A massive capacity building initiative involving elaborate logistical arrangements covering all the 30 districts in the Indian state of Odisha successfully concluded in November 2019. Teams of government agricultural officers and ICRISAT staff in less than three months reached over 2,500 agriculture officers and extension workers. This exercise was a follow-up to the large-scale initiative that analyzed 40,000 soil samples in the state and put in place detailed plans for correcting soil deficiencies, building fertility and enhancing farm productivity.

Participants at the capacity building programs were oriented on using Soil Health Cards, calculating the fertilizer dosage and undertaking disease and pest management among others. A manual that employed the Andragogy technique of adult education and a set of videos on farm management topics were developed for the purpose.

To facilitate the massive outreach, a cadre of 60 master trainers was developed at ICRISAT in the month of July. These master trainers trained select officers at the district level, who then took the capacity building program to the block level.

The enthusiasm of the officers from the Department of Agriculture, Government of Odisha, and support from the Director of Agriculture Dr Muthu Kumar helped in achieving the task within a reasonable time frame, despite delays due to elections in the state.

The entire process has been documented and a report was submitted to the Government of Odisha in which the detailed methodology, strategy and outcome of the Capacity Building program is elucidated. This report could serve as a reference for such programs in the future.

Feedback from the participants:
- Soil Health Maps were seen as a good source of information
- Printing Soil Health Cards in the local language Odia was commended
- The Training Manual was rated as useful and relatable
- Use of videos was highly appreciated
- Integrated Pest and Disease Management classes elicited high interest
- There were requests for acid soil management techniques and fertilizer use from some districts
- Training on market-oriented development and use of mobile apps were sought
- Field trips to demo plots and exposure visits to research institutes were seen as necessary.

Project: Enhancing Agricultural Productivity and Rural Livelihoods through Scaling-up of Science-led Development in Odisha: Bhoochetana
Funder: Agriculture and Farmers Empowerment Department, Government of Odisha
Partners: Association for Development and Research in Socio Economic Activities (ADARSA); Action for Protection of Wild Animals (APOWA); Harsha Trust; Foundation for Ecological Security (FES); Highlands Agriventure Limited; Jana Kalyan Pratisthan; Janasadhana; Lokadrusti; Loksebak; Mahashakti Foundation; National Institute of Rural Development and Environmental Science (NIRD); NIRMAN; Parivarttan, Pragati-Koraput, Pragathi, SAMBAN DH, TADASHA, Udyama, Netaji Jubak Sangha, Triranga Yubak Sangha (TYS), ABHYDAYA, Centre for Action and Rural RE-construction (CARR), Self-Employed Workers Association Kendra (SEWAK), Saunta Gaunta Foundation (SGF), ICAR-National Rice Research Institute (NRRI), Odisha University of Agriculture & Technology (OUAT) and ICRISAT
CRP: Water, Land and Ecosystems (WLE)
Have you heard of ‘pop’ sorghum or ‘diet’ sorghum flour? If you haven’t, you are missing updates on an ancient grain that is gaining popularity in Nigerian markets and in nearby regions as well. Industries with guidance from researchers have picked up suitable varieties to manufacture ready-to-cook flours (plain, composite, diet and confectionery), for use in breweries and as animal feed. This kind of an outcome was possible through an initiative that is now five years old and works across the sorghum value chain from farmers to markets through innovation platforms.

The beneficiaries of the initiative – Sorghum Outreach Program of ATASP (Phase I) – are farmer and processor groups, farmer input/service supplier groups, fabricators, marketers and transporters, seed companies, unemployed youth, training participants, policy makers and people influenced by market information services.

The program’s strategy was to deliver a package of practices that included raising awareness on improved sorghum varieties, building capacity of farmers through good agricultural practices, introducing processing and machine fabrication to provide avenues for unemployed youth and to improve industry interface for uptake of the sorghum produced by farmers. For the last quarter of 2019, a range of activities and training programs were implemented to achieve project targets.

Raising awareness on sorghum among farmers, consumers, communities and policy makers through fairs and training programs was a priority. Visitors flocked the ICRISAT promotional stall at the National Agricultural Show and Seed Fair. Seed of improved varieties were on display and demos held on the use of small-scale agricultural machinery such as the stover crusher. Visitors also tasted sorghum products like pop sorghum, cake and doughnuts. Many were interested in sorghum product development. A total of 400 posters, manuals and booklets were distributed. The program distributed planters, weeders, threshers and choppers and agro-inputs (510 kg of improved sorghum seed and 63 bags of fertilizers) as prizes to groups that performed well during the year.

The local media covered the event extensively. More than 25 programs were on local radio and television channels in English and Hausa languages during 2019.

Building farmers’ capacity through trainings and field days is a time-tested practice. A hands-on training on safe use of agro-chemicals was organized for youth farmers and extension agents in three Staple Crop Processing Zones (SCPZs). Information on seed treatment, pesticides, insecticides and fertilizer usage was shared. A demo on the use of neem leaves and oil as pesticides against fall armyworm and stem borer was held in one SCPZ. The adoption of this readily affordable, effective and environmentally friendly alternative is expected to reduce the extra cost of purchasing conventional pesticides. About 1,241 people participated (517 were women) in the training aimed to ensure standardization of best practices and exploit potential for income generation and job creation.

Farm field days for mid-season and end-season evaluation showcased improved production technologies as well as improved sorghum varieties deployed in the region. The mid-season field days empowered farmers and community members through information sharing on where to acquire improved sorghum seeds.
The field days for end-season evaluation at national and zonal levels led to increased market opportunities and greater farmer-to-farmer exchange of knowledge on improved seeds for increasing sorghum productivity. The events served as platforms for showing achievements by farmers who hosted demonstration plots and followed Good Agricultural Practices.

About 2,357 participants (741 women) attended the events.

**Trainings on processing and packaging farm produce** were conducted especially for women and youth (it was part of the curriculum of government-run schools).

A 5-day training workshop focused on the use, maintenance and fabrication of small- and medium-scale *agricultural machinery* used in sorghum cultivation and post-harvest handling. Trainees learned to construct and assemble a fabricated winnower, hammer mill and multi-crop thresher. There were two such trainings with 30 participants in each, representing equally all the four SCPZs. Close to 616 beneficiaries attended the stover crusher demo. Use of crushed stover as animal feed provided a win-win for farmers and herders.

**Improving industry interface** with flour millers resulted in bringing out packaged sorghum flour in Nigeria. It came with added shelf life due to techniques developed by the millers. Samsorg 17, Samsorg 45 and Samsorg 47 suited millers while CSR-01 and CSR-02 were preferred by brewers. Many other new products are in the pipeline.

Given that barley imports are high in the country, policymakers were asked to intervene to revive the dwindling demand for sorghum among breweries. Alternatively, off-takers in Niger and Kano states agreed to source sorghum from all over Nigeria for brewing and confectionery purposes. Three Innovation platforms that were set up established linkages with major sorghum industrial markets.

The activities and trainings mentioned were for the period October-November 2019.

Read more about ICRISAT work in Nigeria on [exploreit.icrisat.org](http://exploreit.icrisat.org).

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**Project:** Nigeria - Agricultural Transformation Agenda Support Program - Phase 1 (ATASP-1)

**Donor:** African Development Bank Program through IITA

**Partners:** National Centre for Agricultural Mechanization (NCAM), Ilorin-Lokoja - Highway Idofian, Kwara State, Nigeria and ICRISAT

**CRP:** Grain Legumes and Dryland Cereals (GLDC)

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This work contributes to the UN Sustainable Development Goals

(L) Participants at the workshop on machine fabrication. (R) Farmers attend a field day.

(L) Participants at the workshop on machine fabrication. (R) Farmers attend a field day.
Facilitating training programs for improving crop-livestock systems in Niger

Training programs on silage making, animal health and laboratory management were held in Niger for researchers, extension service workers and farmers to improve crop-livestock systems in the region.

Silage making to improve utilization of stover
A study conducted in Maradi and Torodi villages indicated that more than 90% of the farmers conserve crop residues for animal feeding and that the traditional techniques of storing in a hayloft or open shed affected feed quality. At both Torodi and Maradi, farmers stored millet stover and cowpea hay, while Maradi farmers also stored sorghum stover and groundnut haulm.

Based on the above study, the training program on silage making held at Sadoré and Maradi shared techniques to improve utilization of cereal residues (millet, sorghum, etc.) to overcome feed constraints.

The training at Sadoré involved producers, extension service workers, research assistants, research technicians and researchers, while the training at Maradi involved extension service workers and producers. There were 93 participants (36 women and 57 men) and it was held from 28-30 October.

Facilitating the formation of animal health platforms
A study conducted on the animal health information system in Niger showed that very few villages have a communication network with veterinary services. Moreover, there is an unequal distribution of animal health services and farmers have to travel at least 5 to 20 km to avail veterinary services.

To address the issue, a training program was conducted to equip animal health professionals with the necessary knowledge on transboundary animal diseases and improve the surveillance system for livestock disease at a grassroots level.

The training had 11, 15 and 18 participants at Torodi, Madaroumfa and Dakoro, respectively. Over the course of two days in each site, participants learned about the reporting system and awareness/recognition of transboundary animal diseases. They practiced adult learning techniques and discussed effective methods for disseminating information. The trainings were held during 9 October-26 November.

ICRISAT staff trained in laboratory management
Four staff from ICRISAT, a post-doctoral fellow, research assistant, PhD student and laboratory technician participated in a laboratory management training workshop organized by the Human and Institutional Capacity Development team of the Feed the Future Innovation Lab for Livestock Systems. The training aimed at strengthening the administration and management of laboratories, including animal nutrition laboratories, covering the following topics -- sample collection and processing, inventory of supplies and reagents, maintenance of equipment and manuals, analytical procedures, laboratory safety, etc. The training was held from 25-29 November.

A short course on system analysis, household and value chain modelling is scheduled to be held during 23-27 March 2020.

Project: Enabling value chains to create sustainable income for vulnerable people in crop-livestock systems in Burkina Faso and Niger
Funder: USAID through the Feed the Future Innovation Lab for Livestock Systems
Partners: University of Florida, Institute for Food and Agriculture (UF/IFAS), International Livestock Research Institute (ILRI), the Institut de l’Environnement de Recherches Agricoles (INERA), The Conseil National de Recherche Agronomique (CNRA) and ICRISAT. Silage making training was conducted as a part of the EQUIP Feed study funded by the Bill & Melinda Gates Foundation and also implemented by the Feed the Future Innovation Lab for Livestock Systems.
CRP: Grain Legumes and Dryland Cereals (GLDC)
This work contributes to SDGs 1, 8, 15 and 17
Read more about ICRISAT work in Niger on http://exploreit.icrisat.org/profile/Niger/334
Hand-holding outgrowers to produce certified seed in drought-stricken Ghana – a model to emulate

Mr Khalid Abukari Giwah, a civil servant turned seed producer, on his groundnut farm in Tatuani village, Ghana.

Access to quality seed remains a big challenge for farmers in Africa. With increasing drought situations and deteriorating soil quality, especially in the Sudanian and Sahelian zones, improving access to seed of climate-smart varieties is part of the solution. Spurred by a desire to “fix the problem” at least in his village, Mr Khalid Abukari Giwah left his government job to start a seed production venture. Currently, his company fosters 10 outgrowers (contract farmers) for seed production of improved groundnut and cowpea varieties that were disseminated through the Tropical Legumes project.

Welcoming field-monitoring staff from the AVISA project in Ghana, Mr Giwah shared memories of growing up on a farm. “In my village, we used to grow lots of groundnuts and cowpeas for consumption, but with rains becoming scarce and the soils less fertile, farmers need to labor hard for little. I told myself that something needs to be done to fix the problem,” says Giwah, who started Asawaba Farms Limited in 2015. The company is located in the village of Tatuani, which is about 15 km from Tamale city in Northern Ghana.

A certified seed company in Ghana must meet many criteria including having the technical competences and the right facilities for producing seed of the crop of interest. After, going through the required checks by the Ghana Seed Inspection Division, Asawaba Farms produced two varieties of groundnuts (Samnut 22 and Nkatiesari) in its first year of certification. The improved seed was supplied by the company through CSIR-SARI, Ghana’s national agricultural research institution.

According to Dr Richard Oteng-Frimpong, groundnut breeder at CSIR-SARI, the aim was “to recommend climate-smart groundnut seed varieties that are disease tolerant and high yielding for multiplication”. This collaboration allowed the company to produce and sell quality groundnut seed in Ghana markets.

In 2018, two varieties of cowpea foundation seed (Wangkae and Kirkhouse Benga) were cultivated by the company. Both are high-yielding and resistant to aphids and Striga.

Raising seed producers: A model to emulate

Asawaba Farms works in partnership with a network of smallholder farmers in the Northern and the Savannah Regions of Ghana. Farmers are chosen as seed producers based on their willingness, commitment and crop management skills. Some farmers among the outgrowers are selected and trained as seed producers in their respective communities. They then serve as sources of improved seed to other farmers in the remote farming communities in Northern Ghana. Participant farmers are also trained to understand the difference between grain and seed production. They are trained on handling seed before planting, preventing open pollination, identifying off-types and overall handling from farm to market.

To produce certified seed, Asawaba Farms provided a range of services to its 10 outgrowers. The company ploughed the fields, provided herbicides and procured foundation seed for the outgrowers, which they paid for after harvest. The company also provided other services including tractor services and inputs to other smallholder farmers in the farmer organization.
Ms Anti Adiza (42) from Tatuani, who started groundnut seed production (Samnut 22) in 2018, says she had never seen such yields in her life. “With support from Asawaba Farms, my production is over 200% higher. Some of the new things I have learned is how to store seed and the importance of identifying and removing off-types in my field. I gave several farmers a kilo of high-yielding varieties to test on their farms before supplying it to them,” she says.

Benefits to all farmers

The company enabled farmers in the village of Tatuani and the Northern and the Savannah Regions of Ghana to address the problems of Striga and poor soil by using improved seed varieties. In early 2018, farmers benefiting from the company’s programs mobilized themselves and expressed interest in becoming seed producers. Following this demand, the company decided to work directly with these farmers. “We want the benefit to be two-way. So, selected farmers became seed producers too,” says Giwah.

The company is also working with more than 300 smallholder farmers (220 male and 156 female) in the cultivation of groundnut, cowpea, maize, rice and soybeans. “In the coming year, we have the objective of becoming a leader in the groundnut seed value chain,” said Mr Giwah.

Asawaba Farms Limited works with state institutions and Non-Governmental Organizations, including the Ministry of Agriculture and District Assemblies, USAID Advance project and Premium food. The company is also member of Northern Out Growers Business Association (NOBA) and has recently joined the Seed Producers Association of Ghana (SEEDPAG). Funding of the company is from savings of sales of farm produce and equipment support from USAID/Advance project.

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Project: Accelerated Varietal Improvement and Seed Delivery of Legumes and Cereals in Africa (AVISA)

Donor: Bill & Melinda Gates Foundation

Partners: Institut de l’Environnement et Recherches Agricoles (INERA), Burkina Faso; Institut d’Economie Rurale (IER), Mali; Council for Scientific and Industrial Research-Savanna Agricultural Research Institute (CSIR-SARI), Ghana; institute for Agricultural Research (IAR) of Ahmadu Bello University (ABU) and Usmanu Danfodiyo University of Sokoto (UDUS), Nigeria; Ethiopian Institute of Agricultural Research (EIAR), Ethiopia; Department of Research and Development (DRD), Tanzania; National Semi-Arid Resources Research Institute (NaSARRI) of the National Agricultural Research Organization (NARO), Uganda, International Center for Tropical Agriculture (CIAT), International Institute of Tropical Agriculture (IITA) and ICRISAT.

CRP: Grain Legumes and Dryland Cereals (GLDC)

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This work contributes to UN Sustainable Development Goals

1 No Poverty
2 Zero Hunger
3 Good Health and Well-being
13 Climate Action
17 Partnerships for the Goals
South-South collaboration

How Uganda’s millet drink ‘bushera’ saw a revival and India’s peanut ‘chikki’ went to Zambia

If school children in Uganda have taken to a super-nutritious traditional fermented millet drink called bushera and if an India-inspired peanut bar is a popular item in Zambian supermarkets, a training initiative in partnership with the India-Africa Forum Summit deserves mention. The initiative over the past three years fostered nutripreneurs like Mr Adams Sapeho, a food scientist turned businessperson and Ms Chiumphe Sarah Lungu who runs a small-scale enterprise.

Banking on the goodness of a traditional millet drink

In 2014, Mr Adams Sapeho and Ms Teddy Sapeho invested their meager savings and started Bamdam Foods Ltd, a small agribusiness company in Kawanda village, Central Uganda. It wasn’t until 2017, that Mr Sapeho officially registered his small venture as an agro-processing business. Thanks to a two-week India-Africa Forum Summit training program at ICRISAT headquarters that he had signed up for.

Growing product pipeline: On returning home after the training, Mr Sapeho invested his ‘small’ capital to process millet into a traditional fermented drink called bushera and in mango juice production. The products were well received in the local market. In 2018, he added cereal flour processing to his existing business with the support of the National Agricultural Research Organization (NARO), Uganda, which offered him an incubation center early in 2019. His company currently produces bushera, millet-maize-soy flour composite (for babies), and ready-to cook millet, rice and maize flour.

Business expansion plans: Future plans include incorporating more cereal/grain products, processing amaranth flour, cleaned and packed rice, and composite flours for baby food. The company is working on certification from the Uganda National Bureau of Standards to expand business in East African markets.

Benefit to community: Currently, Bamdam supplies bushera to 10 supermarkets and four schools in Kampala. The company has a staff of six who are paid a monthly salary of $75. The products are high on nutrition and are directly procured from local farmers at a good price, contributing to the livelihoods of people in their community.

Indian chikki inspires a Zambian Peanut Energy Bar

Ms Chiumphe Sarah Lungu, a woman entrepreneur from Zambia, runs Inspireme Trading and is engaged in manufacturing pickles and dried cassava leaves. Responding to an invitation from the Ministry of External Affairs, she participated in the training program at ICRISAT headquarters in July 2019 on ‘Starting a Small Scale Food Processing Enterprise for Women and Youth’.

Mr Adam Sapeho with his product ‘bushera’.

Photos: AIP, ICRISAT
An exposure visit to a groundnut processing unit run by a women’s collective supported by ICRISAT got her interested in the chikki – a peanut and unrefined cane sugar concoction. On returning home with inputs from the Agribusiness Innovation Platform (AIP) she worked on the development of a Peanut Energy Bar using locally-available ingredients. Sarah is now marketing them at leading supermarkets in Lusaka and the product has gained wider acceptance among Zambians.

**About the India-Africa Forum Summit partnership with ICRISAT**

The third India–Africa Forum Summit was held in New Delhi, India, in 2015 and the Government of India had committed to play a key role in Africa’s development process. Recognizing the importance of human capacity development to attain socio-developmental objectives, various training programs were organized for African nationals to improve their technology uptake for improved food processing and entrepreneurship.

ICRISAT’s Agribusiness Innovation Platform organized training programs since 2017 on the below topics:

- Technology and Business Opportunities in Food Processing for Small and Medium Enterprises (SMEs)
- Entrepreneurship and Marketing Skills Development
- Advance Training on Food Safety and Nutrition
- Business Plan Preparation and Operations Management
- Starting a Small-Scale Food Processing Enterprise for Women and Youth
- Development of Analytical Skills for Setting up Food Testing Laboratories
- Technology Commercialization and Business Scale-up in Fruits and Vegetable Processing Industry.

From 2017 to 2019, seven training programs of two weeks duration each were held for 289 participants (149 male and 140 female) from 29 countries. Participants said the training was of extreme relevance and important to their countries. For 2020 there are three such trainings in the pipeline.

This work contributes to UN Sustainable Development Goals

This work was undertaken as part of Flagship Program 2 of the CGIAR Research Program Grain Legumes and Dryland Cereals (GLDC)
Eight food processing units to target malnutrition and poverty in South India’s hinterlands

**The facilities aim to create sustainable business opportunities around nutritious diets for tribal farmers in Telangana**

In a bid to boost nutrition and income, farmers from tribal communities in the South Indian state of Telangana will shortly take to ‘agripreneurship’ as eight secondary food processing units become operational in February.

ICRISAT’s Agribusiness and Innovation Platform (AIP) with the Tribal Welfare Department of Telangana State Government and the Ministry of Tribal Affairs of the Indian government has set up these units in Telangana’s Integrated Tribal Development Agencies (ITDA) – Utnoor, Eturnagaram and Bhadrachalam. ITDAs are specially administered areas to ensure governments’ welfare schemes reach tribal populations.

“Eighty farmers have been formed into eight Joint Liability Groups (JLG), one group for each unit. The groups will manage and share profits from the units,” said Aravazhi Selvaraj, AIP’s Chief Operating Officer. “Farm produce of sorghum, groundnut, pigeonpea and pearl millet from the fields in the vicinity of the units will be procured to make food products for government’s food and nutrition schemes in schools and welfare centers. Surplus production will be sold in the market.”

Each facility has been established at a cost of around ₹2.5 million (around US$ 35,000) and is expected to support nearly 100 farmers in its vicinity. It is estimated that each unit will produce 1.5 tons per day of processed food and the local farmers will be able to increase their incomes by at least 20% by supplying their produce to these units.

Mr Selvaraj mentioned that the units will have a brand for marketing the products and the Girijan Cooperative Corporation will oversee the marketing efforts.

Peanut-jaggery bars, popularly called chikki, are among the products that will be made by the food processors. Upma, a semolina porridge, will be also produced in ready-to-cook form. A ready-to-eat sweet meal and processed pigeonpea or dal are other products the units will start producing.

Dr Saikat Datta Mazumdar, Chief Operating Officer (COO), NutriPlus Knowledge Program, AIP, pointed out that the food processing facilities are being set up to localize production and address malnutrition, besides improving the economic conditions of the tribal farming communities.

“The processing units are designed and equipped with machinery as per guidelines laid down by the Food Safety and Standards Authority of India (FSSAI) and shall ensure production of nutritious food products meeting national and international market requirements,” Dr Mazumdar said. “The JLG members are being trained in the areas of food safety management systems, machine operations and maintenance and quality control towards enabling production of hygienically packed, safe and nutritious foods”.

For infographic on the project click [here](https://exploret.icrisat.org)

Read more [here](https:// exploret.icrisat.org). See [exploret.icrisat.org](http://exploret.icrisat.org)

This work contributes to the UN Sustainable Development Goals

**Project:** Setting up of eight (8) processing units in ITDAs of Utnoor, Etturnagaram and Bhadrachalam through Joint Liability Groups (JLGs) of Telangana

**Funder:** Tribal Cooperative Finance Corporation Ltd (TRICOR), Tribal Welfare Department, Government of Telangana.

**Partners:** ICRISAT, Ministry of Tribal Affairs, Tribal Welfare Department, Government of Telangana; Integrated Tribal Development Agencies – ITDAs (Utnoor, Bhadrachalam, Etturnagaram), Department of Women and Child Health Development, Government of Telangana.

**CRP:** Grain Legumes and Dryland Cereals
Recognition

With global accreditation, ICRISAT soil laboratory set to serve as focal point for soil analysis

ICRISAT’s soil laboratory has recently been accredited by the FAO Global Soil Laboratory Network (GLOSOLAN), becoming only the second lab in India to achieve this distinction. The laboratory can now serve as a focal point for all soil laboratories in India and help develop a regional laboratory network in the country.

With this accreditation, the laboratory is now looking at:

▪ Contributing inputs to FAO for developing best practices in soil analysis
▪ Upgrading performance of soil labs in the region by providing technical training
▪ Improving quality assurance and quality control processes for soil analysis.

The ICRISAT Development Center (IDC) has initiated the process for upgradation of two referral soil testing laboratories at Bhubaneshwar and Sambalpur in Odisha state as a part of the Bhoochetana project. Once upgraded, these labs will be equipped to validate soil data generated by other district-level soil testing labs in the state. To aid capacity building of the staff of these government labs, IDC recently conducted a five-day exposure visit-cum-training workshop at the ICRISAT soil lab – Charles Renard Analytical Lab.

Dr Peter Carberry, Director General, ICRISAT, unveiling the registration certificate for the lab, said, “ICRISAT’s research activities span a wide range of sciences - from genomics to plant breeding to nutrition. But soil science underpins them all and therefore is a key part of all of ICRISAT’s work.”

GLOSOLAN was set up in 2017 with a goal to improve soil data to support decision making at field and policy levels. There are 260 soil laboratories currently accredited by GLOSOLAN. The accreditation process, lasting over a year with inspection and validation of protocols and standard operating procedures, found the practices at the ICRISAT soil lab suitably meeting global standards. Dr Sreenath Dixit, Head, IDC, said, “Our next steps will be towards analyzing the biological properties of soil to provide farmers with a holistic vision of their soils.”

The registration certificate was presented to the lab in December 2019.

A glimpse at Charles Renard Analytical Laboratory

The state-of-the-art laboratory for soil, plant and water analysis was set up in 1978

▪ Since 2009, nearly 25,000 soil samples analyzed for Bhoochetana, Bhoosamruddhi and Sujala projects of the Government of Karnataka
▪ In 2018, 2000 soil samples from Uttar Pradesh, 5000 from Maharashtra and 26,000 samples from Odisha tested for various government-funded projects
▪ Capacity to analyze up to 250 samples per day for 14 parameters (including primary, macro- and micronutrients)
▪ High-precision, automated equipment: Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES) and Microwave Plasma Atomic Emission Spectroscope (MPAES)
▪ Qualified and trained technical staff
▪ Quality assurance monitored by Wageningen University, The Netherlands
▪ Safe and eco-friendly disposal of hazardous wastes.
‘Phygital’ tech powered by public-private partnerships promises climate solutions for Nigerian agriculture

An innovative technology that bridges digital approaches and physical interventions on farms and offers last-mile breakthrough capabilities in reaching every single project farmer with climate solutions has impressed the top leadership in Nigeria. The innovation program – agCelerant – is an advanced value chain orchestration that connects smallholders with credit, insurance, input and output markets and is the result of a partnership between CGIAR institutes and a private organization.

The innovation program is leveraged by the Internet-of-Things (IoT), Earth Observation and Artificial Intelligence. It is powered by youth franchisees who can proximally and economically monitor and advise every single smallholder field under contract. agCelerant provides all value chain stakeholders with (i) agricultural investment risk mapping, to reduce lenders cash-out and increase availability of credit to smallholders, (ii) more robust, affordable insurance contracts to reduce persistent climate risk in intensifying crop-livestock systems and (iii) improved management of crop nutrient deficiencies to increase fertilizer use efficiency and agricultural productivity.

As the lead agricultural research institution standing on the national agCelerant committee, ICRISAT will advise in the development of new technical solutions inside the ecosystem, such as advanced yield forecasting, post-harvest loss predictions, or hybrid insurance products and to support the deployment targeting and leveraging of other useful scientific knowledge, e.g. for the structuration of agCelerant digital seed value chains.

The program was developed by Manobi Africa PLC with technical support from ICRISAT, the CGIAR Research Program on Climate Change, Agriculture, and Food Security (CCAFS) and the European Commission’s Horizon 2020 research and innovation program (NADiRA–Nurturing Africa’s Digital Revolution for Agriculture http://nadira-project.eu/).

Original article published on the CCAFS news blog.
Interdisciplinary research key to making India’s Green Revolution sustainable

Around a hundred scientists from varied disciplines, who gathered to discuss an India-UK joint research program, called for more interdisciplinary research to make Indian agriculture sustainable in a changing world and to ensure food security.

The first General Assembly of TIGR²ESS (Transforming India’s Green Revolution by Research and Empowerment for Sustainable food Supplies), a UK-India research program which began in 2018 and brought over 20 research institutions together, was held at ICRISAT during 20-24 January. Crop scientists, sociologists, biologists, nutrition experts and archeologists, among others, are discussing the way ahead for the program.

“The General Assembly is an important milestone for TIGR²ESS, affording us an opportunity to strengthen the interdisciplinary nature of our research and put in place plans with tangible outcomes for positive agricultural and socio-economic change in India,” said Professor Howard Griffiths, Principal Investigator for the TIGR²ESS program and the University of Cambridge’s advocate in Cambridge-India relations.

The program seeks to address four key research questions: (1) What should a sustainable revolution deliver? (2) Can crop productivity increase, whilst maintaining yield stability? (3) Can water supplies be shared to match community demand? and (4) How can we best engage and educate for local community wellbeing?

These questions are being answered by six distinct, but fully integrated, flagship projects which are heavily reliant on research collaborations, exchanges and women empowerment.

Dr Rajeev Gupta, a co-lead in Flagship Project 2, noted that multidisciplinary approach of TIGR²ESS is crucial for India’s Green Revolution to reach the next level. “Screening of several hundred lines of sorghum and pearl millet for water use efficiency is among the many areas where the project has made progress since its inception,” Dr Gupta, a Principal Scientist at ICRISAT who oversees genomics and crop trait discovery, said.

“India is among the top producers in dairy, rice, wheat and pulses. It has seen around 2% productivity gains in crops like pearl millet owing to hybridization and the private sector. In Africa, the productivity is either stable or declining. Why are we lagging so far in Africa?” asked Dr Peter Carberry, Director General, ICRISAT, while emphasizing the need for transferring the learnings and successes from the program to sub-Saharan Africa.

To strengthen collaboration between India and the UK’s scientific institutions and to build research capacity, over 50 early career researchers, from both within and beyond TIGR²ESS, are receiving training in key research skills, from writing research grant applications to deep learning with artificial intelligence during the Assembly.

To further strengthen collaboration, specifically in agriculture research, Prof Griffiths announced that a fellowship program will soon be rolled out with India’s Department of Biotechnology (DBT) and the National Institute of Plant Genome Research (NIPGR). The fellowship will facilitate 30 Indian researchers to undertake research work at crop science universities in the UK for two years.

Project: Transforming India’s Green Revolution by Research and Empowerment for Sustainable food Supplies (TIGR²ESS)
Funder: Global Challenges Research Fund, UK.
Partners: (In UK and India): University of Cambridge; University of East Anglia; Rothamsted Research; National Institute of Agricultural Botany; Department of Biotechnology, (Govt. of India); Punjab Agricultural University, MS Swaminathan Research Foundation, National Institute of Plant Genome Research, ICRISAT and others. See here for complete list of partners
CRP: Water, Land and Ecosystems
New varieties

Industry plans to reach consumers with high oleic groundnut oil in 2-3 years

Two new groundnut varieties with more than 78% oleic acid have captured the attention of the Indian groundnut industry which is keen on marketing ‘healthier’ oil to consumers in the next 2-3 years. Information on the new varieties which come with a potential yield of more than 3 tons per hectare (see box) were shared by researchers at a meeting with the groundnut industry. Plans were discussed on streamlining the development, popularization, and cultivation of high oleic groundnut for the purpose.

Studies show that high oleic peanuts provide a spectrum of nutrients and have enhanced shelf life, beyond that of conventional peanuts. This may be attributed to their oleic to linoleic ratio which is substantially (around 10 times) higher than normal peanuts. There is also emerging evidence that high oleic peanuts may improve lipid profile and markers of glycemic control. Given these benefits there is a growing demand in domestic and international markets.

To address issues related to productivity, export and other needs of groundnut industry players, the Indian Council of Agricultural Research-Directorate of Groundnut Research (ICAR-DGR) held an industries interface meeting. After due deliberations, the following consensus was arrived at:

- Varietal development with industry-preferred traits – round and uniform shaped kernel, attractive seed-coat color, and boldness to meet the requirement of the confectionery industries;
- Development, popularization, and cultivation of high oleic groundnut should be streamlined to make ‘healthier’ oil available in the market within 2-3 years for health conscious consumers;
- Low-cost eco-friendly technologies like biofertilizers should be popularized and made available in the market at the earliest to enable needy farmers to improve yields and incomes;
- Emphasis on increasing the production of quality seed with high genetic purity and marker-based quality control across farmers’ fields, seed systems and value chains.

The industry interface meeting was attended by more than 35 participants from the Indian groundnut business and the groundnut research fraternity. Participants included policy makers such as Mr Khushwant Jain, Chairman, Indian Oilseeds and Produce Export Promotion Council (IOPEPC) and Mr Samir Shah, President, Saurashtra Oil Millers Association; researchers from the Junagadh Agricultural University – Dr VP Chovatia, Vice-Chancellor and Dr IU Druj, Ex-Associate Director of Research; Dr T Radhakrishnan, Director, ICAR-DGR and Dr Manish K Pandey, Senior Scientist, ICRISAT-Hyderabad. Dr Pandey in his presentation emphasized on adoption of the newly developed high oleic groundnut varieties at scale. The meeting was held on 28 December 2019 in Junagadh, India.

Read more on exploreit.icrisat.org

This work was undertaken as part of the CGIAR Research Program Grain Legumes and Dryland Cereals (GLDC)

This work contributes to UN Sustainable Development Goals

(L to R) Dr Manish Pandey, Dr T Radhakrishnan, Dr VP Chovatia, Mr Khushwant Jain, and Dr IU Druj at the industries interface meeting held in Junagadh, India.
If you’re trying to win the trust of a community, you don’t start by building rat houses on their land. But that’s just what some residents living on Ethiopia’s Yewol mountain worried scientists were doing. They saw the slow construction of stone-pile terraces along their mountainside. And they were suspicious.

But the terraces were a small part of a big plan to restore and revive the Yewol watershed. It was an area plagued by food scarcity, erosion, over-grazed lands and unreliable rain. And when it did rain, the water rushed down the slopes, taking with it vital soils and nutrients. Over decades, the lands had become dry, unstable and unable to support enough crops and livestock to feed its people.

Seeing the prospects of restoring this lost potential, scientists from The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) began working with the communities and governments to transform the mountain from top to bottom.

The supposed “rat house” terraces were among these technologies. By building small walls made of fist-sized rocks in some places, and digging ditches in others, the rush of rain water could be slowed down. This keeps nutrients and soils in place, and allows rainwater to refill aquifers. Local farmers – men and women – did the work themselves, each committing to work 60 days to build terraces and other structures. For months, they thrust shovels and hands into the dirt, lugged stones and soil, built and rebuilt walls. But it wasn’t until the months wore on that they saw the results. And their worries – rat-related and otherwise – began to diminish.

More food. Higher incomes. A revitalized environment. Erosion on Yewol had been worsening for decades – probably even centuries. It was an area of growing poverty, food insecurity and increasing out-migration. But in 2013, ICRISAT persuaded district authorities that the whole watershed could be developed as a showcase – a revived and resilient landscape that could serve as an example to other districts. So they mobilized the communities to work together, collaborated with a local university and district administrators, and tackled the mountain’s problems from top to bottom.

This of course involved various techniques, some ancient and some brand new. And it also meant approaching the mountain like a three-tiered landscape...
Climate change is one of the most extreme challenges Indian agriculture is facing today and will have to deal with in future. There have been overwhelming and growing scientific evidences to establish that the world is getting warmer due to climate change and such increasing weather variabilities and worsening extremes will impact the agriculture sector more and more adversely.

The growth story of Indian agriculture since the days of food scarcity (in the mid-1960s) to the present satisfactory production level of food grains has been very impressive. In these efforts, land degradation and environmental challenges have however emerged to thwart sustainability of agri-food systems. The frequent occurrences of natural disasters like food, drought, storms, hails, cyclones have led to severe hardship and farm distress. Feeding a growing population and ensuring food and nutritional security in future thus becomes a daunting challenge in a changing climate. It is in this context, suitable policy actions with scientific interventions become imperative for Indian agriculture to adapt and mitigate climate change impacts.

There has been a growing interest in India to scientifically ascertain the impacts of agriculture sector on climate change and the impact of climate variability as well as climate change on farm sector of the economy. The second Biennial Update Report (BUR) submitted by Government of India to the United Nations Framework Convention on Climate Change (UNFCC) in December 2018 mentions that agriculture sector is responsible for 16.2% of the total Greenhouse gas (GHG) emissions. Scientific analyses have predicted that the trend could lead to a decline in agriculture production due to further climate change. Studies carried out at the Indian Agricultural Research Institute (IARI), New Delhi, have indicated the possibility of a loss of 4 to 5 MMT in wheat production with every 1 degree centigrade rise in temperature. This study has assumed that irrigation would be made available at present level, which of course may not be a possibility considering the receding Himalayan glaciers and increased demand of water from other sectors.

The Economic Survey in 2017-18 (it has an exclusive chapter that covers climate change and its impact on agriculture in India) has warned that “Climate change could reduce annual agricultural incomes in the range of 15% to 18% on an average, and up to 20% to 25% for unirrigated areas”. It has further pointed out the stagnation of growth in agriculture gross domestic product (GDP) and farm revenues in the preceding four years due to repeated monsoon failures.

The quality of food grains is also significantly affected by temperature in many crops, which could in turn have great impact on the nutritional security aspects in a developing country like India...

**Challenge before the governments is to build systems to sustain focus and integrate activities aligned to sustainable agriculture practices as climate change poses new risks to yields and quality of food crops**
There are two compelling reasons for this shift. First, urban dwellers in Africa often have higher rates of malnutrition than their rural counterparts and, second, urban centres are large consumers of food produced in rural areas and in the process are altering the producing areas, sometimes beyond recognition.

‘Cities are changing our landscapes in ways we could not have imagined even 15 years ago,’ said Ravi Prabhu, Deputy-Director General of World Agroforestry (ICRAF), as he opened an expert meeting, Building Sustainable Food Systems for an Urbanising Sub-Saharan Africa, on 10 December 2019 in Nairobi, Kenya.

Rural-urban interdependency has been little examined by international agricultural research. So, organized by Michael Hauser of ICRISAT with CIAT, ICRAF and the CGIAR Research Program on Grain Legumes and Dryland Cereals, the meeting constituted a bold new space.

In current food systems, rural areas often fare poorly in interactions with cities yet urban areas are not flourishing either: they can have nutritional indicators that are worse than the national nutritional indicators. For example, 50% of children in Nairobi’s informal settlements suffer from malnutrition compared to Kenya’s national figure of 25%.

‘Low-income people reside in complex neighbourhoods where access to affordable safe and nutritious food is limited,’ stated the event’s agenda.

‘It’s food vendors who determine what we eat. We walk up to them and say: what’s ready?’ said Billian Ojiwa, a youth leader from Nairobi informal settlement Mathare told the meeting.

In opening remarks, Michael Hauser explained that the urban population in Sub-Saharan Africa is growing twice as fast as the rural population and that 50% of food is consumed in urban areas.

‘In the CGIAR, there’s been a feeling that we should keep to rural areas but we have opportunities to use urbanization as an engine for sustainable rural economic growth,’ said the Austrian agro-ecologist, adding that ‘the relationship between rural and urban is not as symbiotic as many assume’ and needed to change for more mutually beneficial outcomes.

‘Urbanization can be a burden on the hinterland,’ said Hauser. ‘Urban areas can expand into fertile farmland. Farmers face climate risk as they produce the few crops like maize that are wanted in the urban areas. Meanwhile, people in low-income urban areas tend to have narrow diets that expose them to malnutrition’...

Urban farming would enhance peace in low income urban settings.
Superfoods can’t save our broken system – but Smart Food can

Superfoods” is a catchword that has found popularity among the most health-conscious consumers. However, the concept of these nutritionally dense and healthy foods only focuses on one aspect of the complex global food system.

With experts increasingly raising the alarm that our food system is broken, we need a different narrative which captures not only the role of food in nourishing our bodies, but also the connections between agriculture, the environment, and farmers’ livelihoods.

While superfoods provide a useful shorthand for the most nutritious foods available – often only to the most privileged – we need a popular food movement that is accessible to all, from the rural poor and growing urban populations all the way to the global elite.

Transforming the Global Food System

Smart Food is the concept behind such a movement, designed to address all aspects of the global food system by being good for the consumer, good for the planet, and good for the farmer.

Adopting a Smart Food approach can tackle some of the biggest challenges simultaneously, including malnutrition and other diet-related health issues, rural poverty, and adaptation to and mitigation of climate change. The foods that meet these criteria already exist, but how do we use them to transform our global food system?

To have the greatest impact, Smart Food must be mainstreamed as staples in global diets to complement today’s three most consumed crops: rice, wheat, and maize. This is especially important for Africa and Asia where these “Big 3” staple crops can form up to 70 percent of meals, three times a day. Rice, wheat, and maize account for half of the global calories consumed.

Diversification of Diets: Millet and Sorghum

The biggest challenge to mainstreaming Smart Food is the “food system divide,” in which the majority of investment and research is directed towards the “Big 3:” rice, wheat, and maize. Some 45 percent of private sector investment is channeled into maize alone.

But a focused effort can set the wheels in motion for a smarter food system, starting with just one or two Smart Foods. By slowly increasing the staples from the “Big 3” to the “Big 5” (adding millet and sorghum) and then beyond, we can successfully achieve the diversification that our diets need to be sustainable.

To spearhead this transformation, the Smart Food initiative – led by Asian and African networks – has identified millet and sorghum as the first Smart Foods.
Millet and sorghum were originally the staples across many countries in Asia and Africa before the 1966–1985 Green Revolution, which focused energy on developing and improving rice and wheat. And there are enormous benefits to the consumer, planet, and farmer from these crops once again becoming a mainstay of food systems.

Read the full article by Yemi Akinbamijo, CEO of the Forum for Agricultural Research in Africa (FARA) on https://theglobepost.com/2019/12/31/smart-foods/

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Announcements

Dr Paco Sereme appointed Chair of Burkina Faso’s National Academy of Sciences, Arts and Letters

Dr Paco Sereme, Chair, ICRISAT Governing Board, was appointed Chair of the National Academy of Sciences, Arts and Letters of Burkina Faso. He was appointed on 16 December 2019 in Ouagadougou, Burkina Faso, and will be serving an initial term of three years. The academy has five colleges, one each for human and animal health sciences; natural and agricultural sciences; science and technology; social sciences, humanities, culture and art; legal, political, economic and management sciences.

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New members of ICRISAT Governing Board

ICRISAT welcomes board members, Mr Somesh Kumar, Chief Secretary to the Government of Telangana State, and noted agriculture scientist Dr Yilma Kebede.

Mr Kumar, an officer of the Indian Administrative Service, served in several senior administrative roles before being appointed Chief Secretary of Telangana State in December 2019. A post-graduate in psychology, Mr Kumar held key posts in the Greater Hyderabad Municipal Corporation, Tribal Welfare, Revenue-Commercial Taxes and Excise, Collegiate Education and AP Urban Services for Poor, among other assignments.

Dr Yilma Kebede brings several years of experience in crop improvement research and project management to the board. He was an ICRISAT Honorary Fellow, appointed in 2017.

Dr Kebede has been actively involved in finding sustainable solutions for climate-related issues in Africa and other regions while at the Bill & Melinda Gates Foundation and in the private sector.

ICRISAT looks forward to working closely with the new members during their tenure.