Government of Maharashtra and ICRISAT-led coalition to double farmer incomes by 2022

The Government of Maharashtra and a consortium led by ICRISAT have signed a Memorandum of Understanding (MoU) for a bold initiative for science-led development of agriculture in the drought-prone drylands of Vidarbha Region of the state.

The project will benefit an estimated 55,000 farmer families directly and over 200,000 families indirectly through a wider spill-over effect leading to a doubling of family incomes over the next five years. The initiative comes in the wake of a recent announcement of a roadmap by the Government of India to target doubling of farmer incomes by 2022 across the country.

The agreement was signed in the presence of Chief Minister of Maharashtra Devendra Fadnavis. Dr Peter Carberry, DDG, ICRISAT, and Dr Suhas Wani, Director, ICRISAT Development Center, attended the signing ceremony during ongoing Magnetic Maharashtra: Convergence 2018 event in Mumbai. The event was inaugurated by Prime Minister Narendra Modi on 25 March.

“The project is driven by a partnership with research institutions, agricultural universities, Krishi Vigyan Kendras, non-governmental organizations, farmer organizations and private companies to bring holistic, participatory science-based solutions and technologies to the doorsteps of the farmers,” said Dr Wani.

The project will take a twin-pronged approach, involving scaling up of proven technologies and climate-resilient
This work contributes to UN Sustainable Development Goals.

practices in 11 districts reaching 200,000 farmer families through a wider impact. The focus will be on an integrated livelihood approach in the selected districts through science-led development. New science tools like satellites, weather forecasting, crop and water balance simulation models and IT-based solutions will be used to help farmers make climate-smart decisions for better results.

Agroecozone-based land use planning and market-led crop diversification including high-value crops to benefit farmers through a value chain approach will be adopted.

On the whole there will be an emphasis on profitability, value addition and linking farmers to markets directly for enhanced incomes, improved family nutrition, and sustainable development.

Project: KISAN MItRA: Doubling Farmers’ Income in Vidarbha Region, Maharashtra (11 districts in Vidarbha region)
Funder: Project on Climate Resilient Agriculture (POCRA), Government of Maharashtra
Partners: Research institutes, agricultural universities, Krishi Vigyan Kendras, NGOs, Farmer organizations, private companies, and ICRISAT
Crop diversity takes centerstage with 10th anniversary of Svalbard Global Seed Vault

ICRISAT scientist receives global Legacy Award for contribution towards protection of crop diversity

Dr Hari D Upadhyaya from ICRISAT, India, has received the global Legacy Award, along with six other scientists, for exceptional contribution through his life’s work on the preservation of crop diversity.

“This award is unique as it recognizes ICRISAT’s work not only in conservation of germplasm for the global community but also our unparalleled efforts in making this diversity usable through outstanding research. ICRISAT has deposited over 111,000 accessions of its mandate crops and five small millets at the Svalbard Global Seed Vault,” Dr Upadhyaya said. “This award is unique as it recognizes ICRISAT’s work not only in conservation of germplasm for the global community but also our unparalleled efforts in making this diversity usable through outstanding research. ICRISAT has deposited over 111,000 accessions of its mandate crops and five small millets at the Svalbard Global Seed Vault,” Dr Upadhyaya said.

“Conservation of crop diversity is critical to safeguarding the future generation seeds and crops that would otherwise be lost to humanity. It is critical to work tirelessly and relentlessly, as we owe this to the future generation. I am humbled by this honor and happy for the recognition for fellow ‘gatekeepers’ of crop diversity,” he added.

Dr Upadhyaya is currently based at ICRISAT’s headquarter in Hyderabad as Head, Genebank, and Principal Scientist. ICRISAT’s Genebank initiative works to address the challenges of climate change, desertification, land degradation and a host of other factors that threaten to impact the productivity and resilience of crops in the drylands, with severe consequences for food security.

Evaluating germplasm for traits of economic importance and using them in crop improvement programs with the help of modern tools can stave off hunger and preserve crop diversity for the future.

The award was formally conferred in Svalbard, Norway on 25 February 2018 to coincide with the latest shipments of more than 70,000 seeds to the iconic Seed Vault. These will take the total number of seed samples deposited there over the last decade to more than one million. Deposits are made by genebanks from all over the world, to back up their own collections safely and securely.

Several of the Crop Trust Legacy Award recipients have made an invaluable contribution to the vitally important genebanks of CGIAR, which conserve and share hundreds of thousands of seeds of food and forage crops. Duplicates of seeds from CGIAR genebanks make up the majority of varieties currently backed up in the Svalbard Global Seed Vault.

The full list of Crop Trust Legacy Award recipients includes:

▪ Daniel Debouck– International Center for Tropical Agriculture (CIAT), Colombia
▪ Jean Hanson– International Livestock Research Institute (ILRI), Ethiopia
▪ Ahmed Amri– International Center for Agricultural Research in the Dry Areas (ICARDA), Morocco
▪ Hari D Upadhyaya– International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), India
▪ Dave Ellis– International Potato Center (CIP), Peru
▪ Ruairaidh Sackville Hamilton– International Rice Research Institute (IRRI), the Philippines

In addition, a Legacy Award will also be given to Cary Fowler. Cary was one of the visionaries of the Svalbard Global Seed Vault and worked tirelessly for its creation. He is currently a special advisor to the Crop Trust after serving as the organization’s Executive Director from 2007-2012, a period that saw the Vault being designed and constructed, as well as receiving its first shipments of seeds in 2008.

This work contributes to UN Sustainable Development Goals
Companies, Government and ICRISAT to work together to meet the Indian Government’s biofuel target

A unique partnership of large corporates, the government and ICRISAT will work towards 2G biofuel plant feedstock planning and production for India’s upcoming 12 biofuel plants. Each plant has an outlay of ₹ 7.5 billion (USD 115,245,000) with a production capacity of 100,000 liters of ethanol per day.

“As India does not have enough ethanol to blend with gasoline (petrol) to meet its blending targets (20% by 2017), 12 ligno-cellulosic biofuel plants are being set up,” said Mr YB Ramakrishna, Chairman, Working Group on Biofuels, Ministry of Petroleum and Natural Gas, Government of India. He said that the goal of the Government was to:

▪ Promote biofuel production and utilization
▪ Reduce crude oil and petroleum products imports
▪ Increase self-reliance in transportation fuels
▪ Reduce greenhouse gas emissions.

“We are considered as a trusted research-for-development partner in feedstocks development and taking technologies to farmers for ensuring sustainable feedstocks production for the success of the 2G biofuel program,” said Dr A Ashok Kumar, Principal Scientist, Asia Program, ICRISAT.

Biofuel processing technologies presented by private companies reviewed

Various private companies from India and abroad made presentations on processing technologies available for biofuel production in 2G plants at a meeting held at ICRISAT. The monthly meeting of the Working Group was also held to review the progress of 2G biofuel plants establishment and other initiatives in the biofuels front.

Progress made by ICRISAT in developing biofuel feedstock

Participants of the workshop were taken to the sorghum fields and shown the progress made by ICRISAT in developing feedstock for 1G and 2G biofuel production. The genetic enhancement work done in improving the stalk yield, juice yield, percentage of sugar (brix) and ethanol yield were showcased to the group along with the efforts in commercialization of feedstock for biofuel production (Umakanth and Ashok Kumar 2016; Ashok Kumar et al., 2010 and Reddy et al., 2008).

Demonstrations were held on measurement of brix content in the field and the breeding methods followed to protect the grain yield while improving sorghum for biofuel traits so that farmers can get dual income from stalks and grain.

High biomass sorghum that gives higher ethanol yield and stands at a height greater than 4 m was shown to the group. Sorghum produces high biomass per unit of time, land, water, nutrient vis-a-vis other known 2G biofuel feedstock like sugarcane, paddy, corn and switch grass. The low-lignin containing brown midrib (bmr) introgression lines that increase the recovery of biofuel and reduce the cost of production were also shown (Castro et al., 2017).
ICRISAT is striving to improve the market opportunities for drylands farmers and the 2G biofuels initiative offers a major platform for using sorghum, one of the mandate crops, as feedstock for commercial biofuel production. Each 2G plant needs close to 500 tons of feedstock per day and considering the average landholdings of 1 ha, 500 farm families get benefited per day by supplying stalks to 2G plant. In a year, the 2G plant operates for 300 days and directly benefit 150,000 farm families. For 12 plants the beneficiaries will be 1.8 million farm families. This partnership is unique and win-win for all the parties involved.

**How smallholder sorghum farmers will benefit**

<table>
<thead>
<tr>
<th>As a crop</th>
<th>As an ethanol source</th>
<th>As bagasse</th>
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<tr>
<td>▪ Shorter gestation period (3–4 months compared to 12-16 months in sugarcane)</td>
<td>▪ Eco-friendly process</td>
<td>▪ Higher biological value</td>
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<tr>
<td>▪ Dryland crop</td>
<td>▪ Superior quality</td>
<td>▪ Rich in micronutrients</td>
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<tr>
<td>▪ (Water requirement of 8000 m³ over two crops compared to 36,000 m³ over one crop)</td>
<td>▪ Less sulfur</td>
<td>▪ Use as feed/for power/cogeneration/biocompost</td>
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<tr>
<td>▪ Greater resilience</td>
<td>▪ High octane</td>
<td>▪ Farmer friendly</td>
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<td>▪ Farmer friendly</td>
<td>▪ Automobile friendly</td>
<td>▪ Meets fodder/food needs</td>
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<td>▪ Meets fodder/food needs</td>
<td>▪ (up to 25% of ethanol petrol mixture)</td>
<td>▪ Non-invasive/least invasive species</td>
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<td>▪ Low soil NO₂/CO₂ emission</td>
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Partnering to strengthen value chain: Key focus at the launch of global program for grain legumes and dryland cereals

Over 150 participants from 25 countries met to identify better models for partnering as part of the launch meeting of the CGIAR Research Program on Grain Legumes and Dryland Cereals (GLDC). Dr Peter Carberry, Director of GLDC, set the framework from the start, underlining that the Program’s approach is how it can add value to what is already being undertaken. Linking initiatives and building on each other’s strengths will be a key focus of the approach.

Ethiopia’s Minister of Agriculture and Natural Resources, H E Dr Eyasu Abraha Alle, who inaugurated GLDC, supported the value chain approach noting, “Grain legumes and dryland cereals are what have been termed as ‘Smart Food’ because they are: Good for you, Good for the planet, and Good for the farmer. However, they have received less attention and their value chains have not been as well developed. We need to do something different! Through partnerships like GLDC, we will build this whole industry from the consumer end and also develop the food processing industry and connect this right back to the farmers.”

He also challenged the team, “We have to work furiously for the drylands. Tackling the drylands means being climate smart. Grain legumes and dryland cereals are well adapted to the drylands and naturally nutritious. I challenge the CRP to come up with a strategy for the drylands of Ethiopia. These are Smart Foods and we need to diversify our diets with them.”

Jointly launching the Program was Dr Nigel Kerby, Board Chair, ICRISAT, who congratulated the whole team behind GLDC: “As Chair of the ICRISAT Board and on behalf of ICRISAT which has pulled together the partners and prospective for this Program, I take great pleasure in joining the 44 partner institutions and the Minister of Agriculture and Natural Resources for the launch of GLDC. I am very impressed by the commitment shown by the over 150 delegates at the launch, from many different disciplines and their belief in GLDC. I wish great success to GLDC over the next five years of the first phase.”

GLDC’s vision is to deliver improved rural livelihoods and nutrition by prioritizing demand-driven innovations to increase production and market opportunities along value chains. The program supports research for development purposes on six legumes (chickpea, cowpea, pigeonpea, groundnut, lentil and soybean) and three cereals (sorghum, pearl millet and finger millet). It will focus on the semi-arid and sub-humid dryland agroecologies of sub-Saharan Africa and South Asia. The Program is a partnership of CGIAR centers, public and private organizations, governments and farmers worldwide.
Farmers, scientists and government design recipes for resilient and profitable agriculture in Karnataka

In order to improve livelihoods of struggling farmers in Karnataka, India, multiple CGIAR research centers came together to design and implement a long-term, multi-pronged strategy that was so successful that it was scaled up in several other regions and continued into successive phases. Farmer incomes increased by as much as 38% despite adverse climatic conditions and farmer-inclusive projects ensured sustainability.

The first decade of this millennium, specifically between the years 2001 and 2008, was difficult for farmers in Karnataka state in southern India. Growth in the agricultural sector had been poor, with investors reluctant to pump any more money into the ‘losing proposition’ that was agriculture. Looking for answers, the state government approached ICRISAT, a member of the CGIAR System Organization.

In 2009-2010, ICRISAT proposed the Bhoochetana (Revival of the Land) initiative with the following:

1. Creation of a State-Level Coordination Committee (SLCC), comprising of Secretaries of the State, Vice Chancellors of Agricultural Universities, and chaired by the Additional Chief Secretary (ACS). This Committee would have the power to make quick, abiding decisions that had to be implemented within a short stipulated period.

2. Appointment of Farm Facilitators in each village – an active farmer who would be trained by an ICRISAT-led consortium to be the link between the Department of Agriculture and the farmers of his/her village.

3. Starting with six districts initially, the farmland soils were tested for micro- and macronutrient deficiencies. Based on the ‘soil health report cards’ that the farmers received for their respective farms, they were provided subsidized fertilizers (micronutrients and secondary nutrients) that would improve the nutrient balance of the land.

4. Effective monitoring and incentive-based rating systems were put in place to ensure complete adherence to the project procedures and goals.

After a successful pilot, the intervention was scaled up to the 30 districts of Karnataka. At the end of the first phase of the Bhoochetana project, over 4 million farmers had benefitted from the project, with their incomes increasing by 20-66%. From 2009–2012, the total benefits were over US$242 million, despite many districts being hit by drought consecutively in 2011, 2012 and 2013.

The remarkable success of the Bhoochetana initiative spurred the Karnataka Government to try more science-based interventions in agriculture; but this time they wanted more institutions to contribute in a more diversified manner.

The result was Bhoosamruddhi (Prosperity of Land), started in the year 2015: a multi-stakeholder development project that converged the capabilities of more than five CGIAR centers of scientific research and innovation.

With ICRISAT acting as the connecting link, reputed CGIAR organizations viz. the International Maize and Wheat Improvement Center (CIMMYT), International Center for...
Agricultural Research in the Dry Areas (ICARDA), International Livestock Research Institute (ILRI), International Rice Research Institute (IRRI), International Food Policy Research Institute (IFPRI), and World Vegetable Center (WorldVeg) joined in a multipronged approach that targeted several problem areas faced by farmers. Indian institutions such as the Indian Institute of Horticultural Research; University of Agricultural Science, Karnataka; Department of Agriculture and Department of Horticulture also collaborated in the consortium with the international institutes, providing vital resources and inputs into the local needs of the farmers.

Four districts in Karnataka – Tumakuru, Raichur, Chikkamagaluru and Vijayapura – were chosen as the sites for the pilot projects.

CIMMYT provided improved maize cultivars suited to the region, apart from sharing important technologies such as zero-till farming. Zero tillage is a way of cultivating crops without ploughing the soil every year. This technique helps rainwater to infiltrate the soil better, and also increases retention of organic matter, thereby improving soil quality. Machinery such as zero-till multi-crop planters, laser levelers, relay planters etc. benefited the farmers by reducing drudgery and increasing efficiency on the farm. CIMMYT scientists recommended a balanced application of nutrients tailored to the soil requirements of the region; farmers now knew exactly which fertilizer to use in which area of their fields, eliminating the earlier wasteful practice of sprinkling generic fertilizers all over the field.

IRRI introduced improved rice cultivars for high yields; water-saving techniques such as direct seeded rice (DSR); and integrated weed management, leading to great savings for farmers.

ILRI’ innovative feed assessment tools – FEAST and TechFit – gave smallholder farmers easy methods to assess the availability and usage of local feed resources. With the help of these tools, it was easy to plan the best use of available resources for feeding livestock and improving their marketability.

ICARDA focused on providing cheap and high-quality fodder to livestock owners so that their livestock did not suffer during the dry months. It introduced cultivation of thorn-less cactus; this variety of succulent cactus thrived even on degraded lands, providing high-moisture feed for the animals even in times of water scarcity.

WorldVeg helped farmers grow vegetables such as mung bean, tomato etc. after the major crop was harvested. It provided them with low-cost polyhouses for maintaining temperature and humidity in very high temperatures during summer. Farmers added to their income by selling these vegetables profitably.

Apart from acting as the networking hub between the various organizations and the local government, ICRISAT also brought in its homegrown technologies such as accelerated aerobic composting by the addition of a concoction of microbes to shredded organic material such as leaves and stems. It also enabled farmers to have a bigger say in the crops they grow by practicing farmer participatory varietal selection. Along with appropriate soil and water management practices like broad bed and furrows (BBF), soil-test based nutrient management including deficient micro- and secondary nutrients. Preparation of quality compost using vermicompost was demonstrated to and adopted by the farmers.

The result of the collaboration among this exemplary consortium of change agents has been astounding. The International Food Policy Research Institute, which assessed the success rate of the Bhoosamruddhi initiative in the four districts, surveyed 472 beneficiary and 502 non-beneficiary farmer families. It noted an increase of up to 38% in income of farmers in these pilot regions.

Designing a system for many farmers to adopt technologies, improved varieties or breeds and farming practices is a veritable science of delivery. Building multi-stakeholder partnerships (or what Dr Suhas Wani, Director, ICRISAT Development Center, calls ‘A consortium approach’) is critical to achieving significant development impact on the ground. Bhoosamruddhi is a perfect example of cross-sector partnerships for the benefits of scientific advances and innovation to trickle down to the smallholder farmer in the vulnerable regions of the world.
Changing lives of smallholder farmers with innovations and partnerships: The Tropical Legumes Project

Innovative technologies for seed multiplication, increased farmer involvement in varietal selection processes, and information and training about efficient farm management practices have raised incomes as well as awareness of farmers in a rural region in Tanzania.

A partnership between the ICRISAT-led Tropical Legumes Project and the Agricultural Seed Agency (ASA) in Tanzania was facilitated by the Naliendele Agricultural Research Institute (NARI) in 2007, with one of the goals being to enhance groundnut productivity and production in Tanzania. As a result of this outstanding partnership, numerous farmers’ lives have changed for the better in Mnanje B Village in Nanyumbu District, Tanzania, under the ‘Naliende Crop Improvement Program’.

Earlier, it was very difficult for the farmers in the region to access early generation seeds, especially of self-pollinated legume crops. Seed companies also avoided investing in these crops because of poor rates of seed replacement by farmers. Under the program, the ASA produced and promoted the ‘orphan’ crop seeds, with a long-term goal of making the seeds available to all farmers across Tanzania.

In 2007, the second phase of the Tropical Legumes project (TL II) capitalized on the ongoing partnership between the villagers and the NARI. NARI had earlier introduced participatory varietal selection (PVS) in the region and the villagers benefited immensely due to it.

TL II enabled the farmers further by engaging them in deeper discussions about their preference of groundnut varieties and supplied them with the ones that were most suited to and most desired by the farmers. The program has excellent irrigation facilities installed under TL II, making it possible to have multiple production cycles per year. Adoption of improved varieties, together with integrated crop management practices, has contributed to increased groundnut productivity.

Farmer Pesa of Mnanje village was unemployed and poor, until the program trained him on groundnut seed production techniques. Today, he is a wealthy groundnut farmer who also owns livestock and multiple rental properties.

Farmer Helena Petro outlines education and awareness creation as the major non-commercial benefits of participating in PVS trials. Participating farmers get to try new better varieties before others and often are the first to receive the seed and replace the old, poor-yielding varieties. Today, the farmers’ group produces up to 25 t/season of Quality Declared Seed of the high-yielding varieties and Naliendele buys it from them at good rates for supplying to other, more remote regions.

The program has introduced a groundnut school garden program in Mnanje Primary School, wherein schoolchildren are taught the basics of groundnut crop production and they apply the knowledge in their parents’ home-gardens. The school receives groundnut seeds from Naliendele and uses the grain for food and for income. In a recent competition among schools, Mnanje was topmost groundnut producer in the district.

Mr Adam Abdnialhi Nyirenda from Maugula village in Masasi district produces Nachingwea, Mangaka and Naliendele varieties released in 2009. He sells groundnut...
Students of Mnanje Primary School listen to Mr Agili Mrekoni talk about the Groundnut School Garden Program.

First from right Mr. Nyirenda and some of his fellow farmers in one of the TV program explaining importance of improved varieties in their district.

Mrs Pesa and Mr Mathayo Danford display various training material.

to buy inputs for cashew nuts; he no longer waits for subsidy. He appreciates varieties released in 2009 as high-yielding, disease-resistant, drought-tolerant, early-maturing and highly marketable. After appearing on radio and television to discuss the agronomic traits of the new varieties, Mr Nyirenda now receives calls and orders for seed from across the country, including the Lake Zone, more than 1500 km away. He has established a network of more than 20 individual farmers in the village; they produce QDS seeds and jointly sell to different groups within and outside the district. In the 2016/2017 season, Mr Nyirenda and his network produced six tons of the Nachingwea variety of groundnut.

Tropical Legumes and its partnership with ASA/NARI has played a significant role in making groundnut the second largest crop after maize on the basis of area, in Tanzania. 

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, (U.P.), India Funder: Bill & Melinda Gates Foundation CRP: Grain Legumes and Dryland Cereals

This work contributes to UN Sustainable Development Goals

1 NO POVERTY 8 DECENT WORK AND ECONOMIC GROWTH 17 PARTNERSHIPS FOR THE GOALS
Wild crops could save chickpeas from being blitzed, scientists say

They are nutritious, versatile and a dietary staple for millions of people from South Asia to Ethiopia, but scientists have warned that the humble chickpea is under threat from climate impacts such as higher temperatures, drought and pests.

The key to saving the chickpea could lie with a project cross-breeding domestic and wild varieties – found only in southeastern Turkey near the border with war-torn Syria – said a study published this week in the journal Nature Communications.

Unlike domestic crops, which receive dedicated care in the form of fertilisers and pesticides, their wild relatives are able to adapt to changing conditions, according to scientists.

“It will take another five years before it’s in the hands of a farmer in Ethiopia ... but we are well on the road to being there,” Eric J. B. von Wettberg, a plant geneticist at the University of Vermont, told the Thomson Reuters Foundation.

He said researchers were working with the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), an India-based agricultural research body, to ensure that the resilient seeds make it to market once they are available.

About one in five people globally depend on legumes such as chickpeas as their primary source of protein, Von Wettberg said.

He called for better protection for and conservation of wild varieties of crops, which could have traits that would allow them to survive and thrive under climate pressures.

“They (wild crops) may be our most potent weapon against climate change,” said Chikelu Mba, plant geneticist at the United Nations’ Food and Agriculture Organization (FAO).

“They are irreplaceable,” he said by phone, adding that chickpeas were vital for nutrition in many developing countries.

Scientists are also assessing wild rice varietals to combat climate change, with one species growing in northern Australia’s crocodile-infested waters raising hope for a more nutritious grain that is drought- and pest-resistant.

ICRISAT to give nutritional supplements to the anemic

Mancherial: Supplementary nutritional food prepared by the ICRISAT will be supplied to those suffering with anemic in Kasipeta village of Mancherial district, Tiryan of Asifabad district and Utnoor of Adilabad district till July 25 as part of a project that commenced from October 29 last year.

In a release, District Collector RV Karnan said Kasipeta Agency village has been identified as the pilot project for the purpose. Snacks and tiffins like biscuits, kichidi, upma and halwa will be given to children aged between three and six years and suffering from anemia. They also will be given ICDS nutritional supplement.

"London residents Elizabeth, Elina and Priyanka and Bellampalli sub-collector Rahul Raj at an Anganwadi center in Kasipeta on Tuesday evening."
Government may adopt digital tech to reach small-scale farmers

To address numerous challenges bedeviling small scale farming in the country, the Federal Government may adopt phygital technology to reach farmers across the country.

The Permanent Secretary, Ministry of Agriculture and Rural Development Bukar Hassan, while speaking during the presentation of the phygital smallholder value chains technology in Abuja harped on the need to provide extension services for small scale farmers.

He said: “If we want the small scale farmers find its right foot place in Agriculture, we must do exactly what we are saying here; we must provide the Farmer extension services, the knowledge he will need to evolve his farming skills from subsistence to commercial farming, and I believe this technology would help us solve so many problems”.

The Director General, Manobi Daniel Annerose said the project to be implemented in collaboration with the International Crop Research Institute for the Semi Arid Tropic (ICRISAT), said the aim of the project is to reach 100,000 farmers before the end of 2018, and reach 50million farmers across Africa by 2020. The the project would monitor the production process to harvesting, transportation till it get to the final consumer.

Disclosing that the project has kicked of with an initial investment of $800,000, he said that the overall plan is to invest $50million within the next two years to enroll one million farmers and prepare the recruitment of 50million farmers in the next five years. He added that project would also ease financial lending to farmers as commercial banks would be provided.

The Director, Research and Development Digital Agriculture Manobi, Pierre Sibery Traore, explained that the initiative is divided into two phases of agcelerant and phygital technology. He added that the agcelerant is the value chain orchestration platform that helps link smallholders farmers to financial services, insurance, offtakers that is agro industries, agro advisors and giving them technical support on how to meet their production target.

He said the essence of the project is to ensure the safe inclusion of the small scale farmers to the World Food Market stressing that because of the size of Nigeria economy the country would be a major supplier of food to the world in the coming decade and there is the need to set in motion the phygital infrastructure to make it happen.

Traore further explained that the organization is also launch the Nurturing Africa Digital revolution for Agriculture (NADIRA), explaining that the purpose was to embed in phygital agriculture the use of advance satellite technology.

He said they are working with the European Space Agency who have develop a system that has some satellite updating the earth and providing free data for up to 10meters for every five days all over the world.

He said the data would help monitor crop response in smallholder field in aerial time and embed the data stream into mobile telephoning and other phygital infrastructure.
Distant cousins of domesticated crops harbor traits to feed a hungry planet

Recently, scientists found that more frequent flooding caused by storm and rainfall along with erratic temperature are responsible for the resurgence of phytophthora blight, a devastating disease that weakens pigeonpea stems irrespective of soil types and cropping patterns. With climate change, new invasive pests and changes in the farming landscape, strategic pulses like pigeonpea can dramatically fail. Crop breeders race against time to develop varieties that can adapt or withstand new risks but are sometimes at a loss to find appropriate traits from the pool of cultivated germplasm. [Read more]

Looking beyond the big staples

“Improving nutrition through diet diversification and better food systems is key to good health and for this, we need to look beyond the big staples,” says Dr Prabhu Pingali in this video blog.

“Defining pathways to link agriculture and nutrition are important to improving nutrition and augment livelihoods in the rural parts of India,” Dr Pingali adds. [Read more]

Resilience over profitability: Could agricultural research deliver on both?

“Although in recent years we are inclined towards separating the two issues while designing research, reviewing our agricultural research for development over the past 45 years shows that it is possible for research to develop win-win technologies,” says Kai Mausch lead author of a ‘new study’ looking at how ICRISAT research could improve both farmers’ resilience and their incomes. [Read more]

Agriculture policy: An actionable strategy to make doubling of farmers’ income possible

The most vital point of the ambitious goal to double farmers’ income (DFI) by 2022 — the 75th year of India’s Independence — set by the Prime Minister Narendra Modi is the paradigm shift in the agricultural policy space that it entails. The focus is now on the “profitability” rather than simply the “productivity” aspect of farming.

The Modi government has further launched a number of schemes such as Pradhan Mantri Krishi Sinchayee Yojana, Pradhan Mantri Fasal Bima Yojana, Soil Health Card, Neem-coating of Urea and e-NAM (electronic National Agriculture Market) for achieving sustainable agricultural growth. [Read more]
Dr Elisabetta Aurino, is a developmental economist from the Centre for Health and Economics and Policy Innovations at the Department of Management, Imperial College Business School, Imperial College London, UK.

'Molecular events underpinning the evolution of C4 photosynthesis' - A Science Seminar presented by Prof. Julian Hibberd, Head of Group; Radiation Protection Supervisor, Department of Plant Sciences, University of Cambridge, UK, on 30 January 2018 at ICRISAT, Hyderabad, India.
Panel discussion on integrating Smart Food across programs at Deccan CSR Summit

At the recent Deccan CSR Summit a panel discussion was held on ‘Integrating Smart Food across programs’ to discuss ways in which Smart Food can be included into existing initiatives. The discussion focused on Corporate Social Responsibility (CSR) engagement on health/nutrition, agriculture development, entrepreneurship programs, education and agribusiness programs, among other aspects.

Joanna Kane-Potaka, Director External Relations and Strategic Marketing, ICRISAT, moderated the discussion. The flagship summit brought together companies, foundations, not-for-profits, entrepreneurs and policy makers under one roof on 22 February in Hyderabad.

She set the tone for the discussion by underlining that Smart Food is good for the consumer (highly nutritious), good for planet (sustainable) and good (viable) for the farmer. Millets and legumes are recognized as Smart Foods. They are growing in popularity with increasing awareness among consumers and food companies.

“We are calling for programs that support farmers to educate them about nutritional value of these crops and their environmental value. There is a need to help entrepreneurs who want set up businesses and marketing of Smart Food,” she added, defining the scope of discussion while inviting the panellists to present.

The panel had a wide range of participants in terms of the organizational affiliations and sectors they represented.

Following are the panellists and the theme or topic they spoke on:

- Leigh Fisher, CSR External Relations & Partnerships, The Aga Khan Academy, Hyderabad, spoke on how education or nutrition CSR programs can incorporate Smart Foods (like millets) to have a better outcome and how best to do this.
- Dr Dayakar Rao, PI Center of Excellence for Agribusiness, ICAR-International Institute of Millets Research, spoke on how agribusiness incubation can support SMEs and the role CSR can play.
- HG Satya Gaura Chandra Dasa, President, The Akshaya Patra Foundation, Andhra Pradesh & Telangana and Hare Krishna Movement-Hyderabad, spoke on approaches to bringing Smart Food into meal schemes.
- Sitaram K, Founder & Managing Trustee, GrameenMall Foundation, spoke about working directly with farmers to improve livelihoods through Smart Food.
- Dibyajyoti Borgohain Saikia, Co-Founder, Ind Millet Foods, spoke on challenges of SMEs and how CSR can support SMEs in Smart Food.
- Sridhar Irivent, Founder and Director of GoBhaarati, spoke on how CSR can influence bottom-of-the-pyramid kitchens in to preventive pharma, using Smart Food.
ICRISAT, Grain Legumes and Dryland Cereals (GLDC) team participated in the Pulses Conclave 2018 held from February 14th to 16th, 2018 at Delhi, India. The biennial event was hosted by the India Pulses and Grains Association (IPGA), which is considered as the apex body of India’s pulses and grains industry and trade.

IPGA is one of the partners in the CRP on GLDC that is led by ICRISAT.

As a support partner for the Conclave, ICRISAT showcase activities proposed under its newly unveiled flagship research program. Visitors to the exhibit stall were provided with an overview of GLDC, and partnership opportunities were explored with other exhibitors who comprised of trade associations, and participants offering value-added services in the pulses value chain. ICARDA also participated in the event.

Presence of GLDC team at the conclave created awareness about CGIAR’s role in general, and CRP-GLDC in particular. GLDC focus research areas among selected grain legume crops (cowpea, chickpea, pigeonpea, and lentils) were an exact match with many discussions and deliberations at the conclave. Dr D Kumara Charyulu of ICRISAT made a presentation on the newly launched CGIAR Research Program on Grain Legumes and Dryland Cereals at the Conclave.

Among the visitors to the stall was H.E. Charity Ngilu, Governor of the Kitui County from Kenya and her team who showed interested in ICRISAT’s research work. Since Smart Food Kenya already is working in the county, this conversation could lead to opening of GLDC-related activities in the region.
Awards and Fellowships

Government of Uttar Pradesh felicitates Dr Rajeev K Varshney

The State Government of Uttar Pradesh (UP) recognized Dr Rajeev Varshney for his outstanding contributions to the field of genomics during a ceremony held on 26 January 2018 as part of the celebrations of UP State’s Foundation Day at the state capital Lucknow. Dr Varshney expressed joy and gratitude at being felicitated by his home state.

Honorary Fellowship for Dr Peter Carberry by ISPRD

Dr Peter Carberry, ICRISAT, DDG, was conferred Honorary Fellowship by the Indian Society of Pulses Research & Development (ISPRD) and felicitated by Indian Institute of Pulses Research (IIPR), Kanpur.

Dr Carberry was awarded the fellowship during his maiden visit to the IIPR visited different fields and saw research collaboration outputs from different disciplines such as breeding, pre-breeding, genebank, genomics and molecular breeding, genetic engineering, agronomy etc. Some key impressive material includes QTL hotspot introgression lines, Fusarium wilt introgression material in chickpea, B-chickpea and B-Pigeonpea lines testing in fields, heat tolerant, machine harvestable lines in chickpea and hybrid breeding material in Pigeonpea.

ICRISAT shares its knowledge repository with National Digital Library

ICRISAT was recently recognized for its significant contribution towards content curated in the National Digital Library of India (NDL India). Over 20,000 information resources (including 8000 publications by ICRISAT scientists and over 12,000 articles related to ICRISAT’s mandate crops) have been shared with NDL India. By being included in the virtual repository, the visibility of the ICRISAT’s research will be enhanced manifold, increasing the reach of the research articles and findings to larger circles.

NDL India is an all-digital library that stores information (metadata) about different types of digital content (books, articles, videos, audios, these and other educational material) in varied subjects such as science, technology, agriculture and humanities. So far, over 10 million items, by more than 300,000 authors have been collected in the repository. It provides a single-window search facility to access digital content currently existing in India across different institutions.

The NDL India initiative is a pilot project under the National Mission on Education through Information and Communication Technology (NMEICT) by the Ministry of Human Resources and Development (MHRD)

Readers’ comments

“Many encouraging initiatives in Africa, led by African scientists. Investment in education may have a time lag before pay off. Compared with 40 years ago the results are now very obvious, and there is greatly increased self-determination by African countries.

Seed production is essential for enabling adoption of new varieties, and various models such as involving local producer-distributors can be implemented. Especially for grain legumes with a very low seed multiplication factor compared with cereals, seed production will be key for climate-smart sustainable agriculture.

I enjoyed reading this newsletter.”

Regards,
Bob Redden
Newsfeed

Wild crops could save chickpeas from being blitzed, scientists say

Nigeria: Govt May Adopt Digital Tech to Reach Small-Scale Farmers

FG to adopt digital technology for small scale farmers

Government may adopt digital tech to reach small-scale farmers

Super Sorghum

Tripling the number of grains in sorghum and perhaps other staple crops

Five reasons why women should be eating millet

Microbrewery takes to millets for making beer

Save the seeds - and the living plants we eat and use

Arctic stronghold of world’s seeds reaches one million mark

AfDB President Dr. Akinwumi Ade urges U.S. to support Africa’s agri business

India to produce 277.5 mt of food grains in FY18 against target of 274.5 mt

New projects

Agricultural Transformation in Uttar Pradesh: Equitable, Scientific, Prosperous and Climate Smart Primary Sector Mission

Funder: Government of Uttar Pradesh
Research Program: Asia
Principal Investigator: Dr Suhas Wani
Duration: 1 Jan 2018 – 31 Dec 2021

KISAN MITrA: Doubling Farmers’ Income in Vidarbha Region, Maharashtra (11 districts in Vidarbha region)

Funder: Project on Climate Resilient Agriculture (POCRA), Government of Maharashtra
Research Program: Asia
Principal Investigator: Dr Suhas Wani
Year of commencement: 2018

Participatory evaluation for Fast Track release of high-yielding diseases resistant cultivars of Pigeonpea

Funder: Project on Climate Resilient Agriculture (POCRA), Government of Maharashtra
Research Program: Asia
Principal Investigator: Dr Suhas Wani
Year of commencement: 2018
New publications

Microbial consortium culture and vermi-composting technologies for recycling on-farm wastes and food production

Authors: Chander G, Wani SP, Gopalakrishnan S, Mahapatra A, Chaudhury S, Pawar CS, Kaushal M and Rao AVRK
Abstract: A study was conducted to characterize the ‘Madhyam culture’ (Excel Crop Care Limited.), an aerobic-composting microbial consortium culture, and understand composting dynamics, product quality and use in crop production vis-à-vis vermi-composting (using earthworms).

Aerobic-composting (using microbial consortium culture), like vermi-composting, proved to be an effective technology with advantage of no requirement to maintain ambient living conditions in lean periods as is required for earthworms in vermi-composting, but needs more energy/labor for biomass turnings.

OAR link: http://oar.icrisat.org/10409/

Towards climate-smart agricultural policies and investments in Telangana

Published: 2018, CCAFS
Abstract: This briefing note summarizes the key findings of the “Scaling up climate-smart agriculture in the Telangana State” project, carried out by the International Crops Research Institute for the Semi-Arid Tropics and partners, between 1st January 2016 and 31st December 2017.

OAR link: http://oar.icrisat.org/10413/

On-Farm Demonstrations with a Set of Good Agricultural Practices (GAPs) Proved Cost-Effective in Reducing Pre-Harvest Aflatoxin Contamination in Groundnut

Authors: Parimi V, Kotamraju V and Sudini H
Published: 2018, Agronomy, 8(2) (10). pp. 1-13. ISSN 2073-4395
Abstract: Aflatoxin contamination in groundnut is an important qualitative issue posing a threat to food safety. In our present study, we have demonstrated the efficacy of certain good agricultural practices (GAPs) in groundnut, such as farmyard manure (5 t/ha), gypsum (500 kg/ha), protective irrigation at 90 days after sowing (DAS), drying of pods on tarpaulins after harvest in farmers’ fields. During 2013–2015, 89 on-farm demonstrations were conducted advocating GAPs, and compared with farmers’ practices (FP) plots. Based on our results, it can be concluded that on-farm demonstrations were the best educative tool to convince the farmers about the cost-effectiveness, and adoptability of aflatoxin management technologies.

OAR link: http://oar.icrisat.org/10415/

Improving nutrient use efficiency from decomposing manure and millet yield under Plinthosols in Niger

Authors: Fatondji D and Ibrahim A
Published: 2018, Nutrient Cycling in Agroecosystems. pp. 1-15. ISSN 1385-1314
Abstract: To improve synchronicity between nutrients released from the decomposing manure with millet nutrient requirement under zaï technique, a 2-year field experiment was conducted at the International Crops Research Institute for the Semi-Arid Tropics Research Station, Sadoré, Niger. We conclude that application of manure prior to planting satisfies better millet nutrients demand, thereby increasing nutrient use efficiency and grain yield under zaï pits.

OAR link: http://oar.icrisat.org/10416/

Surface Freshwater Limitation Explains Worst Rice Production Anomaly in India in 2002

Authors: Zampieri M, Garcia GC, Dentener FM, Gumma MK, Salamon P, Seguini L and Toreti A
Published: 2018, Remote Sensing, 10 (2). pp. 1-19. ISSN 2072-4292
Abstract: India is the second-most populous country and the second-most important producer of rice of the world. Most Indian rice production depends on monsoon timing and dynamics. In 2002, the lowest monsoon precipitation of the last 130+ years was observed. It coincided with the worst rice production anomaly recorded by FAOSTAT from 1961 to 2014. In that year, freshwater limitation was blamed as responsible for the yield losses in the southeastern coastal regions. Given the important implication for local food security and international market stability, we here investigate the specific mechanisms behind the effects of this extreme meteorological drought on rice yield at the national and regional levels. Our findings highlight the need for integrating non-local surface freshwater dynamics with local rainfall variability to determine the soil moisture conditions in rice fields for yields assessment, modeling, and forecasting.

OAR link: http://oar.icrisat.org/10417/

Double-Stranded RNA-Mediated Suppression of Trypsin-Like Serine Protease (t-SP) Triggers Over-Expression of Another t-SP Isoform in Helicoverpa armigera

Authors: Sharath Chandra G, Asokan R, Manamohan M, Ellango R, Sharma HC, Akbar SMD and Krishna Kumar NK
Published: 2018, Applied Biochemistry and Biotechnology, 184 (2). pp. 746-761. ISSN 0273-2289
Abstract: High diversity of digestive proteases is considered to be the key factor in the evolution of polyphagy in Helicoverpa armigera. Serine proteases (SPs) contribute ~85% of the dietary protein digestion in H. armigera. We investigated the dynamics of SP regulation in the polyphagous pest, H. armigera using RNA interference (RNAi). These findings provide a new evidence of the existence of compensatory effect to overcome the ef-
fect of silencing individual gene with RNAi. Hence, the study emphasizes the need for simultaneous silencing of multiple isoforms.

**OAR link:** [http://oar.icrisat.org/10418/](http://oar.icrisat.org/10418/)

**Genome-wide in silico analysis of dehydrins in Sorghum bicolor, Setaria italica and Zea mays and quantitative analysis of dehydrin gene expressions under abiotic stresses in Sorghum bicolor**

**Authors:** Nagaraju M, Reddy PS, Anil Kumar S, Kumar A, Suravajhala P, Ali A, Srivastava RK, Kavi Kishor PB and Manohar Rao D

**Published:** 2018, Plant Gene, 13. pp. 64-75. ISSN 23524073

**Abstract:** Dehydrins (DHNs) are highly hydrophilic, thermostable, calcium dependent chaperons involved in plant developmental processes as well as in diverse abiotic stresses. A systematic survey resulted in the identification of 7 dehydrins (DHNs) in *Setaria italica* and *Zea mays*, but 6 in *Sorghum bicolor*. They are classified into 5 sub-groups, namely YnSKn, SKn, KnS, S, and YnS. In contrast to other DHNs, the SbDHN2 of YnS subgroup, exhibited the highest expression, under multiple stresses in all the tissues indicating its involvement against a wide array of abiotic stresses.

**OAR link:** [http://oar.icrisat.org/10419/](http://oar.icrisat.org/10419/)

**Biological Control as a Tool for Eco-friendly Management of Plant Pathogens**

**Authors:** Sharma M, Tarafdar A, Ghosh R and Gopalakrishnan S


**Abstract:** Crop protection is pivotal to maintain abundant production of high quality. Over the past 100 years, use of chemical fertilizers and pathocides and good agronomical practices enabled growers to maintain improved crop productivity. However, extensive use of chemicals during the last few decades in controlling pests and diseases resulted in negative impacts on the environment, producing inferior quality and harming consumer health. In recent times, diverse approaches are being used to manage and/or mitigate a variety of pathogens for control of plant diseases. Biological control is the alternative approach for disease management that is eco-friendly and reduces the amount of human contact with harmful chemicals and their residues.

**OAR link:** [http://oar.icrisat.org/10420/](http://oar.icrisat.org/10420/)

**Empowering Women in Integrated Crop-Livestock Farming through Innovation Platforms: Experience in Semi-arid Zimbabwe**

**Authors:** Homann-Kee Tui S, Senda T, Dube T and Van Rooyen A

**Published:** 2018, ICRISAT brief

**Abstract:** Empowering Women in Integrated Crop-Livestock Farming through Innovation Platforms has drawn upon the experience gained during the ZimCLIFS project in semi-arid Zimbabwe, funded by the Australian Centre for International Agricultural Research, to introduce legume fodder crops like *Mucuna* as a better livestock feed, to improve market linkages for farmers to benefit from higher livestock productivity and to enhance knowledge and skills among support services enabling upscaling of the impacts of the integrated crop-livestock systems.

**OAR link:** [http://oar.icrisat.org/10421/](http://oar.icrisat.org/10421/)

**Gene/QTL discovery for Anthracnose in common bean (Phaseolus vulgaris L.) from North-western Himalayas**

**Authors:** Choudhary N, Bawa V, Paliwal R, Singh B, Bhat MA, Mir JI, Gupta M, Sofi PA, Thudi M, Varshney RK and Mir RR

**Published:** 2018, PLoS ONE, 13 (2). pp. 1-12. ISSN 1932-6203

**Abstract:** Common bean (*Phaseolus vulgaris* L.) is one of the most important grain legume crops in the world. The beans grown in north-western Himalayas possess huge diversity for seed color, shape and size but are mostly susceptible to Anthracnose disease caused by seed born fungus *Colletotrichum lindemuthianum*. Dozens of QTLs/genes have been already identified for this disease in common bean world-wide. The major, stable and validated markers reported during the present study associated with Anthracnose resistance will prove useful in common bean molecular breeding programs aimed at enhancing Anthracnose resistance of local bean landraces grown in north-western Himalayas of state Jammu and Kashmir.

**OAR link:** [http://oar.icrisat.org/10425/](http://oar.icrisat.org/10425/)