At the recently concluded biannual meeting of ICRISAT Governing Board goals and strategies were reviewed to guide the organization towards achieving its vision. Going forward, integrating our research with corporate goals and targets and tracking contributions towards achieving the UN Sustainable Development Goals (SDGs) is critically important.

Country strategies, developed in close collaboration with national partners, are at the core of ICRISAT’s strategy. The next important stage will be integrating our research, partnerships and fundraising in line with the country strategies. Bottom-up target setting based on the country strategies will be the next critical step.

The Board fully supported the innovative market-driven approach taken by ICRISAT and partners in developing the proposal for the CGIAR Research Program Grain Legumes and Dryland Cereals (GLDC). The Board believes we need to progress beyond traditional breeding and engage more extensively with the whole value chain and integrating a demand-driven approach. This is important to ensure the poor, especially in the drylands who depend on these naturally resilient and highly nutritious crops, are served.

A full day was devoted to discussing the scientific work being undertaken and the Board members were excited by the scientific innovations presented. This was presented under our new structure of three regional programs and two global programs (Genetic Gains and Innovation Systems for the Drylands). Click here for PPTs

New innovative approaches for resource mobilization were discussed. The policy for guiding who we engage with and how through CSR initiatives was also reviewed and accepted. ICRISAT’s approach to its own CSR was also presented and discussed and will be taken forward.

The annual staff survey results were reviewed in detail by the Board. Developing career progression for scientists is a key area for management to take forward.

The Board meeting ended with a Farmers Day. This was a highlight as the Board members engaged with over 2,000 farmers from five different states of India. The farmers presented what technologies and support they need to double their income.
Indian farmers exchange ideas on how to double farm income in five years

We need to learn from you, as you are the master of your fields, you know the ground level issues of agriculture, and you will set the research agenda for organizations like ICRISAT,” said Professor Chandra Madramootoo, Governing Board Chair, ICRISAT, while addressing over 2,000 farmers from across India.

“If we make good use of technology, farmers like me can increase or double our farm income,” said Ms Madhuri Nalawade who was among the farmers attending the National Farmers’ Day organized by ICRISAT at its headquarters on 21 September.

“Technologies such as TV, internet and mobile phones can get us timely information on sowing and other best farming practices. WhatsApp for example is one of the best means to connect and share information about farming, I have been using it for some time,” said the young, dynamic farmer and village head of Kanheri village, Satara, Maharashtra, India.

Ms Nalawade is one of the youngest female village heads in India.

The event, which coincided with ICRISAT’s Governing Board meeting, was one opportunity for Board members, to interact with farmers and understand how the farmers feel they can double their income in the next five years.

Dr David Bergvinson, Director General, ICRISAT, said, “We are here to exchange ideas for demand-driven agricultural research and see how we can use technology to not just increase crop productivity, but also profitability.”

“Indian Prime Minister Mr Narendra Modi has called for doubling of farm income in the next five years; this day is our first step towards realizing the vision of the Prime Minister,” added Dr Bergvinson.

The National Farmers’ Day saw representation from seven Indian states: Tamil Nadu, Telangana, Andhra Pradesh, Maharashtra, Odisha, Karnataka and Gujarat. The farmers were given tours of demo fields planted with various varieties of crops including millets, pigeonpea and sorghum as well as shown different watershed and other agricultural practices that could help increase their incomes.

In his address to the farmers, Hon’ble Deputy Speaker of Karnataka Legislative Assembly Mr Shivashankar Reddy said, “Research that is being done in organizations like ICRISAT needs to be practically translated onto the farmers’ fields. Farmers will benefit when it is fully translated and research organizations and the Government need to make efforts to help farmers prosper. I think in that direction ICRISAT is doing great work.”

Highlighting the role of digital agricultural tools such as drones, Ms Nalawade said, “In some hilly areas of Maharashtra, farmers face a lot of crop loss, as it gets damaged by wild animals. If we have technologies like drones in place, farmers can monitor the movement of wild animals in the crop fields and alert wildlife authorities — this could prevent a lot of crop loss hence improving their incomes.”

The event was organized by ICRISAT Development Center (IDC) led by Dr Suhas P Wani, Research Program Director, Asia Program and Theme Leader, IDC.

This work contributes to UN Sustainable Development Goal
79th Governing Board Meeting in pictures

Board members and ICRISAT team members at the 79th Governing Board Meeting in India.

At the program committee meeting.

Deputy Speaker of Karnataka Legislative Assembly, Mr Shivashankar Reddy, inaugurates the National Farmers’ Day event at ICRISAT headquarters. Also seen Dr Chandra Madramootoo (far left), Dr David Bergvinson (second from right), and Dr Suhas P Wani (far right).

Farmers at a pigeonpea demo plot.

Board visit to ICRISAT facilities and demo sites.
To assist farmers cope with climate change ICRISAT has been working on different approaches. The thrust, lessons learnt and the impact of five main models used for building climate-smart villages have been compiled and released this week as part of a feature in the ICRISAT Annual Report.

Working for over 40 years in the semi-arid tropics, with varied partners, ICRISAT has developed climate resilient dryland crops and a pool of climate-smart technologies that are used in all of its climate-smart project interventions.

Put together, the approaches focused on equipping farmers to use climate-smart scientific interventions and innovations, use climate information for cropping decisions, diversify livelihoods, link to markets, make agriculture profitable, rehabilitate and restore their environment and influence policy makers.

The five approaches highlighted for building climate smart villages include:

The **watershed management approach** focuses on rehabilitating agroecosystems and deploys a pool of climate-smart agricultural practices developed by ICRISAT which have resulted in increasing crop yields and incomes of farmers. This approach which is gaining momentum in India is also favored by companies for their corporate social responsibility activities. The success of this approach has led to efforts to replicate it in sub-Saharan Africa.

The **futuristic multi-model approach** uses computer simulated scenarios and to give policy makers in Zimbabwe agricultural practices and take up agroforestry in a big way. Farmers who had never used a phone are now using mobiles for climate information to make cropping decisions. About 90% of the farmers find the weather alerts useful and 64% of them also make use of the helpline when needed.

The **metrological advisory and farm systems approach** used in Mopti, Mali, demonstrated that climate change adaptation is achievable by using eco-friendly methods and climate information. Close to 76,000 women and 94,000 men representing all stakeholders in the value chain reported using climate information in their decision making.

The **climate and crop modelling approach** helped farmers who followed crop advisories in the drought-prone district of Kurnool in Andhra Pradesh, India, to earn 20% more than those who did not. The success of this pilot project has led to its expansion in other villages of Andhra Pradesh and the neighboring state of Karnataka.

To know more about our climate-smart village approaches read the ICRISAT Annual Report 2015.

For the interactive version see [here](#).
Download PDF version see [here](#)

This work contributes to UN Sustainable Development Goal 13: Climate Action.
Mobile app for pest and disease management of crops

An app that allows farmers to identify pests and diseases using their mobile phones and provides remedial measures is the latest addition to using modern digital tools to benefit smallholder farmers.

A key feature of the mobile app ‘Plantix’ is automated disease diagnosis. Farmers can upload a photo of their infected crop and the app will provide a diagnosis. Besides giving a diagnosis and steps to mitigate the disease, the app also provides information on preventing the disease in the next cropping season. Farmers are also presented biological treatment options for pest and disease control. Given the rampant overuse of chemical pesticides in India the app will also help disseminate best practice methods to reduce pesticides. The app also features a library of diseases which farmers can refer in case there is no connectivity.

Currently, the database has over 60,000 photographs and covers 30 crops in India, 60 crops worldwide and has prescriptions for over 200 crop diseases. Every time a farmer uploads a photograph for diagnosis it will be time marked and georeferenced. Hence, the database also facilitates pest and disease outbreak monitoring and can send early warning messages for specific locations.

Working together with the developers of the app – Progressive Environmental & Agricultural Technologies (PEAT) – ICRISAT aims to build a database of pest and disease images and content for its six mandate crops.

The app can be downloaded on any Android-based mobile device. For farmers without a smart phone an extension worker or farm facilitator or progressive farmer equipped with a tablet or smart phone can be the mediator. To overcome connectivity issues, photographs can be taken and later uploaded when internet connectivity is available.

"ICRISAT-ICM (Integrated Crop Management) team is actively working with PEAT and providing technical support to capture good quality images of the diseases and pests of ICRISAT mandate crops. We have now captured the major diseases of pigeonpea such as Fusarium wilt, Sterility mosaic disease and Phytophthora blight. Additionally, ICM will also provide solutions for mitigating or eliminating pests and diseases for our mandate crops to ensure sustainable agriculture for smallholder farmers,” said Dr Mamta Sharma, Theme Leader - Integrated Crop Management, Asia Program.

Mr Alexander Kennepohl, in-charge of Plant Pathology and Data at PEAT, is of the view that introducing farmers to new technology will help them understand that a mobile is not just a communication tool but an important agriculture tool of the future. In fact, the app partly takes on the role of an agriculture extension worker. Cases where a farmer cannot identify the disease are rare and in such cases farmers can always contact the extension agent or get in touch with PEAT.

Efforts to regionalize the content are also in the pipeline. Ms Charlotte Schumann, Knowledge Management, PEAT, said that as part of a pilot project in Telangana, India, they are working towards delivering content in Telugu by end of 2016, and later work on other Indian and African languages. She said they are also transforming the content of the app into icons to help people with limited literacy.

This work contributes to UN Sustainable Development Goal
Shanti Swarup Bhatnagar Award for genomics and molecular work in pulses

The importance of genomics breeding for advancements in agriculture was recognized by bestowing the prestigious Shanti Swarup Bhatnagar Award on Dr Rajeev K Varshney, Research Program Director- Genetic Gains, ICRISAT by India’s Prime Minister Narendra Modi.

The Shanti Swarup Bhatnagar Award was given to Dr Varshney for his contribution to decoding the genome sequences of three important crops – pigeonpea, chickpea and groundnut and identifying genes with traits to develop more resilient varieties.

Prime Minister Modi emphasized the need to double the income of farmers by 2022 and also highlighted the importance of science to produce more pulses in rainfed conditions. He was speaking at the 75th Foundation Day of the Council for Scientific & Industrial Research (CSIR) in New Delhi on 26 September.

After receiving the award from Dr Harsh Vardhan, Union Minister of Science & Technology; Mr YS Chowdary, State Minister of Science & Technology; and Dr Girish Sahni, CSIR Director General, Dr Varshney said, “I would like to thank colleagues and collaborators from ICRISAT and its partners for their contribution to reach this stage where we have started to see results of genomics-assisted breeding in the fields.”

Molecular markers have been used in developing superior lines of chickpea and groundnut seeds through breeding. Molecular breeding lines for drought tolerance in chickpea and for foliar disease resistance in groundnut have already been transferred to the All India Coordinated Research Project (AICRP) on Chickpea and Indian Council of Agricultural Research (ICAR), respectively.

“The power of genomics science (upstream research) and collaboration with advanced research institutes and national partners, especially ICAR and State Agricultural Universities, has made it possible for us to take a leap in genomics research and molecular breeding in dryland tropics,” said Dr David Bergvinson, Director General, ICRISAT.

Dr Varshney has been working at ICRISAT for the last 11 years. He has led several international genome sequencing consortia to decode the DNA of dryland crops. ICRISAT is the only CGIAR center and one of few centers to lead genome sequence of several dryland crops like pigeonpea, chickpea, groundnut and pearl millet.

The Shanti Swarup Bhatnagar Award is very prestigious and often dubbed as the Noble Prize of India in multidisciplinary science. The prize is awarded on the basis of contributions made through work done in India during the five years, preceding the year of the prize. The prize comprises of a citation, a plaque, and a cash award of US$7,400. In addition, recipients also get US$200 per month up to the age of 65 years. Dr Varshney is one of the few agricultural scientists who has been conferred this prestigious award.
A different approach to watershed management has proven successful and will require a “paradigm shift” in the implementation of watershed programs in India. The approach was awarded Best CSR Project (Livelihoods category) at the India CSR Summit held in Mumbai, 27 September. The initiative was a consortium led by ICRISAT and supported by the Corporate Social Responsibility (CSR) program of JSW Group — part of the OP Jindal Group.

Within three years, water harvesting structures captured an additional 18,500 cubic meters with a gross conservation of 25,000 cubic meters rainwater during the rainy season. Groundwater level also increased by 1.5-2.0 meters. With soil test based fertilizer application the overuse of fertilizers was reduced, which meant lower cost of cultivation by 10-15%. The yield of groundnut and maize increased by 19% and 27%, respectively. And many new livelihood options led to an increase in the income of households by US$22 – US$37 per month.

This was achieved in the Bellary district of the state of Karnataka which is a hotspot of water scarcity (less than 700 mm rainfall per annum), land degradation, poor socio-economic conditions, non-inclusive and imbalanced development, resulting in food insecurity and poor nutrition of the people and livestock.

Key to the success of the watershed management included a consortium of various institutions such as research, development, government and civil society, working closely in partnership with the community, which led and guided the process and decision making. Science-backed analysis and interventions were critical to find appropriate and best solutions along with a holistic approach where all issues from the natural resources through to livelihoods and social issues were tackled in unison.

Convergence was also important to leverage existing programs. Various methods for capacity development such as exposure visits, hands-on training, demonstrations, leadership skill development, and communication skills in addition to various watershed activities were undertaken. A total of 3,500 farmers benefitted through the training programs. Good ‘Sites of Learning’ were established as models to encourage scaling up by others.

Other implementing partners included the NGO Pragati Rural Development Society, University of Agricultural Sciences in Dharwad, Government of Karnataka (GoK), Department of Agriculture (DA, GoK), and the Watershed Development Department (GoK) and the District Watershed Development office (DA, GoK).

The initiative covered 7,000 hectares with over 2,000 households in which 1,200 belong to the farming community. All the household are engaged including the landless households. Full community engagement was achieved, even school children have been made aware about protecting the environment and were also provided with vegetable seeds to grow in their backyard, helping improve home nutrition.

Some of the major interventions included:
- Building soil and water conservation structures
- Improved variety of seeds of sorghum, green gram (mung bean), pearl millet, pigeonpea, groundnut and castor
- Soil analysis and micronutrient applications
- Farmers’ participatory varietal evaluation trials for productivity enhancement
- Avenue plantation - to improve green cover and to trap the dust. Agroforestry: Various tree species including horticulture plants (18,100) were planted in the project villages
- Additional income generating activities - vermicomposting and nursery plantations
- Women self-help groups (SHGs) are given prominence along with the landless under livelihood enhancement initiatives like goat rearing, dairying, production of vermicompost, skill development like tailoring, food product preparation, kitchen gardening, and other micro enterprises.
- Programs and activities to improve animal health
- Areas like climate change and adaptation strategies were addressed
- Policy makers were also sensitized with the approaches adopted in the development of model watersheds.

Dr Wani receiving the award along with Mr GJ Deshpande Director - Technical JSW Energy Limited and Mr Mukund Gorakshkar, Executive Officer, JSW Foundation.

This work contributes to UN Sustainable Development Goal 11: Sustainable Cities and Communities, 13: Climate Action and 8: Decent Work and Economic Growth.
Boost for Malawi farmers from improved seed systems and root and tuber crops technologies

About 320,000 smallholder farmers in Malawi will benefit from two projects that aim to further strengthen the country’s legumes and cereal seed systems as well as increase contributions of root and tuber crops to food security, nutrition and incomes.

Two Irish Aid funded projects, Malawi Seed Industry Development Project-Phase II (MSIDPII) and Root and Tuber Crops for Agricultural Transformation in Malawi (RTC-ACTION Malawi) were launched on 26 September. ICRISAT leads the MSIDPII while RTC-ACTION Malawi is led by the International Potato Center (CIP).

In its second phase, MSIDP, which aims to reach 200,000 farmers by 2020, will include common bean and have a stronger focus on sorghum and pearl millet. The crops covered in the project are groundnut, pigeonpea, common bean, rice, sorghum and pearl millet.

“This new phase of MSIDP will contribute to the country’s legumes and cereal seed systems to support smallholder farmers to improve their food and nutritional security. We are aiming to release new sorghum and pearl millet varieties to ensure diversification in farming, and utilization,” said Dr Patrick Okori, ICRISAT-Malawi Country Representative.

“A total of 95,000 tons of groundnut, pigeonpea, and common bean, 10,000 tons of sorghum, 2,400 tons of pearl millet certified seeds will be pumped into the seed system. Building on our current experience we are expanding our nutrition work guided by our mission to reduce malnutrition. Together with other CGIAR and national partners we will ensure the success of this project to improve the livelihood of the smallholder farmers,” added Dr Okori.

MSIDP was designed to support the work of the Eastern and Southern Africa Seed Alliance (ESASA) in Malawi to increase crop yields and incomes by providing high quality and affordable seeds to smallholder farmers. The aim is to strengthen the cereal seed systems and access to complementary agricultural innovations to improve food, nutrition and income security of farmers.

The RTC-ACTION Malawi project aims to directly benefit 120,000 farmers by 2020. It will increase the contribution of root and tuber crops to food, nutrition and income security in Malawi by harnessing advances in research and development of these crops and scaling them up through potato, sweet potato and cassava value chains.

Both projects were officially launched by Dr George Chaponda, Honorable Minister of Agriculture, Irrigation and Water Development of Malawi in the presence of Her Excellency Áine Hearns, Irish Ambassador to Malawi.

Dr Chaponda said, “I am confident that this project will add value the holistic development of the people of Malawi by ensuring that people have food, good health and also money in their pockets.”

In her remarks, Ms Aine Haerns, said Ireland is impressed with the impact that its funding to CG centers particularly ICRISAT Malawi and the International Potato Centre (CIP) has had on the lives of Malawians.

The occasion was also attended by the Head of Cooperation of the European Union in Malawi, Lluis Navaro, the Head of Cooperation of Germany in Malawi, Thomas Steiger, as well as dignitaries from the donor community funding the agriculture sector of Malawi, The Principal Secretary in the Ministry of Agriculture Irrigation and Water Development, Director of Department of Agricultural Research Services and several senior staff of Ministry of Agriculture were present. Dr Moses Siambi, Regional Director, East and Southern Africa, ICRISAT, was also in attendance. Over 150 participants from the private and public sector, non-governmental organizations and farmer’s organizations were also in attendance.

The Malawi Seed Industry Development Project Phase I was implemented by ICRISAT together with the International Centre for Tropical Agriculture (CIAT) in partnership with the government’s Department of Agricultural Research Services (DARS), local nongovernment and other organizations.

This work contributes to UN Sustainable Development Goal

| Project: Malawi Seed Industry Development Project-Phase II |
| Investor: Irish Aid |
| Partners: International Centre for Tropical Agriculture (CIAT), Department of Agricultural Research Services (DARS), ICRISAT, local non-government and other organizations. |
| CGIAR Research Program: Grain Legumes and Dryland Cereals |
High-iron pearl millet varieties identified for fast track improvement in Africa

Pearl millet varieties GB 8735 and ICTP 8203 have been selected for fast track improvement and release in Niger, Ghana and Senegal. The selected varieties along with local controls are being tested on-farm at more than 30 locations across five countries.

This is part of an initiative for biofortification of pearl millet and sorghum. Other key achievements of the initiative include:

- Creating a database on commercialized open pollinated varieties of pearl millet for Fe (iron) and Zn (zinc) density over 16 locations across West and Central Africa (WCA);
- Working towards defining the Fe baseline for WCA (i.e. ~40 XRF ppm) which still needs to be validated.

These achievements were discussed at a review and planning meeting for the initiative. The meeting also focused on plans for nurseries and trials in 2017 with National Agricultural Research Systems partners. Other key issues discussed included strengthening the XRF lab and upgradation to the latest calibration method and exercising caution with regard to grain sampling protocols. The country strategy for millet and sorghum was shared highlighting the importance of biofortification research. The review group visited the high-Fe cultivar demonstration plots and actively participated in the ranking of demo entries.

The two-day meeting was organized by ICRISAT-Niger. The 22 participants represented partner organizations and ICRISAT staff from Niger, Nigeria and India. Presentations were made by NARS partners and by ICRISAT staff Dr Ramadjita Tabo, Research Program Director, West and Central Africa and Country Representative Mali; Dr Malick Ba, Country Representative Niger and Senior Scientist, Entomology; Dr Prakash Gangashetty, Scientist, Pearl Millet Breeding; Dr Ignatius Angarawai, Scientist, Sorghum Breeding; and Dr M Govindaraj, Scientist, Pearl Millet Breeding.

This work contributes to UN Sustainable Development Goal 3 (Good Health and Well-being).

**Partners:** HarvestPlus, The Council for Scientific and Industrial Research - Savanna Agricultural Research Institute (CSIR-SARI), Institute of Agricultural Research (IAR), Institut d’Economie Rurale (IER), Institut de l’Environnement et de Recherches Agricoles (INERA), Institut National de la Recherche Agronomique du Niger (INRAN), Institut sénégalais de recherches agricoles (ISRA), Usman Danfodio University- Sokoto (UDU-Sokoto), l’Association Minim Sông Pânga (AMSP) and ICRISAT.

**CGIAR Research Program:** Agriculture for Nutrition and Health (A4NH)
Connecting farmers with the sorghum value chain in Nigeria

Sorghum farmers in Nigeria and large commercial buyers are coming together for improving the supply of quality seeds to farmers and assuring them a ready market for grains.

A ‘Sorghum Innovation Platform’ meeting was held recently so that stakeholders could interact and find common grounds for addressing the challenges hindering growth, as well as discuss measures to close the demand-supply gap.

During the event, farmers and other stakeholders who benefitted from seed distributed by the Honeywell Group gave feedback and discussed the challenges encountered. Speaking about the benefits of the seeds Mr Muhammad Abdulsalam, a sorghum farmer described varieties CSR-01 and SK-5912 as “very good” as the 1,500 hectares planted in Ningi by farmers’ groups are doing well. “We have not recorded any pest and disease outbreak,” he added.

Mr Abdulsalam, based in Ningi, Bauchi state, has been farming sorghum for 20 years.

“The new varieties yield more. You get 3 tons per ha as against the local variety which gives you between 1 and 1.5 tons.” Furthermore, Mr Abdulsalam said, “It takes just 100 to 110 days for the new variety to get to maturity for harvest, and now that we have large-scale commercial buyer we will be able to invest in inputs for higher yields.”

“With this system whereby Honeywell Group is ready to buy these two varieties even before you plant, there is a ready market and farmers will turn away from subsistence farming as farmers also need to make money from their farming activities,” he concluded.

“Now that we have big companies like Honeywell, we will make big sales in sorghum seed,” said Mr Lawan Gwadabe, Managing Director, Seed Project Ltd, who has been in the seed business for nine years in Kano and owns one of the over 120 registered seed companies in Nigeria.

Delighted by the feedback, Dr Teddy Ngu, representative Honeywell Group, assured farmers, “If you produce high quality seed, you will get more incentives.” Dr Ngu noted that Honeywell Group would require about 80,000 tons of grain in the coming year, which would be a ready market for the farmers, especially for the Samsong 17 (SK5912) and the CRS-01 varieties. “If we can get good grains from farmers in Nigeria, the volume of our imports will reduce drastically,” he said.

The recently concluded “Sorghum Innovation Platform”, was conducted by ICRISAT Nigeria in Kano. The event brought together over 50 participants from sorghum seed companies, aggregators, sorghum farmers, private companies like Honeywell Group, CGIAR centers such as International Institute of Tropical Agriculture (IITA) and representatives from development projects (ATASP-1, Fadama 3, USAID-MARKETS2, and SG2000). The participants were from seven states in Nigeria, namely Kano, Kaduna, Bauchi, Gombe, Jigawa, Niger, Kebbi and Sokoto states.

This work contributes to UN Sustainable Development Goal 8: Decent Work and Economic Growth

Project: Agricultural Transformation Agenda Support Program Phase 1 (ATASP-1)
Investors: Africa Development Bank,
Partners: International Institute of Tropical Agriculture (IITA), Nigeria Federal Ministry of Agriculture and Rural Development, Institute of Agricultural Research (IAR Zaria), Honeywell Group.
CGIAR Research Program: Dryland Systems and Dryland Cereals.
Innovation Platforms for building seed value chains of groundnut and beans in Tanzania

Innovation Platforms (IPs) are being set up for building the seed value chains of groundnut and common bean. In the case of groundnut, the target is production and delivery of 533 tons basic seed and 8,000 tons certified groundnut seed in Tanzania. This has started with a training program with Tanzanian national partners and the Tropical Legumes III (TL III) support team.

The participants, trained to be IP facilitators, were oriented on the TL III deliverables for groundnut and common bean that focused on varieties, associated technologies, productivity gains and dissemination of quality seed. Special emphasis was laid on closing gender yield gaps and assisting women to earn higher incomes. The targets of the seed roadmap for ICRISAT groundnut and the International Center for Tropical Agriculture (CIAT) bean breeding programs were discussed.

At the end of the workshop, the participants came up with an action plan for setting up functional IPs or strengthening the existing ones in their respective areas. The training was conducted by ICRISAT-Kenya scientists, Dr Essegbemon Akpo, Scientist, Seed Systems Specialist, Seed Systems, Dr Monyo Emmanuel, Theme Leader Seed Systems and CIAT staff Dr Jean-Claude Rubyogo, Seeds Expert, Mr Enock Maeraka, Seed Business Development Specialist, and Mr Wilfred Odhiambo, Agricultural Economist. A total of 24 participants attended the training held from 6 to 8 September at Moshi, Tanzania.

Photo: ICRISAT

This work contributes to UN Sustainable Development Goal

Project: Tropical Legumes III
Investor: Bill & Melinda Gates Foundation
Partners: CIAT, International Institute of Tropical Agriculture (IITA), ICRISAT and partners in Ethiopia, Tanzania, Uganda, Burkina Faso, Ghana, Mali, Nigeria, India
CGIAR Research Program: Grain Legumes
Collaboration for improving the groundnut value chain

Modernization of the breeding pipeline, use of molecular markers, robust phenotyping to enhance selection efficiency, and need for partnerships with industry were identified as key areas of collaboration between the Indian Council of Agricultural Research - Directorate of Groundnut Research (ICAR-DGR) and ICRISAT.

Past collaborative research work between the two organizations since 2011 led to the delivery of three key products:

- Identification of ‘High Oil’ groundnut varieties for release in India;
- Development of ‘High Oleic’ lines in Spanish and Virginia variety;
- Near-isogenic lines (NIL) that combine early maturity and foliar fungal disease resistance identified for release.

The partnership enabled targeted improvement of traits to meet end-use needs, besides focusing on yield and agronomic performance requirements to meet production challenges.

‘High Oil’ groundnuts

These varieties enhance the milling efficiency and value chain studies showed that buyers are willing to pay a premium price for high oil content. To fast-track their adoption, Dr KL Dobariya, Research Scientist (Groundnut), Junagadh Agricultural University, is bulk producing the seeds to ensure sufficient availability of Breeder Seed at the time of release.

‘High Oleic’ trait groundnuts

For food and confectionery uses, ‘High Oleic’ trait is a priority trait as it is good for health and benefits the industry as it enhances the shelf-life. The Spanish variety of groundnut is best suited for breeding with ‘High Oleic’ traits as they have the preferred market traits, mature early and are suitable for cultivation in major production ecologies of Africa and Asia.

The increasing demand for ‘High Oleic’ groundnuts in international markets can be translated into economic benefits along the value chain. Industry partnerships for commercializing these varieties is necessary to enhance profitability of farmers. In this direction, ICRISAT has partnered with Mars Chocolate North America, LLC, for testing and commercialization of ‘High Oleic’ groundnut varieties.

NIL lines (combining early maturity and foliar fungal disease resistance)

ICRISAT’s groundnut improvement program has shared 57 introgression lines with six centers to conduct multi-location evaluation leading to recommendation of 16 lines based on pod yield performance and foliar fungal disease resistance to NIL trials. Dr AL Rathnakumar, Coordinator All India Coordinated Research Program-Groundnut, and Principal Scientist, DGR, apprised about the first-ever ‘NIL trials’ at the national level. The NIL trials followed systematic multi-location evaluations conducted in partnership with four state agricultural universities (SAUs) of Karnataka, Andhra Pradesh, Tamil Nadu and Maharashtra, DGR and ICRISAT. Earlier at ICRISAT, genotyping in early generations followed by extensive phenotyping in disease nurseries and disease hotspots led to the development of introgression lines in the three varieties: JL 24, TAG 24 and ICGV 91114.

Read more about the visit at http://dgblog.icrisat.org/

This work contributes to UN Sustainable Development Goal

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Energy and agriculture: Stronger links must be built for ‘smart villages’ to flourish in India

The Smart Villages Initiative and ICRISAT, together with experts from India and other countries, are calling for closer attention to the linkages between energy and agriculture.

The concept of the ‘smart village’ is that modern energy access can act as a catalyst for sustainable development for a neglected group of people — the ‘bottom billion’ who often live in remote off-grid communities. With the right framework conditions in place, advances in the use of renewable energy solutions—solar, wind, hydro, biomass and hybrid combinations—offer attractive and sustainable opportunities for rural communities to improve access to energy and add value to agriculture.

Sir Brian Heap, Special Advisor to the Smart Villages Initiative, notes: “In India where two-thirds of the population lives in around 600,000 villages, empowering villagers to create income-generating enterprises can lead to improved food security, education and health, and to participatory democracy.”

National estimates show that poverty among smallholders is much higher than for other farmers. The rising number of marginal and small landholdings along with the large number of people that continue to be employed in agriculture is a major development challenge for policymakers. This highlights the opportunity of adopting the concept of smart villages and promoting productive enterprises to raise income levels of marginal landholders and landless agricultural labourers as well as promoting non-farm activities within rural areas.

According to Dr John Holmes, Co-leader of the Smart Villages Initiative, “The national grid may never reach parts of India for economic and geographical reasons. Of the 240 million people who are not connected to the national grid, or are often without reliable energy supply, it has a negative impact on agriculture and associated activities that are extremely important within the rural economy. Energy shortages also create problems for lighting homes, charging mobile phones, and in some cases cooking.”

“The richest innovation happens at the intersection of disciplines and sectors so I am sure this will hold true for the Smart Villages in India workshop. Access to reliable energy will be a key catalyst to transform agriculture from subsistence to commercial enterprise, especially for youth. Energy enables irrigation, charging of mobile phones to access production recommendations and market access and supports processing of produce into value added products that when taken together will enable farmers to double their incomes by 2022 – the challenge laid before us by PM Modi,” said Dr David Bergvinson, Director General, ICRISAT.

Decision makers and policymakers have to make hard choices about the competing opportunities of energy access and application in urban and rural areas, but synergies can result from involvement of the public and private sectors. Where smart villages can generate agri-business wealth from the ‘bottom billion’, it can complement and contribute to the regional success of analogous smart cities.
Policymakers have a key role to make this happen by putting in place the appropriate framework conditions:

- Creating policies that increase awareness among the multiple stakeholders from farmers to decision takers about the availability of off-grid energy technologies and their benefits; demonstration of successful prototypes and business models can help
- Addressing key concerns of those based in rural areas such as routes to affordable and sustainable finance for capital and current expenditure particularly where the banking sector is unfamiliar with off-grid energy solutions and transactions costs for companies are restrictive
- Developing mini-grids for village clusters which need a stable and supportive regulatory environment with a close engagement of villagers in the phases of design and implementation, a favorable climate for private investors, and the integration of national grid and off-grid planning to avoid conflicts of interest
- Creating policies to protect the commercial viability of off-grid projects when heavily subsidized incumbent energy technologies cut across promising energy services that are more sustainable in the long term
- Developing policies to promote agri-food systems and help production, processing, and value addition in smart villages, as well as gaining access to markets with the objective of creating economic independence and improved quality of life for rural communities
- Implementing government support for local entrepreneurs in the rural community and in particular women and youth by reducing red tape and providing an appropriate and simplified regulatory regime
- Encouraging technology training and capacity building through the application of information and communication technologies
- Improving cooking and dietary strategies which progress by developing standards and testing facilities for cookstoves, and technical support and training for producers to help improve product quality
- Co-operating with international development agencies which can usefully work with national governments to resolve some of the challenges facing policy makers in developing supportive policy frameworks.

The workshop titled ‘Energy and Agriculture for Smart Villages in India’ held from 21-23 September was co-organized by Smart Villages and ICRISAT.

Awareness campaign on optimum use of nitrogen fertilizers

Close to 3,000 farmers, who brought their soil samples for testing to a farmer’s fair (kisan mela) in Punjab, India, were given Leaf Color Charts (LCC) to create awareness on the technology for judicial use of nitrogen fertilizers in wheat and rice. The technology involves comparing leaf color of the plants at certain developmental stages with standards on LCC.

The awareness campaign was conducted by CINTRIN (Cambridge-India Network for Translational Research in Nitrogen). Future plans to adopt five villages in Punjab for awareness and dissemination of this technology were announced. Dr Tina Barsby, Director, National Institute of Agricultural Botany (NIAB), lead of CINTRIN from UK, addressed the scientists of Punjab Agricultural University (PAU) and was impressed by the overwhelming response of farmers to the fair.

Mr VP Singh Badnore, Governor of Punjab, Mr Tota Singh, Agricultural Minister of Punjab, delegates from UK and India, and more than 150,000 farmers attended the event held at PAU, Ludhiana from 22-23 September.

CINTRIN, led by ICRISAT and NIAB, is one of four new Virtual Joint Centres in Agricultural Nitrogen, delivered in partnership by the Biotechnology and Biological Sciences Research Council (BBSRC), the Natural Environment Research Council (NERC) and the Department of Biotechnology (DBT) in India.

Major partner institutes: PAU, ICRISAT and National Institute of Plant Genome Research (NIPGR) from India and NIAB, Department of Plant Sciences and Sainsbury Laboratory Cambridge University, UK
Workshops

Orientation on plant hybridization and e-data collection

Introducing research technicians to new methods of plant hybridization and using tablets for data collection and analysis for six crops - sorghum, pearl millet, rice, groundnut, cowpea and soybean was the focus of a workshop on plant breeding held at ICRISAT-Mali. Practical exercises on identification of plant development stages, emasculation, pollination, sterile plants identification and seed parent multiplication (for sorghum) were conducted. Special emphasis was laid on electronic field book preparation, data collection, quality control and analysis using the Breeding Management System. The 35 participants were from Mali, Niger, Burkina Faso, Cameroon, Senegal and Chad.

Investor: Alliance for a Green Revolution in Africa (AGRA)
Partners: International Institute of Tropical Agriculture (IITA) and ICRISAT

Training course in quantitative methods in plant breeding

A training course on modern tools and technologies for genomics and breeding was conducted by Dr Ian Mackay and Dr Alison Bentley from National Institute of Agricultural Botany (NIAB), UK. The course provided hands on experience in designing of experiments, data curation and appropriate analysis using various statistical packages in R module as well as genetic mapping using relevant packages. The training was organized by CINTRIN (Cambridge-India Network for Translational Research in Nitrogen) at Punjab Agricultural University (PAU), Ludhiana, from 29 August to 2 September. Four researchers from ICRISAT were among the 30 participants from India and UK.

CINTRIN, led by ICRISAT and NIAB, is one of four new Virtual Joint Centres in Agricultural Nitrogen, delivered in partnership by the Biotechnology and Biological Sciences Research Council (BBSRC), the Natural Environment Research Council (NERC) and the Department of Biotechnology (DBT) in India.

Major partner institutes: PAU, ICRISAT and National Institute of Plant Genome Research (NIPGR) from India and NIAB, Department of Plant Sciences and Sainsbury Laboratory Cambridge University, UK.

Capacity building of NARS partners on millets and sorghum

A five-day training workshop for NARS cereal breeding technicians was organized by ICRISAT-Nairobi at their Kiboko field station from 8-12 August.

The objective of the workshop was to enhance participants’ knowledge and capacity on theory and practical application of emasculation, pollination, seed production and data collection in sorghum, finger millet and pearl millet for improved management of their breeding programs.

The training brought together 12 participants from Kenya (6), Ethiopia (1), Tanzania (4) and Malawi (2). The training was conducted by the technical staff of ICRISAT lead by Mr Patrick and assisted by Mr Samuel Massive of Kenya Plant Health Institute Services.

Project: HOPE 2
Investor: Bill & Melinda Gates Foundation
Partners: Ethiopian Institute of Agricultural Research (EIAR), Ethiopia; Kenya Agricultural and Livestock research Organization (KALRO), Kenya Plant Health Inspectorate Services (KEPHIS); Department of Research and Development (DRD), Tanzania; Department of Agricultural Research Services (DARS), Malawi.

CGIAR Research Program: DryLand Cereals
Readers’ Comments

All millets and not just ragi (finger millet) are a good source of nutrition. Farming communities have been using them since long. We have seen during our Gujarat farmers’ interaction that pearl millet dishes are compulsorily given to pregnant women due to their nutritional value. Also if the government can make it mandatory to supply pearl millet in midday meals in schools, it will help fight iron deficiency among children.

The general public know about the nutritional value of millets, especially pearl millet, but preparing dishes from it in homes is slightly difficult when compared to other cereals. If we could develop technology for the same, in no time millets will become popular.

Devendra Singh Dangi, Strategic Marketing Manager - Pearl Millet & Mustard, Dupont Pioneer, Hyderabad

A great read - aflatoxin mitigation using participatory approach in Tanzania is a good way of disseminating technologies. Farmers learn from each other and push the technologies faster. Product development needs to go hand in hand with market availability all the time. Product/commodity value chain approach is encouraged.

Mr Charles Mutinda (Ph D), Principal Maize Breeder, Kenya Agricultural and Livestock Research Organization

Many intersecting initiatives can come together to create viable new options, notably in food technology/marketing - especially as the proportion of the urban population rises, choice of crops with water use efficiency coupled with heat tolerance (millets) as adaptations to climate change, and emphasizing the important role for legumes in food diversification and nutrition, crop intensification, and in nitrogen fixation - very important for sustainable agriculture systems into the future.

The overarching feature is genuine partnership with farmers in fine-tuning of agricultural systems, with benefits of ownership of innovations and farmer level insights into application of these innovations.

A very encouraging model for farmer-driven progress, partnerships and development literally from the ground upwards.

Dr Robert John Redden, Plant Breeding and Genetics, RJR Agriculture Consultants, Australia

It is appreciated that 105 model villages are being set up. The model village should be self-sufficient in energy, water and living space. It should have a primary health center, farmer-producers market, biowaste recycling facility, primary school, library, common playground and above all it should be crime-free.

Prof. KV Peter, former Vice Chancellor, Kerala Agricultural University

Farewell

The following staff member are retiring on 30 September:

Mr Mohd. Anis Akhtar, Lead Engineer (A/C & Refrigeration), Asia Program, after serving the Institute for over 27 years.

Mr K Giridhara Pillai, Security Associate, Security Services, after serving the Institute for over 22 years.

Team ICRISAT wishes them a very happy retired life.