers and fish traders, many of them women; and second, catching small fish, which are simply sun-dried or smoked with simple methods, is the most high-yielding, eco-friendly, low CO<sub>2</sub>-emitting, and nourishing way of utilising aquatic resources.



### SMALLFISHFOOD PROJECT

**Consortium:** Wageningen University & Research and University of Amsterdam, *the Netherlands*; University of Bergen and Institute of Marine Research, *Norway*; University of Ghana and CSIR, *Ghana*; BfR, *Germany*; KMFRI, *Kenya*; NaFIRRI, *Uganda*

> Website: [SmallFishFood](http://SmallFishFood)



## Women's common sense

The SmallFishFood project mapped current patterns of production and distribution of small fish in Kenya and Ghana. They also researched the changes in nutritional value and in microbiological quality along the value chain, from catch to consumption. The findings from this research, which feed into the FAO/INFOODS uFish database, revealed that the biggest quality loss happens during processing, that is, when the fresh catch is being sundried on the sand, or smoked. It is mostly women who are responsible for this stage in the value chain.

Scholtens: 'The women are often blamed for the loss of quality. It is said that they lack business sense because they don't invest in the improved solar dryers, ovens, or other technologies that are being promoted by NGOs or researchers. However, our findings show that there is no profit margin in this processing stage. It is therefore rather proof of the women's common sense that they refuse to invest in vain.'

**It is proof of the women's common sense that they refuse to invest in vain**



## Policy bias

The researchers stress that, rather than being fixated on technological innovations, attention should be paid to the socio-political issues. In this case, to the women's lack of access to land and financial resources to set up a proper fish drying business. In fact, they argue that the real problem is not merely a neglect of the small fish sector, but an active and strong policy bias against this sector. Scholtens: 'The fishers of small fish are often being criminalised for allegedly overfishing the resource. In Uganda, military operations are targeting these fishers, confiscating their boats and fishing nets. Ugandan politicians argue that the small fishers are destroying the

export market by robbing tilapia and Nile perch off their natural feed or by catching the juveniles of these species.' The European Union is a strong advocate for the fight against Illegal, Unreported and Unregulated (IUU) fishing. Scholtens: 'Of course IUU is a massive global problem. Yet the EU should ensure that small fishers don't become collateral damage in the global fight against IUU fishing. The small fishers are often victimised in the process of seeking easy targets, while governments meanwhile turn a blind eye to the violations by Chino-Ghanaian trawlers.'

## Blind spot

The SmallFishFood project aims to stir up evidence-based discussion on topics that concern both European and African policy. Such as the substantial investments in tilapia research and commercial farming in Africa, most recently by EU governments. Scholtens: 'They argue that these investments will also benefit African food security and small-scale fish entrepreneurs, but research shows that this is a questionable assumption. From the perspective of SDG2, these millions are not well spent. Worse still, there is a risk that large volumes of small fish, the food of the poor on the lake shores, will soon be ground into fishmeal to serve as feed for the tilapia farms.' Clues for why policy choices are what they are, can be found in the systematic analysis that the project conducted of Kenyan and Ghanaian fishery and food security policies. It revealed that there is remarkably little cross-referencing between the two: food security policies are focused on agriculture and don't mention fish, while fishery policies don't mention food security. It appears that recent Dutch policies share this major blind spot as they completely ignore the FNS and development relevance of fish.

## Recognition

There certainly is good news too. An impressive international research community is emerging, in which the partners of the SmallFishFood project play a leading role. Their work has gained recognition in organisations such as FAO, WorldFish, IFAD, Rockefeller Foundation and USAID, not least thanks to the two impactful FAO papers that the project's scientists co-authored. Scholtens: 'A programme like LEAP-Agri, which funds close collaboration between European and African research institutes that have close links to their national policymakers, is an invaluable asset for stimulating international policy debates and increasing political awareness on "the big deal about small fish"?' That the World Food Prize 2021, often referred to as the 'Nobel Prize for Food and Agriculture', was awarded to Shakuntala Thilsted, who was involved with the SmallFishFood project, was an enormous boost for all those advocating nutrition-sensitive approaches to fisheries. ■

An interview with  
**Dr Abigaël Otinga**



‘The promise of tangible impact is extremely fulfilling’



# A platform for action research

## CREATING A HEALTHIER DIET FROM FORGOTTEN GRAINS

If it were up to soil scientist Abigaël Otinga from the University of Eldoret and her partners in the UniCARSSA project, ugali, the staple meal consumed daily by families across Kenya, is ready for a remake. Ugali is prepared by stirring maize flour in boiling water to make what some refer to as a ‘stiff porridge’. While maize yields are declining as a result of climate change and soil degradation, more nutritious cereal grains are waiting to be rediscovered.

*What explains the importance of maize for Kenyan farmers?*

Many farmers in our country grow maize as their main household crop because their families depend on it for their sustenance. They use maize flour to make porridge in the morning, and have ugali for lunch or dinner – served with leafy vegetables in an onion-tomato or sometimes meat sauce. Selling their maize surpluses moreover earns them cash income. So whenever harvests are disappointing, the small-scale farmers feel the impact immediately. Despite the more erratic

yields, most farmers remain very attached to their maize even though it is not our traditional staple crop. My parents and grandparents used to grow sorghum and millet. However, these grains were nearly wiped out as a result of the colonial administration pushing maize cultivation in the early twentieth century.

*Your research looks at re-introducing these forgotten cereal grains, sorghum and millet. Why?*  
Indeed, we research the viability of producing sorghum and millet, and popularising their consumption. This could serve three goals at



### UNICARSSA PROJECT

**Consortium:** Royal Tropical Institute (KIT), the Netherlands; University of Eldoret and EASTCOM Foods Ltd, Kenya; Makerere University, Uganda; University of Lisbon, Portugal

> [Website UniCARSSA](#)



once: more nutritious meals for rural families, a higher income for smallholders, and farming systems that are more resilient to the effects of climate change. Unlike maize, sorghum and millet are climate-resilient crops that can thrive despite prolonged periods of drought. They moreover fetch a better market price than maize. To strengthen the value chains of these cereals, we also research the viability of intercropping grains with legumes like groundnut and soybean. This diversification can help farmers spread the risks of failing harvests in cases of extreme weather events. More diverse farming systems also provide more micronutrients for healthier diets.

#### *What are some of the important findings so far?*

Earlier research revealed that soils in Western Kenya were deficient of the micronutrient zinc. This micro-nutrient is also lacking in people's diets. It is one of the deficiencies contributing to malnutrition and stunting in young children. During field demos that we conducted with 32 farmer groups in Bungoma and Siaya, we showed the

## More diverse farming systems provide more micronutrients for healthier diets



farmers how to apply zinc as an additional fertilizer in fields where they planted sorghum. The results exceeded our expectations. Not only did the farmers' yields increase, but lab tests also showed that zinc applied to the soil was taken up and retained in the harvested sorghum. It was even still available after preparing ugali from sorghum flour.

#### *Can these promising lab results be implemented at scale?*

We cannot create a shift in smallholder choices and habits overnight. But the University of Eldoret has a

helpful vehicle for scaling technologies and innovations: the Community Action Research Platform. It brings together researchers and farmers with stakeholders along the value chain, such as input suppliers, wholesalers, market off-takers, agricultural insurance companies, and importantly, county governments. We use the Platform to learn from farmers about their constraints and innovation needs, as well as for capacity building.

#### *Have you seen concrete impacts from creating these linkages between stakeholders?*

We certainly see that the platform approach boosts research uptake. For instance, the over 500 smallholders trained in our project produce more, and some farmer groups started supplying cereals and legumes to small and medium-sized companies such as EASTCOM Foods. This company, which was a partner in the project, lacked a steady supply of raw materials for value added products made from sorghum and millet. The project thus contributed to establishing new value chains for our research crops, which can eventually also benefit farmers outside the research area. One farmer group, empowered by the four-year capacity training, pulled resources to buy their own milling equipment. They now produce sorghum and millet flours, thus adding value to their crops while reducing post-harvest losses.

#### *It is said that 'the proof of the pudding is in the eating'. Will consumers accept ugali made from these new flours?*

We investigated this last and critical step in the value chain, using our sorghum flour fortified with green leafy vegetables and soybean for protein enhancement. Given its high nutritional value, this flour would be perfect for ugali served in schools and hospitals. We tested it among primary school children and their parents. In terms of colour, the children preferred the white, maize-based ugali over the brown-coloured ugali made from sorghum flour. They called it 'dirty ugali'. A blind sample test focusing on taste, however, yielded more positive responses.

#### *How will you proceed with this feedback?*

We are busy with lab experiments to improve the colour, texture and flavour of our sorghum-based flours. Meanwhile, the Outreach Centre at the University continues to organise trainings and agricultural shows, which elicit a lot of interest for our nutritious brown ugali. We are busy trying to secure funding to have the brown ugali certified, so it can be commercialised and scaled. Our findings clearly show its potential for achieving more healthy diets as well as income security for Kenyan smallholders. For me as a researcher and a fellow Kenyan, the promise of tangible impact is extremely fulfilling. ■

A conversation with  
**Prof Peter Verburg (left) and  
 Dr Vincent Linderhof**



# Tackling malnutrition in African cities

## THREE RULES OF THUMB FOR UNDERSTANDING URBAN FOOD SYSTEMS

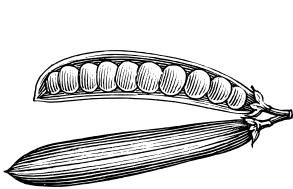
African cities are growing at a fast pace. As a result, poverty and malnutrition hotspots are shifting from rural to urban areas. Peter Verburg (VU) and Vincent Linderhof (WUR) worked closely together with African colleagues on the multi-country Food4Cities and NOURICITY projects. Both scientists argue that a deep understanding of the rural-urban food system is indispensable for developing knowledge and tools for inclusive and nutrition-sensitive policies in dynamic urban settings. They offer three rules of thumb for achieving research impact.



## 1 Mapping is knowing

**Verburg:** 'We invested a lot in mapping and engaging key actors in the cities' food systems, from producers, processors and traders to street vendors, supermarkets and municipal and government agencies. In Worcester, near Cape Town, a student literally cycled through the city to mark all the food outlets on neighbourhood maps; when the Covid lockdown started, we continued the exercise using Google Street View. In our household survey, we asked people about their diets and also where they buy their food. Linking the different data sets helps to understand, for instance, people's ability and willingness to pay for public transport to visit a fresh vegetable market.'

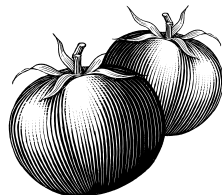
These data proved their use when the city government of Worcester approached us for advice during the Covid pandemic. They were debating whether to close down all local food stores. Our survey data suggested that this



### FOOD4CITIES PROJECT

**Consortium:** Vrije Universiteit Amsterdam, *the Netherlands*; KU Leuven, *Belgium*; Makerere University, *Uganda*; University of the Western Cape, *South Africa*

> [Website Food4Cities](#)



### NOURICITY PROJECT

**Consortium:** University of Bonn, *Germany*; ISSER, *Ghana*; Wageningen University & Research, *the Netherlands*; University of the Western Cape, *South Africa*

> [Website NOURICITY](#)





## African-European collaboration

Verburg and Linderhof consider the African-European collaboration indispensable for the success of the LEAP-Agri projects. The European scientists are strong on food system analysis and methodological design. The African researchers have invaluable knowledge of the local cultural and socioeconomic context and can effectively mobilise stakeholder networks. They conducted most of the field research in South Africa, Kenya, Ghana and Uganda. Verburg: 'The consortia span various countries and disciplines, but are still small enough in size for us all to personally interact. The fact that the national science foundations in the African countries contribute funds, adds to the equal basis from which we approach and execute these projects.'

policy would highly impact poor people's access to affordable fresh products, with potential repercussions for their overall health. The local government really wanted to understand how a certain intervention, in this case for public health purposes, might be undermined by its effect elsewhere in the urban food system. This curiosity about the system's interlinkages is exactly what our transdisciplinary research seeks to trigger.'

## 2 Sharing is understanding

**Linderhof:** 'This is indeed an important added value of our transdisciplinary work: we bring together stakeholders who may have never sat at the same table before. This helps to create a more complete picture of the food system. Our research for instance revealed the differences

in perception between local residents and policymakers about food system challenges such as food price levels and food safety linked to environmental pollution. We expect that such multi-stakeholder dialogues can support more effective and inclusive policy-making. But it's not a done deal: focus group discussions can also expose many opposing interests, not least between policymakers and powerful commercial actors in the food system, such as export firms, international supermarket chains or seed and insurance companies. As scientists, we can act as moderators and show how an interdisciplinary exchange of knowledge between agronomists, behavioural scientists, food scientists, economists, etc. is also vital for designing the right interventions.'

## 3 The system determines the solution

**Linderhof:** 'The workshops in Kampala revealed that both residents and policymakers had little knowledge of what constitutes a healthy diet. This finding determined our research intervention with 450 randomly selected households in a low-income neighbourhood, with which we tried to influence consumer decisions. Such interventions could equally be relevant in Europe, where awareness of and access to healthy diets among certain sections of the population is also a growing problem. Data compiled by the Food4Cities project showed that 95% of food consumed in Kampala is produced within Uganda. The availability and affordability of locally produced fresh food supported the idea that an intervention focused on consumer behaviour has a chance of being effective.'

**Verburg:** 'In Worcester instead, the same intervention would have less impact. The Western Cape is oriented towards industrial agriculture of fruits and vegetables for export. This drives up food prices: on the local market, one apple can cost one euro. There is very little fresh produce available locally. Even the highly nutritious butternut squash, important to the South African diet, is now cultivated for export. At the same time, as a result of European export subsidies, chicken from Poland is dumped in South Africa for a giveaway price of a few euros for 5 kgs. Interventions to combat malnutrition in this context will have to take on board these extreme market and price distortions, which inevitably impact consumer behaviour. The Worcester local government was very interested in discussing these complex issues, not least because they are grappling with rising public health costs due to obesity and other diet-related diseases among poor populations. Our research findings on how European export policies disrupt local food systems and contribute to unhealthy diets in African cities, equally holds a very important message for Dutch and European policy makers.' ■

# Project overview

Out of the 27 LEAP-Agri projects, the 14 projects with Dutch consortium partners are listed below. Information on all 27 projects can be found on the LEAP-Agri website.



## **AFRICA-MILK**

**Promote ecological intensification and inclusive value chains for sustainable African milk sourcing**

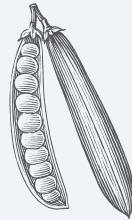
Burkina Faso, Uganda, Kenya, Madagascar, Senegal, France, the Netherlands



## **ATMA4FS**

**Agricultural trade and market access for food security**

Ghana, Senegal, South Africa, Belgium, Germany, the Netherlands



## **OPTIBOV**

**Genetic characterisation of cattle populations for optimized performance in African ecosystems**

Egypt, Uganda, South Africa, Finland, Portugal, the Netherlands

## **PROJECT AFRICA**

**On-site air-to-fertiliser mini-plants relegated by sensor-based ICT technology to foster African agriculture**

Ghana, Uganda, South Africa, Germany, Portugal, the Netherlands

## **EA-TSANE**

**Education and training for sustainable agriculture and nutrition in East Africa**

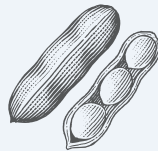
Kenya, Uganda, Germany, the Netherlands



## **FOOD4CITIES**

**Exploring food system transformations in rapidly changing African cities**

Uganda, South Africa, Belgium, the Netherlands



## **RAMSESII**

**Role of agroforestry in sustainable intensification of small farms and food security for societies in West Africa**

Burkina Faso, Senegal, France, the Netherlands

## **LEARN**

**Long-term Europe Africa Research Network**

Cameroon, South Africa, Germany, the Netherlands

## **NOURICITY**

**Partnerships for healthy diets and nutrition in urban African food systems**

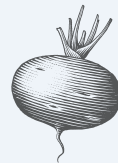
Ghana, South Africa, Uganda, Germany, the Netherlands



## **NUTRIFOODS**

**Innovative approaches to value addition and commercialisation of climate smart crops for enhanced FNS in Africa and beyond**

Kenya, Uganda, South Africa, Finland, the Netherlands



## **STEP UP**

**Sustainable transition to entrepreneurial production in agriculture through upgrading**

Kenya, Uganda, Germany, the Netherlands

## **UNICARSSA**

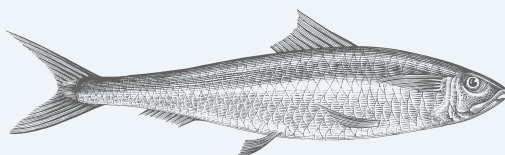
**University-based community action research for increasing viability of cereal-legume value chains towards improved nutrition and livelihoods in sub-Saharan Africa**

Uganda, Kenya, Portugal, the Netherlands

## **WAGRINNOVA**

**Co-innovations across scales to enhance sustainable intensification, resilience, and FNS in water-managed agricultural systems in West-Africa**

Burkina Faso, Ghana, Senegal, Spain, the Netherlands







## Some **take aways** on African-European research collaboration

### Dealing with complex food system challenges

- Transdisciplinary research collaboration and dialogue between food system stakeholders are indispensable for understanding the complex and dynamic linkages between the different components of (local, rural-urban, international) food systems as well as their trade-offs.
- This understanding and collaboration is essential for the development of effective interventions and policies that reflect the dynamics of local food systems and their interaction with regional or global systems.

### Increasing the impact of research

- The knowledge exchange and learning between researchers, farmers and food system stakeholders from policy, business and industry sectors, facilitates uptake and scaling of insights and innovations in agricultural systems and value chains.
- Research that can draw on the expertise of African scientists, NGOs, SMEs and farmer cooperatives about local contexts, resources and crops, combined with global food technology expertise, leads to innovations for scalable solutions in local and international value chains.
- Private sector involvement adds value for the design, testing and implementation of scalable solutions and potentially creates employment and economic benefits; however, new public-private partnerships take time to develop.

- Collaboration between African and European research institutes that maintain close links to their national policymakers, helps to raise political awareness on Food and Nutrition Security and Sustainable Agriculture (FNSSA) issues and solutions.
- The formal and informal networks of scientists that emerge through close collaboration can be avenues for diplomacy, feeding international policy debates with evidence-based insights.

### Strengthening European and African knowledge infrastructure

- Through the EU-AU collaboration, European researchers deepen their understanding of African food system challenges, which strengthens their international knowledge position as well as their capacity to develop solutions for global challenges.
- Joint funding by African and European ministries and funding agencies enhances the shared responsibility for Research & Innovation project design and implementation.
- The close collaboration from design to research execution, helps African and European researchers to grow and strengthen their international networks, which in many cases has led to new joint initiatives.
- In addition to EU-AU research collaboration, LEAP-Agri has resulted in unexpected regional collaborations (e.g. between Anglophone and Francophone Africa) that will continue after the programme.
- Some consortia have secured (seed) funding to continue their research or to develop proposals for follow-up research, implementation or scaling of innovations. More funding opportunities, however, are needed to support the implementation and scaling of research innovations. ■





**The LEAP-Agri programme was the first long-term, jointly funded Research & Innovation (R&I) Partnership launched by the African Union – European Union High Level Policy Dialogue (HLPD) on Science, Technology and Innovation, under the framework of the European Union’s Horizon 2020 programme.**

#### **Colophon**

##### *LEAP-Agri*

A Long-term EU-Africa research and innovation Partnership on food and nutrition security and sustainable Agriculture.

[www.leap-agri.com](http://www.leap-agri.com)

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