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/
Highlighting different approaches for building climate-smart villages

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](#)
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
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.”

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.
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 Maereka, 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.
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

Investor: HarvestPlus

Partners: 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)
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
Congratulations

Mr Ram Kiran Dhulipala, currently Strategy and Operations Officer in the Director General’s Office, ICRISAT, will take dual charge as Head, Digital Agriculture & Strategic Initiatives in the Innovation Systems for the Drylands (ISD) Program. His past experience in information technology and corporate sectors will be invaluable as he takes on this new responsibility.

We congratulate Mr Dhulipala and wish him all success.

About the Digital Agriculture theme

The concept of Digital Agriculture driving innovation in agriculture is a major opportunity for bringing smallholder farmers out of poverty in South Asia and sub-Saharan Africa. Technology is being applied in various ways. For example: In the delivery of downscaled information from various sources (markets, weather, farming system, soil, etc.) as locally specific advisories direct to farmers on smart phones or tablets; in the application of risk management intelligence on markets or weather in the banking or insurance sectors; in business intelligence through harnessing information to a dashboard to monitor project outputs. While there are many such examples, ICRISAT has a particular role to play in the following areas:

- How and what information and tools might be created and delivered to provide new services for smallholder farmers, value chains and communities;
- Conduct leading-edge research on the technical and social dimensions of digital agriculture, specifically how and what information will lead to change, improve efficiencies and overall impacts farm livelihoods;
- Build new partnerships for enhanced development impact using information and communication technology platforms and tools, particularly working in partnership with leading private sector innovators;
- Act as a mediator in knowledge sharing and innovation through updated ICT tools, including the piloting of virtual educational, library and learning programs.

Announcement

InterDrought-V Fellowship Awards Program

The InterDrought-V (ID-V) conference is offering 100 fellowship awards in three categories to young scientists who have made notable research contributions in agricultural sciences.

Who can apply

- Students from developing countries actively involved in research topics that fall in the scope of ID-V.
- Post Graduates/ PhD students or Post-Doctoral fellows.
- Students coming from developing countries but working at CGIAR institutes or advanced research institutes in developed countries are NOT eligible for these fellowships.

Individuals from African countries, as well as those who can demonstrate partial funding for attendance, will be given priority.

How to apply

ID-V fellowship award application is available [here](#).

Abstract for poster/oral presentation - guidelines and details are available [here](#).

Applications with relevant supporting documents must be submitted via e-mail to fellowships.idv@gmail.com

Deadline: 30 September 2016. Successful candidates will be notified on 15 October 2016

ID-V conference dates: February 21-25, 2017

Venue: Hyderabad International Convention Centre (HICC), Hyderabad, India

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- Act as a mediator in knowledge sharing and innovation through updated ICT tools, including the piloting of virtual educational, library and learning programs.
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

The new website allows virtual visitors to learn and share about the Tropical Legumes project led by ICRISAT. Get the latest news updates, blogs, tweets and photostreams.

http://tropicallegumes.icrisat.org