Bill Gates recognizes the CGIAR as “essential to feeding our future”

He continues to note that no other organization has done as much to ensure families – especially the poorest – have food.

CGIAR institutions in India discuss strategy to meet SDGs and drive agricultural R&D

From Left to Right: Dr Javed Rizvi, World Agroforestry Centre; Dr Andre Zandstra, CGIAR; Dr Habibar Rahman, ILRI; Dr Ashutosh Sarker, ICARDA; Dr A K Padhee, IAS, ICRISAT; Dr Peter Carberry, ICRISAT; Dr Marco Ferroni, CGIAR; Ms Celine D’Silva, Bioversity; Dr Samarendu Mohanty, CIP; Dr A K Joshi, CIMMYT; Dr Shahidur Rashid, IFPRI; Dr Arun Padiyar, WorldFish; Dr Alok Sikka, IWM; Dr Arvind Kumar, IRRI; and Mr Praveen Kumar, ICRISAT.

Dr Marco Ferroni, Chair, CGIAR System Management Board, held discussions with representatives of all the CGIAR centres based in India earlier this month. Dr Ferroni was briefed on various research activities undertaken by the centers and future priorities. Special emphasis was put on the possibility of undertaking new research activities as a collaborative/CGIAR group to maximize the expertise of available resources within each Center. Meetings were held with the Indian Council of Agricultural Research (ICAR) for strong collaboration of CGIAR with the Indian agricultural research system. Also held were discussions with the Secretary, Ministry of External Affairs on enhanced South–South collaboration as well as with Niti Aayog, India’s nodal planning and policy body of the Government of India.
New research

What diet and related agriculture changes have you seen in Africa?

Across Africa the diets are changing. Twenty years ago rice was not a very common food in Africa. It was bought and consumed on occasions because the price was high. But the price of rice coming from the East, is cheap and is comparable to some of the cereals. Because of the low price, there was a big move towards rice consumption. Also, the countries in Africa have developed irrigation schemes and the local production is converting to rice.

When we have drought situations and famine - what do the governments bring in? The donation is typically maize. And once people’s palates have tasted maize and they realize that the government’s going to provide that year in year out, they don’t grow sorghum and millets, which would naturally be the crops most suitable for those drought prone areas. So people who have traditionally grown sorghum and millets then change to maize.

However, some organizations like World Food Programme (WFP) are now changing that. For areas that have famine or flood but are predominantly millet or sorghum consuming areas, WFP tries and procures sorghum and millet for those areas so as to not drastically change people’s diets and so people do not become dependent on maize which regularly fails in those agro-ecologies.

Also maize mills were brought into villages and these mills don’t process any of the other grains. This convenience of mechanical processing further encouraged people who had traditionally grown sorghum and millets to change to maize. Processing of the traditional grains became something only your grandparents could do.

We are seeing a number of health related diseases and we think it’s because of this change in the diet. Also, people are going for highly processed foods. I think the time for popularizing Smart Food like millets, sorghum and legumes in Africa is now.

What approaches have you taken to popularize Smart Food among consumers?

In Kenya we have two approaches – 1. Looking at prepared products that will have an urban appeal which means products that are convenient and easy to cook; 2. For the rural areas, we are looking at products that diversify the diet.

For the people in the rural areas to consume these traditional Smart Foods, it is behavior change we need
at the household and at the farmer levels. The farmers and their families are the first market. It is good for them and it is good for the processor to put it out in the market. So our approach on behavior change is really on those two levels.

We created an African recipe book for easy ways to cook sorghum and millet. We also ran a season of a Smart Food Reality TV show with a competition to cook sorghum, millets and legumes. This was all part of a USAID-funded project (AVCD).

The approach for making the product available in the urban areas requires that we work closely with the private sector for the processing. For the rural areas we think awareness is important. Engaging with schools is one approach that is happening now. The reason for this is because many of these children are growing up when some of those crops are no longer being utilized at the household level and they are losing out on the benefits but also on the awareness that these are nutritious foods.

“We conducted the field days differently. We had a product that people can taste, people can feel, people can see, and if you have 3 number of products, people have choices and they see that you can make so much more other than just showing grain at a field day.”

The push towards behavior change and being able to communicate the nutritional benefits I think have been the game changer. I wish we had more money to invest in terms of behavior change, trying to get people to appreciate the products more and the many ways we can utilize them.

“And for me personally, working from this angle – focusing on uptake and utilization – is very different from working as a crop scientist, where I looked at production as the answer to adoption. Focusing on communication and behavior change is a whole new approach.”

Behavior change is important. People want convenience because of the change in lifestyle. Is there something that I can prepare quickly? It is important that people then understand the benefits over the years of diet-based solutions, and understand, maybe instead of popping a tablet of folic acid you need to be ready to consume the right food. That is why we are approaching it from the angle of behavior change.

What do you think has changed since the launch of Smart Food?

“I think one major change has been the private sector embracing processing of these traditional and Smart Foods.”

The fact that we are now able to process a number of products from e.g. either finger millet or sorghum or even pigeonpea, this has attracted attention. Even the media has started focusing on the benefits of these Smart Foods.

Now that the private sector has taken them up, it doesn’t matter where you are from, if you like the taste, it’s there available for your convenience to pick it off the supermarket shelf. This has happened in less than ten years. Previously, if you wanted to consume these products, you had to be from an area where they are grown and you needed to know how to process them. So that has been a very big transition thanks to the private sector initiatives.

How is the overall response of Smart Food?

“Smart Food in particular is a good name. We realise that people pay attention when we talk about Smart Food, even if we are talking about traditional crops.”

Now that we are calling them Smart Food, people realize the benefits from these traditional crops and that there is more than what they knew before. In terms of the Smart Food initiative, I think we are likely to succeed in the coming years working with the processors, because product development and retaining the nutritional value is going to be very important.

There are a number of countries, because of the prevalence of drought, that are now giving a lot of importance to the millet and sorghum cereals. Zimbabwe is one of them. And what is interesting about Zimbabwe is that we haven’t yet made the push to create processed products. So it is essentially consumed as a staple in the rural areas. Other countries that have great potential are for example Botswana and Namibia, where millets and sorghum are the only cereals that can survive well in the harsh conditions and they are the staples.

There are countries like Ethiopia where sorghum injera is now becoming very popular not just in the drylands, but also in the highlands. So in those areas it is much easier to popularize any other sorghum or millet product because people are already consuming there.

We have seen some tremendous changes both in awareness in the urban areas and also in the rural areas about the benefits of these Smart Foods. And we can foresee trends like in Kenya, where even the government has also started taking interest; and right now they have a legislation to make it compulsory to blend sorghum and millet with maize flour, which we think is a big, big development.

The beauty that our products offer is that it is natural; they don’t have to use chemicals to fortify. And we think that the knowledge that we are now providing both in terms of science from the background of our production to the nutrition information, is providing confidence that the food we are talking about is super healthy and should be part of the diet.

For the full transcript of the interview click here
Harnessing technology to foster advanced small-scale food processing in Africa

Connecting technology with open innovation will revolutionize agriculture in the Semi-Arid Tropics, participants of a training course on small-scale food processing recognized.

The training helped 36 participants from over 13 countries including Côte d’Ivoire, South Sudan, Zambia, Tunisia and Uganda, understand key technical, regulatory and business aspects of operationalizing a small-scale food business enterprise, capable of producing products as per international standards. The participants identified opportunities and solutions to challenges of sustainably operating enterprises in the food industry.

Industry experts and subject matter specialists detailed current trends and opportunities for SMEs in food processing, food safety, quality, business plan development and equipment in a small-scale food processing enterprise.

Ms Kisakye Sarah from the National Agricultural Research Organisation in Uganda said, “I appreciate the simplicity with which the subject matter for each of the sessions was delivered. I loved all exposure visits and meeting individuals from diverse industries.”

Dr Peter Carberry, Director General of ICRISAT, reiterated ICRISAT’s commitment to work closely with partners in Africa. “Boost to agriculture and food processing sectors across the continent with interventions can strengthen value chains, develop innovative products and technologies to facilitate entrepreneurship to ultimately help smallholder farmers. This training program is part of ICRISAT’s mandate of connecting technology and innovations across the semi-arid tropics,” he said.

Participants also visited the pilot processing facility at the Agribusiness and Innovation Platform (AIP), besides other private units. Ms Vanessa Moono Zangy Diangamo, Director, Daisy Meats Ltd., Zambia, spoke of how the program provided practical learning. “I am looking forward to implementing the skills and knowledge I have gained from this program in my business,” she said.

The two-week-long training on ‘Starting a Small-Scale Food Processing Enterprise for Women and Youth’ was organized by ICRISAT’s AIP in partnership with the Ministry of External Affairs (MEA), Government of India, under the India African Forum Summit III (IAFS III).
Multi-location evaluation of six pigeonpea pre-breeding lines through India’s national program

Developed at ICRISAT, these lines have been selected by the All India Coordinated Research Project (AICRP) on Pigeonpea

Six high-yielding pigeonpea pre-breeding lines derived from wild *Cajanus* species with an average yield potential ranging from 1,400-3,000 kg/ha, were proposed for initial varietal trials across India for the 2019-20 crop season. This development is significant on two counts. One is of pre-breeding lines directly reaching the varietal pipeline and the second is the utilization of wild *Cajanus* species for broadening the ‘stagnant’ genetic base of pigeonpea cultivars in India.

Current breeding programs in India have been using a ‘cultivated’ gene pool wherein the narrow genetic base and unadaptive segregants led to yield stagnation at around 850 kg/ha in the past 70 years in varied ecologies of the country. Further, pigeonpea improvement programs are focusing on developing short-duration varieties, particularly in mid-early maturity duration group. Concerted efforts at genetic enhancement of pigeonpea by using wild *Cajanus* species at ICRISAT resulted in the development of a number of high-yielding introgression lines in different maturity duration groups. Amongst these, six lines derived from popular variety *Asha* (ICPL 87119) as the recipient and wild *Cajanus acutifolius* and *C. cajanifolius* as donor parents performed exceedingly well in Telangana, Maharashtra, Karnataka, Andhra Pradesh and Odisha states of India which account for about 90% of the pigeonpea cultivated area in the country.

Agronomic fitness, stability in yield and market preference were excellent in the ICRISAT pre-breeding lines. Hence, breeders from the national agricultural research system (NARS) of the five states nominated them to the Initial Varietal Trials of the All India Coordinated Research Project (AICRP) on Pigeonpea.

The six lines nominated are ICPL 15010, ICPL 17116, ICPL 15072, ICPL 15062, IBTDRG 8 and IBTDRG 10.

These lines will be evaluated across 13 locations in the Central Zone and eight locations in the Southern Zone in

Nominations for mid-early maturity duration (151-165 days)

Two introgression lines derived from wild *C. acutifolius* were nominated.

- ICPL 15010 was nominated by NARS in Berhampur
- ICPL 17116 was nominated by Dr P Jaganmohan Rao, Associate Director of Research & Principal Scientist (Pulses), Regional Agricultural Research Station (RARS) - Professor Jayashankar Telangana State Agricultural University (PJTSAU), Warangal.

ICPL 17116 has been nominated based on two years data. It has high yield potential of 3,000 kg/ha, is of medium height with long fruiting branches and amenable to machine harvesting. Its mid-early duration suits various agro-ecological conditions.

– Dr P Jaganmohan Rao
Nominations for medium maturity duration (166-185 days)

Four introgression lines were nominated.

ICPL 15072 derived from *C. acutifolius*, was nominated by Dr S Muniswamy from RARS - University of Agricultural Sciences (UAS), Kalaburagi (formerly Gulbarga), Karnataka.

> ICPL 15072 has a potential yield of 1,700 kg/ha with a desirable seed size of 10.5 g per 100 seed.”
  
  – Dr S Muniswamy

ICPL 15062 derived from *C. cajanifolius* was nominated by Dr L Prasanthi from RARS - Acharya NG Ranga Agricultural University (ANGRAU), Tirupati.

> ICPL 15062 is a medium duration line with orange-brown bold seed, seed size of 12 g per 100 seed and recorded seed yield of 1,450-1,725 kg/ha in rainfed red soils. It was found tolerant to wilt and Sterility Mosaic Disease at RARS, Tirupati.

  – Dr L Prashanti

IBTDRG 8 and IBTDGR 10, both derived from *C. cajanifolius* were nominated by NARS in Tandur.

India. The nominations were made at the annual meeting of the Indian Council of Agricultural Research (ICAR) AICRP on Pigeonpea held from May 25-27 at the Agricultural University Kota, Rajasthan.

Use of promising pre-breeding lines in breeding programs

ICAR and State Agricultural University (SAU) pigeonpea breeders across the country opined that pre-breeding lines derived from wild *Cajanus* species will aid in identification and release of broad-based high-yielding cultivars for cultivation across India.

Dr Shivali Sharma, Principal Investigator and Theme Leader- Pre-breeding, has shared these lines along with other promising pre-breeding lines with NARS (Dr CV Sameer Kumar, Principal Scientist, RARS-PJTSAU, Palem, Dr P Jaganmohan Rao, RARS-PJTSAU, Warangal and Dr L Prashanti, RARS-ANGRAU, Tirupati). Evaluation across locations include farmers participatory trials in India as well as for evaluation in Myanmar (Department of Agricultural Research, Yezin) to study their adaptability and further use in pigeonpea breeding programs (click here for more).

This work has been undertaken in different projects supported by the United States Agency for International Development, CRP-Grain Legumes and Dryland Cereals (CRP-GLDC) and ICAR-ICRISAT collaborative research projects. Currently, this work is part of the initiative “Adapting Agriculture to Climate Change: Collecting, Protecting and Preparing Crop Wild Relatives” which is supported by the Government of Norway. The project is managed by the Global Crop Diversity Trust with the Millennium Seed Bank of the Royal Botanic Gardens, Kew UK and implemented in partnership with national and international genebanks and plant breeding institutes around the world. For further information, visit the project website: [http://www.cwrdiversity.org/](http://www.cwrdiversity.org/).
Uncovering the secrets of silt in Telangana, India

Armed with shovels and smartphones, 16 ICRISAT staff set out across the Indian state of Telangana. Their mission – collect soil samples to determine if silt from water tanks has improved farm soil quality.

“In June we collected 11 samples from each of the 90 villages visited. Ten were farm soil samples and one from the tank that was desilted under Telangana government’s Mission Kakatiya. The farmers are keen to have their soils analyzed and readily allowed us to dig for samples, making it possible to sample all 30 districts of the state in just eight days,” Mr Arun Seshadri, Scientific Officer, ICRISAT, who was part of the sampling team, said.

ICRISAT Development Center (IDC) is carrying out an economic evaluation of Mission Kakatiya for the Telangana government. As part of the mission, over 46,000 tanks are being desilted to double the minor irrigation capacity of the state.

The silt removed from minor irrigation tanks are known to be nutrient rich and can benefit farm lands when applied. IDC’s eight sampling teams with two members in each, collected samples from fields where silt was applied for comparison with control samples that were collected from fields where silt was not applied. While testing is underway to determine benefits accrued to silt-applied fields, farmers reported improved yields during interactions with visiting teams.

Given the enormity of the sample collection task, a smartphone app was developed by ICRISAT’s GIS and Remote Sensing team to capture data during collection. Called iCrop, the app helps gather location coordinates, farm and crop information, and also captures images for remote transmission to ICRISAT’s computers.

Scientists at ICRISAT’s soil testing laboratory will now test the samples for soil pH, electrical conductivity, major nutrients including organic carbon, phosphorus and potassium, and secondary nutrients such as calcium, magnesium and sulfur. Micronutrient deficiencies are known to affect farm yields, warranting testing for zinc, boron, iron, copper and manganese. The results of the tests are expected to be made available to farmers through soil health cards in the coming months.
Opportunities for crop intensification in rice fallows
How farmers in Warangal district grew a second crop with residual moisture

Cultivation of early-maturing chickpea in rice fallows which hold sufficient post-monsoon soil moisture has led to better resource utilization and a boost in farm incomes in Warangal, Telangana, India.

In Telangana, paddy (rice) is grown widely with irrigation from tanks in the rainy season. Katakshapur in Warangal district is one of the tanks selected under the TIGR2ESS project to study sustainable crop intensification in dryland systems. The tank receives nearly 185.65 million cu.ft of water annually, irrigating over 546 hectares in four villages. However, post rainy season, the land lies fallow with a considerable amount of residual soil moisture, providing a good opportunity for crop intensification.

The TIGR2ESS project involved local farmers for an intervention to utilize this opportunity during the post-rainy season in late 2018. The intervention called for a sequential process using multiple disciplines.

- Farmers were motivated to cultivate chickpea in rice fallows.
- Soil analysis was performed and soil nutrient status conveyed to farmers.
- High-yielding chickpea varieties JG 14 and NBeG3 were provided for late sowing (mid-December).
- Zero-tillage crop planter was demonstrated to enable the crop to utilize upper layer soil moisture.
- Seed treatment and integrated pest management were provided.
- Triple-layered Purdue Improved Crop Storage (PICS) bags were given to farmers to store chickpea seeds for the next season.

As a result of this intervention, participating farmers could harvest 500-1000 kg/ha of chickpea on land that would otherwise lie fallow post monsoon. They supplemented their regular income with an additional income of at least ₹25,000/ha. This has encouraged farmers in neighboring villages to show interest in this initiative.

Considering that about 14.3 million ha (30% of rice-growing area) of rice fallows are available in Bangladesh, Nepal, Pakistan and India, out of which 11.4 m ha (82%) are in the Indian states of Bihar, Madhya Pradesh, Chattisgarh, Jharkhand, West Bengal, Odisha and Assam, there is great potential for this initiative to be replicated across India for sustainable crop intensification and increased income generation for Indian farmers.

Project: TIGR2ESS: Transforming India’s Green Revolution by Research and Empowerment for Sustainable food Supplies
Funder: Global Challenges Research Fund, UK
Partners: University of Cambridge and Centers for International Projects Trust
CGIAR Research Program: Water, Land and Ecosystems
Impact

Knowledge + passion: Women’s recipe in millet and sorghum production in Mali

Two women’s associations in Sikasso, Mali are changing the status of pearl millet and sorghum, using these crops to diversify and improve food and nutrition security. Sikasso is one of the most prosperous agricultural regions in southern Mali, where farming is dominated by maize, potatoes, peas and other crops while the nutritious millet and sorghum are less popular.

In 2014, the ARDT_SMS project was initiated in Sikasso. Both associations, Jigui Fa (based in Bougouni) and Benkadi (based in Sikasso district) showed interest in undergoing training conducted by project partners. The women farmers were provided with hybrid seeds of sorghum and improved millet seeds which they tested on their fields.

Members of both Jigui Fa and Benkadi had better access to sorghum and millet production technologies. Over the past four years now, Mrs Habi Marico and others from Jigui Fa have become sorghum hybrid seed producers. The women are also involved in its marketing.

When both associations joined the project in 2014, their members participated in trainings in integrated Striga management and soil fertility and pest management. “Those were the major challenges in our farming systems,” says Mrs Marico. Then women groups were trained in seed production techniques by the national agricultural system, the Institut d’Economie Rurale (IER) and ICRISAT. The project also gave them Apron star seed care.

The next stage involved linking members of the women’s cooperative to seed companies. They signed production contracts and it was agreed that CFA 500 (about US$1) would be paid to the cooperative for every kilo produced.

“The seeds we produce are deemed one of the best, which accounts for the enthusiastic buyers we get,” says a beaming Mrs Rokia Koné. With this new knowledge, members of the cooperative are now producing surplus seed for local markets, with earnings being used to pay for the children’s schooling and savings.

Proving the old proverb money begets money right, some women farmers have already invested in small businesses from their earnings. Mrs Habi Marico now plans to launch a second poultry business and is saving up to buy residential plots for her children.

For more success stories of the USAID Africa RISING’s Large-scale Diffusion of Technologies for Millet and Sorghum Systems (ARDT_SMS), please [click here](#).

Project: USAID Africa RISING’s Large-scale Diffusion of Technologies for Millet and Sorghum Systems (ARDT_SMS)
Funder: United States Agency for International Development
CRP: Grain Legumes and Dryland Cereals
Putting drought behind – how a village in south India increased groundwater availability by 50 – 80%

Ukkali, a village in India’s Karnataka state, is witnessing a marked change in the economic status of its farm households. A watershed management initiative of the Power Grid Corporation of India and ICRISAT has made more water available for farming and provided women skill-based employment, pushing household incomes up in the last five years.

An estimated 1600 farm households in the village located in Vijayapura district are direct beneficiaries of the project. Water scarcity, poor crop and livestock productivity, poor soils with low organic carbon, phosphorus, sulfur and zinc was the picture of the drought-hit village before the project began.

Impact created
Starting 2014, nearly 150,000 m$^3$ rain water harvesting capacity was created after the construction of 23 check dams, renovation of two and desilting of seven existing ones. Forty farm ponds, 16 mini percolation tanks, gully checks, one wastewater treatment plant and 23 borewell recharge pits contributed to increasing capacity. As a result, nearly 300,000 m$^3$ of runoff water was harvested, increasing groundwater availability by 50-80%. This in turn brought nearly 500 ha of additional land under the plough.

Increased crop productivity
Following efforts to make more water available, the project attempted increasing crop productivity through improved land form management practices such as the Broad Bed & Furrow (BBF) method, which was promoted in more than 100 ha for increasing soil moisture. Field bunding, another land form management, now practiced on nearly 600 ha, helped arrest soil erosion, increased in-situ soil moisture and enhanced base flow. These interventions have helped increase overall crop yield by 30-60%.

Smart cultivars for improved returns
Climate-resilient crop varieties, balanced nutrient management, crop diversification with high value crops and improved crop management on more than 1000 ha with cultivars of pigeonpea (TS 3R, ICPH 2740, BSMR 736) and chickpea (JG 11, JAKI) have helped realize crop yield increases between 10% and 14%. Local pigeonpea varieties under drought conditions could provide about 1250 kg per ha. The wilt-resistant and drought-tolerant variety TS 3R has helped farmers harvest between 1500 to 1750 kg per ha.

Bund plantation with more than 80,000 saplings of Gliricidia and neem, horticulture and floriculture on 100 ha, besides wasteland development, have been promoted for enhancing greenery and incomes. Providing fodder varieties such as improved multi cut sorghum and dual purpose maize on 10 ha area have benefited 20 farmers so far.
Reaping rewards

The project is helping generate additional income of ₹5000-10,000 per year per beneficiary household. Empowering women is helping the families earn an added income of ₹6,000. More than 500 women were trained in tailoring while 300 women have taken up kitchen gardening to cultivate vegetable to cut household expense and boost household nutrition. Goat rearing, vermicomposting, bread making and small-scale enterprises such as mom and pop stores and textile stores have financially strengthened women. To support these women-led enterprises a revolving fund was set up.

Farmer training to build capacity

Experts from the College of Agriculture, Vijayapura, have been training farmers. About six animal health camps were organized for over 800 farmers where more than 1000 animals were examined. Livestock was vaccinated against foot and mouth disease and other infections. About 160 farmers also visited ICRISAT-Patancheru and were exposed to farm practices in Maharashtra for further learning. Land, water, nutrient and pest management training besides soil health awareness, were provided through agricultural universities, regional agricultural research stations and Krishi Vigyana Kendras. ■

Kalavathi, a beneficiary of the watershed project, earns about ₹5000 selling bangles.
The birth of an impatient and optimistic breed of community seed producers in Mali

Jean Goita has come a long way since his days as a grain producer in his hometown of Yorosso. Today he is a respected seed producer covering nine communes of Yorosso district in Sikasso region of Southern Mali. Goita and 10 other members of his district were trained to produce improved seed under the ARDT_SMS project.

“There are many seed growers in the communes of Kiffoso, Karangana, Mahou and Yorosso. They are impatient to be trained,” says Mr M Seydou Dao, President of an innovation platform established in Yorosso district in September 2018 with the support of Mali Agricultural Market Trust (Malimark), a national NGO and local partner in the project. The platform with 100 members is the place where farmers, input suppliers, grain processors, and traders meet to discuss their businesses.

“The innovation platform has been a good channel for actors involved in the agricultural value chain. Farmers get to know each other and they are now working together in a very cooperative way,” explains Mr Mohamed Diawara, an extension officer with Malimark. Farmers of Yorosso district have built their reputation and industry on cotton. “Cotton used to be our first choice while sorghum and millet production were low on priority,” says Mr Goita. “With poor soils, late maturing local varieties which yielded very poorly (500-800 kg/ha), and crops that were regularly attacked by all kinds of pests, we were looking for an alternative,” adds Mr Hamadou Dembélé, a seed producer from Karangana in the same district.

There seemed to be no end to the Sikasso Paradox, for Mali’s most fertile region is also its least nourished. According to a 2016 report by the World Bank group, “cotton has not made it possible to limit migration, which remains a pillar of rural economies, including coping with the shocks of cotton growing.” Goita and many more champions are now turning to sorghum, millet, cowpea and groundnut production.

With the intervention of the ARDT_SMS project in some districts of Sikasso, improved varieties and best agronomic practices for staple crops such as sorghum were made accessible to farmers. Once trained, many farmers were able to increase and often double the production of these staple crop and even turn away from the solely cotton-based production system. “In 2018, I grew an improved sorghum variety Pablo and harvested 2 tons on 1 ha. This was the first time as producer that I harvested so much of sorghum,” says Amadou Dembélé, member of an innovation platform initiated with support of the project.

Mr Fousseini Mariko in the Solabougouda Commune in Koulikoro Region has a similar tale. Fousseini is one of the best trainees in seed production. He encourages women farmers to produce improved seed. “In 2018, three women were able to produce sorghum hybrid seeds in our Community,” he says.

Among the other farmers who have started growing sorghum is Mrs Téa Mariko, who began growing two improved sorghum varieties, Grinkan Yerewolo and Soubatimi on 2 ha each in 2018. “I harvested 1.4 tons of Grinkan Yerewolo and 400 kg of Soubatimi,” she says. ARDT_SMS is implemented in partnership with NGOs such as Malimark, EUCORD and CRS. Together, they have enabled a large number of farmers with seed production, some of them now registered as certified seed producers. This is a major breakthrough for agriculture in Mali in general and for small and marginal farmers.

For more success stories of the USAID Africa RISING’s Large-scale Diffusion of Technologies for Millet and Sorghum Systems (ARDT_SMS), please click here

**Project:** USAID Africa RISING’s Large-scale Diffusion of Technologies for Millet and Sorghum Systems (ARDT_SMS)  
**Funder:** United States Agency for International Development  
**CRP:** Grain Legumes and Dryland Cereals
A lhaji Sani Usman remembers what being a groundnut farmer in Nigeria’s Kano state entailed a few decades ago – prosperity, respect and global admiration, manifest in the fabled pyramids of groundnut stacks that reached for the skies following harvest.

“The groundnut pyramids soared over the buildings in Kano and were a sign of our pride. It was a time when groundnut was the most valued export crop,” Usman reminisces while talking about groundnut’s past in Nigeria.

In the 1980s, the pyramids began to crumble on the aging groundnut varieties and left farmers to fend off drought, disease and pests; Nigeria’s groundnut production fell from 1.6 million tons to 0.47 million tons. Farmers abandoned the crop that not just earned them international repute but was also an important diet and fodder for livestock. Though improved varieties were introduced, they remained inaccessible to many communities like Dabawa until 2015 when five farmers from the village started cultivating Samnut 21, 22 and 23 under the ICRISAT-led Tropical Legumes III Project. These improved varieties were released more than a decade ago by the Institute of Agricultural Research, Samaru.

“The new varieties are better than the local cultivars in all respects – early maturity, high pod, oil and haulm yields, greater tolerance to major biotic and abiotic stresses, and quality including stay green nature of leaves that fetch high premium in the market,” says farmer Malam Sule Boka.

The following year, farmer numbers began to swell and by 2017 three newer Samnut varieties – 24, 25 and 26 were introduced. To multiply access to the farming community, the Kano State Agricultural and Rural Development Authority (KNARDA) helped the farmers group into the Dabawa Groundnut Farmers’ Association. In 2018, more than 50 farmers cultivated the improved varieties.

Under the association’s banner, the group sells certified seeds of improved varieties at a 20% premium. They also manage to save over 100 kg of seeds every season for subsequent cropping. More importantly, increased yields are helping farmers rely on a crop that sustained livelihoods for centuries in Nigeria.

Project: Tropical Legumes III
Partners: ICRISAT (lead), International Center for Tropical Agriculture (CIAT), International Institute of Tropical Agriculture (IITA) and other national agricultural research systems partners (NARS) from 7 African Countries and ICAR- Indian Institute of Pulses Research, Kanpur, (UP), India
Funder: Bill & Melinda Gates Foundation
CRP: Grain Legumes and Dryland Cereals
Fruitful and empowering years, is how Mrs Afou Ouattara of N’Tobougou Commune, Sikasso region describes her three-year association with the ARDT_SMS project. This 45-year-old mother of four has witnessed and personally experienced changes in production practices brought about by the project in her village, be they in the form of microdosing, composting or improved varieties of sorghum.

Sorghum cultivation had almost been totally abandoned before the project, with maize and potatoes ruling the roost. Says Afou, “We never would have imagined it would be possible to achieve yield of 3,500 kg/ha from a hectare sown to sorghum. The demonstration fields confirmed this for us in our village in 2015-2016. Willing to see how it works, in 2016-2017 I convinced my husband to place one hectare at my disposal. I brought organic manure and seeds of sorghum variety Pablo that the project had introduced. I followed all the instructions the extension agent gave on production practices.” Sorghum is an indispensable alternative that ensures food self-sufficiency. Stalks of variety Pablo are much enjoyed by livestock.

Elaborating on the benefits accrued from this move, Afou says, “I can harvest around 1800 kg of sorghum, a huge contrast to the previous years when my family could barely extract 100 kg from a quarter hectare! My husband and I decided to set aside 800 kg for home consumption and sell the rest later when we can obtain a higher price. This meant I would have to store them till then. I was able to get 10 PICS (Purdue Improved Crop Storage) bags from a vendor to store the 1000 kg to be sold. Incidentally, the vendor promised to buy my sorghum since the grains were clean and good.”

Proving that the adoption of right production practices can lead to substantial benefits, Afou compares the stark gains/losses from her harvest in 2018: “Our household’s entire potato harvest went for a low price of CFA 75/kg (approximately US$ 0.13) in the market since they had not been stored well. Sorghum, on the other hand, sold for CFA 200/kg (approximately US$ 0.34) in the same market. My husband and I will sell our stock (1000 kg) to buy an oxen plough.”

This work was undertaken as part of the CGIAR Research Program on Grain Legumes and Dryland Cereals (CRP-GLDC).
Renewing its commitment to investments in Mali, USAID’s partnership declaration event at the US Embassy, Mali, brought together high-level participants including from the Ministry of Agriculture and officials from the USA. Held in June 2019, the event saw discussions about activities to boost resilience, strengthen agricultural growth, and improve nutrition for millions of Malians.

His Excellency Ambassador Dennis B Hankins officially launched the US Government’s partnership with the Malian Government for a renewed five-year country plan to promote food and nutrition security. ICRISAT through the USAID Africa RISING’s Large-scale Diffusion of Technologies for Millet and Sorghum Systems (ARDT_SMS) project, participated in a fair where interventions supported by USAID in Mali were displayed.

The five-year strategy builds on the US Government’s ongoing USAID Feed the Future initiatives, and supports Mali’s National Agricultural Investment Plan, the Multi-Sectoral Nutrition Action Plan, and National Resilience Priorities. Through inclusive and sustainable agricultural-led economic growth, activities under the plan will improve nutrition and strengthen resilience of vulnerable populations in Sikasso, Koutiala, Bougouni, Mopti, and Tombouctou regions. Mali is one of 12 partner countries selected by the US Government for this new phase of the Feed the Future initiative. Other countries included in the strategy are Bangladesh, Ethiopia, Ghana, Guatemala, Honduras, Kenya, Nepal, Niger, Nigeria, Senegal, and Uganda.

At the ceremony, Ambassador Hankins underscored the importance of investing in the agricultural sector to provide job opportunities for Malian youth. “This new five-year strategy invests in agriculture to feed the future, and to increase economic and job opportunities for young people to lead a more prosperous Mali,” he said.

The plan supports innovative activities to increase agricultural productivity of sorghum, millet, maize, rice, and livestock, as well as help resilience with new techniques of vegetable gardening and agroforestry to improve dietary diversity and sustenance.

Under the plan, USAID and Feed the Future will also promote engagement with private sector partners to introduce innovative solutions to agricultural challenges in Mali. The five-year plan also seeks increased domestic and international commercial opportunities for Malian agricultural products. The agricultural fair was attended by Malian Minister of Agriculture, Mr Moulaye Ahmed Boubacar, and other key invitees.

Dr Ramadjita Tabo, Research Program Director, West and Central Africa led the ICRISAT team at the event, and Dr John Nzungize, The ARDT_SMS Project Coordinator presented updates on the project results and key technologies including biological control of the Millet Head Miner.

Others attending included representatives of research centers, and implementing partners of Feed the Future, World Agroforestry Centre (ICRAF), World Vegetable Center and International Livestock Research Institute (ILRI).
The Seed of the Technology: ISTA conference generates interest in concerns of the drylands

Discussions at the recently concluded congress of the International Seed Testing Association (ISTA) reflected the seed community’s focus on seed production in a changing environment, the association’s Secretary-General Dr Andreas Wais said.

“The attendance we had at the congress this time has never been experienced before. More than 500 people joined the conference and were very interested in all the topics presented. Especially, the areas of climate change and changing environment were very important,” Dr Wais said of the congress during a visit of the ISTA delegation to ICRISAT. The congress was held in Hyderabad, India.

An independent organization operating through cooperation between seed scientists and analysts, ISTA aims to achieve uniformity in seed quality evaluation across the globe. Members of its executive committee visited ICRISAT’s facilities, including the gene bank and the plant quarantine unit. The delegation also visited the Agribusiness and Innovation Platform (AIP).

“Members of our storage committee are involved in genebanks. So we very much appreciate the opportunity to visit ICRISAT’s genebank. We are very impressed by the facilities and the people you have here,” said Dr Steve Jones, ISTA President. While referring to ICRISAT Director General Dr Peter Carberry’s symposium at the congress, Dr Jones said ISTA will look for cross-collaboration opportunities with ICRISAT.

ICRISAT showcased its work on seed systems at the ISTA congress, held during 26 June - 3 July. Improved varieties and hybrids of the institution’s mandate crops and seed technologies were demonstrated. The institution’s work with its seed industry partners in the private sector, Hybrid Parents Research Consortium (HPRC) came to the fore during the congress owing to a high-yielding sorghum hybrid developed by one of the consortium partners. High-yielding sorghum varieties and hybrids are helping farmers utilize lands fallowed by rice production in major rice producing states of India, like Andhra Pradesh.

Conveying the importance of ICRISAT’s mission in the drylands during his interaction with the delegation, Dr Carberry outlined the challenges of nutrition and income security faced by marginal farmers in Africa and Asia and the role robust seed systems can play to address them.
Agriculture researchers join nutrition and health scientists to discuss global challenges

Cutting across academic and national borders, over 350 researchers working in agriculture, nutrition and health gathered in India recently to understand and tackle major global challenges to achieving the Sustainable Development Goals (SDGs).

The gathering, Agriculture, Nutrition and Health (ANH) Academy Week, was held during 24-28 June in Hyderabad. The conference aimed to bring global thought leaders together, informed Dr John McDermott, Director of the CGIAR Research Program on Agriculture for Nutrition and Health (A4NH).

“A key goal is to engage and support researchers in these regions, and the geographic proximity enables young researchers to participate and connect with senior figures in their fields from around the world,” Dr McDermott said.

The international conference was organized by the global research network ANH Academy, led by the London School of Hygiene & Tropical Medicine (LSHTM) and A4NH. This year’s Academy Week was held in partnership with the National Institute of Nutrition (NIN), the International Food Policy Research Institute (IFPRI), ICRISAT and other partners.

Challenges pertaining to land, forests, groundwater and rain, and plastics in food systems were discussed during a session chaired by ICRISAT Director General, Dr Peter Carberry. He underlined the role of dryland cereals like millets and sorghum in minimizing the environmental footprint of agriculture while benefitting consumers.

The session ‘Environmental shocks, resource management and sustainable agriculture-food system strategies’ explored interstate cereal trade between Indian states and how healthy diets can reduce land pressure in Nigeria. A research presentation on plastics in food systems was also part of the session.

Highlighting the importance of food and farm diversity, Dr R Padmaja, Senior Scientist, Gender Research, ICRISAT, presented a poster on the Smart Food campaign and Nutri-Basket program.

Speaking about the academy week, Dr Bharati Kulkarni, Deputy Director, NIN, called for more research in the areas of ANH.

“Agriculture, nutrition and health are closely linked but research connecting them all is in nascent stages. There is need for more tools that can facilitate such research,” Dr Kulkarni said.

The learnings from past conferences are known to have helped in improving food safety, supply and quality, besides influencing policy on food distribution systems. Dr Suneetha Kadiyala, Associate Professor at LSHTM pointed out that the SDGs are to be achieved in 11 years and therefore it is important that ANH researchers work together.
Ten key takeaways that could transform food systems

New book highlights the malnutrition paradoxes of India’s population

India doubled its ‘over-nutrition’ prevalence rate over the past 10 years, even as it housed the largest number of people with malnutrition. These and many such paradoxes and dilemmas are addressed in a recent book on “Transforming Food Systems for a Rising India.”

The book advocates an approach that looks at nutrition through a ‘food systems’ lens and provides 10 tangible ways to effect this transformation. The book is authored by Prof Prabhu Pingali, Director, Tata-Cornell Institute for Agriculture and Nutrition (TCI) and member of ICRISAT’s Governing Board along with authors from TCI, Mathew Abraham Anaka Aiyar, and Andaleeb Rahman. The book, published by Palgrave Macmillan, brings together six years of work and thinking at the institution.

“While India has been extremely successful in addressing calorie hunger, especially through rice and wheat, high levels of malnutrition and improved access to micronutrient-rich food and vitamin-rich food, the shift from calorie dense to nutrition dense has been a challenge. This book tries to look at how we transform the existing food systems – from staple grains to more diversified diets with higher nutrient values,” says Prof Pingali.

In the context of changing diets, the book also looks at economic growth as a determinant of changing diets and possible responses triggered from the supply side as well. It also looks at linking smallholder farmers into value chains, making them more commercially connected, not just with access to more nutritious food but also increased household income and agency.

The key takeaways of the book include meeting the changing urban demands for food, need to focus on food system diversity, crop diversification for improved income and food diversity, technology to promote diverse food systems, focusing on the disproportionate impact of climate change on non-staples and multi-pronged policies including on behavior change for improved diets.

Prof Pingali also emphasized the need to recognize that “India is not homogenous but so many different countries in one place because there is diversity at the state level. Also, while some states are growing rapidly like South East Asia, others are lagging behind with per capita similar to low-income countries in Africa. So progressive states are seeing obesity, while lagging states are seeing micronutrient malnutrition. Food system transformation can address both.”

The open access book released globally at TCI and at IFPRI is also set for an India release later this year. Also planned is advocacy around different policy changes that need to take place to make this transformation a reality, both at the local level as well as the national.

Author speak

This book provides a detailed assessment of the major paradoxes of the Indian growth story, one in which we see the simultaneous existence of regional inequality, rural and urban food insecurity, intractable malnutrition problems and the growing incidence of overweight and obesity. We examine the nexus of economic development, agricultural production and nutrition through the lens of a “Food Systems Approach (FSA)”. Central to our vision for a robust food system is a future where nutrition-secure individuals have the capability and the opportunity to improve their health through greater access to a balanced and healthy diet.