Meeting with the Zimbabwe President – Matopos Research Center to be positioned as a world-class facility

The commitment to Zimbabwe’s agriculture was reinforced by ICRISAT’s Director General Dr Peter Carberry during his meeting with the President of Zimbabwe Emmerson Mnangagwa on 27 February, in Harare. Strengthening ICRISAT’s research center in Matopos to be a world-leading facility for crop improvement was high on the agenda. President Mnangagwa assured ICRISAT of his government’s support. Plans now include strengthening the infrastructure at the Matopos facility and the agriculture research agenda for Zimbabwe with new resources and new capability, said Dr Carberry. Discussions were also held on areas of mutual benefit with the Zimbabwe Minister for Agriculture and the Department of Research and Specialist Services. ICRISAT will work closely with the Department of Research in the country, to take these plans forward.

More on ICRISAT’s collaboration and work in Zimbabwe here

Healthier and prosperous Africa: ‘AVISA’ project launched for faster agriculture gains in seven countries

Greater yields, higher incomes and improved livelihoods – these will be the results farmers in seven countries across Africa could get with the launch of the Accelerated Varietal Improvement and Seed Delivery of Legumes and Cereals in Africa (AVISA) project. Focusing on five crops – groundnut, common bean, cowpea, sorghum and millet, AVISA aims to increase productivity, profitability, resilience and marketability of nutritious grain legume and cereal crops across Burkina Faso, Ghana, Mali, Nigeria, Tanzania, Ethiopia and Uganda.

Modernization of crop breeding, strong market orientation, gender responsiveness and nutrition traits, besides public-private partnership focus are some components that make the project unique.

Tanzanian Minister for Agriculture calls for more public-private collaboration

Minister and key delegates at AVISA stalls.
Speaking at the launch, Hon. Japheth Hasunga, Minister for Agriculture, Tanzania, called this a timely initiative for farmers to gain high quality seed of improved varieties of crops for better productivity, improved nutrition, and income opportunities. “Agriculture contributes to 29.1% of our GDP in Tanzania and approximately 70% of our population depend on agriculture for their livelihoods,” he said. Most dryland grain legumes and cereals have high nutritive properties.

“Pearl millet, extremely high in iron, zinc and folate can reduce anemia, while legumes are high in calcium and protein, particularly important for growth and development. AVISA comes at a time when we have ambitious Sustainable Development Goals around food security and nutrition,” said the minister.

Funded by the Bill & Melinda Gates Foundation, the AVISA project consolidates gains made by earlier initiatives that the Foundation funded – Tropical Legumes, HOPE and HarvestPlus. AVISA will be implemented by ICRISAT, International Institute of Tropical Agriculture (IITA) and International Center for Tropical Agriculture (CIAT). Important components include public-private partnerships, an active role for private seed companies and the National Agricultural Research System (NARS).

Dr Jeff Ehlers, Program Officer, Gates Foundation, emphasized the importance of partnership: “This is a strong opportunity to learn from one another and grow together. The private sector approach in AVISA can mean much greater gains for farmers. Climate is shifting and new varieties bred in the new climate are needed to help smallholder farmers deal with the challenge.”

Dr Geoffrey Mkamilo, Director General, Tanzania Agriculture Research Institute, said it was important to deliver and have an impact in the community. Dr Adebisi Araba, Regional Director for Africa, CIAT, said “This project partnership can build solid food systems for Africa. Nutrition is a great challenge and the focus on five crops in AVISA is a perfect mix to address this.”

Dr David Chikoye, Regional Director, IITA, asked why farmers were still using very old varieties. “Why is this still happening in spite of good genetic variability?” he asked, emphasizing on the need to focus on improved varieties from the nutrition and livelihood perspectives.

Dr Peter Carberry, Director General, ICRISAT, said he was very proud and pleased to lead this initiative. “We are excited that this brings so many partners from the NARS, the CGIAR and the private sector together. We are committed to support the success of the project – the dual goals of modernizing crop improvement as well as measuring on this for greater benefits”.

At the launch meeting on February 25, the logo of AVISA was unveiled symbolizing a healthier and prosperous Africa. Over 100 participants from across the world including representatives from the private sector, national agricultural system, scientists, development workers and government officials attended the meeting.
Niger government takes higher stand on pearl millet

First Lady of Niger becomes Smart Food Ambassador

Dr Lalla Malika Issoufou, First Lady of Niger, was named as Smart Food Ambassador for her vision and leadership in nutrition and the promotion of traditional food crops such as millets. Dr Peter Carberry, Director General, ICRISAT, presented the plaque of recognition during the launch of the International Millet Festival (FESTIMIL) in Niamey, Niger, on 21 February.

The Smart Food initiative is all about food that is ‘Smart’- good for you (healthy), good for the planet (sustainable) and good for the farmer. The vision of Smart Food initiative is to diversify staples by bringing Smart Foods like millets back as a major part of diets across Africa and Asia.

Niger’s inaugural national Millet Festival

The Niger government’s inaugural national millet festival (FESTIMIL) is a trailblazer and has succeeded in raising awareness on the importance of millets, recognizing the challenges of its value chain, creating synergy among actors, and attracting investment to improve food and nutrition security as well as income-generation activities.

Smart Food Master Class conducted for preparations of Pearl Millet

ICRISAT partnered with the "Institut International des Métiers de l’Aviation du Tourisme & l’Hôtellerie" to provide a Smart Food Master Class to 25 students of this school. A Smart Food tasting and competition was organized for all the festival participants.

Panel discussions on millet adaptability to climate change and millet nutritional value

As part of the millet festival, a panel discussion on millet adaptability to climate change and its nutritional value was organized. The panel discussions covered three thematic areas:

- The cultivation of millet and climate change
- Millet in nutrition and human health
- Challenges and prospects of millet sector in Niger
African parliamentarians, experts tap into ICRISAT’s biotech expertise

Use of biotechnology-based solutions for agricultural growth, as well as to cope with the changing climate conditions, is indispensable, observed a high-level delegation from six African nations.

Policy makers and experts from Mozambique, Malawi, Uganda, Ghana, Burkina Faso and Kenya visited the ICRISAT headquarters as part of the New Partnership for Africa's Development (NEPAD)/African Biosafety Network of Expertise (ABNE) biotechnology/biosafety study tour organized in collaboration with Michigan State University.

“We wish to modernize our agricultural systems. We need a more effective system of research and dissemination of technologies. This is a priority for our respective governments,” the delegates said while interacting with the top management of ICRISAT. They expressed strong interest to partner with ICRISAT for enhancing food and nutrition security, food safety as well as regional and international trade.

Enhancing gains from plant breeding by applying biotechnology, and developing accurate and cost-effective tools to diagnose pathogens and toxins has been a critical component of ICRISAT’s research activities. Citing the success of developing aflatoxin-free groundnut, Dr Peter Carberry, Director General, ICRISAT said: “We are at the forefront of world-leading research that can lead to significant benefits for smallholder farmers and consumers. We need more support for being able to translate and take this research from laboratories to farmer fields in Africa”.

Availability of innovative technologies in a breeder’s tool kit, significantly reduces the time and effort needed to develop newer varieties, and allow more precision. ICRISAT uses biotechnology for crop improvement when other plant breeding options are non-existent to make high-quality plant varieties available for farmers, providing possibility to produce food and feed in a more efficient and sustainable way as well as much-needed economic benefits.

“The Platform for Translational Research on Transgenic Crops (PTTC), an ICRISAT-Department of Biotechnology (DBT) initiative, focuses on advancing promising Ag-biotechnologies through a development cycle with adequate safety assessments.

“Policy makers are key to making big impacts in agriculture and uptake of biotechnology,” said Dr Paco Sereme, Chair, ICRISAT Governing Board. Forging a dynamic regional and international technological partnership in agriculture is the way forward for advancing food security and poverty reduction in Africa, he added.

Dr Pooja Bhatnagar-Mathur, Theme Leader - Cell, Molecular Biology & Genetic Engineering, briefed the delegation on biotechnological applications for crop improvement and advanced testing & detection mechanisms. She also appraised the delegation on the ongoing efforts at ICRISAT on advanced breeding methodologies such as rapid generation turnover (RGT) techniques for realizing crop improvements more quickly and efficiently.

The visit was capped with the delegation’s expression of full support to the new, emerging partnerships to tackle food security and poverty reduction in the region, particularly to the revitalized ICRISAT collaboration and the new partnership dynamics under various national programs.

The high-level delegation included Mr James Ted Kabifya Munthali, Member of Parliament (MP), Malawi; Mr Joseph Fred Chidanti – Malunga, MP, Malawi; Dr Wilkson Issa Hudson Makumba, Director of Agricultural Research Services, Malawi; Dr Larbouga Bourgou, Senior Cotton Breeder, INERA/Programme Coton, Burkina Faso; MS Zoumbare Henriette /Zongo, Presidente Commission Du Developpement Economique, De L’Environnement Et Des Changements Climatiques (CODECC), Burkina Faso; Mr Charles, Antwi-Boasiako, Chair, National Biosafety Authority, Ghana; Mr Woldeyesus Sinebo Jinore, Senior Program Officer, Agricultural Biosafety, NEPAD-ABNE, Uganda; Dr Philemon Kiprono, Principal Monitoring and evaluation Officer, Executive Office of the President (EOP), Kenya; Dr Lydia Muriuki, Secretary of Administration, EOP, Kenya; Dr Ruth Mbabazi, Research Assistant Professor, Michigan State University and Dr Karim Maredia, Professor and Director World Technology Access Program, Michigan State University.
Scientists to focus on favorable nutritional traits in sorghum for both human consumption and animal feed

Recognizing the increased market pull for sorghum grain as health food and animal feed (see box) and the use of foliage as forage, 70 scientists from public, private and national systems from 10 countries were called to focus on prioritizing traits in improved products. The emphasis was on greater human and animal nutrition, forage with higher digestibility and processing quality suited to various end-uses.

The group visited ICRISAT headquarters to select materials for further research and commercialization. They were shown improved sorghum materials, advanced breeding lines, breeding populations and germplasm developed by the institute.

Increased focus on forage research particularly on multi-cut single cross forage hybrids with higher digestibility was suggested. The seed companies offered to provide locations for testing the forage hybrids in target environments. The group also suggested that biofortification should be mainstreamed into sorghum breeding to make it more nutritious for end-users.

The participants commended ICRISAT for the progress with regard to –

**Rainy and postrainy sorghum varieties:** Development of new varieties, parental lines and hybrids with preferred ideotypes (dwarf and early-maturing) was appreciated. Participants asked for retaining the stover yield while improving the grain yields and for increased feed quality of grain (low protein and high starch) with antioxidant properties considering huge opportunities for export.

**Global sorghum area expands in the Americas**
The global sorghum area is expanding in the Americas, where it is mostly grown as animal feed, with a net gain of 1.0 m ha in the last five years. Contrarily, it is shrinking in traditional bastions like Africa and Asia where it is used primarily as food. The prime drivers of this shift are the competitiveness of the crop under intensification and increasing opportunities for exporting the grain as animal feed to the Middle East, China and Japan.

**Dual-purpose sorghums:** Significant improvements in *in-vitro* organic matter digestibility of up to 50% in dual-purpose sorghums and up to 58% in forage and sweet sorghums was highly appreciated. Use of Near Infrared Spectroscopy for assessing the stover quality with the support of the International Livestock Research Institute is a successful model that can be upscaled.

**Improved products in field:** Cultivars containing *shoot fly resistance* QTLs is one of the major advancements in this area. The postrainy season adapted parents and varieties that are dwarf have implications for machine-harvesting.

**Sweet sorghum cultivars:** A significant increase in brix% (soluble sugars concentration) from 12% a few years ago to 21% in current cultivars has large implications for economic viability of sweet sorghum ethanol.

**Biomass sorghum hybrids:** The progress in biomass yields (>60 tons per ha fresh stalk in each cut) and ratoonability (2-3 cuts from single planting) was appreciated. It was suggested that the brown midrib (*bmr*) trait be introduced into these hybrids to reduce the lignin content and increase digestibility.
The Sorghum Scientists Field Day was held under the aegis of the Sorghum Hybrid Parents Research Consortium which has been operating from ICRISAT for the past 19 years. Nearly 10 seed companies from Asia, Africa and South America are the current members of the Consortium.

The recent field day was the largest and most diverse thus far. It was attended by 23 participants from the public sector, 15 from the private sector including a representative from Syngenta Foundation, four researchers from Agricultural Research Corporation-Sudan, one researcher each from the National Programs of Myanmar, Burkina Faso, Uganda and Ethiopia, two researchers from ICRISAT African locations (Nigeria and Kenya) along with ICRISAT scientists. Dr Andy Hall from Commonwealth Scientific and Industrial Research Organisation, Australia, representing Flagship Project 2 of CRP-Grain Legumes and Drylands Cereals (CRP-GLDC) also participated in this event.

The event was organized from 14-15 February by ICRISAT and was funded by the Sorghum Hybrid Parents Research Consortium and the CRP-GLDC.

For more on sorghum: http://exploreit.icrisat.org/profile/Sorghum/193

We need to generate new data providing evidences for water-use-efficiencies of sorghum vis-à-vis maize and other competing crops. We also need to assess the genetic gains in each of the breeding programs and work towards increasing it.

To maximize sorghum adoption rates we need to prioritize traits that meet the product needs of various markets.

Dr SS Rao, Principal Scientist, Indian Institute of Millets Research

Investment in advocacy and institutional commitments on mainstreaming nutrition can be the game changer for pearl millet

Investing in advocacy for biofortified pearl millet which has the potential to address prevailing high levels of malnutrition across India and Africa, was identified as a key action point at a recent review and planning meeting. The other action points included institutional commitments on mainstreaming, strengthening germplasm screening facilities and fast-tracking introgression of high-nutrient genes into popular varieties. About 50 scientists from public, private and national systems together with HarvestPlus and ICRISAT participated. The group deliberated on trial results from locations across India, identified major concerns, reviewed new materials and finalized the 2019 trials and nurseries.

Despite pearl millet’s high nutritive value compared to other staple cereals like wheat and rice (see graph) it struggles for uptake in markets. Even biofortified varieties/hybrids face an uphill task in finding favor with seed companies and farmers outside the traditional growing areas. Hence, developing an advocacy strategy to raise awareness among decision-makers in private and public sector seed companies was identified as a key action point.

To drive home the point on the need for advocacy on a bigger scale and for promoting biofortified pearl millet along the value chain, Dr Wolfgang Pfeiffer, Director of Research and Development, HarvestPlus, in his presentation, posed these questions – Could high-iron pearl

Pearl millet should not be positioned as prestige food or poor person’s food, but food, mainstreamed in the food system that everyone can afford and wants to eat because it is nutritious.

Dr Wolfgang Pfeiffer
Director of Research and Development, HarvestPlus

Dhanashakti (high-iron variety) was made available to 94,000 households in 2018.

Source: Key food samples of India, IFCT, ICMR-NIN
millet be the next superfood in India – the next ‘quinoa’ for the westernized markets? He said this was an opportune time to pursue it as current policies in India favor biofortified pearl millet and that there could be a move to initially subsidize seed of biofortified crops to accelerate scaling. He said that the Government of India’s midday meal scheme for school children and the food and grocery business that’s estimated at US$380 billion, provide opportunities for innovative solutions. He also mentioned the establishment of a new entity HarvestPlus Solutions, a social enterprise to drive the market, fill gaps in the value chain and generate revenue for biofortification programs.

Dr M Govindaraj, Senior Scientist (Pearl Millet breeding), ICRISAT, said that yield and nutrition should be the central goal of plant breeding. He said that biofortification carries no yield penalty and does not affect the protein content. He pointed out that in view of climate change and rising CO₂ levels, there will be further significant nutrient loss in staple cereals and vegetable crops. However, pearl millet is one of the least affected. He also presented information on ICRISAT’s diversified materials with higher micronutrients and promising hybrids for various zones and the high-iron core germplasm collection identified in Africa and India.

National-level progress on pearl millet biofortification was detailed by National Agricultural Research System partners. The Indian Council of Agricultural Research’s encouragement for a focus on mainstreaming iron and zinc in pearl millet in the All India Coordinated Research Project on Pearl Millet (AICRP-PM) centers was also mentioned.

Mr Binu Cherian, Country Manager for India, HarvestPlus, in his presentation said that the HarvestPlus initiative for Scaling up Biofortified Pearl Millet Cultivars sustains on partnerships. He said that the objective of HarvestPlus is to create a sustainable demand for biofortified pearl millet. The initial focus of the program has been to create seed demand for biofortified cultivars and grain demand for household nutrition security, while plans to develop food partnerships for value-added products and retail are in process. The Government’s inclusion of millets in the public food distribution system will help to trigger demand for biofortified millets and to meet the food and nutrition security. Updates on the impact of Dhanashakti (high-iron variety with 71 mg/kg) showed about 94,000 households were reached in 2018.

During the discussions, concerns were raised on the increasing Blast epidemics and the need for collective breeding and management efforts to control it — similar to what was done for Downy mildew incidence in the past. Participants were also keen on knowing the fodder value of biofortified crops. During the inaugural session, Dr Pooran Gaur, Research Program Director-Asia, ICRISAT, said that all of ICRISAT’s mandate crops should be biofortified through mainstream breeding.

Summing up the review meeting, Dr SK Gupta, Principal Scientist, Pearl Millet Breeding, ICRISAT, reiterated the key breeding action points and called for a joint draft for a mainstreaming strategy which can be shared on a common platform.

The HarvestPlus Pearl Millet Biofortification Review and Planning Meeting was held on 25 February at ICRISAT headquarters.

More on ICRISAT’s work on pearl millet here.

### Fast Facts About Malnutrition

*For more: Global Alliance for Improved Nutrition*

- Two billion people in the world suffer from various forms of malnutrition.
- Adults who were malnourished as children earn at least 20% less on average than those who weren’t.
- It is calculated that each dollar spent on nutrition delivers between US$8 and US$138 of benefits.
- Almost half the children in low- and middle-income countries – 47% of under-fives – are affected by anaemia, impairing cognitive and physical development. Iron is a key component of micronutrient blends which are used in large-scale and targeted fortification programs.

### Project Title:
Genetically enhanced pearl millet with high grain iron density for improved human nutrition in India

### Funder:
HarvestPlus

### Partners:

### CRPs:
- [CGIAR](https://www.cgiar.org)
- [Grain Legumes and Dryland Cereals](https://www.cgiar.org)

---

**Participants at the review and planning meeting.**

---

**ICRISAT Happenings | February 2019 | 7**
Propagating a pigeonpea revolution across India

Farmers from five Indian states came together to celebrate the success of one of the world’s first pigeonpea hybrids and to exchange views on good agricultural practices to benefit from agri-technology. At a two-day ‘Cross Learning Workshop’ at ICRISAT they were joined by representatives of non-governmental organizations, State Agricultural Universities, Departments of Agriculture of Andhra Pradesh, Karnataka, Maharashtra, Odisha and Telangana, and scientists. “For the past three years, we’ve been working with Government of India’s National Food Security Mission to bring ICPH 2740 pigeonpea hybrid to over 60 villages in 15 districts of five states,” said Dr Sreenath Dixit, Head, ICRISAT Development Center (IDC). “This hybrid has a potential yield of 4.0 t/ha and there have been places where farmers have surpassed this potential. We want farmers to share their experience so that others can learn and be enthused about using this hybrid.”

Farmer Ganpat Narayan Kale from Parbhani, Maharashtra, an early adopter of the ICPH 2740, said he’s been sowing it for the past two years. “Last year it yielded 1000 kg/acre,” he said. “This year, in spite of the drought in our area, I’m expecting at least 800 kg/acre.” (1 acre=approx. 0.4 ha)

Dr Peter Carberry, Director General, ICRISAT, congratulated the IDC team and the farmers for taking technology to the fields and exhibiting its benefits. “Rainfed agriculture is difficult and in those conditions, farmers need access to the best seeds, inputs, advisory services and the latest technology to overcome the challenges,” he said. “We hope to hear from the farmers what they need from our breeding programs so we can play an even greater role in taking the impact of our science to farmers’ fields.”

Dr Carberry also handed out special Personal Protection gear kits to farmers that need to be worn while spraying pesticides in their fields. The use of the kit was demonstrated by an ICRISAT staff member for better understanding.

“Agriculture can be a profitable business model with improved cultivars like ICPH 2740 that are also sustainable” said Dr Gajanan Sawargaonkar, Principal Investigator of the project. Citing 9-26% increase in pigeonpea productivity in regions adopting this cultivar and better management practices, he said that this had created interest in other farmers too.

The pigeonpea crop is an integral part of India’s rainfed agriculture; India is the largest producer and consumer of pigeonpea in the world. Moreover, pigeonpea is one of the main sources of protein for a predominantly vegetarian population. Therefore, enhancing its productivity is critical to combat protein malnutrition in the country. Click here to know more about ICRISAT’s work on pigeonpea. Hybrids are created by cross-pollinating two different varieties of a crop, usually to obtain desired traits (e.g. drought tolerance and high yield). The first generation of hybrid crops generally give a higher yield due to a phenomenon known as ‘hybrid vigor’.

The workshop ‘Popularizing and Scaling-up of Pigeonpea Hybrids and Management Practices under National Food Security Mission in Andhra Pradesh, Karnataka, Maharashtra, Odisha and Telangana’ was held during 18-19 February 2019 and was attended by over 70 participants. Some of the other activities during the workshop included technical sessions on integrated pest management, hybrid seed development; visit to the pigeonpea fields at ICRISAT; and visit to a watershed site at Kothapally village.

Dr Peter Carberry, Director General, ICRISAT, releases a booklet on good agricultural practices for pigeonpea, along with (L-R) Dr Prakash Kothari, Visiting Scientist, ICRISAT; Dr Gajanan Sawargaonkar, Senior Scientist, ICRISAT Development Center; Dr Peter Carberry; Dr Sreenath Dixit, Head, IDC; and Dr Vinod Kukanur, Visiting Scientist, ICRISAT.
Scientists identify small investments for big gains in drylands, call for policy interventions

Low cost interventions on the farm like soil testing, on-farm ponds and mechanized sowing can significantly increase crop yield in the tropical drylands, suggests a recently published study.

The research paper ‘Low-cost interventions for big impacts in dryland production system’ describes impediments to realizing higher yields in Kurnool and Anantapur districts of Andhra Pradesh, India. Depleted soils, dry periods during the crop growing phase and absence of mechanization were targeted by the researchers to improve yield.

“Small investments and policy support in system-context technologies can substantially improve productivity and livelihoods of a large number of smallholders in drylands, while contributing to resilience against climatic variability,” the researchers stated in the Archives of Agronomy and Soil Science.

For the study, the research team including ICRISAT scientists Dr Girish Chander, Dr Shalander Kumar, Dr Komuravelly Srinivas and former Director of RP-Asia Dr Suhas P Wani, analyzed over 120 soil samples from two villages in each of the districts in 2015. They found low organic carbon content in 78% of the fields studied. It was found that secondary nutrient deficiency including that of sulfur (93% deficiency), micronutrients zinc (84 % deficiency) and boron (73% deficiency) also contributed to poor yields of groundnut, legumes and millets. The deficiencies resulted from crop intensification in the recent past sans addition of secondary or micronutrients; such addition is uncommon in the region the researchers observed.

To improve soil fertility, these deficient nutrients were added and the resulting crops from the farms were compared with those from farms where no such additions were made. The researchers found that addition of macro- and micronutrients increased grain production by 30%. Economic analysis revealed the additional net returns were over seven times the cost of applying secondary nutrients and micronutrients to the soil.

Similarly, a 30% increase in crop yield was realized following drought-proofing with on-farm ponds. To keep costs low, these ponds were cement-lined without use of stone, brick or sophisticated masonry. Water augmentation further helped farmers grow high-value market crops like vegetables and fruits.

The scientists also identified absence of mechanization as a limiting factor in improving crop yield. During the study period, sowing machinery was provided through a common hiring center. They established that mechanized sowing reduced input cost and increased pod yield of groundnut by as much as 12%.

“Desired policies to promote such low-cost but critical interventions are needed to benefit large numbers of smallholding farms that may increase their abilities to put their farms on the growth trajectory,” the authors of the study noted while calling for policy-mediated farm interventions.
Environment-friendly initiatives

Improved water management and livelihoods through CSR for farmers in southern India

Knowledge and training related to management of water and other natural resources will be shared with communities around the dry region of Tadipatri in Anantapur, Andhra Pradesh. This was announced in an MoU signed between UltraTech Cement and ICRISAT on 13 February 2019 at ICRISAT. ICRISAT Development Center (IDC) will be working with the Corporate Social Responsibility (CSR) team of UltraTech in about 10 villages at Tadipatri, which receives an average annual rainfall of 500 mm. The goal of this project is to increase groundwater availability through rainwater harvesting and other means, as well as develop and support various livelihood options for farmers and the women of the communities around the cement plant.

In 2017, IDC had undertaken a comprehensive water balance study for the World Business Council for Sustainable Development (WBCSD), of which one of the sites was the UltraTech Cement site. The idea to construct rainwater harvesting structures to achieve self-sustainability in water was developed from there and culminated in this MoU. The project’s initial aim is to establish a model site of learning through integrated watershed management in a pilot village of about 1500 ha.

Mr MSRK Prasad, Senior Vice President, UltraTech Cement, expressed happiness on being associated with ICRISAT and was hopeful that IDC and UltraTech together could bring some positive change in the difficult lives of the farmers that live around the cement factory.

Signing the MoU, Dr Peter Carberry, Director General, ICRISAT, reiterated the role that IDC has played in several villages and districts in Andhra Pradesh and Telangana in bringing about change in the farmers’ lives. “ICRISAT has extensive experience in natural resource management and research-backed development,” he said. “We’re proud to harness a convergence of various technologies/programs/partners and act as ‘knowledge brokers’ in order to make a difference to lives of smallholder farmers”.

Dr Sreenath Dixit, Head, IDC, said, “We would like to help the smallholder farmers in the region, as well as women’s Self Help Groups existing in the region by providing technology backstopping and training in various areas such as rainwater harvesting, setting up of small enterprises, etc.”

ICRISAT has earlier carried out several watershed management projects in collaboration with state governments of Karnataka, Andhra Pradesh and Odisha.

For more on CSR projects: [https://www.icrisat.org/csr/](https://www.icrisat.org/csr/)
For more on watershed impacts: [https://www.icrisat.org/a-complete-farming-mode-stage3/](https://www.icrisat.org/a-complete-farming-mode-stage3/)
For more on Natural Resource management [http://exploreit.icrisat.org/profile/natural%20resource%20management/92](http://exploreit.icrisat.org/profile/natural%20resource%20management/92)

Project: Improving Livelihoods through Integrated Water Resources Management at Tadipatri, Anantapur
Funder: UltraTech Cements Limited
Partner: ICRISAT
Award given for taking the ‘waste’ out of wastewater in India’s villages for agriculture

Earlier a menace, swamps in Mentapally are now water sources for agriculture. The turnaround in the south Indian village comes on the heels of a three-year-old wetland construction which treats over 6.5 million liters of wastewater a year. This has been recognized through Dr Aviraj Datta, ICRISAT scientist, receiving the ‘Impactful CSR Leader’ award at the Corporate Social Responsibility Summit & Awards 2019 held recently in Bengaluru.

Constructed wetlands are treatment plants built to treat wastewater through a combination of physical, chemical and biological processes. In Mentapally, wastewater from the 125 households of this Telangana village are directed to an inlet tank and then into a decentralized subsurface treatment plant, populated with specific plant species and sand media. Physical filtration and phytoremediation removes pollutants in the water, mainly inorganic nitrogen and sulfate, while improving chemical oxygen demand. The water is then stored for use downstream in the farms.

Dr Aviraj Datta, a wastewater management expert at ICRISAT Development Center (IDC), explains how treated water can help farmers handle water shortage during crucial crop growth.

“Treated water is ideal for cash crops and seed production. By itself, it may prove insufficient for water intensive farming, but it can supplement irrigation sources during dry spells,” he said.

More importantly, wastewater treatment assumes greater significance against the backdrop of its direct use for cultivation. A 2012 report by the Indian Council of Agricultural Research (ICAR) and ICRISAT scientists pointed to the growing use of untreated wastewater for flower, vegetable, fodder and even cereal cultivation in India.

Using treated water reduces the circulation of contaminants in the food chain.

Additionally, plants used in wetlands make for compost which can be sold for profit. The Mentapally treatment plant produces as much as 1,700 kg of compost in 45 days. Wetlands also run without electricity, chemical input and help recycle nitrogen, phosphate and other nutrients needed for farming.

Wetland construction in India gained pace under the Indo-EU Water4Crops project. The Mentapally wetland is a Corporate Social Responsibility (CSR) initiative of REC Limited, a Government of India enterprise.

According to Dr Datta, “We are now trying to make villages sustain constructed wetlands by preparing rural communities to maintain them after the CSR funder and the technology implementer withdraw from the picture. This requires education, knowledge transfer and awareness creation besides construction”.

The demand for wetlands is on the rise but their proliferation and success hinges on self-sufficiency, he attests. IDC has constructed six units in Telangana alone and is working with village-level communities and NGOs to make wetlands self sufficient.
Giving back to the community: Enthusiastic homemakers learn the science of safe composting of kitchen waste

A group of enthusiastic homemakers from a large housing colony that generates two tons of garbage per day attended an hour-long session on how to compost kitchen waste safely while minimizing the odor and the ordeal.

Dr Rajesh Pasumarthi, a microbiologist and a visiting scientist at the ICRISAT Development Center, oriented the group on how to get a steady supply of compost from kitchen waste for their balcony gardens. Handouts on how to do it were given to the participants, who were full of questions.

The recipe is as follows –

What’s needed:
- A compost bin or a regular bucket/container with a hole at the bottom and a cover with 10-15 holes in it.
- Kitchen waste minus meat, oil and dairy waste (to discourage maggots and unpleasant odors).
- An inoculant mixed in a glass of plain water (a few drops of NCOF’s Waste Decomposer or plain old buttermilk – the more sour the better).

Method
- Chop green kitchen waste that’s generated daily into small bits – 5 cm size is ideal. Egg shells should be crushed if used, leftover cooked food can be added too.
- Maintain the Carbon/Nitrogen ratio. Approximately 70% of vegetable/fruit waste should be mixed with 30% of dried leaves. If it’s not available it can be substituted with newspapers or bits of cardboard.
- Keep the contents moist by sprinkling water (needs to have about 50-60% moisture).
- Aerate the mixture by mixing it ideally every day or once every week.
- The bucket can be kept in the balcony or terrace with adequate protection from rain.
- Once the bucket is full, let it sit for 45-50 days. Don’t forget to stir it regularly.
- Your compost is ready to use if it’s black, granular and smells like earth.

Over coffee and tea, the ladies shared their experiences in handling the garbage disposal in their housing complex (My Home Jewel apartment complex in Madinaguda, Hyderabad) that has 2116 flats.

The entire group was also taken on a field visit to the vermicompost unit located on ICRISAT campus and included a demo on preparing kitchen compost. The event was organized on February 1.

"We have a Go Green initiative in our complex. Last October, we encouraged the residents to separate plastic waste and engaged a recycling vendor to pick it up. We’ve done door-to-door campaigns on segregation of waste in terms of wet and dry, electronic waste and biohazardous waste.

This session at ICRISAT is really useful. If all of us did our bit we could cut down on the quantum of at least the green garbage that’s generated."

– Monica Mandal

"We are looking at ways for disposing the 2 tons of garbage that is generated in our complex everyday. There are some systems already in place, but we are looking for more efficient and eco-friendly options to choose from."

– Udisha Alok
Mali’s Tech Parks are equipping farmers with science to battle agrarian crises

Farmer Fousseini Samake nearly gave up agriculture for a job in the city. Four years ago, he was set back by aging seed varieties and drought with pest and diseases eating into the meager harvest.

Cut to 2018, Samake is a name to reckon with in the farming community of Mali’s Bougouni district. Not only did he turn his fortunes around with multifold increase in agriculture yield, he also helped half a dozen farmers better their lives. With a mission to help farmers beat the odds, he directs them to science-based farming at Tech Parks -- large tracts of agricultural land set up under the project ‘Africa RISING’ (Research in Sustainable Intensification for the Next Generation).

“The grains of Soubatimi are bigger than the local varieties and the cattle seem to enjoy the stover more. It also gives better yield than the local variety,” the farmer hailing from Flola Village in Bougouni said while talking about the sorghum variety made available at the parks. “A farmer is guaranteed a harvest of 500 kg each from a quarter hectare of Soubatimi cultivation when compared to only 200 kg if the local variety is grown over the same area.”

Farmers from the villages of Flola and Madina were also introduced to drought-tolerant and early-maturing groundnut varieties. Intercropping agronomy practices were demonstrated at the parks to combat droughts, flooding, erosion and loss of fertility.

“My farm was affected by erosion in 2014. Subsequently, the production dipped so low that I used to get less than 400 kg of sorghum per hectare in a season. Contour bunding with fast growing tree species helped control runoff and enhanced soil fertility. My yield increased to 1,600 kg per hectare,” farmer Mamadou Berthe says.

Surge in production, increased availability of food for consumption and sale are among the many benefits of Africa RISING, explains Dr Birhanu Zemedim Birhanu, a Senior Scientist at ICIPE and the project’s coordinator in Mali. As more farmers learnt about these technologies the demand from the farming communities increased.

“Driven by farmers’ interest, Africa RISING will continue testing and validating more technologies in collaboration with other projects that meet demands of rural communities. In October 2018, a project by CARE Mali International and ICIPE began implementing Africa RISING validated technologies in the Mopti region,” he says.

More than 3,500 farmers have come out of poverty and hunger since the implementation of Africa RISING technologies in Mali. The project also spurred similar initiatives by USAID in Mopti region, where four parks were set up to target 10,000 farmers.

Africa RISING’s Tech Parks were developed with funding assistance from USAID through the International Institute of Tropical Agriculture (IITA) and the CGIAR Research Program - Water, Land and Ecosystem (WLE).

Partners include Institut d’Economie Rurale (IER), International Institute of Tropical Agriculture (IITA), The World Vegetable Center (WorldVeg), International Livestock Research Institute (ILRI), Wageningen University, CRP- Climate Change Agriculture and Food Security (CCAFS), Association Malienne d’Eveil au Développement Durable (AMEDD) and Cooperatives of the Mouvement Biologique du Mali (FENABI).

Authors:

Dr Birhanu Zemedim Birhanu  
Senior Scientist Land and Water Management (WCA)  
West & Central Africa Program

Rohit Pillandi  
Senior Communication Officer

Photographs by: ICRISAT
Awards and recognition

**AARES Distinguished Fellow award to Dr Wendy Umberger**

Dr Wendy Umberger, member ICRISAT Governing Board, received the Australasian Agricultural & Resource Economics Society (AARES) **Distinguished Fellow** award. This award recognizes members who, throughout their career, have made distinguished contributions to the advancement of agricultural and resource economics through research, teaching, extension, administration, business, or public service.

**AZRAI Honorary Fellowship award to Dr Rajeev Varshney**

For his immense contribution to the improvement of dryland crops of developing countries through pioneering contribution in the application of genomics and molecular breeding, Dr Rajeev Varshney, Research program Director, Genetic Gains, ICRISAT, was awarded Honorary Fellowship by the Arid Zone Research Association of India at Jodhpur on 11 February at the “**13th International Conference on Development of Drylands**”.

**CSR leadership award to Dr Aviraj Datta**

ICRISAT Development Center’s Dr Aviraj Datta, Scientist – Wastewater Management, received the ‘Impactful CSR Leader’ award at the Corporate Social Responsibility Summit & Awards 2019 held recently in Bengaluru. Dr Datta was recognized for his work in the Decentralized Wastewater Treatment plant in Mentapally, Telangana. The plant treats wastewater from 125 households for use in agriculture. It was set up in 2016 through a CSR initiative of REC Limited, a Government of India enterprise.

New projects

**Climate Smart Agricultural Technologies for Improved Rural Livelihoods and Food Security in Mali**

**Donor:** Norwegian Ministry of Foreign Affairs through IITA  
**Period:** 15 Jan 2019 - 2 Nov 2023  
**PI:** Dr Ramadjita Tabo  
**Project Coordinator:** Dr Baloua Nebie  
**RP:** West & Central Africa Program

**Climate Smart Agricultural Technologies, Niger**

**Donor:** Norwegian Ministry of Foreign Affairs through IITA  
**Period:** 15 Jan 2019 - 2 Nov 2023  
**PI:** Dr Ramadjita Tabo  
**Project Coordinator:** Dr Baloua Nebie  
**RP:** West & Central Africa Program

**Innovative and contextual agromet advisory services for climate smart agriculture**

**Donor:** Earth System Sciences Organization (ESSO), Ministry of Earth Sciences (MoES), Government of India  
**Period:** 29 November 2018 - 28 November 2021  
**PI:** Dr Anthony Whitbread  
**RP:** Innovation Systems for the Drylands Program

**Innovative and contextual agromet advisory services for climate smart agriculture**

**Donor:** Earth System Sciences Organization (ESSO), Ministry of Earth Sciences (MoES), Government of India  
**Period:** 29 November 2018 - 28 November 2021  
**PI:** Dr Anthony Whitbread  
**RP:** Innovation Systems for the Drylands Program

**Improving Livelihoods through Integrated Water Resources Management at Tadipatri, Anantapur**

**Donor:** UltraTech Cements Limited  
**Period:** 1 Jan 2019 - 31 Dec 2023  
**PI:** Dr Rajesh Nune  
**RP:** ICRISAT Development Center, Asia Program

**A strategy to exploit genomic selection for achieving higher genetic gains in groundnut**

**Donor:** Newton Babha Fund-BBSRC through University of Edinburgh/DBT, India  
**Period:** 5 October 2018 - 4 October 2021  
**PI:** Dr Manish Pandey  
**RP:** Genetic Gains Program

**Climate services for better risk management and build resilience of smallholder farmers in the highly vulnerable rainfed areas of India**

**Donor:** Earth System Sciences Organization (ESSO), Ministry of Earth Sciences (MoES), Government of India  
**Period:** 29 November 2018 - 28 November 2021  
**PI:** Dr Anthony Whitbread  
**RP:** Innovation Systems for the Drylands Program

**Striga control in pearl millet phase II**

**Donor:** Bill & Melinda Gates Foundation thru King Abdullah University of Science and Technology, Saudi Arabia  
**Period:** 1 January 2019 - 31 December 2023  
**PI:** Dr Prakash Gangashetty  
**RP:** West and Central Africa Program
**ICRISAT in the news**

**Hindustan Times:** World’s first green gene bank in Hyderabad

*Spread across 4,500 sq metres, the gene bank is powered by a 500 kW solar power plant generating 60,000 units per month. A gene bank is a type of bio-repository that preserves genetic material of plants and animals.*


**IPPmedia:** Government to set aside enough funding for agricultural research and development


**BBC Swahili Radio**

[https://www.bbc.com/swahili/bbc_swahili_radio/w172wg18fx26rxz](https://www.bbc.com/swahili/bbc_swahili_radio/w172wg18fx26rxz)

**Tanzania Broadcasting Corporation**

[https://www.youtube.com/watch?v=LfkTuc37bgs&feature=share](https://www.youtube.com/watch?v=LfkTuc37bgs&feature=share)

**The hans India: This school girl’s startup creating waves**

AgriVeda, a Hyderabad-based agriculture startup, recently raised $8 lakh (Rs 5.7 crore) and undoubtedly, it is one of few startups from the City of Pearls, which could raise such a significant amount of funds. But the better part of the story is that it was founded in 2017 by a sixth-grade student, Yukta Raghavendra. The 11-year-old CEO of Nirmoha Pvt Ltd, which owns the startup, has come out with a product that can be used for application of pesticide and insecticide on crops and to monitor the condition of the crop using drone technology.

Her idea, further supported by Ram Kiran Dhulipala, Head of Digital Agriculture at International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), gained her access to I-Hub, a startup incubation centre for agriculture startups located in ICRISAT. She has a 10-member team. Four of them work on agriculture research, five as software employees and one assisting with networking from the US.


**Financial express: Artificial intelligence reshaping lives, can bring societal transformation if acted upon**

The AI Sowing App developed by Microsoft in collaboration with ICRISAT is a good example of how farmers are able to get timely information on their feature phones without having to invest in sensors and how they are benefiting with the advance intimation of weather conditions and the ideal timing for sowing, thus enhancing their farm yield.


**Krishijagran: 14th Agricultural Science Congress concluded**

Besides participation from 46 ICAR institutes, state agricultural universities, several central research institutes, International organizations such as IRRI, CIMMYT, ICRISAT, IFPRI, ILRI, CIAT, BISA, ACIAR, University of Queensland, University of Tennessee, World Bank, University of Manitoba, University of Adelaide, University of Sydney, University of Catania, Massey University and many other attended the Congress.


**APN news: Microsoft shows the way to unlock full potential of AI for India**

In its work to deploy AI, Microsoft is working with policy think tanks and research organizations such as Niti Aayog (National Institute for Transforming India) and ICRISAT in creating and adopting frameworks to accelerate AI-led digital transformation across sectors. This will help frame the guard rails of where and how AI should be used to instill trust and responsibility across AI-based systems.


**APN: 1ère Edition du Festival International du Mil (festimil) à Niamey**


**Open Access Government:** The genetic improvement of cowpea: Develop highyielding varieties

CGIAR Research Program on Grain Legumes and Dryland Cereals is working on genetic improvement of the important crop cowpea to develop high-yielding varieties with resistance to diseases and pests and to increase its production and consumption, as this article from The International Institute of Tropical Agriculture (IITA) explains.

[https://www.openaccessgovernment.org/genetic-improvement/58949/](https://www.openaccessgovernment.org/genetic-improvement/58949/)

**Hindustan Times:** Researchers get AI help to map ecosystem, wildlife conservation

What’s new is that AI-based technologies are catching on big time across Indian research organisations working on environment and conservation. These organisations are being backed by big-ticket funding programs such as Microsoft’s AI for Earth, a $50 million, five-year program that has eight participants from India.

PBS: Does AI Hold the Key to a New and Improved “Green Revolution” in Agriculture?
In India, a team at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) is working on providing real-time pest predictions to help Indian farmers take specific actions to protect their crops. ICRISAT uses cloud computing, machine learning, and data from IoT (short for the “Internet of Things”) sensors to come up with personalized predictions about pest risks.
https://www.pbs.org/wgbh/nova/article/does-ai-hold-key-to-new-green-revolution-in-agriculture

The Hindu Business Line: Action plan drawn up for improved crops
https://www.thehindubusinessline.com/markets/commodities/action-plan-drawn-up-for-improved-crops/article26140801.ece
(also published in Agriculture Post, Rural Marketing, Telangana Today)

Farmbiz Africa: Organisation launches online seed informational tool to enable farmers access critical data in one click
International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), an international agricultural research organization has launched modern digital seed ‘catalog’ and seed ‘roadmap’ tool to enable farmers access information about the quality and availability of seeds in one click.

Entrepreneur India: Adopting AI in Agriculture Eases the Risk of Changing Patterns
https://www.entrepreneur.com/article/327487