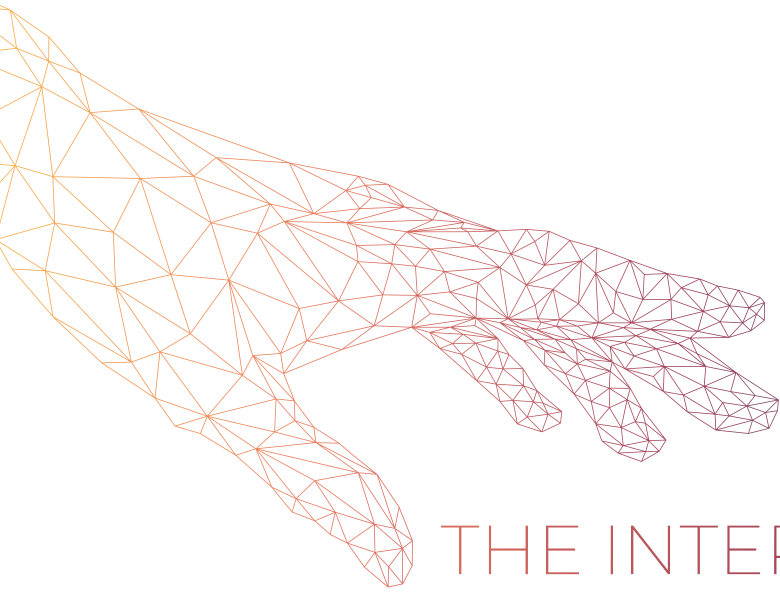




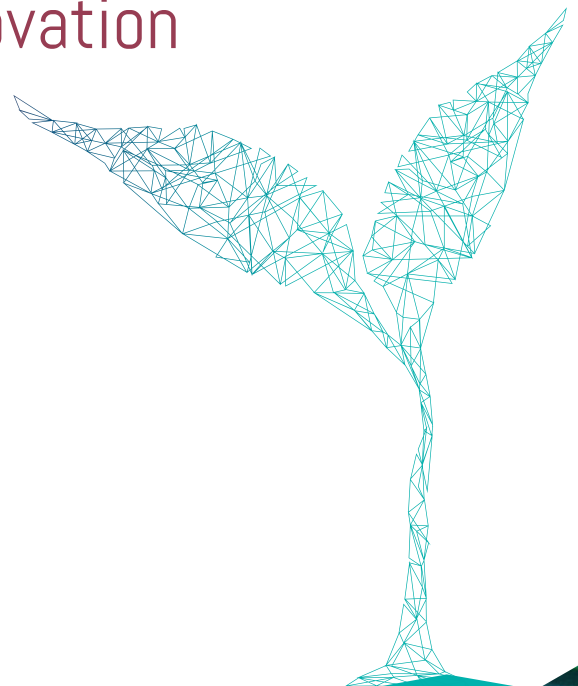
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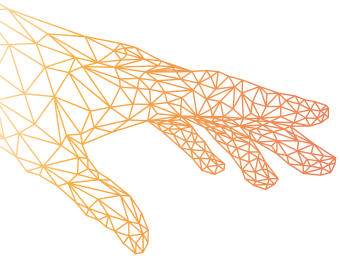


Working for  #ZeroHunger



THE INTERNATIONAL
SYMPOSIUM ON
AGRICULTURAL
INNOVATION
FOR FAMILY FARMERS
20 Success Stories of
Agricultural Innovation
from the
Innovation Fair





PREFACE

One of the objectives of The International Symposium on Agricultural Innovation for Family Farmers: Unlocking the potential of agricultural innovation to achieve the Sustainable Development Goals, held at the Food and Agriculture Organization of the United Nations (FAO) Headquarters in Rome, 21-23 November 2018, was to celebrate inspiring success stories of innovation and innovators. One of the ways to do this was through an Innovation Fair, which showcased the 20 success stories gathered in this booklet of agricultural innovation for family farmers and/or by family farmers.

The Innovation Fair explored how and why agricultural innovation happens and benefits family farmers. This booklet, in the same way as the Fair, aims to increase the understanding of innovation in agriculture and its key role to achieve the Sustainable Development Goals.

For that purpose, success stories presented in the Fair provide excellent examples of the key drivers that lead to successful innovation, without neglecting the obstacles and challenges

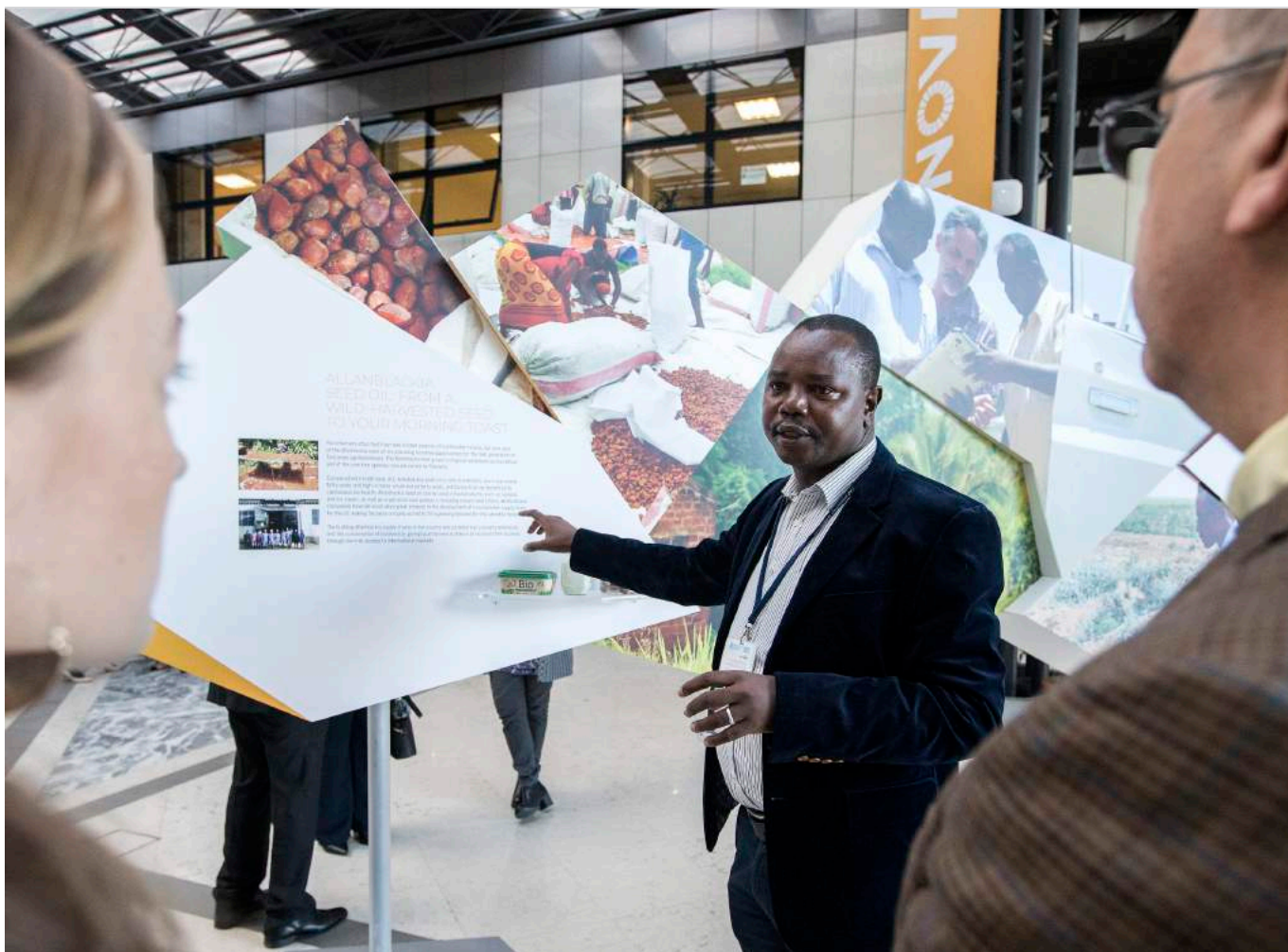
that had to be faced and overcome before the innovations were brought into use. The cases show the impact that these agricultural innovations have made in people's lives.

During the Fair, each success story had a presenter and a dedicated space in the FAO Atrium. Presenters were available to discuss with participants about their innovation and success story. They talked in an informal way about the constraints they faced, as well as the drivers that led to innovation and success.

The selection of success stories presented at the Innovation Fair aimed to encompass and capture a broad range of innovations that are being used in the different agricultural sectors (crop, livestock, fisheries and aquaculture, forestry). Most of them came from a call for FAO staff to propose successful examples of agricultural innovation based on their wide experience and knowledge in different fields of expertise and regions. The majority of those selected were not from FAO's work.



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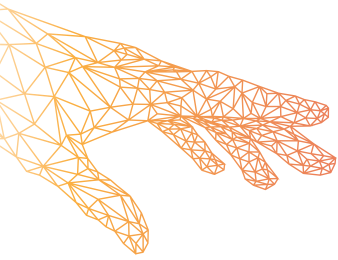
The definition of agricultural innovation that FAO used for the Symposium is: "Agricultural innovation is the process whereby individuals or organisations bring new or existing products, processes or ways of organisation into use for the first time in a specific context in order to increase effectiveness, competitiveness, resilience to shocks or environmental sustainability and thereby contribute to food security and nutrition, economic development or sustainable natural resource management".

Novelty is a key aspect of the definition, i.e. although the products, processes and ways of organisation may already exist, they are new to the individuals or organisations who are bringing them into use in a given location and context for the first time. Also, it is not restricted to use of technologies but also use of social, organisational, institutional or marketing processes or arrangements. Further details on the definition are available at <http://www.fao.org/about/meetings/agricultural-innovation-family-farmers-symposium/about/faq/en/>

The success stories revolve around the use of agricultural innovation to address four key challenges : climate change; sustainable natural resource management; food insecurity, hunger and malnutrition; and job creation, with a focus on youth.

Preparation of this booklet was led by FAO's Office for Corporate Communication, with support from the Symposium Secretariat and the Innovation Fair presenters. The name and affiliation of the Innovation Fair presenters are provided at the end of each story.

All in all, this booklet aims to replicate to a certain degree what the Innovation Fair represented, i.e. a unique space to explore key questions and issues of agricultural innovation around the world.



GROWING FOOD IN IMPOSSIBLE PLACES

HOW ADAPTED HYDROPONIC SOLUTIONS HELP COMMUNITIES TO STRENGTHEN LIVELIHOODS BY GROWING FOOD ANYWHERE

THE SITUATION

Sahrawi refugees and their descendants have inhabited refugee camps in the Algerian Saharan desert for over 40 years, the consequence of a protracted refugee crisis. In these areas, temperatures often soar to 50 degrees Celsius, water is scarce and there is limited availability of grazing lands.

Traditionally nomads, the Sahrawi raise livestock as part of their livelihoods. Animal products are an essential part of their diet but because there is limited fodder to feed their goats and sheep, these animals usually end up eating leftovers and rubbish, leading to poor quantity and quality of meat and milk available.

THE DRIVERS

Taleb, a Sahrawi refugee with an agricultural engineering background, in 2016, came up with the idea of testing the hydroponic technique in the refugee camps, as any other traditional agriculture method was not possible in arid desert areas. The World Food Programme Innovation Accelerator helped the refugees to develop a localized low-tech hydroponic unit that could be sourced and managed locally to grow barley fodder for their animals.

THE INNOVATION

Low-tech hydroponics enable plant growth in arid environments with a soilless cultivation technique. It is a livelihood-smart and cost-efficient solution that uses up to 90 percent less water and 75 percent less space. With the H₂Grow project, the Sahrawi refugees in the Algerian Sahara desert have tested and adapted a high-tech hydroponic system to a sustainable low-tech, locally produced hydroponic unit, which provides fodder supply for their livestock year round. In 2018, the H₂Grow project has also started with a local adaptation in Eastern Chad, in the Sudanese refugee camps and it is also being piloted in Internally Displaced People (IDP) camps in Darfur, Sudan, in collaboration with FAO.



© Nina Schröder



© Nina Schröder

THE CHALLENGES

Extreme weather and scarcity of water are a constant challenge for households to grow crops year-round and provide for their families and livestock. In local markets, vegetables and fodder are either not available or not affordable.

The H₂Grow project is continuously exploring different solutions to overcome these challenges, also by leveraging its partnerships with FAO, governments, academia, NGOs such as OXFAM, and the communities to develop and deploy the most adapted and affordable solution to every context, considering local constraints and limitations.

THE IMPACT

H₂Grow is now being implemented in 9 countries - Peru, Algeria, Jordan, Chad, Sudan, Kenya, Namibia, Mali and Niger - reaching 5000 people amongst refugees, IDPs and urban communities living in vulnerable areas, of which 75 percent are female participants.

From sprouting green fodder in deserts to fresh vegetables in urban slums, with H₂Grow, communities are growing food in impossible places and strengthening their livelihood with new options of low-cost dietary diversity and expanded sources of income.

INNOVATION FAIR PRESENTER: Nina Schröder, Co-Founder H₂Grow/ Scale-up Enablement Manager, United Nations World Food Programme (WFP), WFP Innovation Accelerator, Munich, Germany

A-MAIZE-ING!

SWITCHING TO DROUGHT-TOLERANT MAIZE GIVES ZIMBABWEAN FARMERS A BOOST IN FOOD SECURITY

THE SITUATION

Formerly a prosperous, self-sufficient agricultural producer, Zimbabwe's erratic rainfall in recent years has posed a huge limiting factor for millions of farming households who depend on maize for food security and their economic well-being. Since the early 1990s, drought stress has steadily decreased the production and productivity of maize in Zimbabwe, changing the country's role from a surplus producer of maize to a net food importer, and plunging millions of rural communities into food insecurity and poverty.

THE DRIVERS

Since the turn of the century, most farmers in southern Africa experienced around one to three drought years, due to climate change. In Zimbabwe, the situation was far worse with farmers reporting four to five years of drought in the same period.

In response, the country turned to the International Maize and Wheat Improvement Center (CIMMYT) to develop new maize varieties that could withstand drought conditions. By switching to these drought-tolerant maize varieties, Zimbabwean smallholder farmers could dramatically increase their yields and in so doing, save their lives and livelihoods.

THE INNOVATION

With the International Institute of Tropical Agriculture (IITA), CIMMYT piloted the Drought Tolerant Maize for Africa (DTMA) project to breed drought-tolerant maize varieties for the region and particularly for Zimbabwe. The project involved the national maize breeding programmes of 13 sub-Saharan African countries and private seed companies. Between 2007 and 2013, around 160 drought-tolerant maize varieties were released and scaled up for uptake by smallholder farmers, 15 of them in Zimbabwe.



© CIMMYT

THE CHALLENGES

Initially, the introduction of drought-tolerant maize was low. Farmers were sceptical that these new varieties would deliver on their promise and were reluctant to invest and risk the whole crop failing. It was only through demonstrations where farmers could compare the yields of the new varieties with those commonly grown that demand for drought-tolerant seeds was generated.

Seed companies were also reluctant to scale up and market drought-tolerant varieties because they were unaware that these varieties grew equally well under rainy season. Extension agents required training on how to promote the advantages and use of these varieties to farmers in drought prone areas.

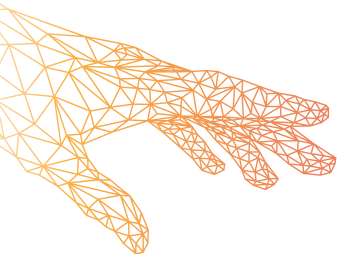
THE IMPACT

For the same amount of seeds, farmers who grew drought-tolerant maize varieties were able to harvest over 600 kg more maize per hectare, compared to those using drought-susceptible varieties. The additional maize translated to US\$240 extra per hectare, giving farmers a buffer of nine months' worth of additional food security at no additional cost as well as extra income for other household needs.

Millions of farmers in the region benefited from the outputs of this partnership, which included support and training for African seed producers and the promotion of vibrant, competitive seed markets.

INNOVATION FAIR PRESENTER: Cosmos Magorokosho, International Wheat and Maize Improvement Centre (CIMMYT) Southern Africa Regional Office, Harare, Zimbabwe

© CIMMYT



OUTSMARTING THE WEATHER

HOW WEST AFRICA'S CLIMATE-SMART VILLAGES ARE MITIGATING THE EFFECTS OF CLIMATE CHANGE

THE SITUATION

West Africa is blessed with an abundance of natural and human resources, yet remains one of the poorest regions on the planet. The agriculture sector in this region has been severely inhibited owing to climate change in recent years. Extreme climate events, such as torrential rain followed by extensive droughts, strip the soil of its nutrients, and negatively impact its fertility and its ability to grow crops. Innovations in agriculture are therefore key to conserving the world's biodiversity and to ensuring the ability of millions of small farmers to grow their own food.

THE DRIVERS

The reason why agricultural innovations often fail in countries is because they cannot be up scaled either appropriately or effectively. Not so with climate-smart villages (CSVs) as they can be implemented effectively with positive long-term results for crop production, which makes them so attractive.

THE INNOVATION

The CSV is an approach where research, extension, NGOs and others partners (public and private sectors) actively participate in cross-cutting testing to validate technological and institutional options to address the effects of climate change in agriculture. CSVs implement sustainable technologies and practices, such as improved varieties of crops, soil and water conservation techniques, for example, *zai*, half-moon, tied ridging, agroforestry such as tree planting and farmer managed natural regeneration, and integrated soil fertility management using organic manure or crop association. Once proven, the options are then scaled up, drawing lessons for policy makers from local to global scale.

THE CHALLENGES

Not all the components of the CSV model have been easy to implement. Components that were particularly challenging are climate information services and insurance, national and subnational plans and policies, climate and ag-development finances, and local and national public and private institutions. More training to develop the capacity of partners (NARS, NGOs, etc.) to implement the CSV approach is also needed.

From the farmers' side, the main constraints they reported in adopting climate-smart agriculture (CSA) technologies and practices have been the limited availability and accessibility of inputs, the poor technical capacity due mainly to the illiteracy of farmers and, finally, the low financial capacity of farmers.



© Mathieu Ouedraogo

THE IMPACT

The CSV approach has proven effective as a scalable partnership between rural communities and broader stakeholders, with great potential to be deployed and implemented in similar environments. Food security has improved through the use of organic manure/compost, soil and water conservation techniques such as tied ridging and *zai*. Farmers managed natural regeneration and integrated soil fertility management (micro-dosing, crop association and crop rotation) in Burkina Faso, Ghana, Mali, Niger and Senegal.

The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) has been working since 2011 with local partners to develop CSVs. Since 2015, the concept of CSVs has been embraced by researchers, extension and NGO agents alike. The World Bank now have CSVs at the heart of its project in Niger. In 2017, CSVs was adopted by the Saskawa Africa Association in Mali and Nigeria.

Women farmers' income have improved through the development of gender sensitive activities including off-season gardening and processing of non-timber forest products in Senegal, moringa tree planting in Niger and Burkina Faso, sesame cropping in Mali and soybean production in Ghana.

INNOVATION FAIR PRESENTER: Mathieu Ouedraogo, Senior Scientist, CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), International Crops Research Institute for the Semi-Arid Tropics, West and Central Africa (ICRISAT-WCA), Bamako, Mali.

PEST CONTROL ON THE FLY

A MOBILE APP FOR MONITORING AND EARLY DETECTION OF THE DESERT LOCUST IN AFRICA AND ASIA

THE SITUATION

The Desert Locust is considered to be the most dangerous of all migratory pest species in the world due to its ability to reproduce rapidly, migrate long distances and devastate crops. This is because the pest has the ability to change its behaviour and physiology, in particular its appearance, in response to environmental conditions. It can transform itself from a harmless and solitary individual to part of a collective mass of insects that form a cohesive swarm, which can cross continents and seas, and quickly devour a farmer's field and his entire livelihood in a single morning.

THE DRIVERS

As part of the FAO work in emergencies, member countries and stakeholders requested the Organization to establish a monitoring and early warning system for the Desert Locust in Africa and Asia to allow governments to manage this deadly pest effectively.

THE INNOVATION

FAO developed eLocust3, a rugged tablet used by national survey and control teams in 30 countries to record and transmit, via satellite, field data in real time from some of the remotest areas on Earth to decision-makers and forecasters so that action can be taken and alerts and warnings can be issued. Even without internet connection, it also guides teams to green vegetation, contains a digital library and camera, and works in three languages. The eLocust3 system has dramatically improved the management and analysis of data as well as forecasting and early warning to prevent devastating plagues. The eLocust3 system is an example of how the latest advances in digital tools, communication and satellite technologies can be packaged into a unified monitoring and early warning system for use in Africa and Asia. Data from the app provide valuable insights on how the insect populations change over time and its potential to migrate and invade other countries.



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This allows FAO to provide countries with more timely and precise forecasts and warnings to better manage Desert Locusts.

THE CHALLENGES

Integrating the new technologies into the national and global Desert Locust monitoring and control programmes was a complicated endeavour that had to overcome harsh environmental operating conditions, including the low level of digital literacy rates coupled with a lack of Internet connectivity use and deployment of appropriate technologies or technical support in the countries. Different languages and cultures, insecurity, a lack of training and sustainability also complicated matters considerably.

THE IMPACT

eLocust3 has contributed significantly to a decline in the duration, severity and frequency of devastating Desert Locust plagues in Africa and Asia. As more outbreaks are detected earlier, allowing their successful control, this has led to improved plague prevention, better food security and protection of the environment.

Lessons learned from eLocust3 are currently being expanded to other transboundary plant pests monitoring and early warning systems, including the Fall Armyworm Monitoring and Early Warning System (FAMEWS) and the Red Palm Weevil mobile app, SusaHamra. Drone technology is also being considered to supplement monitoring and control of these pests.

INNOVATION FAIR PRESENTER: Mehdi Ghaemian, Desert Locust Information Officer, Head of the Desert Locust Programme, Plant Protection Organization, Tehran, Iran



A FRUITFUL ECONOMY

HOW THE DOMINICAN REPUBLIC STAMPED OUT THE MEDITERRANEAN FRUIT FLY

THE SITUATION

Agriculture is a major employer and the third most important industry in the economy of the Dominican Republic, after tourism and industry. This all changed in March 2015, when the Mediterranean fruit fly or medfly, was first detected on the east coast of the Caribbean country. Importing countries reacted swiftly by imposing an immediate trading ban on 18 types of fruits and vegetables that were not treated for fruit flies - spelling disaster for the Dominican Republic as it caused a loss of over US\$ 40 million that year and put 30 000 jobs at risk.

Although the main agricultural areas of the country were never infected with the fly, Dominican farmers were badly affected as they were forced to throw out their produce that was destined for exports or sell them locally and saturate the market.

THE DRIVERS

An emergency response was required. In collaboration with the International Atomic Energy Agency (IAEA) through its partnership with FAO and US Department of Agriculture, the Dominican Republic launched a medfly eradication programme.

THE INNOVATION

A nuclear technology known as the sterile insect technique (SIT) was used where millions of flies are reared in special facilities and male pupae are sterilised with radiation. After being chilled, the sterile flies were distributed by plane over the infested areas where, in the wild, they mated with female flies but produced no offspring. In January 2017, the last wild medfly was detected, paving the way for the announcement in July that same year that the Mediterranean fruit fly had finally been eradicated from the country.



© Gregory Marte-Diaz

THE CHALLENGES

The SIT was not a stand-alone technology and for the extermination of the fruitfly to be successful, it needed to be integrated with other pest management and population such as insecticide/bait application, the use of bait stations, host-plant management, mating disruption, orchard/vineyard or cropland sanitation, and the release of natural enemies.

THE IMPACT

The Dominican Republic is now on the list of countries that have successfully eradicated the medfly and has substantially strengthened its fruit fly surveillance system and emergency response capacity. Further research is ongoing to improve SIT worldwide against other pests such as mosquitos and sugarcane borers.

INNOVATION FAIR PRESENTER: Gregory Marte-Diaz, Agricultural Sector Coordinator at the National Competitiveness Council; former Project Manager, Programa Moscamed, Ministry of Agriculture, Dominican Republic



© FAO/Vladimir Rodas

WHAT'S IN A NAME?

A LABEL PUTS NEPAL'S MOUNTAIN AGRIBUSINESSES ON A SUSTAINABLE FOOTING

THE SITUATION

Throughout the centuries, mountain communities' indigenous practices in agriculture have produced a variety of high-quality goods such as coffee, honey, herbs and spices to name a few, as well as handicrafts, cosmetics and medicines, adding value to the lives of consumers while improving the livelihoods of farmers.

While small-scale mountain agribusinesses cannot compete with the prices and volumes of lowland production, by focusing on niche markets they can tap into the rising demand for sustainable, fair trade and high-quality products. However, without a merchandising mark indicating the origin of the product from the mountains, consumers have difficulty distinguishing these products from others in the marketplace.

Some 82 percent of Nepal, for example, is classified as mountain area. Poverty in Nepal is mainly a rural phenomenon with approximately 75 percent of the population living in villages, where agriculture is their main source of subsistence. Despite the poverty and adverse conditions, farmers have continued the traditional way of agriculture and are still cultivating unique varieties of crops like Jumla's mixed beans, despite limited customer awareness.

THE DRIVERS

As the only United Nations voluntary alliance of partners dedicated to improving the lives of mountain people, the Mountain Partnership (MP) members called for the establishment of a global labelling scheme to brand high value mountain products in 2013. After consultation with a task force composed of pro-active MP members, the Mountain Partnership Secretariat in collaboration with Slow Food, FAO and the Government of Italy, created the Mountain Partnership Products (MPP) label in 2015.

Two examples from Nepal are highlighted here because of their pro-active involvement in the entire process: Jumla's mixed beans and Himali black lentils. Jumla's mixed beans are grown at an altitude of 2300 metres above sea level in Sinja Valley, which is 800 km or three days travel from the capital city Kathmandu. Himali black lentils are tied to the local culture and religious festivals like "Janai purne", marking the end of the rainy month and beginning of the cold season. They are cultivated manually and without mechanical inputs that result in high quality but low quantity production. Fields are free of chemicals and pesticides.

THE INNOVATION

A voluntary label for high-quality mountain products for small mountain producers in developing countries was created. The narrative label endorsed by the Mountain Partnership and Slow

Food tells the story of a mountain product and its producer. It begins with the origins and territory of the product and includes cultivation techniques, processing, preservation methods, and the organoleptic and nutritional characteristics. Only a narrative label can convey a product's true value.

The first phase of this pilot project selected 16 products from seven countries. Products range from coffee produced in the Panamanian Central Cordillera to herbal tea and rice grown in the Indian Himalayas.

THE CHALLENGES

Agribusinesses located in mountains work in harsh and inaccessible terrains with poor infrastructure and inadequate transportation. Their remote location is a contributing factor to their difficulties in attracting investors in their operations and in scaling up their businesses. Capacity development also suffers as there is a scarcity of training opportunities in these areas. Furthermore, expensive certification and unfair market incomes mean that they cannot compete with lower prices and larger volumes of lowland production. All of these factors keep mountain enterprises as small or niche businesses with few, high priced products.

THE IMPACT

Products with the MPP label have been associated with quality, generating great interest by consumers and distributors and helping farmers fight against imitations and in so doing offers a measure of protection to farmers with the MPP brand. It was a source of pride for farmers to receive an upgrade of their product as the label contributes to protecting food heritage of the Himalayan villages in a responsible manner. The success of this innovation is based on the pro-active involvement of the partner and thanks to the MPP label, pulses were finally sold in a large supermarket chain.

The livelihood of farmers was transformed: Jumla's mixed beans doubled in production while the price for the beans has risen by 20%, adding 10 Nepalese rupees per kilogram of extra profit directly to the pockets of the farmers. The success of the label has also attracted 13% more women as farmers in the same period.

INNOVATION FAIR PRESENTER: Umesh Lama, Chairman/Executive Director, Organic World and Fair Future, Pvt Ltd, Kareshwor-1250 Marga, Kathmandu, Nepal



FARMERS OF THE FUTURE

HOW AGROECOLOGY DRIVES LOCAL DEVELOPMENT: THE EXAMPLE OF THE KAYDARA SCHOOL FARM

THE SITUATION

In sub-Saharan Africa, over 10 million new jobs per year will have to be created in rural areas in the next two decades to absorb the new entrants into the labour force. In the context of youth migration from rural areas, there is a largely untapped reservoir of opportunities in applying agroecological principles. By promoting rural decent employment, green innovative jobs and green entrepreneurship, these will create local markets, community-based economies and sustainable rural development. In Fimela, Saloum Delta, 150 km south of Dakar, where the Kaydara farm is located, only 30 percent of agricultural land remains cultivable due to the erosion, desertification and salinization that occurred as a result of climate change.

THE DRIVERS

The estimated population growth in Africa shines a light on the urgent need to create sustainable food systems. Young people bring energy, vitality and innovation into the work force and will have a transformative impact on economic growth and social development. Educating them in all aspects of agribusiness is, therefore, key to creating enterprises where they can lead, and develop innovations in agroecology while focusing on gender issues, religion and culture, and environmental management, and using a rights-based approach that links animal, plant and environmental health. Community seed systems and seed autonomy in Africa are also important drivers of successful agroecological transitions among women and youth in the context of climate change.

The Ecological Organic Agriculture Initiative (EOA) of the African Union equally emphasizes scientific and traditional knowledge for agricultural development, aims to integrate ecological organic agriculture into the national agricultural production systems and policies and can further contribute to the development of such integrated projects.

THE INNOVATION

The Kaydara Agroecological School Farm opened its doors in 2007. It is an example of how a training centre can boost a territory while keeping the youth in rural areas. The centre works closely with villages and municipalities and not only trains local youth but also helps them to settle there by negotiating long-term tenure at the end of the training course. Young people are trained at all stages of agroecological techniques of plants and animals. As a joint commitment with the municipalities, the Mayor and his municipal councilors hire Village Development Committees to select a young candidate. Graduates are then granted land titles, allowing them to develop their agroecological farm while contributing to the reforestation of the commons.

The training can last from nine months to two years, during which the necessary capital elements for their installation are provided: land capital, plant capital (fruit trees, forest trees, fodder), animal capital (poultry, rabbits or donkeys), seed capital, agroecological and technological knowledge. Financial capital is supplied by the sale of the trainee's production during the year. They design their personal project for their farm and submit it to the end of their training period. The motto is "train and transmit". The youth are called to become development leaders in their village and learn to transmit. The functioning of the farm is a model of social inclusion. It is based on the swarming of practices that respect ancestral values present in the symbolism of the tale "Kaydara", where knowledge prevails over the possession and the power. Tours of the school farm allow further awareness raising.

THE CHALLENGES

In sub-Saharan Africa, agroecological principles and innovations are not yet widely incorporated in the current agricultural development models. This is due to agroecology's interdisciplinary nature (agronomy, ecology and social sciences), that need local multi-stakeholder and participatory mechanisms to be put in place, in line with adapted policies. Investments are also required. The involvement of local elected officials and technical agents is essential for the success of such a project, and for the ripple effect of neighboring municipalities, even of remote areas such as visits of elected officials of the Northern Region of Senegal.

THE IMPACT

As the municipality has granted one hectare of land to each young farmer trained, this joint commitment helps to train the young people of the territory and to support them in the development of productive farms. To date, 20 farmhouses are being installed in the villages of the municipality aiming to create a belt around Fimela. Easier access to fresh local produce promotes better nutrition for the population. Food costs are reduced through local sales on the farm or at news stands.

In the near future, the sustainable development impact will be clear as young people return and once again view farming as an attractive profession, and as soil quality and the environment improve thanks to agroecological practices that integrate crops, trees and animals. Agroecology in small farms and intensive reforestation of communal land around them will contribute to the restoration of biodiversity and the regeneration of soils.

INNOVATION FAIR PRESENTER: Gora Ndiaye, Director, Association Panafricaine Jardins d'Afrique, Mbour, Senegal

HOW HARVESTING ALLANBLACKIA SEEDS FOR OIL HAS BENEFITTED FARMERS AND THEIR FARMS AND FORESTS IN TANZANIA

THE SITUATION

The Allanblackia tree is found in the wet tropical belt of Africa, spanning 37 countries from West Africa to Central and East Africa. This giant tree can grow up to 30 metres high and produce up to 500 units of the largest fruit among indigenous Africa fruits. Allanblackia fruit weighs 5-7 kg each and it contains 40-50 seeds with 40 percent of oil. Traditionally, the oil had limited use for cooking and a source of medicine.

Of the nine species of Allanblackia trees, two are endemic in Tanzania, specifically in the Eastern Arc Mountain forests and surrounding villages, one of the world's top twenty biodiversity hotspots. Like any other endemic trees in these areas, Allanblackia population has decreased over the few past decades due to demand for timber and other uses including opening land for agriculture. In the early 1980s, the government-owned parastatal organization used to buy Allanblackia seeds for export, but the business stopped after its collapse, leaving Allanblackia trees with no significant non timber use, and most farmers cleared it on farmland reducing its population significantly.

THE DRIVERS

New awareness of the commercial value of the Allanblackia seed oil, and demand for conserving the tree from unsustainable logging as the future of biodiversity.

The sharp oral melting curves found in the Allanblackia oil makes it the best hard stock in margarine replacing palm oil as a natural ingredient. Allanblackia seed oil can also be used in emulsion products like spreads, dairy based products and ice cream. Further applications in personal care products as skin moisturiser and conditioner in skin creams and lotions are being investigated. Multinationals like Unilever showed interest in a sustainably sourced Allanblackia oil and supported Novel Development Tanzania, a local company that manages the supply chain in Tanzania, to establish this new business. Currently, organic certified Allanblackia oil is only produced from Tanzania.

Unilever had co-founded before the Allanblackia Partnership in 2002, together with non-governmental organizations (NGOs) and local African partners to pilot a sustainable Allanblackia supply chain in rural communities in Tanzania. The project was supported by the United Nations Development Programme (UNDP), the Department for International Development of the United Kingdom (DFID), and the Government of Austria and promoted by the Government of Tanzania. The pilot was phased out in 2005. In 2006, Novel Development Tanzania was established as a local private company to manage the Allanblackia supply chain locally.

THE INNOVATION

A virtuous supply chain was created: farmers collect seeds from the mature fruit that fall from the tree, dry the seeds in the sun and sell them to Novel Developments Tanzania. This business happens in the first quarter of the year as a part time job for farmers who can thereby earn an additional income. January and February are a challenging time of the year due to the scarcity of income available as most crops are still immature and farmers need cash for weeding and are also in need of school fees and uniforms for schools opening.

Farmers were also encouraged to plant trees on their farms alongside their other crops, which has further multiplied their incomes. This is because the Allanblackia trees give natural shade to other smaller trees such as the spice tree. The World Agroforestry Centre (ICRAF) addressed, and is still working on, bottlenecks regarding the domestication of Allanblackia tree. This public-private partnership to harness the Allanblackia seed oil is a project taking a giant step towards conserving the tree and the forest landscape while sustainably harvesting its seeds as a 'cash crop'. It is also one of the few natural resources that gives equal earning opportunities directly to women.

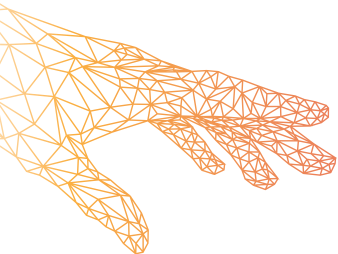
THE CHALLENGES

Current production from wild harvesting does not meet demand. This is because it takes almost a decade for a new tree to give fruits. Increasing the supply of Allanblackia's seeds must be a long-term commitment.

THE IMPACT

Roughly 2 500 family farmers have benefitted directly from the Allanblackia supply chain, 45 percent of whom are women farmers and Novel Development Tanzania has supported them to plant a total of 100 000 trees up to 2017. In addition, conservation education has encouraged farmers to preserve the forest and promote natural regeneration of Allanblackia trees. This will increase volume significantly once they start fruiting in few coming years. The additional income received from harvesting Allanblackia seeds allow farmers to send their children to school and buy household goods such as kerosene cooking oil, soap and salt. For many, the revenue from the seeds bought has doubled the family income during harvest season. Novel Developments Tanzania is committed to maintain its Organic and UEET (Union for Ethical Bio Trade) certifications and support domestication for sustainability of Allanblackia business in Tanzania for generating income along the value chain in Tanzania.

INNOVATION FAIR PRESENTER: Fidelis Rutatina, Managing Director, Novel Development Tanzania Ltd, Morogoro, Tanzania.



FARMERS' WINDFALL

HOW A GRANT AND INSURANCE SCHEME HAVE LIFTED FARMERS OUT OF POVERTY IN THE INDIAN STATE OF TELANGANA

THE SITUATION

A relatively newly formed state in the centre south of India, Telangana has a hot dry climate with semi-arid areas consisting of hills, mountain ranges and forests. Roughly 45 percent of its geographical area is net sown area, with 56 percent of the population dependent on agriculture for their livelihood.

Agriculture is the chief source of income for the state's economy, characterised by five million small-scale farmers owning less than five acres of land. The agriculture sector contributes about nine percent of GSDP (gross state domestic product) but with erratic rainfall that is uncertain and unevenly distributed, agriculture is a gamble during monsoon.

The sector's stagnation has been exacerbated by low levels of public and private investments. Farming is an unattractive sector to banks due to unpredictable weather, the wide gap between expenditure and income from farming activities and the small size of land holdings.

For these farmers their only source of livelihood was being undermined by the weather, stifling not only their income but their health too, as well as the food security of their entire family. If the farmer fell ill or had an accident and was not able to work or worse still, died, their family spiralled into a severe financial crisis. This is endemic in a state with the third highest prevalence of agricultural indebtedness in India.

THE DRIVERS

Given the prominence of agriculture in the economy of the state and the fragility of the farmers, the state government came to the realization that providing them with an economic injection and financial security was the fastest way to boost their agricultural yields and incomes. In this way, the vicious cycle of poverty would also be broken once and for all.

THE INNOVATION

The Government of Telangana has pioneered two schemes targeting farmers. The first was a non-repayable grant under the Agriculture Investment Support Scheme, called Rythu Bandhu, while the second was a Farmers Group Life Insurance. The investment support consists of 4000 rupees/acre/season (the equivalent of 55 USD/acre) and was given to every farmer in the state as a non-repayable grant to purchase farm inputs such as seeds, fertilizers or to hire extra farm hands. This amounted to the equivalent of over 72 million USD disbursed to all the farmers.

The insurance scheme provided financial relief to families with Rs. 5.00 Laks (the equivalent of 6,849 USD) that was deposited within



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10 days of the claim being made. An app linked to a web portal was developed to schedule the distribution of the cheques and inform farmers of the date when their cheques would be ready in the village. Agricultural extension officers used the app once a cheque had been distributed in their jurisdiction, which would automatically update the portal and ensure full transparency and traceability of the system.

THE CHALLENGES

Initially, the schemes were hampered by outdated land records and the failure to lend adequate and timely crop loans by the banks to farmers before the rainy season. In coordination with the Reserve Bank of India, technology partner (NIC) and the revenue department, the Agriculture Department with proper budgetary support provided by the Government, kicked into action to develop the app which ensured that every farmer received the grant.

THE IMPACT

Thanks to the government grant, the number of farmers approaching private money lenders for the purchase of inputs and land preparation activities has significantly declined. By avoiding private money lenders, farmers have escaped the trap of perennial indebtedness. Also, the timely supply of inputs and agronomic management practices under the technical guidance of field staff (agricultural extension officers and mandal agricultural officers) have helped farmers increase their harvest yields and incomes. Farmers' confidence levels have skyrocketed. So far, the insurance scheme has made a huge difference in the lives of 3 200 families, many of whom had less than 1 000 rupees (around 14 USD) in their accounts, reflecting the extreme economic vulnerability of the bereaved family. Both schemes have proved to be so successful several other states have approached the Telangana State Government with a view to studying how they can replicate them in their own states and upscale for the whole country.

INNOVATION FAIR PRESENTER: C. Partha Sarathi, Agriculture Production Commissioner & Secretary to Government Agriculture & Cooperation (Horticulture & Sericulture) Department, Government of Telangana, India

FOREWARNED IS FOREARMED

HOW CLIMATE INFORMATION SERVICES ARE SAVING THE LIVES AND LIVELIHOODS OF SENEGALESE FISHERFOLK

THE SITUATION

Located in the West Coast of Africa, Senegal and neighbouring coastal countries have some of the richest fishing grounds in the world.

The boom in the Senegalese fisheries sector saw the number of artisanal fishermen almost double in the last twenty years, as climate volatility forced many farmers and herders to abandon the countryside and take up fishing to make ends meet. This made for crowded waters and pushed trawlers much further out to sea for several days for fishing to compensate for the scarcity of fish resources closer to shores.

THE DRIVERS

Overfishing and uncontrolled growth of fishing activities have been major problems for long term sustainability of the sector. In addition, Senegal is very vulnerable to the impacts of climate change, which saw a rise in storms and strong winds. In fact, these have caused immense damage to the fishing materials and have cost many fishermen their lives.

THE INNOVATION

Climate information services (CIS) or meteorological forecasts in the form of SMS, voice calls, radios and vigilance flags tailored to Senegalese fishermen needs have helped to provide timely guidance as they weigh up the risks and take appropriate decisions or measures before venturing out to sea. As a result, CIS have helped to reduce untimely deaths of fishermen at sea.

The project began in 2016 under the leadership of the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) to promote the USAID-funded project CISNERE (climate information services for increased resilience and productivity in Senegal).

THE CHALLENGES

Meteorological warnings come with a number of challenges. First, they do little to help fishermen if they are out of the radio and mobile network coverage or if the transmission of climate information is delivered too late. Second, illiterate fishermen find it difficult to grasp the risks associated with CIS. Finally, the search for stable funding sources for CIS delivery is an ongoing challenge, which, if not solved, could undermine the effectiveness of the uptake of CIS. From the production of appropriate tools to training fishermen on the validity and use of the tools, there is a huge cost associated that goes beyond the financial capacity of a national meteorological office.



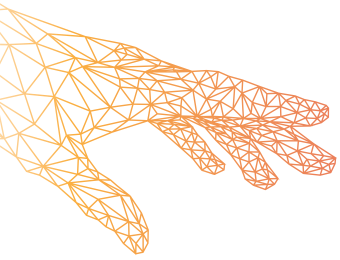
© Issa Ouedraogo

THE IMPACT

CIS are now part of daily fishing practise in Senegal. Before setting off to sea, fishermen scan a three-day forecast to make sure that they will be safe. They also routinely call their local artisanal fishing councils (CLPA) for different CIS such as safety training while on board. Thanks to CIS, the rate of fishermen survival has improved while deaths and the loss of equipment have declined.

Covering all the coastal zones of Senegal, the success of CIS has prompted other coastal countries in West Africa to request climate information production for their fishery sectors.

INNOVATION FAIR PRESENTER: Mathieu Ouedraogo, Senior Scientist, CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), on behalf of Issa Ouedraogo, CCAFS Programme West Africa, International Crops Research for the Semi-Arid Tropics West and Central Africa (ICRISAT-WCA) Regional Office, Dakar, Senegal



REFRAMING THE GREENHOUSE

LOW-COST WOODEN GREENHOUSES FOR HIGH QUALITY VEGETABLE PRODUCTION IN EL SALVADOR

THE SITUATION

In Central America, farmers struggle to produce all year round high quantities of vegetables with high quality. Unpredictable rainfall along with insufficient water sources can drive up the price of agricultural inputs and leaves an already struggling farmer with no buffer for further shocks.

When El Salvador was struck with natural disasters, this was the last straw for many farmers who were forced to emigrate to developed countries in search of a better life for them and their families.

THE DRIVERS

Faced with the prospect of emigrating if their farming activities at home failed, a small group of farmers set about looking together for a safer investment that would bring in higher yields and incomes, which in turn would provide them and their children with better access to food, health care and education.

THE INNOVATION

In 2007, a group of farmers invested in wooden low-cost greenhouses for high quality vegetable production. The farmers installed netting as walls to create a physical barrier to prevent virus-transmitting insects, and a roof made of plastic to prevent high humidity and keep out bacteria and fungus. They used coconut fibre as a substrate for soil free system to avoid roundworm and soil diseases. Finally, they installed a drip irrigation system. The farmers grew tomatoes, bell peppers and cucumbers and with this system, they were able to produce year round vegetables, with fewer inputs, pesticides and fertilizers.



© Boris Corpeño

THE CHALLENGES

Irrigated land is primarily at sea level in El Salvador. However, temperatures there were too high for greenhouse production without expensive cooling systems. Farmers have found it difficult to find suitable flat or semi-flat land at 700 to 1,200 meters above sea level that had access to water year round.

THE IMPACT

After 10 years, the farmers upscaled their activities and markets by creating a cooperative. Farmers now have access to markets where they can sell their produce directly to supermarkets in the main cities. Collection centre and packing facilities have since been built to reduce post-harvest losses.

In some cases, farmers were selling a kilo of tomato for an average price of USD 0.70 for a total income in the first crop cycle, in the case of tomato equivalent to USD 8 400 in 600 square meters.

These types of greenhouse systems have been already replicated in Honduras, Guatemala, Jamaica, Kenya and Tanzania with excellent results. In Jamaica, for example, ten farmers banded together in 2005. Today, there are more than 120 farmers growing vegetables in greenhouses. In Tanzania, there are now over 40 low-cost greenhouses that have been built following the system in Central America, producing sweet pepper and tomato.

INNOVATION FAIR PRESENTER: Boris Corpeño, Technical Advisor, Consultant for Hortaliceros de Cuscatlán Association and Cooperative, El Salvador



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INNOVATION IN THE ANDES

HOW SHELTERS AND MOBILE VETERINARY PHARMACIES SAVED THE LIVES OF LIVESTOCK AND THE LIVELIHOODS OF INDIGENOUS FARMERS

THE SITUATION

A high altitude plateau covering the divide between eastern and western Andes Mountain, the Altiplano stretches for 800 km at an eye-watering elevation of 3 700 m. Braving extreme winds, frost, hail and snow, indigenous farmers herd llama camelids, their main source of protein and food security. Traditionally, camelids have also been an economic commodity, providing farmers with organic fertilizer, traction and transport as well as fibre for textiles. However, recurrent and prolonged cold waves in recent years have decimated the number of livestock and left indigenous farmers on their knees.

THE DRIVERS

Recognising that the indigenous farmers in the highlands of Bolivia constitute a culturally important group, the Bolivian government turned to FAO, who, in turn, carried out a two-pronged innovation package to increase the resilience of the llamas and the livelihoods of the farmers.

THE INNOVATION

By introducing use of a semi-roofed shelter, called corralón in Spanish, specially designed for llama camelids in an area where camelids used to sleep in the open field, these livestock are now protected both from the attack of pumas and foxes during the night, as well as from extreme weather patterns in the Andes. Additionally, providing farmers with easy access to mobile veterinary pharmacies meant that sick livestock could be treated and losses were significantly reduced.

The design of the corralón considers the position in relation to the sun and wind, as well as the topography of the land. The dimension of the corralón is directly correlated to the size of the herd, with a ratio of 1.5 m² per adult llama, and the height of the roof considers the the maximum height of llamas (1.70 cm), with a maximum height of 3 m, with a patio of at least the same size of the shelter area where forage production is also possible. Additionally the corralón has a water-diverting canal, a draining canal and a dung deposit for future manure production and for heating and cooking purposes.

The corralón makes it possible to raise camelids in a holistic way, where the space can also be used for breeding purposes and for the provision of health treatment.



© Luca Galuzzi

THE CHALLENGES

Farmers relied on additional financial support from municipalities, as most of them were unable to carry the costs of building animal shelters themselves. They also struggled to pay the travel costs to attend the veterinary pharmacies in the municipalities. To solve this issue, mobile ones were set up in the highlands closer to the herders.

THE IMPACT

Farmers reported a decline in the mortality of their livestock as they were now protected by roof shelters. Farmers reported 18 percent higher income in camelid meat and wool, along with the trading of live camelids. In 2016, this good practice was observed in 14 farms in the municipalities of Bolivia.

INNOVATION FAIR PRESENTER: Severo Choque, President of Quri Tama Camelides Producers' Association, Yuruna, Santiago de Andamarca, Bolivia



FULL OF BEANS

HOW GUATEMALA DEVELOPED BIOFORTIFIED BEANS THAT GROW IN DROUGHT CONDITIONS TO COMBAT MALNUTRITION

THE SITUATION

The Dry Corridor lives up to its name. Stretching from the Pacific Coast of Mexico to the western part of Costa Rica and Panama, this region, originally a tropical dry forest, is now the most densely populated part of these countries and its land is arid. In fact, it is known for its irregular rainfall and is one of the world's most susceptible places to climate change and variability. With long periods of heatwaves during which there is hardly any rainfall, the countries of Guatemala, El Salvador, Honduras and Nicaragua are particularly vulnerable. Climate change has increased the threat of drought and other extreme weather events that have had a disastrous effect on agricultural production, skyrocketing food insecurity in the population of this area. The constant and cumulative succession of extreme weather events has worsened the vulnerability of families living in the dry corridor of Guatemala, into a complex situation of food and nutrition insecurity, as well as the deterioration of livelihoods. As eight in ten of Guatemala's farmers work on tiny plots of land, a vast share of them are failing to generate their income solely by self-employment in agriculture.

THE DRIVERS

With six out of ten Guatemalans living below the national poverty line, the Human Development Index for Guatemala is still the third lowest in Latin America. The Government of Guatemala needed to solve a health and agriculture conundrum: develop a crop that would withstand the harsh climatic and soil conditions of the country and properly nourish its people.

THE INNOVATION

The biofortified Chortí bean, bred for high content of iron and zinc and resistance to drought, mosaic virus and other pests, was introduced in the Dry Corridor of Guatemala in 2016. Two organizations, Atescatel, a seed cooperative, and APALH, a producer association, now promote the Chortí bean in this poverty-stricken part of the country. The technical innovation - the biofortified Chortí bean (ICTA ChortíACM), developed by the International Center for Tropical Agriculture (CIAT), HarvestPlus, and ICTA (Guatemala's National Agricultural Research Institute) - needed to be matched by a social innovation to bring this nutritious bean variety into use among vulnerable communities in Guatemala's Dry Corridor.

In order to do that, the Capacity Development for Agricultural Innovation Systems (CDAIS) approach for developing capacity in multi-stakeholder partnerships was followed. The project built on the needs of Atescatel and APALH in order to improve their market opportunities and capacities, involving local government and actors such as the Plataforma BioFORT, a network on biofortification for



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improved diet, an NGO called Semilla Nueva, and other actors that could share a common vision.

THE CHALLENGES

While the public-private partnership approach is in its infancy and showing promise, it has also identified a number of policy-related constraints. Today, there is no strategy for the development of a value chain of biofortified beans in Guatemala. The government could play a much more active role in promoting the production and sales of the beans with seed companies. More focus on national market strategies is needed since farmers tend to prefer larger-seeded traditional varieties over new types with smaller seeds. Awareness raising at the national level of the benefits of consuming biofortified beans is sorely needed, and there is a need to address the unfair competition from cheaper (subsidised) beans from other countries.

THE IMPACT

Capacity development in institutional collaboration, entrepreneurship and marketing are key aspects that have been developed for building an effective agricultural innovation system. Other outcomes include grassroot awareness of the benefits of the fortified beans among women, health and nutrition services, extension services and farmers, and new partnerships with NGOs, and inputs suppliers now disseminate knowledge on this new variety. The APALH producer association grows the Chortí bean for improved nutrition and yields in the region are 2.5 tonnes per hectare. The association was also able to negotiate a better price compared to other bean varieties in 2017 and found that consumers preferred the taste of the Chortí variety, making it more adaptable and marketable. By 2017, 84 members produced almost 10 tonnes of the Chortí bean for their own home consumption, with ten members growing the bean for sale with seeds fetching about USD2/kg.

INNOVATION FAIR PRESENTER: Leonel Osorio Quiñónez, President, Cooperativa Atescatel, Guatemala

UP IN THE CLOUDS

A DIGITAL SOLUTION THAT CONNECTS SMALLHOLDER FARMERS TO NEW MARKETS

THE SITUATION

Rural smallholder farmers are facing numerous obstacles. They struggle to access local and international markets with fair prices for their crops that could lift them out of poverty. When smallholder farmers find a buyer, they rarely have any power to negotiate terms and improve their lot.

THE DRIVERS

Africa is the fastest-growing mobile market in the world, second only to Asia. Lower smartphone prices are driving a digital revolution in the continent, allowing phone users to access the internet at unprecedented levels. In fact, half of Africa's one billion population already subscribe to mobile services and increasingly use their mobile phones to do banking and agri-business.

For smallholders farmers in Africa, new technologies offer radical opportunities to grow their agricultural output, gain access to new markets and improve profit margins.

THE INNOVATION

The Virtual Farmers' Market (VFM) is an app-based e-commerce platform where farmers' surplus and buyers' demand for crops are advertised and traded. VFM builds on the United Nations World Food Programme's (WFP) leadership providing agricultural market support for smallholder farmers worldwide, namely, Purchase for Progress (P4P), WFP's flagship programme connecting smallholder farmers to markets.

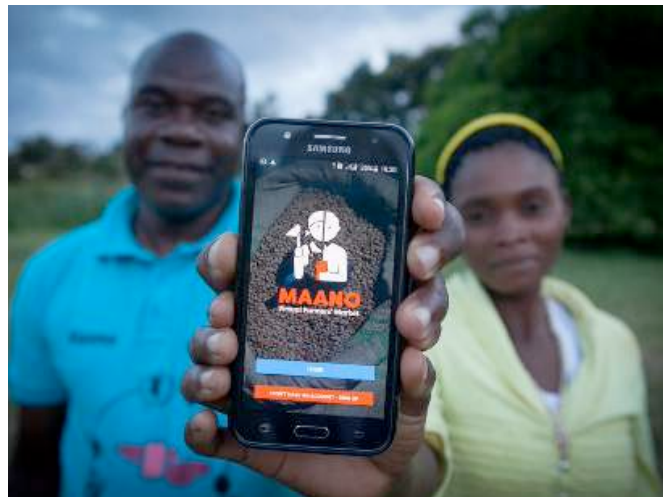
The app is based on the same logic as popular exchange platforms eBay and Airbnb by connecting smallholder farmers with buyers and other stakeholders and providing a transparent, open and trustworthy space for smallholder farmers and buyers to negotiate fair prices and deals.

In July 2016, the WFP Innovation Accelerator provided seed funding to prototype and pilot the VFM platform with smallholder farmers from rural areas in three districts in Zambia. By May 2017, a pilot of the app was launched in Zambia named Maano, which means intelligence in the local Tonga language.

THE CHALLENGES

Lack of price visibility and trust between smallholder farmers and buyers outside their own communities is often the main challenge hindering them from engaging in business.

Through VFM, WFP helped to overcome this by serving as an intermediary and holding buyers' payments until the produce has



© Ahna Gudmunds

been examined and collected, ensuring that traders pay the agreed price and farmers supply the agreed amount and quality. Trust is built through the app's collection of feedback on both buyers and sellers, enabling the farmers and traders using the app to build up a reputation for reliability.

By reducing transaction costs both for buyers and sellers, VFM aims to create efficiencies in supply chains, formal markets and food systems. In addition, the project sets out to contribute to improved nutrition, promote gender equality and women's empowerment and ensure that benefits reach the poorest people in the community and that no one is left behind. Promoting gender equality and women's empowerment is challenging in communities with deep-rooted gender norms that discriminate against women and girls. During the pilot, the Zambia country office project team prioritized women when selecting ambassador farmers and 40 percent of ambassadors were women.

THE IMPACT

In line with this, VFM provides a tool for pro-smallholder development, improving food security and income generation for rural smallholders by providing poor, vulnerable smallholder farmers – including those in remote areas – with access to markets for their crops. Its aim is to contribute to doubling smallholder productivity and incomes and create inclusive, sustainable food systems by 2030. The app reached over 1000 Zambian farmers during the 2017 pilot season with a total of some 100 transactions totaling 150MT of produce worth US\$50,000. During the ongoing 2018 marketing season, the results are expected to at least triple in Zambia.

INNOVATION FAIR PRESENTER: Ahna Gudmunds, Project Coordinator, Virtual Farmers Market / Programme Officer, Digital Development, United Nations World Food Programme (WFP), Purchase for Progress (P4P), Rome, Italy



MENDING THE CHINK IN THE COFFEE CHAIN

HOW ONE COMPANY IS USING BLOCKCHAIN TO ENSURE COFFEE GROWERS IN ETHIOPIA ARE PAID THEIR FAIR SHARE

THE SITUATION

Did you know that only 10 percent of the value of any cup of coffee sipped anywhere in the world, stays in the coffee producing country? This is because over the past 25 years, a handful of multinationals have dominated the coffee value chain. They roast 99 percent of the world's coffee outside of the coffee producing country and exert so much power that countries like Ethiopia have no influence over pricing or direct access to international markets.

Despite being one of the top producers of coffee, few countries receive more foreign aid than Ethiopia. Between 2004 and 2013, Africa's coffee capital received a staggering USD 30.6 billion in development aid, making it the fourth largest recipient of aid on the planet.

THE DRIVERS

The coffee industry is unfair. Fairtrade and certification have proven not to be the best solution for poverty among farmers and coffee producing countries over the past 25 years.

None of the roasting, distributing, streamlining operations or innovations happen in the global coffee belt. If Ethiopian farmers were to roast all of their coffee beans before selling them, they could charge triple the price and lift themselves out of poverty. By doing so, Ethiopia would no longer be dependent on development aid.

One social enterprise, Moyee, is looking at tipping the balance back to a 50/50 split and do so in a transparent manner. By roasting and packing the coffee in the country of origin and applying cutting edge technology with positive externalities, a bigger piece of the coffee-pie stays in the coffee producing country, with coffee growers benefitting as much as coffee companies.

THE INNOVATION

Blockchain is a revolutionary innovation. It connects all the stakeholders in the supply chain from the farmer to the end consumer. By making the value addition of each step in the coffee supply chain transparent, the industry, as well as consumers, become aware of the unfair sharing of value in the coffee chain.

Next step is to create inclusive business models. Using blockchain technology makes it possible to share value among the stakeholders (sharing by design) and to improve the fairness within the coffee value chain without raising prices. FairChain is developing a blockchain platform to make it available for any crop and country.



© Moyee Coffee/Sander Govers

THE CHALLENGES

In Ethiopia, as in many coffee producing countries, farmers do not have the necessary technological equipment or knowledge to render the value chain transparent, and this absence of technological infrastructure at the start of the coffee chain is a major constraint. This will require heavy investments to help farmers understand the technology and to further develop the platform so that it is user friendly and available for any actor along the supply chain.

THE IMPACT

Blockchain in coffee, and other crops, is new and it will disrupt the supply chain in the near future. By laying out the process for all actors to see, the value can be shared fairly. This transparency and traceability will inform and heighten the consumer awareness to inspire them to choose sustainable products and inclusive business models. There is no doubt that this technology will challenge the coffee industry and can dramatically improve the position of coffee producing farmers and their countries.

So far, Moyee contracted the 350 smallholder farmers who participate in the FairChain farmer training programme in the Limu region in Ethiopia. Today, 32 percent of the value of every cup of Moyee coffee stays in Ethiopia, which is twice that of multinationals. Moyee is currently looking at transferring all the processing to Ethiopia so that it can raise the split to 46/54. By working with Ethiopian freighters, Moyee will be able to reach its goal of an equal split in the value: 50 percent for farmers and 50 for Moyee.

INNOVATION FAIR PRESENTER: Sander Govers, Business Development and International Retail Manager, Moyee Coffee, The Netherlands

A WALK IN THE PARK

HOW AGRICULTURAL YOUTH PARKS HAVE ATTRACTED YOUTHS INTO AGRICULTURE IN AFRICA

THE SITUATION

One of Africa's most pressing challenges is to address widespread youth unemployment. Youths accounted for 60% of Africa's jobless population in 2017. With 200 million people aged between 15 and 24, not only has Africa the largest population of young people in the world but this number is expected to double to over 830 million by 2050 in the whole continent.

THE DRIVERS

Higher education has grown faster than the economies they were intended to support. This has meant that large numbers of recent graduates have been unable to find decent employment and that this lack of jobs for the young can leave them vulnerable to poverty, migration, or worse being easily recruited to join armed groups in a bid to stay relevant and make ends meet.

On average, the agribusiness sector allows an increase in monthly income from \$0 to \$500 within three years. Coupled with the rising average age of farmers being 65 years of age and the numerous agricultural technologies sitting on the shelf, agriculture offers a link for young people to bridge this gap and empowers them to create jobs for themselves and others along the value chain.

THE INNOVATION

A pioneering agribusiness incubation called youth agricultural park was designed specifically for young people interested in agri-entrepreneurship. Establishing an Agricultural Park is one way to quickly place young people into modern farming practices by providing land and key farming services at reasonable rates. These services include common land preparation, irrigation, pest control and marketing services. The programme's unique features lie in incorporating the diverse yet complimentary skills of young people, developing ICT tools and using innovative means to cutting out the middlemen, such as e-marketing platform. It also looked at collaborating with a smart tractor company to provide mechanisation services and students learned to use improved crop varieties for better yields.

With headquarters in Ibadan, Nigeria, the International Institute of Tropical Agriculture (IITA) first established a pioneering agribusiness incubation in Nigeria in 2012, then expanded to DR Congo, Kenya, Uganda, Zambia, Tanzania with funding from different sources.

THE CHALLENGES

The initial constraints centre around mind set, social beliefs and norms whereby young people in the past saw jobs in agriculture as the last resort or alternative. Even at universities, agriculture-related



© Evelyn Ohanwusi

courses are rarely the first choice among students. An ongoing challenge is finding financial support to scale up activities and to facilitate start-up for trainees.

THE IMPACT

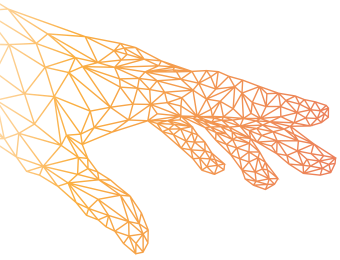
As the programme generated momentum, the concept was scaled up to cover a total of ten groups in different locations across Africa.

With over 2,000 youths trained and projects to reach over 15 000 youths in the next 5 years, the youth agricultural parks have seen the creation of over 300 independent agribusinesses, each of these employing another three to five youths.

The agripreneurs have proven adept at "rescuing" rural development facilities and farms from ruin and dilapidation. Scaling up these parks is a viable possibility and requires minimal investment.

Perhaps the most encouraging achievement of the programme is that it has empowered youths to provide step down training to other youths, planting the seed of sustainability into the next generation. The multiplier effect of jobs created through the start-up enterprises is also a major landmark of the initiative.

INNOVATION FAIR PRESENTER: Evelyn Ohanwusi, Head, Youth in Agribusiness Office, International Institute of Tropical Agriculture, Ibadan, Nigeria



IN DEEP WATERS

HOW WOMEN FARMERS IN ZANZIBAR ARE ADAPTING TO CLIMATE CHANGE AND REVITALISING THE SEAWEED INDUSTRY

THE SITUATION

Off the coast of Tanzania, the semi-autonomous archipelago of Zanzibar is ranked eighth in the world's top ten exporters of farmed seaweed. In an island where men hold most of the jobs, over 80 percent of seaweed farmers are women. For these 20 000 women farmers, the seaweed industry provides them with more than jobs, it has greatly improved their standard of living and given them financial clout and independence.

The women farmers harvested two types of red seaweeds on the shores since the early 1990s. High-valued seaweed, *Kappaphycus alvarezii* (Cottoni), was preferred for exports and used as a base for cosmetics, lotions, toothpaste, soaps, medicines and food. In many countries in Asia, for example, it is eaten as a vegetable. A second, less expensive type of seaweed, *Eucheuma denticulatum* (Spinosum), was grown mainly for local consumption. When the bulk of seaweed started to die in 2014, it started a worrying downward trend in production from 13 000 tonnes (USD 3.9 million) to 11 000 tonnes (USD 2.09 million), two years later. Rising sea temperatures were to blame.

THE DRIVERS

The Zanzibar Seaweed Cluster Initiative (ZaSCI) is one of the five clusters formed by the government of Tanzania and promoted by the regional Zanzibar government in their push to revitalise the bioeconomy and increase the resilience of women farmers.

THE INNOVATION

Women farmers adapted their cultivation methods and processes to changing realities. In direct response to climate change, the women farmers have moved to deeper, cooler waters where they focus on growing the local variety of seaweed *Kappaphycus alvarezii* (Cottoni). As most of the women cannot swim, they wear special protective gear that keeps them afloat and safe during the long hours spent in the sea. Farmers have also partnered with researchers where best practice methods for harvesting and processing are tried and tested, in order to help the farmers increase their competitive advantage.

THE CHALLENGES

Climate change continues to be challenging as farmers struggle to keep the seaweed farms away from areas with warmer water. Staff from a local university working closely with ZaSCI have since taught farmers innovative harvesting methods in these deeper, colder waters as well as how to process the available seaweed so that they are even more competitive.



© Flower Ezekiel Msuya

THE IMPACT

When it comes to seaweed, producing value-added products will reap far greater profits than exporting the raw biomass. In fact, women farmers have seen their income skyrocket from USD 0.18 per kg of raw seaweed to USD 13.4 per kg for soap. This has meant that for many, they could afford to build their own house and send their children to school. In doing so, they have gained invaluable business acumen and farming techniques, while some have even learned commercial English.

ZaSCI, founded in 2006, has trained the farmers to produce and sell added value products (food, soap, body cream, powder, etc.) in Zanzibar and mainland Tanzania (17 villages in total). In addition to selling soaps and creams made with seaweed, ZaSCI members and their products act as a tourist attraction by organizing tours to production sites and processing facilities, as well as offering a taste of seaweed foods to the visitors.

With a target of 20 000 tonnes of dry seaweed exports by 2020, the Government of Tanzania plans to replicate this model by creating new women farmer cooperatives, new harvesting and processing technologies and linking them with researchers to provide continuous improvement.

INNOVATION FAIR PRESENTER: Flower Ezekiel Msuya, Senior Researcher/Consultant Facilitator of the Zanzibar Seaweed Cluster Initiative, University of Dar es Salaam, Zanzibar, Tanzania

EARTH-FRIENDLY STAMP

HOW BURKINA FASO AGRIPRENEURS PIONEER THE FIRST NATIONAL ORGANIC LABEL IN WEST AFRICA

THE SITUATION

Most farming in Burkina Faso is characterised by excessive and non-regulated use of agrochemicals. Some 36 percent of vegetables in the markets of Ouagadougou have pesticide residue levels that exceed health standards of FAO and WHO. This has deadly consequences for future generations as soils become degraded, farmers' health deteriorates from long-term exposure to pesticides, and food security for all is threatened. However, Burkina Faso's agricultural policies in the past have not encouraged organic production. Many farmers do not venture down the path of organic certification because of stiff competition from conventional family farmers.

THE DRIVERS

In 2011, several key players came up with the idea of creating a national organic farming council with the mission of promoting agroecology and organic farming. Farmers understood that an organic certification could be a marketing tool to distinguish and better market their products. In addition, the organic certification creates job opportunities along the value chain (production, processing and marketing) and responds to the growing demand of the population for safer, fresh, tasty and nutritious food.

THE INNOVATION

In such a scenario, organic agriculture is already an innovation in itself. The Burkina Faso BioSPG (système participatif de garantie, or participatory guarantee system in English) label is one of the first national organic labels in West Africa, active since 2015. The SPG is a local quality assurance system that certifies producers based on active participation by stakeholders and, as such, is an innovative process for organic labelling since a participatory multi-stakeholder process ensures better ownership and thus greater respect for higher standards for the products. Founded on rigorous organic farming standards, the SPG process goes beyond certification by engaging local peer groups in the whole process. As the main leader of change in emerging organic value chains, the National Council for Biological Agriculture (CNABio) oversees organic certification nationally using the SPG methodology and supports new members by strengthening links between the different actors of the value chains, from the producers to the consumers. Women and youth have been organized and trained to use social media and business skills to improve the marketing of vegetables.

CNABio is supported by the Capacity Development for Agricultural Innovation Systems (CDAIS) project to facilitate the capacity development of their network. This is done through multistakeholder collaborative activities that have two priority objectives: to scale up organic production and certification with the BioSPG label; share knowledge and training among the members of the network.



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THE CHALLENGES

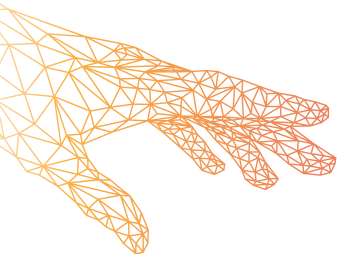
Limited awareness and knowledge among consumers and authorities remains a challenge for commercialization and for the success of organic agriculture. On the producers side, there is a limited availability of products that struggle to satisfy a fast growing market, due to the lack of professionalization and training or land limits. The members of the CNABio are learning how to voice their concerns in a collaborative manner. They established a monthly meeting of organic producers in Ouagadougou, where they can discuss problems and find solutions or new ideas that helps them make progress in organic farming. For instance, they decided to create new ways of distributing local organic food and products such as local farmers' markets and to organise promotional events such as fairs in order to link producers and consumers.

THE IMPACT

Since certification was introduced in 2015, 286 small family farmers and agripreneurs are now labelled organic farmers. Farmers increased the quantity of products by 15% because of the larger number of consumers. Farmers and traders have reported a 45% increase in income and living standards. Instead of buying their food at the market, they are able to grow their own and eat better quality vegetables. They can use the extra income they gain to send their children to school, for example. Women are both key agents of change and beneficiaries as they move toward organic farming. For instance, an association of some 30 poor women growing organic vegetable outside of Ouagadougou gained visibility and higher incomes thanks to these farmers' markets and local fairs. They also developed mechanisms to distribute their production to schools.

The Ministry of Agriculture has gained awareness of the importance of safe food and of developing organic farming around cities to serve local markets, as well as the importance of agroecology principles for the sustainable development of organic farming.

INNOVATION FAIR PRESENTER: Clémence Lankouande, Coordinator, National Council for Biological Farming, Burkina Faso



HACK FOR HARVESTS

HOW DRONES AND SMARTPHONES ARE HELPING UGANDAN FARMERS SAVE THEIR CROPS FROM PESTS AND DISEASES

THE SITUATION

Known as the “pearl of Africa”, the Republic of Uganda’s fertile soils and favourable climate conditions have contributed to the country’s success in agriculture - a sector that employs a whopping 80 percent of Ugandans.

In recent years, the increase in pests and diseases that have devastated crop fields have threatened the livelihoods and food security of Ugandan farmers, who lose from 30 to 40 percent of their harvests to pests, diseases or to rudimentary handling, storage, processing and transportation.

THE DRIVERS

As the threat to food security in the Elgon region in Uganda became more serious in 2016, it prompted the Government to look at early warning systems in the region and for the whole country, recognising that farmers struggled to both identify pests and diseases and know how to treat them.

THE INNOVATION

Using smartphones and drones that work in tandem both offline and online, with built-in machine learning for image recognition, large fields can be mapped out to identify affected areas. Depending on the pest or disease, the service would recommend sustainable pesticides to farmers ensuring that the solution is environmentally sound and maintains the nutritional integrity of crops. By tracking incidences of pests and diseases, the service could also alert neighbouring farmers of the dangers and suggest ways for them to manage the risks and contain further infestation. The service also includes a platform to connect the farmer and buyer and the transparency ensures fair prices and accurate origin of produce.



© Siraji Nazirini



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The service called Fapp was the fruit of Hansu Mobile Innovations - a startup team of three young Ugandan developers from a farming community in Mbale in the Eastern region of Uganda. In development since April 2018, the Fapp was first piloted in neighbouring fields in the summer of 2018 to hone the features of the service to the real needs of the farmers.

THE CHALLENGES

The innovation had to overcome a number of constraints, some of which are still ongoing. During its initial stages, the lack of funding and necessary equipment meant that developers had difficulty in collecting sufficient data required to properly train a machine-learning model on pattern recognition of pests or diseases. In order to make sure the model was accurate; the team needed an army of agronomists, pathologists and drones to provide the quantity of data needed. Finally and most importantly, many farmers did not have smartphones to avail of the service.

THE IMPACT

While the project is still in its initial stages, developers have begun a collaboration with the Islamic University in Uganda and will spearhead the rollout of the Fapp thanks to its most recent working relationship with the Buginyanya Zonal Agricultural Research and Development Institute (BugiZARDI). It is envisaged that this Fapp will become ubiquitous as Ugandan farmer’s continuous learning channel and digital support.

INNOVATION FAIR PRESENTER: Mwila Kwanga, AgriPredict start-up, Zambia, on behalf of Siraji Nazirini, Software developer, Hansu Mobile Innovations, Mbale, Uganda

MORE FOR LESS

HOW MODERNISING THE RICE SECTOR BY BENIN'S AGRIPRENEURS GIVE MORE AND BETTER RICE AT A LOWER COST

THE SITUATION

Rice is the most consumed cereal in Africa in general and in Benin, in particular. Growing appetites have led farmers to farm rice in increasing quantities.

The production, milling and drying of rice is a multifaceted process. Rice farmers employ an ancient two-step method to separate the grain from chaff; threshing, the loosening of grain or seeds from the husks and straw before winnowing, which separates the grain from the chaff and remove pests. This is a gruelling process that is mainly the responsibility of women farmers, at great sacrifice of their health. At the same time, rice mills are struggling to get rid of rice husks.

THE DRIVERS

Young agripreneurs saw an opportunity to increase rice yields, reduce paddy losses and reduce the hardships of manual threshing by women workers.

THE INNOVATION

Innovations are three-fold. Young Beninese farmers and entrepreneurs founded the start-up AfriRice Agrobusiness. Their innovations allowed farmers introduce a thresher machine with a diesel engine, capable of threshing 2 500 kg of paddy in one hour alone and which reduces paddy losses by 10-22 percent. Women workers no longer need to take tramadol – a medication for moderate and severe pain - for manually threshing and winnowing.

Second, farmers replaced wood with rice husks as fuel in fireplace touring, which dramatically reduced the cost of parboiling rice to the tune of 300 kg of paddy in one go for steamers, which are the means traditionally used by women and threshing machines for rice farmers in north and central Benin. With solar panels, rice husks can be used as fuel, freeing women's time and energy and reducing the need for wood.

Third, farmers created an online community for farmers and agripreneurs to share best practices in sustainable local agriculture.

THE CHALLENGES

Many Beninese farmers do not have access to the right networks to enquire and test new technologies, nor can they afford to invest in new equipment, even if they understand the benefits they would bring to their activities.



© Steve Hoda

Trust was a stumbling block both in convincing farmers to try out new methods on the farm and participate online as part of a community. West Africa's online reputation is widely associated with scams, so attracting international investors or making a profit by online sales of the machines proved to be impossible. Instead, farmers had to reach out to local farmers one by one and gain their trust. Now, the website is only used to share articles, information and meetings.

THE IMPACT

To date, these innovations reached 390 village groups, 8 508 rice farmers, 4 766 women steamers and about 100 mini mills in North and Central Benin.

Next year, AfriRice will be looking for partners to develop the rental market for threshing machines and provide threshing and winnowing services for producers and women. An AppRice app is being developed to coordinate the entire rice value chain in Benin and throughout Africa. In 2020, AfriRice plans to market its solutions in Ivory Coast.

Further development is being carried out to provide rice industry actors with AppRice, a mobile application which makes it possible to follow and evaluate the operations of harvests and post-harvest and locate agricultural machinery suppliers.

INNOVATION FAIR PRESENTER: Steve Hoda, Founder, AfriRice Agrobusiness, Benin

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