

Partnerships for Impact



ICRISAT
Annual Report 2012

Citation:

ICRISAT Annual Report 2012. 2013. International Crops Research Institute for the Semi-Arid Tropics. Patancheru, Andhra Pradesh, India: 40 pp. ISSN 1017-9933.

Cover photos: Top to bottom and left to right (L Vidyasagar, Alina Paul-Bossuet, L Vidyasagar, ICRISAT file photo and L Vidyasagar), ICRISAT.

ICRISAT

Annual Report 2012



**International Crops Research Institute
for the Semi-Arid Tropics**

**Patancheru 502 324, Andhra Pradesh
India**



Farmers of Guntur District, Andhra Pradesh harvest chickpea.

Vision

A prosperous, food-secure and resilient dryland tropics.

Mission

To reduce poverty, hunger, malnutrition and environmental degradation in the dryland tropics.

Goal

Partnership-based international agricultural research-for-development that embodies *science with a human face*.

Approach

An Inclusive Market-Oriented Development (IMOD) approach to take smallholder farmers from poverty to prosperity.

This Annual Report is in recognition of more than 300 partners from more than 50 countries, over the last 40 years.

Partnerships for Impact



Photo: S Sridharan, ICRISAT

*CGIAR Challenge Program on Water and Food –
exchange visit, Zimbabwe.*

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Message from the Director General

The year 2012 was a landmark year for ICRISAT as we celebrated our fortieth anniversary. More importantly, it was a celebration of forty years of agricultural research dedicated to improving the lives of poor farmers in the semi-arid tropics – and what an eventful period this has been. We are keenly aware that much of our success stems from the excellent partnerships we enjoy, and this annual report acknowledges the immense contribution of our partners, recognizing that our impacts are a credit to our combined efforts.

Although ICRISAT is widely known as an agency serious about agricultural research to improve livelihoods, we know that to remain relevant we have to respond to current needs, elevate our efforts, and communicate our science and technology to the ultimate beneficiary, the poor smallholder farmer. Our report this year bears examples of ongoing successes, achieved through the strategic partnerships we are fortunate to have established – and this time our partners themselves contribute to the stories and affirm the power of partnerships.

Take for instance the unraveling of the chickpea genome – ICRISAT and its partners have once again demonstrated the power of productive partnerships by achieving this breakthrough in legume genomics, which will play a crucial role in speeding up the development of improved varieties for smallholder farmer crops.

In sub-Saharan Africa as well as in Asia, it would have been impossible for ICRISAT alone to spread essential knowledge about effective farming practices, or to simplify the process of making

good and improved seed easily available to farmers. Here too, the excellent partnerships with national systems and like-minded private sector partners facilitate the outreach to even remote villages and farms.

While our Inclusive Market-Oriented Development (IMOD) framework is aimed at assisting smallholder farmers to move from subsistence farming to the more rewarding and secure market mainstream, our Agribusiness Incubation Program, of the Agribusiness Innovation Platform, is fully involved in creating opportunities for startup businesses to grow into more useful and prosperous ventures. Our partner reports on setting up agribusiness incubators in India and Africa testifies to this.

Along with our partners, we take pride in reporting that our efforts are showing impact. At this point I would like to also recognize the encouragement and guidance given to us by our very engaged Governing Board, by our supportive donors and stakeholders, and by our dedicated staff. I wholeheartedly thank and congratulate you all. Let us continue to make meaningful impacts, and realize our vision – prosperous, food-secure and resilient dryland tropics.

William D Dar
Director General

Message from the Chair



At the outset, let me congratulate ICRISAT on forty years of sterling service and scientific contributions to both agriculture and the smallholder farmers of the semi-arid tropics. Around such a significant anniversary, besides the celebrations, there was a lot of looking back and reviewing of our achievements, an activity that naturally leads to plans for the future. What are the pitfalls? What works? What needs urgent attention? What can we do better? At this juncture, permit me to quote one of my personal and favorite mantras, “If you’re not part of the solution, you are actually part of the problem.” It is an incredibly powerful mantra, and works at many levels, because it assists one to define the problem and focus one’s efforts on contributing solutions.

At ICRISAT, we keep re-examining the problems and challenges. That is what science is about. ICRISAT moves with the times and is constantly working against new problems, while at the same time applying new solutions to old problems. Take for example the challenge of pests and diseases. This is an old problem that keeps recurring every time immunity wanes or environmental conditions change. One of our solutions is our increasing understanding of the plant genome structure, which permits scientists to breed and select new varieties and hybrids with inbuilt defenses in their genetic makeup.

Ever since man began to farm some 8000 years ago, farmers have been subject to the vagaries of the elements and have been searching for solutions for just as long. Farmers in the semi-arid tropics have faced more than their fair share of challenges— poor soils, erratic rainfall,

poor infrastructure, hunger, malnutrition and poverty being the hallmarks. But these have been overcome to a certain degree with solutions such as microdosing, crop varieties resistant to pests and disease, early maturing varieties that escape terminal drought, major capacity building programs, food safety measures, programs to facilitate availability of good seed, and programs that enhance livelihoods. Along with its excellent science, ICRISAT’s excellent partnerships have been at the crux of many of these solutions. We are honored to work with so many excellent partners.

ICRISAT is serious about its mission, and assuming the new responsibilities of the CGIAR Research Programs into our mandate has given us a new impetus; one that includes “CGIAR family members” as well as partners in Governments, NARES, Research Institutes and Universities. In this new “avatar”, ICRISAT is even more confident about achieving its goals. ICRISAT’s approach of “Inclusive Market-Oriented Development” is an important ingredient in the solutions, one that continually reminds us about who we are aiming to benefit – a noble goal indeed.

On behalf of my fellow Governing Board members, I thank ICRISAT, its management, its staff and its partners for their dedication to improving the lives of the smallholder farmers.

Finally, I am convinced that ICRISAT will continue to be part of the solution.

Nigel Poole
Chair, Governing Board



Photo: UC Davis

Rajeev Varshney (left) and Prof Doug Cook in a “ready for harvest” chickpea field at ICRISAT headquarters.

Unraveling the chickpea genome

49 scientists from 23 organizations in 10 countries, coordinated by ICRISAT

In 1866, Gregor Mendel characterized hereditary units as factors — observable differences that were passed from parent to offspring, and sixty years ago, Watson and Crick proposed the double helix model of DNA. Today, we know that a genome is the total amount of genetic information of a living organism, in the form of DNA, needed to build and maintain a living example of that organism.

Discovering the genetic code of a living thing is always exciting, and more so when the newly discovered information has great implications for improved food and ultimately improved livelihoods of farmers.

The International Chickpea Genome Sequencing Consortium (ICGSC) undertook the chickpea genome sequencing project led by ICRISAT, the University of California-Davis, and Beijing

Genomics Institute (BGI)-Shenzhen, China, with key involvement of national partners in Australia, Canada, Czech Republic, Denmark, Germany, India, Mexico, Spain and the USA – an international team comprising 49 scientists from 23 organizations in 10 countries. The chickpea genome sequence was completed by the end of 2012 and announced in January 2013.

Successful sequencing of the chickpea genome (after pigeonpea genome sequencing in 2011) is a true example of the power of partnerships. Organizations with complementary expertise were brought together by ICRISAT – to contribute funds, genomic and genetic resources, and large-scale analyses. As a result, this partnership not only delivered the draft genome sequence of chickpea but also generated re-sequencing data of ninety chickpea lines. These analyses provided insights into domestication that will help to increase the

efficiency of chickpea improvement by integrating biotechnological tools into conventional breeding.

"The chickpea genome sequence is expected to help in the development of superior varieties with enhanced tolerance to drought and resistance to several biotic stresses. India will benefit most from this genome sequence, as it is the largest producer of chickpea. This is by far the most significant collaboration between ICAR, ICRISAT and the global genomics community," said Dr Swapan Datta, Deputy Director General - Crop Science, Indian Council of Agricultural Research (ICAR).

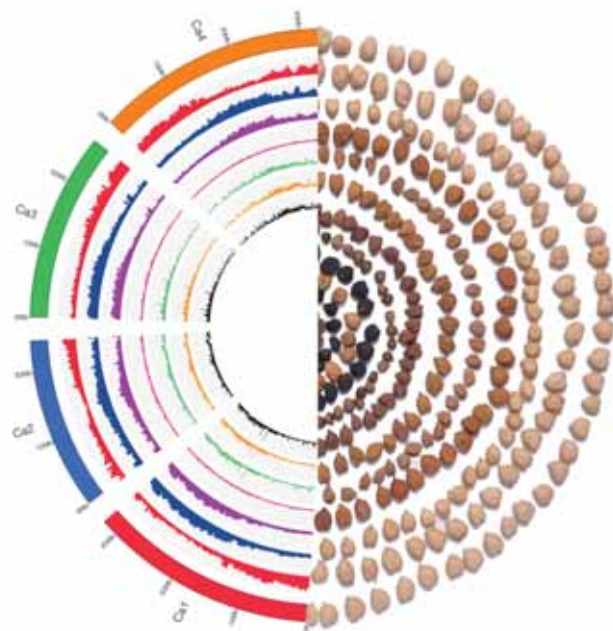
Professor Jun Wang, Director of BGI, says, *"The collaboration between BGI and ICRISAT has yielded great achievements in crops research. I believe that our partnership will revolutionize research on orphan crops, which are key staples in many low-income countries and extremely important to smallholder farmers worldwide."*

"This genome sequence will provide the basis for a wide range of studies, from the important goal of accelerated breeding, to identifying the molecular basis of a range of key agronomic traits, to basic studies of chickpea biology," said Professor Doug Cook from the University of California-Davis.

Dr David Bergvinson of the Bill & Melinda Gates Foundation, commented, *"Making the chickpea genome available to the global research community is an important milestone to address nutritional security. We look forward to seeing how researchers around the globe will harness this resource to increase chickpea productivity against the backdrop of climate change in the developing world."*

Dr Rajeev Varshney, project leader, explains the breakthrough. An international like-minded group of scientists came together at the Vth International Conference on Legume Genetics and Genomics in Asilomar, USA in 2010. *"We all agreed it was high time that we had a genome sequence for chickpeas,"* he said. Dr Varshney is also the Comparative and Applied Genomics Theme Leader of the CGIAR Generation Challenge Programme (GCP), coordinator of the ICGSC, and Director of the Center of Excellence in Genomics at ICRISAT.

The initiative was funded by the CGIAR GCP, US National Science Foundation, Saskatchewan Pulse Growers (Canada), Grains Resource



(Left) Features of the chickpea genome and (right) diverse germplasm lines used for re-sequencing and analysis.

Development Corporation (Australia), Indo-German Science Technology Corporation (Germany and India), National Institute for Agricultural and Food Research and Technology (Spain), National Research Initiative of the USDA's National Institute of Food and Agriculture, Ministry of Education, Youth and Sports of the Czech Republic and the European Regional Development Fund, University of Cordoba, ICAR, BGI and ICRISAT.

Renowned agricultural scientist and Member of the Indian Parliament, Prof MS Swaminathan says, *"I compliment the excellent scientific work done by Rajeev Varshney and his colleagues in developing a high-quality genome sequence of chickpea. The knowledge provided by this study will help accelerate the improvement of this crop through marker-assisted breeding."*

Prof Tim Close, Geneticist at the Department of Botany and Plant Sciences at the University of California, observes, *"There has been a paradigm shift in biological research during the past few years, driven largely by a more than 2,000-fold reduction in the cost of DNA sequencing, and simultaneous improvements in computational methods. The rise of model systems has completely reshaped the landscape: each organism can be studied directly, and its significance determined by economic, social and ecological relevance. Here, we have an example of an international, culturally diverse group of individuals who have worked together to bring this paradigm shift firmly into the realm of a crop of major importance. It is inspiring!"* ■

The work reported in this article is continuing under the CGIAR Research Program on Grain Legumes.



ICRISAT scientists with partners from Plan Mali- Sanambélé.

Peanuts and partnerships in Mali and Niger

ICRISAT with farmer organizations and eight NGOs

“News of our accomplishments in the initial 2 pilot villages, spread like wildfire,” said Mr Moussa Hamma Diallo, Coordinator of Plan Mali’s program with ICRISAT in the Sanankoroba district of Mali, “With such high demand from the women’s groups, the program was extended to 17 villages in 2012 involving more than 600 women, and more are to be added in 2013.”

Groundnut (peanut) is the major source of livelihood for small-scale farmers in the West African countries of Mali and Niger. It is generally seen as a woman’s crop in these countries, with a high percentage of individual plots being cultivated by women. Women are essential in the fight against malnutrition and poverty, especially rural women, who not only contend with poverty, but who have unequal resources and social services such as land, health and education. ICRISAT is therefore helping to empower these women by facilitating access to improved seeds, and training them on cultivation and post-harvest management.

ICRISAT developed a range of improved groundnut varieties, and in collaboration with NGOs in Mali and Niger, evaluated them in farmer participatory variety trials in target villages. Farmers helped with the evaluation and selected those that met their criteria. The average yield of the new varieties ranged from 15-25% increase over the farmers’ variety, also increasing enthusiasm at the prospect of income generation and improved nutrition.

The partnerships in Mali and Niger include farmer organizations and eight NGOs – Aga Khan Foundation, Plan Mali, Sahel 21, Adaf Galle, MALI ESPOIR, AMASSA-AFRICA GREEN, and AMED in Mali and MORIBEN in Niger.

Recounting the start of the partnership, Mr Diallo said, *“We found that women grow mainly groundnuts on small plots for household consumption, so our Kati Unit Program, known as Saving for Change, explored the idea of introducing*

improved groundnut varieties from ICRISAT to women groups. We selected the Bougoula and Sanambelé villages as a pilot test we called Friends of the Village Children. At the initiation of the partnership in the 2009-10 cropping season, the country director of Plan Mali, Mr Michelet William said, “Although our program is focusing on the nutrition of children, empowering their mothers is essential to enhance their well-being, especially in the remote villages where there are limited resources, extreme poverty and malnutrition. We are pleased to partner with ICRISAT to avail new groundnut varieties for the rural poor, chiefly women and children”. Mr Diallo further added, “Teamwork has developed well, and we are now producing seed of a preferred variety in four villages. The women now have access to agricultural equipment and farm animals. Facilitators in the team have mastered the use of rainfall records and data collection, and we have co-opted village animators to accompany the Plan-ICRISAT partnership in all 17 villages.”

Mr Sedou Togola, Director General of Sahel 21, Mali, reports on their partnership achievements with a hint of pride, “We have made available five improved varieties of groundnut in seven villages, trained more than 60 producers (mainly women) on techniques for producing certified seed, helped two women’s groups to purchase oxen and a plough, and increased awareness of research results through annual field days.

“This meets the objectives we committed to on 7 June 2011, when we formalized our partnership with ICRISAT – to introduce new groundnut varieties adapted to drier areas of Kolokani District, the Sahel 21 intervention areas; develop sustainable production systems and community-based seed production; contribute to increasing women’s income, capacity building, food security and enhanced nutrition,” he continued.

Mr Oumar Coumare, Supervisor Faladie and Tominian Districts of the Association des Organisations Paysans Professionnel (AOPP) says of the partnership efforts, “Producers start to remember the history of their varieties and reflect on their progress. There is a revival of interest in deepening the knowledge and expertise to conserve genetic diversity. We have strengthened the capacity of producers in marketing and storage of seed and in the fight against aflatoxin, and have



Photo: A Traore, ICRISAT

A bumper harvest of groundnut – outcome of a good partnership.

taught them techniques to improve soil fertility.” He also reports, “We constructed a warehouse and a groundnut store, and have made provision of a revolving fund for the procurement of seed.”

Other outcomes of ICRISAT’s partnerships for groundnut production in the region include:

- In collaboration with NGOs such as the Aga Khan Foundation, Amassa-Africa Green, ADAF GALLE, CAAD and extension services in Mali, nearly 3000 farmers (60% women) have received training in integrated crop management to enhance groundnut productivity and control aflatoxin contamination.
- Women’s groups in Niger’s Dosso department are now producing 65% of the certified groundnut seed in Niger. Seed producers have been linked to grain processors to supply local processors with good quality produce, thus creating a market pool for quality seed production. The women seed and grain producers have been assisted with draft animals and ploughs, and processors in turn have been assisted with small-scale oil extraction machines to reduce drudgery. In collaboration with the Wadache Farmers organization, 1100 farmers also received training in integrated aflatoxin contamination management.
- Partnerships have indeed made a difference to women farmers in West Africa, as is apparent from this happy announcement of Mr Diallo (Plan Mali), “The village chiefs are now allocating better land than ever before to the women for groundnut cultivation!” ■

The work reported in this article is continuing under the CGIAR Research Program on Grain Legumes.



Photo: J Hansen, CCAFS

Farmers training workshop on the interpretation and application of seasonal rainfall forecasts in Kaffrine, Senegal.

Kaffrine farmers forearmed with forecasts

The National Meteorological Service, agronomists and agricultural extension, along with CGIAR scientists as a catalyst

Kaffrine is a region in central arid Senegal prone to recurrent climatic hazards such as flooding and dry spells. Here, climate forecasters from the Senegal's Agence Nationale de l'Aviation Civile et de la Meteorologie (ANACIM) and agricultural extension workers from the National Department of Agriculture have joined hands since 2011 to help farmers overcome climate risks. One partner uses high level science to obtain weather and climate forecast information, while the other spreads the knowledge to farmers of the region with forecasts and early warning advisories, enabling them to make better on-farm decisions.

Behind this salutary partnership, the first of its kind in Senegal, is the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS)-funded project to support the production and communication of downscaled probabilistic seasonal forecasting to improve decisions made by farmers in Kaffrine.

The seasonal forecasts are innovative in their own right and stem from state-of-the-art advances in climate model output downscaling to the specific region of Kaffrine, using the Climate Prediction Tool developed at the International Research Institute for Climate and Society (IRI, based in Columbia University, USA), in an attempt to get closer to the geographical scale where farmers can make decisions. Once the downscaled forecast for Kaffrine is received from the National Meteorological Service, agronomists and agricultural extension experts based in Kaffrine add value to the received information on likely climate conditions, keeping in mind the specific risks these will yield, and recommend mitigation measures. This demonstrates a good practice example where climate scientists collaborate with agricultural researchers to produce a tailored agromet advisory usable by farmers to guide their farm-level operations.

“For once, we see our forecasts on weather and climate being useful for farmers and for development in the country,” states Dr Ousmane Ndiaye, Columbia University trained climate scientist who returned to Senegal in 2011 and took the lead in this CCAFS-ICRISAT project. “The information was new to farmers, but actually the farmers were very keen and enthusiastic, and did show up for the first training. After the training they shared the information and keep coming for other training as well. So we keep training, and felt that we were filling an actual gap. Building trust was very important for us, so that the farmers can use our information. We build trust by trying to connect our climate information to things that are well known to farmers – the indigenous knowledge.”

Building strong partnerships at the national level and enabling the institutional framework for collaboration among relevant technical departments is indeed a prerequisite to the successful uptake of climate services by farmers. Climate and weather forecasts produced by the National Hydro-Meteorological services in the region are of no value to farmers, unless downscaled to fit the geographic area and have value added with agricultural extension support. Only the agricultural researchers and planners can provide such support.

As such, partnerships between forecasters and national knowledge hubs have to be enabled, and spaces opened for relevant partners to dialogue and pool their expertise in response to farmers’ information needs. Such a process of bridging the gap at the national level between

The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) is a strategic collaboration to address the increasing challenge of global warming and declining food security.

Led by CGIAR Consortium member the International Center for Tropical Agriculture (CIAT), CCAFS collaborates with all 15 CGIAR research centers, ICRISAT included, as well as with the other CGIAR thematic research programs.

CCAFS brings together the world’s best researchers in agricultural science, climate science, environmental and social sciences to identify and address the most important interactions, synergies and trade-offs between climate change and agriculture.



Photo: J Hansen, CCAFS

Farmer workshop participants examine a rain gauge in the field.

those who have the information and those who need it will not, however, happen in a vacuum; scientists and development partners will need to mediate and actively support this process.

The CCAFS-ICRISAT partnership served this crucial role of boundary organization in Senegal, through unrelenting and iterative stakeholder meetings and scoping of farmer information needs in climate services. This process today has engendered a solid partnership between ANACIM and Senegal’s Department of Agriculture, which will outlive the project itself, and has already started to demonstrate beneficial results for the local farmer communities in Kaffrine.

“The information provided by the Department of Agriculture and the national Meteorological service are useful to us. We now know when to expect the beginning of the rains and whether the rains will stop during the season. Because of this information, today we are able to better plan our farming activities!” exclaims a woman farmer from Sikilo, one of the target villages of Kaffrine, where the seasonal outlook and agrometeorological advisories have been shared with farmers since 2011.

This is indeed research for development. In 2013 and beyond, CCAFS plans to scale up this approach so that millions more farmers can have access and benefit from available climate information and advisory services in Kaffrine, and throughout the rest of Africa and South Asia.

In the meantime, national partners at ANACIM gear up for yet another risk-prone June-July-August rainy season, during which they will continue to monitor risks over Kaffrine and support farmers in the region with downscaled climate information and advisory services. ■

The work reported in this article is continuing under the CGIAR Research Program on Climate Change, Agriculture and Food Security.



Photo: P Van Mele, Agro-Insight

Large-scale community mobilization and engaging farmers with evening shows of the DVDs.

Scaling up training with “Fighting Striga” videos

Media companies, rural radio broadcasters, NGOs and farmer organizations, backed by scientists

S*triga* is a killer weed that sucks the life out of crops in West Africa, but training videos on fighting *Striga* are helping to control this scourge. Within nine months, the number of viewers rose to over 15,000, due mostly to efforts of partners. Several NGOs, farmer organizations and rural radio broadcasters have responded positively to the request for feedback and often request more DVDs, technical support documents and training of their field agents.

Physical uprooting of the weed combined with proper soil fertility management are the key lessons presented in the videos. Besides providing new knowledge, the videos engage large numbers of farmers who are exposed to and discuss integrated *Striga* and soil fertility management (ISSFM). Also, field agents, technicians and

researchers, play a bigger role from being mere teachers, to facilitators of knowledge exchange between farmers and other stakeholders.

Since 2006, ICRISAT and partners have conducted farmer field schools to experiment with a wide range of *Striga* control options. As a result, they developed ISSFM practices for pearl millet and sorghum cultivation. However, the scarcity of skilled trainers and the need for maintaining quality training were bottlenecks in scaling up. Through concerted efforts and intense collaboration with the private company Agro-Insight, and with ICRISAT partners in Ghana, Mali, Niger and Nigeria, ICRISAT produced a series of ten farmer-to-farmer ISSFM videos in French and English, and translated these into six major West African languages (Bambara, Bomu, Hausa, Mooré, Peulh and Zarma) in early 2012.

All language versions were put onto a multi-language DVD, called “Fighting Striga”, and a distribution and monitoring plan was made with stakeholders from four focus countries – Burkina Faso, Mali, Niger and Nigeria. Partners included local, national and regional organizations, ranging from national research institutes, chambers of agriculture and NGOs, to farmer organizations, rural radio stations and seed companies. Of the 30,000 DVDs produced in Mali and Nigeria, over 20,000 copies have already been distributed. ICRISAT distributed DVDs to partners and other strategic development agencies who then further distributed the DVDs within their own network of partners, who in turn distributed them even further (third level). Through intensive data collection and monitoring, it became clear that within a year the DVDs had reached 2150 representatives in 700 organizations from 43 countries.

“The farmers enjoyed watching the (Arabic version) videos, which encouraged them to comment and fully participate in discussions,” said Nouredin Ahmed Abdalla, Sudan Meteorological Authority, Khartoum, Sudan.

It is too early to assess total impact, but several partners observed communities mobilizing themselves for hand pulling of *Striga*, or digging and filling compost pits in Mali and Niger at the end of the 2012 rainy season. They stated that this was a direct response to watching the videos.

“The communities understood that fighting Striga requires concerted efforts to attain results, and I have already seen examples of community action to hand pull Striga,” says Ali Mamane Aminou from the farmer organization, FUMAGASKIYA in Maradi, Niger.

While the prime goals of the videos were to train farmers and extension agents, universities in Africa and Europe have included the DVDs in BSc and MSc curricula. They found the videos a useful tool to illustrate the reality of smallholder farming in Africa, while at the same time showing new technologies and approaches to participatory research. The “Fighting Striga” videos developed by ICRISAT, Agro-Insight and partners are effective because they are made after strong interactions with farmers through participatory approaches such as farmer field schools, thereby resulting in



Photo: P Van Mele, Agro-Insight

“We find someone to play the DVDs and watch with our families and friends,” say farmers in Sindala village, Mali.

regionally relevant and locally appropriate farmer-to-farmer training videos.

These videos are also used by the international NGO, Access Agriculture, who operates a video- and audio-sharing web-based platform (www.accessagriculture.org) devoted to agricultural support in developing countries, and open to all. They also makes videos available by large-scale multiplication and dissemination based on national demand.

The videos continue to be translated into new languages, eg, Dagaari, Sisaala, Dagbani, Gonja, Kusaal, Buli and Frafra for northern Ghana. Several governmental and non-governmental organizations discovered the quality and relevance of the videos (via the Access Agriculture website) and have had them translated into Arabic, Portuguese, Swahili (Kenya), Chichewa (Malawi), Dendi, Bariba and Nago (Benin). Some agencies also support large-scale production of the DVDs and intend to broadcast the videos on national television, further increasing availability and visibility.

“We were thrilled to see how quickly institutions responded to these videos. Since they were hosted on the Access Agriculture website, many have come forward to invest in getting the videos translated into local languages and make these available again in the public domain for any agricultural service provider to view and download. The videos are now reaching audiences not only in West Africa, but also in Eastern and Southern Africa,” says Dr Paul Van Mele, Chairman of Access Agriculture. ■

The work reported in this article is continuing under the CGIAR Research Programs on Dryland Cereals and Dryland Systems.



Photo: ICRISAT

Groundnut (peanut) harvest in Malawi (Inset: NASFAM Farma Nuts, photo: NASFAM).

Smallholders access quality seed in Malawi

The National Smallholder Farmer Association and ICRISAT

In 2012, over 700 metric tons of groundnut seed was distributed through the Farm Input Subsidy Programme in Malawi. This is a newsworthy achievement, as fourteen years ago certified seed of legumes was unheard of in Malawi, and it was only between 1998 and 2000 that the government made efforts to produce certified seed of groundnuts and other legumes. Unfortunately, due to poor management this effort only survived one phase. Brighter days arose in 2000 when the National Smallholder Farmer Association of Malawi (NASFAM) and ICRISAT formed a partnership that was to widen progress in these efforts. Today, smallholder farmers, many more than just those affiliated to NASFAM, enjoy enhanced access to quality seed.

The NASFAM-ICRISAT partnership was first established with funding from USAID. This ongoing project involved the multiplication of

seed through technical support to smallholder farmers involved in growing groundnuts. Before ICRISAT and NASFAM launched this partnership, there was a high demand for groundnuts in domestic, regional and also in the international arena. This partnership aimed at promoting production of groundnut and other grain legumes in the smallholder sector and providing capacity for smallholders to access better markets on the domestic, regional and international levels.

Right from the start, there was determination to improve the seed quality, which was the biggest concern of the two organizations. The groundnut seed production program commenced in 2003, and the partners chose the traditional groundnut producing districts of Malawi – Mchinji, Kasungu and South Mzimba – as the sites for the program. NASFAM affiliated farmers had earlier grown groundnut in these areas.

The improved seed is initially produced by an ICRISAT breeder and is then multiplied through a contractual system with farmers, who are carefully selected based on a set of given criteria. The provided “Basic” seed is further increased into the next category called “Certified” seed. It is the certified seed that is used to produce high quality grain. The Seed Unit of the Department of Agricultural Research Services inspects the seed crop at various stages of development until harvesting. Once harvested, the Seed Unit takes samples for determination of quality, and issues a certificate if the seed meets the standards. The seed that receives certification is then made available for sale or provision to the farmers for commercial grain production.

The program process is rigorous and focuses a lot on the capacity development of both NASFAM staff as well as the farmers. The training package involves ICRISAT staff visiting the groundnut growing Associations to train staff at the onset of each season. Residential trainings with the Association Field Officers are held annually and last for two to three days. These trainings are compact and involve lectures and field days that are crucial, as they enhance the knowledge of the staff trained in the process of seed production and the knowledge of the parent material (seed), principles of seed production and Good Agricultural Practices.

ICRISAT has been able to extend the training to NASFAM staff by adding other legumes or NASFAM commodities such as sunflower, coffee and chilies to the training package. Over the years, ICRISAT and NASFAM have seized such opportunities to share the latest farming research practices.

NASFAM generally provides its member Associations with a deeper level of technical assistance and acts as a conduit through which results from research on new technologies and crop varieties are made available to farmers. ICRISAT, on the other hand as a research institute developing improved varieties, provides the initial seed so that many farmers can have access to good quality seed of the best varieties.

Through the partnership, smallholder farmers have ready access to good quality, affordable



Photo: NASFAM

NASFAM- ICRISAT training in progress.

seed. In addition, seed production training on certified seed is conducted all year to build capacity to meet quality standards and specifications in the processing. In 2005, NASFAM introduced the sale of *NASFAM Farma Nuts* Super Grade Raw Nuts. To go further along the value chain, the organization also introduced *Farmers Pride NASFAM Roasted and Salted Peanuts* in 2007. Technology adoption has been widespread. At present almost every farmer in Mchinji grows new varieties of groundnut demonstrating that they are now capable of understanding, applying and adapting the farming practices they were taught.

The partnership has also significantly contributed to the legume crop diversification agenda, where NASFAM has witnessed a remarkable increase in groundnut production in the previously dominant tobacco producing areas like Kasungu and Mzimba Districts.

Although mostly grown in the Central Region of Malawi, groundnut still counts as an important food legume in smallholder agriculture. It provides up to 25% to 30% of household agricultural income. For smallholder farmers, there is hope that they will continue to get advisory and training services from ICRISAT and have a well-established feedback mechanism to respond to variety development and adoption, all of which is beneficial to them, their community, and the nation. ■

The work reported in this article is continuing under the CGIAR Research Program on Grain Legumes.



Photo: ICRISAT

Dr APJ Abdul Kalam (former President of India) inaugurates the NIABI 2012 conference in the presence of Dr WD Dar (left) and Director of IARI, Dr HS Gupta.

Hatching success through agri-business incubators

South-South collaboration between India and Africa

“Through ICRISAT’s help and expertise we have increased the technology commercialisation in India from 40 agro-technologies in 2010-11 to 93 technologies in 2012-13. We have also enhanced the number of start-up clients from 60 to more than 600 across 2012. This brought in revenues above US\$ 2 million through the 10 business planning and development units,” said Dr PS Pandey, National Coordinator, Indian Council of Agricultural Research (ICAR).

Dr Pandey was referring to the business planning and development units (BPDs) that ICRISAT’s Agri-Business Incubator (ABI) helped to “handhold and mentor”. Partnerships were key to this success, and lessons learned in India were transferred to Africa where new partnerships were formed to assist in the establishment of six agri-business incubators.

ICRISAT’s ABI works as a global platform for transferring technologies developed by ICRISAT (or jointly with partners) to the private/public sector. It also provides services in technology, business development, resource mobilization and infrastructural facilities to fledgling agri-businesses.

A noteworthy area of collaboration is with the Indian national agricultural research and extension system to strengthen development of farmer linkages through Public Private Partnership mechanisms, such as the BPD units. In conjunction with this, ICAR initiated the National Agricultural Innovation Project (NAIP), funded by the World Bank, which aims to accelerate the collaborative development and application of novel agricultural technologies.

After a successful pilot project in 2009, through which NAIP set up 10 BPD units in its research institutes and State Agricultural Universities, the BPDs and ICRISAT-ABI formed the Network of Indian Agri-Business Incubators (NIABI) to accelerate and support the process of encouraging the national agricultural system to embrace entrepreneurship development. Working through the potent partnership of NIABI, several budding businesses are showing promise of succeeding and scaling up in a relatively short time.

"NIABI was instrumental in promoting the concept of agri-businesses through BPDs. In a short span of three years, ICRISAT-ABI has done a commendable job of incubating start-up entrepreneurs, commercialising agro-technologies and benefitting the farmers through new products and access to markets. The three initial agri-business incubation conferences since 2011 helped in creating a competitive atmosphere among the BPDs by acknowledging the best performance of the incubators and incubatees."

"I am really thankful to ICRISAT for successfully contributing to making NIABI what it is today! This has instilled confidence in us to further increase the number of incubators by another ten, taking the overall total to twenty BPDs across the country, and making us pioneers in the world with the maximum number of agri-incubators," said Dr Pandey.

In 2011, to help sustain the rising demand for jobs, incomes and value added agricultural products in sub-Saharan Africa, ICRISAT launched a South-South Initiative (IS-SI) for Indian-African partnerships in agricultural research-for-development. This increased the reach and impact of ICRISAT in the global fight against poverty and hunger, a reach that has been extended further by the participation of ICRISAT-ABI in the Universities, Business and Research in Agricultural Innovation (UniBRAIN) initiative, which is led by the Forum for Agricultural Research in Africa (FARA) with generous support from the Royal Danish Ministry of Foreign Affairs (Danida). UniBRAIN is promoting agribusiness incubation in sub-Saharan Africa by supporting the six agribusiness incubators mentioned earlier, which now form the nucleus of an African network, similar to NIABI. In addition, food processing incubation centers and food testing laboratories have also been set up in Africa.



NIABI, a gateway for agri-business ventures to take off.

According to UniBRAIN Facility Coordinator, Mr Ralph von Kaufmann, "UniBRAIN's tripartite (university, business, research) collaboration is an innovative model, and ICRISAT should be proud to be contributing to its validation and growth through a partnership with FARA, ANAFE, PanAAC, ASARECA, CORAF/WECARD and CCARDESA."

Overall, ICRISAT's Agribusiness and Innovation Platform (of which ABI is a component) has extended its successful experience into Africa as part of the ICRISAT South-South Initiative. This includes:

- Mentoring the six UniBRAIN Agribusiness Innovation and Incubation Consortia in five African countries (Ghana, Kenya, Mali, Uganda and Zambia).
- Being the Implementing Agency for two projects of the Ministry of Food Processing Industries, Government of India, under the India-Africa Forum Summit-II:
 - i. Food Processing Business Incubation Centers will be established in Angola, Cameroon, Ghana, Mali and Uganda, to help local entrepreneurs to scale-up food processing businesses.
 - ii. Setting up Food Testing Laboratories in Gambia, Nigeria, Republic of Congo, Rwanda and Zimbabwe, to provide local entrepreneurs with access to the state-of-the art, ISO 17025:2005 accredited facilities so that they can produce high quality and safe food products that comply with international standards.

Based on the high rate of success from these partnerships, plans are underway for increased investment to more than double the number of agri-business incubators in India in the very near future, and to further extend this success in the African continent. ■

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Technical support for promotion of conservation agriculture in Insiza and Mberengwa Districts, Zimbabwe [as part of Protracted Relief Programme (PRP) Phase II activities]

Donor Agency: Action Contre la Faim (ACF), Zimbabwe

Capacity building for soil and plant analysis laboratories for the improvement of soil health in West Africa

Donor Agency: Alliance for a Green Revolution in Africa (AGRA), Kenya

Improving soil fertility, productivity and livelihoods of smallholder farmers in northern Uganda by intensifying and diversification of Pigeonpea cropping systems

Donor Agency: AGRA through National Agricultural Research Organization (NARO), Uganda

Enhancing the adaptive capacity of smallholders to climate variability through response farming innovations

Donor Agency: Association for Strengthening of Agricultural Research in Eastern and Southern Africa (ASARECA), Uganda

Pearl millet innovations for improved livelihoods in drought-prone areas of Eastern and Central Africa (ECA)

Donor Agency: Association for Strengthening of Agricultural Research in Eastern and Southern Africa (ASARECA), Uganda

Genomic approaches for stress tolerant chickpea

Donor Agency: Australia-India Strategic Research Fund (AISRF), Dept. of Science & Technology (DST), Govt. of India, India

Partners: Australian Centre for Plant Functional Genomics (ACPGF), University of Adelaide, Australia; Indian Agricultural Research Institute (IARI), New Delhi, India; National Institute for Plant Genome Research (NIPGR), India.

Increasing productivity of legume-based farming systems in the central dry zone of Myanmar

Donor Agency: Australian Center for International Agricultural Research (ACIAR), Australia

Partners: University of New England, Australia; University of Adelaide, Australia; Department of Agricultural Research, Myanmar; Department of Agriculture, Myanmar; Yezin University, Myanmar

Developing resilient and profitable rural livelihood systems in semi-arid Mozambique: A conceptual approach

Donor Agency: Austrian Development Agency (ADA), Austria

Partners: Mozambiquan Agricultural Research Institute (IIAM), Maputo, Mozambique; University of Natural Resources and Life Sciences, Vienna (BOKU), Austria.

Genomics assisted accelerated product development of high yielding pigeonpea hybrids

Donor Agency: Biotechnology Industry Partnership

Programme (BIPP), Dept. of Biotechnology, Govt. of India, India

Partners: Krishidhan Seeds Pvt. Ltd., India

Development of the GCP crop ontology and trait dictionaries for chickpea, sorghum, groundnut and pigeonpea

Donor Agency: Bioversity International, a member of the CGIAR Consortium

The role of information networks for the adoption of agricultural innovations – the case of sorghum and finger millet in Tanzania

Donor Agency: Bundesministerium für Wirtschaftliche Zusammenarbeit und Entwicklung (BMZ) / Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Germany

Partners: University of Göttingen, Germany

Field testing of ICRISAT legume varieties and technologies in selected regions of the Philippines (Phase 3)

Donor Agency: Bureau of Agricultural Research, Dept. of Agriculture, Philippines

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Conservation agriculture, forage fodder demonstration plots design and monitoring in Chivi, Mangwe, Bulilima and Binga districts of Zimbabwe

Donor Agency: CAFOD, Zimbabwe

Provide technical support to Enhancing Community Resilience Programme (ECRP)-Malawi consortium Implementing Partners in seed systems development, pre- and post- harvest handling and storage of crops

Donor Agency: Care International, Malawi

Pathways to agricultural and economic development in rural Malawi project

Donor Agency: Care International, Malawi

Implementation of the AgMIP program for South Asia and Sub-Saharan Africa

Donor Agency: Columbia University, USA

Partners: University of Agriculture, Faisalabad-Pakistan; Bahauddin Zakariya University (BZU), Pakistan; COMSATS

Institute of Information Technology (CIIT), Pakistan; Washington State University (WSU), USA; CIAT; Agricultural Research Council (ARC), South Africa; National University of Lesotho (NUL), Lesotho; Polytechnic of Namibia, Namibia; Human Sciences Research Council (HSRC), South Africa; University of Cape Town, South Africa; University of the Free State, South Africa; Botswana College of Agriculture (BCA), South Africa; Agricultural Research Council (ARC) Grain Crops Institute (GCI), South Africa; Project Directorate for Farming Systems Research (PDFSR), India; ICAR Research Complex for NEH Region, India; Nepal Agricultural Research Council (NARC), Nepal; CIMMYT; Bangladesh Agricultural Research Council (BARC), Bangladesh; Oregon State University, USA; Tamil Nadu Agricultural University (TNAU), Coimbatore; Acharya NG Ranga Agricultural University (ANGRAU); Foundation for Environment, Climate and Technology (FECT), Sri Lanka; University of Peradeniya (UoP), Sri Lanka; University of Ruhuna (UoR), Sri Lanka.

Enhancing capacities of the AgMIP South Asia Regional Teams through Capacity-Building Workshops and Knowledge-Sharing Platforms

Donor Agency: Columbia University, USA

Assessing the impacts of climate variability and change on agricultural systems in eastern Africa while enhancing the region's capacity to undertake integrated assessment of vulnerabilities to future changes in climate

Donor Agency: Columbia University, USA

Partners: Makerere University, Uganda; Kenya Agricultural Research Institute (KARI), Kenya; Mekelle University, Ethiopia; Bureau of Agricultural Consultancy and Advisory Services (BACAS), Tanzania.

Crop-livestock intensification in the face of climate change: Exploring opportunities to reduce risk and increase resilience in Southern Africa using an integrated multi-modeling approach

Donor Agency: Columbia University, USA

Partners: Faculdade de Agronomia e Engenharia Florestal to Universidade Eduardo Mondlane, Mozambique; University of the Free State, South Africa; University of the Cape Town, South Africa.

Climate change Impacts on West African Agriculture: a Regional Assessment (CIWARA1)

Donor Agency: Columbia University, USA

Partners: University of Ghana; Agrhymet Regional Centre, Niger; Initiative Prospective Agricole et Rurale (IPAR), Senegal; University of Development Studies (UDS), Ghana; Agence Nationale de la Meteorologie (Mali Meteo), Mali; Savanna Agricultural Research Institute (SARI), Ghana; Agence Nationale de l'Aviation Civile et de la Meteorologie (ANACIM), Senegal; Institut de l'Environnement et de Recherches Agricoles (INERA), Burkina Faso.

Conversion of Commonwealth of Learning – Commonwealth Computer Navigator Certificate (CCNC) modules to flash format

Donor Agency: Commonwealth of Learning (COL), Canada

Integrating bio-treated wastewater with enhanced water use efficiency to support the Green economy in EU and India (Water4Crops)

Donor Agency: Dept. of Biotechnology, Govt. of India under Indo-EU collaboration on Biotechnology, India

Partners: The Energy and Resources Institute (TERI), India; University of Agricultural Sciences-Dharwad (UASD), India; MS Swaminathan Research Foundation (MSSRF), India; National Environmental Engineering Research Institute (NEERI), India; Jain Irrigation Systems Limited (JISL), India; Euro India Research Centre (EIRC), India; SAB Miller India (SABM), India; University of Agricultural Sciences-Bangalore (UASB), India.

Biofortifying sorghum with high grain iron and zinc content for combating micronutrient malnutrition

Donor Agency: Dept. of Biotechnology, Govt. of India, India

Partners: Marathwada Agricultural University, Parbhani, India; Directorate of Sorghum Research, Hyderabad, India.

Development of low-lignin high-biomass sorghums suitable for biofuel production

Donor Agency: Dept. of Biotechnology, Govt. of India, India

Partners: Directorate of Sorghum Research, ICAR, India.

Innovation in Science Pursuit for Inspired Research (INSPIRE) Faculty Award and Research Grant for Dr Hima Bindu Kudapa

Donor Agency: Dept. of Science & Technology, Govt. of India, India

Innovation in Science Pursuit for Inspired Research (INSPIRE) Faculty Award and Research Grant for Dr Palakolanu Sudhakar Reddy

Donor Agency: Dept. of Science & Technology, Govt. of India, India

Innovation in Science Pursuit for Inspired Research (INSPIRE) Faculty Award and Research Grant for Dr Santisree Parankusam

Donor Agency: Dept. of Science & Technology, Govt. of India, India

Enhancing productivity of groundnut and pigeonpea cropping systems in Tanzania and Uganda

Donor Agency: European Commission through International Fund for Agricultural Development (IFAD), Italy
Partners: Ministry of Agriculture and Food Security (MAFS), Govt of Tanzania; Ngetta Zonal Agricultural Research Development Institute (Ngetta ZARDI), Uganda; National Semi-Arid Resources Research Institute (NaSARRI) of NARO, Uganda.

AHBF/ICRISAT Proposal – Development of a robust commercially sustainable Multiple Uses Sorghum (MUS) value chain in Kenya and Tanzania

Donor Agency: European Commission through International Fund for Agricultural Development (IFAD), Italy
Partners: Africa Harvest Biotech Foundation International (AHBFI), Kenya; Dunia Trust Limited, Tanzania; Sokoine University of Agriculture; Selian Agricultural Research Institute (SARI), Tanzania; Iramba District Council, Tanzania; Kondoa District Council, Tanzania; Kongwa District Council, Tanzania; Moshi Rural District Council, Tanzania; Mwangi District Council, Tanzania; Same District Council, Tanzania; Serengeti District Council, Tanzania; Singida Rural District Council, Tanzania; Tanzania Chamber of Commerce in Industry and Agriculture (TCCIA), Tanzania; World Vision International, Zimbabwe.

Pre-Implementation phase activities for UniBRAIN agribusiness incubators (AIICs) and partners

Donor Agency: Forum for Agricultural Research in Africa (FARA), Ghana

Implementation phase of the Universities, Business and Research in Agricultural Innovation (UniBRAIN) project

Donor Agency: Forum for Agricultural Research in Africa (FARA), Ghana

CV Raman International Fellowship for African Researchers' under the Visiting Fellowship – Ms Mareme Niang, Agronomist, Senegal

Donor Agency: Federation of Indian Chambers of Commerce and Industry (FICCI), India

CV Raman International Fellowship for African Researchers' under the Visiting Fellowship – Mr Nouhan Belko, PhD Student, Senegal

Donor Agency: Federation of Indian Chambers of Commerce and Industry (FICCI), India

CV Raman International Fellowship for African Researchers' under the Visiting Fellowship – Dr Walid El-Rodeny, Egypt

Donor Agency: Federation of Indian Chambers of Commerce and Industry (FICCI), India

Comprehensive adoption and impact study of improved chickpea cultivars in Andhra Pradesh, India

Donor Agency: Food and Agriculture Organization of the United Nations (FAO), Italy

Training to strengthen the capacity of agribusiness incubators and partners

Donor Agency: Forum for Agricultural Research in Africa (FARA), Ghana

Expanding the GCP crop ontology within the community of practice and partners to integrate data sets for the GCP priority crops through the Integrated Breeding Platform (Crop Ontology-Community of Practice)

Donor Agency: Generation Challenge Program (GCP)/ CIMMYT through Bioversity, a member of the CGIAR Consortium*

Establishing a climate change knowledge network in Indian agriculture

Donor Agency: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Germany

Improving rural livelihoods through innovative scaling-up of science-led participatory research for development in Karnataka

Donor Agency: Govt. of Karnataka, India

Partners: IRRI, CIMMYT, ILRI, IFPRI, IWMI, ICARDA

Extension of Bhoochetana in paddy and sugarcane for 2012-13

Donor Agency: Govt. of Karnataka, India

Farmers participatory trial and popularisation of improved cultivars of sweet potato in three districts of Odisha

Donor Agency: Govt. of Odisha, India

Partners: CIP

Enhancing livelihoods of resource-poor farmers of Rajasthan through introduction of eco-friendly pigeonpea varieties

Donor Agency: Govt. of Rajasthan through Swami Keshawanand Rajasthan Agricultural University (SKRAU), India

* All CGIAR donors are recognized and listed in <http://www.cgiarfund.org/FundDonors>

Development of hybrid pigeonpea technology suitable for Rajasthan

Donor Agency: Govt. of Rajasthan through Swami Keshawanand Rajasthan Agricultural University (SKRAU), India

Evaluation of high yielding Pigeonpea varieties and hybrids in Tamilnadu

Donor Agency: Govt. of Tamil Nadu, India

To serve as a Member in the Management Committee of CGIAR Program: Policies, Institutions and Markets

Donor Agency: IFPRI, a member of the CGIAR Consortium

Partners: Foretell Business Solutions Pvt Ltd

Testing the design and communication of downscaled, probabilistic seasonal forecasts; and evaluating their impact on farmers' management and livelihood outcomes at Wote, eastern Kenya under the Research Theme # 2 of CGIAR Research Program on Climate Change, Agriculture and Food Security

Donor Agency: ILRI, a member of the CGIAR Consortium

Calibration and intercomparison of climate, crop and economic models and assess their strengths and weaknesses in simulating impacts of climate change on agriculture in Eastern Africa under the Research Theme # 2 of CGIAR Research Program on Climate Change, Agriculture and Food Security

Donor Agency: ILRI, a member of the CGIAR Consortium

US-India Consortium for Development of Sustainable Advanced Lignocellulosic Biofuel Systems (SALBS)

Donor Agency: Indo-US Joint Clean Energy Research and Development Center (JCERDC), Indo-US S&T Forum (IUSSTF), India

Partners: Indian Institute of Chemical Technology, Hyderabad; Directorate of Sorghum Research, Hyderabad; Jawaharlal Nehru Technological University, Hyderabad; Tamil Nadu Agricultural University, Coimbatore; Rajamatha Vijayaraje Sindia Krishi Vishwa Vidyalay, Gwalior; Centre for Economic and Social Studies, Hyderabad; Indian Institute of Technology-Delhi; Indian Institute of Technology-Chennai; Abellon Clean Energy, Ahmedabad; Hindustan Petroleum Corporation Ltd, Bangalore, India; University of Missouri, Virginia Tech, Montclair State University, Texas A&M University, Show Me Energy, Green Technologies, USA.

Sustainable management of crop-based production systems for raising agricultural productivity in rainfed Asia

Donor Agency: International Fund for Agricultural Development (IFAD), Italy

Partners: Rajmata Vijayeraje Scindhia Krishi Vishwa Vidyalaya (RVSKVV), India; Jharkhand Tribal Development Society (JTDS), India; Mitigating Poverty in Western Rajasthan (MPOWER), India; Ministry of Agriculture and Forestry (MAF), Laos; Nepal Agricultural Research Council (NARC), Nepal; Vietnam Academy of Agricultural Sciences (VAAS), Vietnam.

Development of genetic markers for sorgoleone (a BNI component) release capacity in sorghum (Seed multiplication of a sorghum GCP-reference germplasm set collection)

Donor Agency: Japan International Research Center for Agricultural Sciences (JIRCAS), Japan

Innovating communication media and methods for more effective Aflatoxin mitigation, variety uptake, and use of interventions in Groundnut in Malawi and Tanzania

Donor Agency: McKnight Foundation, USA

Partners: Danish Management, Denmark; Agricultural Research Institute, Tanzania.

Implementing agency for setting up five Food Processing Business Incubation Centres (FPBICs) in 5 African countries (Uganda, Cameroon, Ghana, Mali and Angola) under India-Africa Forum Summit-II (IAFS-II)

Donor Agency: Ministry of Food Processing Industries, Govt. of India, India

Implementing Agency for setting up Food Testing Laboratories (FTLs) in 5 African countries (Republic of Congo, Rwanda, Zimbabwe, Gambia and Nigeria) under India-Africa Forum Summit (IAFS-II)

Donor Agency: Ministry of Food Processing Industries, Govt. of India, India

Characterization of commercial hybrids to enable model applications for environmental characterization in India

Donor Agency: Pioneer Overseas Corporation, USA

Tracking *Aspergillus flavus* toxigenic strain AF 11- 4 in groundnut crop soils using SCAR marker based PCR diagnostic assay

Donor Agency: Science & Engineering Research Board, Dept. of Science & Technology (DST), Govt. of India, India

Pre-breeding for chickpea improvement

Donor Agency: Science & Engineering Research Board, Dept. of Science & Technology (DST), Govt. of India, India

Pathological, cultural variability and sequence diversity in *Rhizoctonia bataticola* causing dry root rot of chickpea

Donor Agency: Science & Engineering Research Board, Dept. of Science & Technology (DST), Govt. of India, India

Integrated water resource development in Kolar district through watershed interventions

Donor Agency: The Coca-Cola Foundation, USA

Cartes d'adaptation variétale des sorghos et mils d'Afrique de l'Ouest : Validations de terrain au niveau des agro-systèmes villageois au Mali [START Fellowship Award under the African Climate Change Fellowship Program (ACCFP) for Ms Aichata F Mohamed Sako]

Donor Agency: The Institute of Resource Assessment (IRA), University of Dar es Salaam in partnership with START Secretariat, Tanzania

Partners: Institute d'économie rural (IER), Mali; University of Bamako, Mali.

Unlocking health benefits of Pearl millet: Identifying factors for starch digestibility, and Slowly Digestible Starch (SDS) using a world inbred germplasm association panel

Donor Agency: Unilever Industries Pvt. Ltd., India

Sustainable intensification of key farming systems in the Sudano-Sahelian zone of West Africa

Donor Agency: United States Agency for International Development (USAID) through IITA

Partners: Malienne pour la Sécurité et la Souveraineté Alimentaire (AMASSA), Mali; MOBIOM, Mali; L'Association Malienne d'Eveil pour le Développement Durable (AMEDD), Mali; ILRI

Global crop yield gap and water productivity atlas

Donor Agency: Univ of Nebraska-Lincoln, USA

Partners: Federal University of Technology Minna, Nigeria; Institut de l'Environnement et des Recherches Agricoles (INERA), Burkina Faso; Institute of Agricultural Research, University of Ghana, Legon, Ghana; Institute of Rural Economy (IER), Mali; Indian Council of Agricultural Research (ICAR); Centre Regional AGRHYMET (AGRHYMET), Niger; CIMMYT.

EAGER: Development of a geospatial soil-crop inference engine for smallholder farmer

Donor Agency: Univ. of Florida, USA

Africa RISING: Transforming key production systems: Maize mixed East and Southern Africa (Multiplication of breeder and basic seed for maize and legumes in Tanzania, Malawi and Zambia)

Donor Agency: United States Agency for International Development (USAID) through CIAT, a member of the CGIAR Consortium

Strengthening partnerships for innovation in beans, groundnuts and sesame research and technology transfer in Mozambique

Donor Agency: USAID through IITA, a member of the CGIAR Consortium

Africa RISING: Transforming key production systems: Maize mixed East and Southern Africa (Multiplication of breeder and basic seed for maize and legumes in Tanzania, Malawi and Zambia)

Donor Agency: USAID through IITA, a member of the CGIAR Consortium

Partners: CIAT; CIMMYT; Naliendele Agricultural Research Institute (ARI Naliendele), Tanzania.

Value chain analysis of grain legumes in eastern and southern Africa: Building partnerships for impact through research on sustainable intensification of farming systems

Donor Agency: USAID through IITA, a member of the CGIAR Consortium

Pigeonpea improvement using molecular breeding (Pigeonpea Activity – India)

Donor Agency: USAID, USA

Partners: National Bureau of Plant Genetic Resources (NBPGR), India; Agricultural Research Station-Tandur, India; Acharya NG Ranga Agricultural University (ANGRAU), India; Agricultural Research Station-Gulbarga, India; University of Agricultural Sciences-Raichur, India.

US-CGIAR Linkage Program linked to CGIAR Research Program on Grain Legumes

Donor Agency: USAID, USA

US-CGIAR Linkage Program linked to CGIAR Research Program on Dryland Cereals

Donor Agency: USAID, USA

Water Resources Group: Expert input on preparing detailed project report for water-enabled growth in Karnataka

Donor Agency: World Bank, USA

Partners: Department of Agriculture, Govt. of Karnataka, India; IWMI.

To conduct CCAFS workshop on “Scaling up good practice in climate services for farmers in Africa and South Asia” to be held in Dakar, Senegal from 10-12 December 2012

Donor Agency: World Meteorological Organization, Switzerland

Conservation agriculture, forage fodder demonstration plots design and monitoring in Matobo and Insiza districts, Zimbabwe

Donor Agency: World Vision International, Zimbabwe

Conservation agriculture, forage fodder demonstration plots design and monitoring in Matobo and Insiza districts (under the GRM International funded Protracted Relief Programme (PRP) Phase II, Year 4

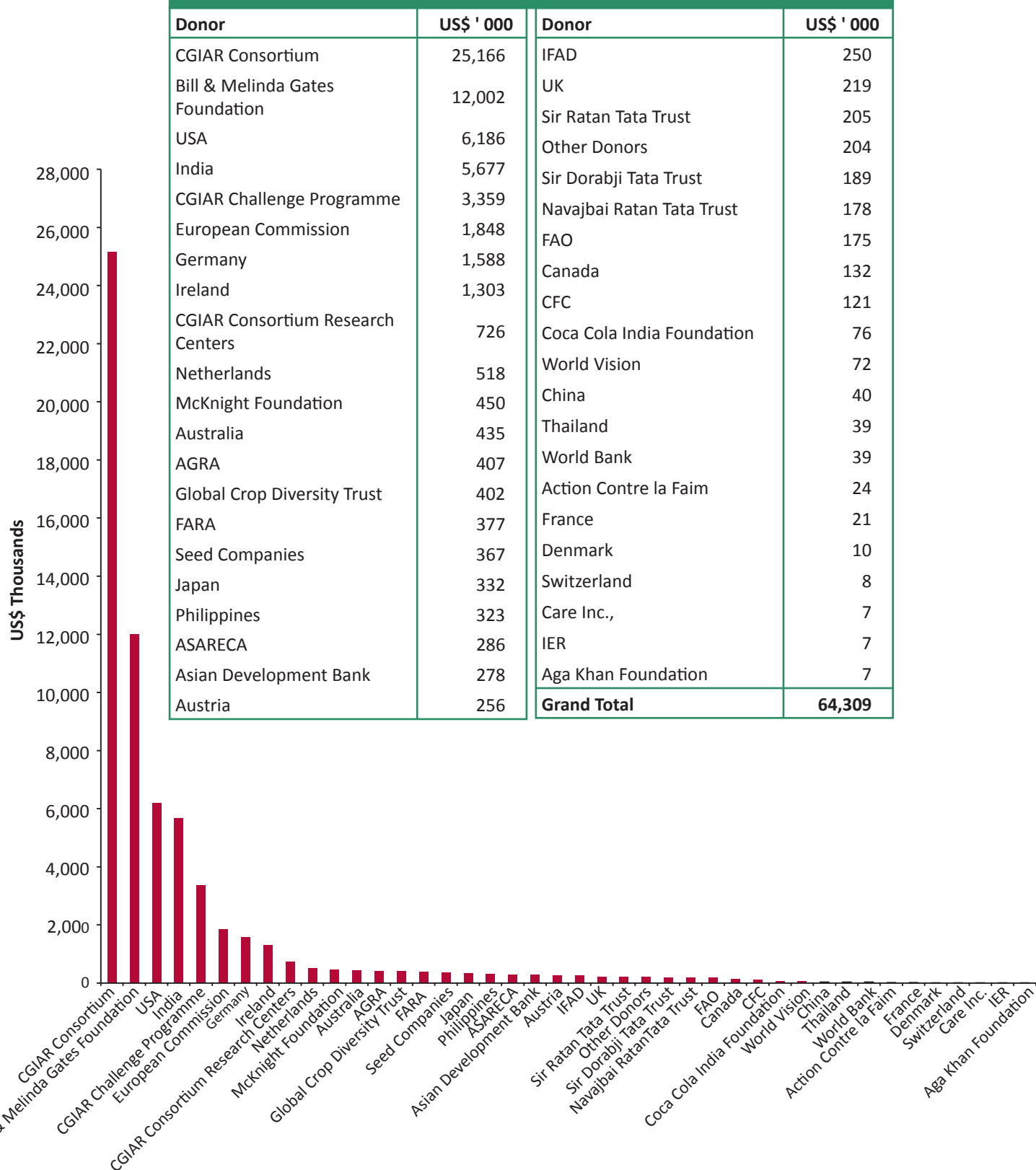
Donor Agency: World Vision International, Zimbabwe

Financial Summary

Balance Sheet		
	US\$ thousands	
	2012	2011
Assets		
Cash and Cash equivalents	10,393	9,711
Investments	56,916	55,170
Accounts receivable	24,234	11,261
Inventories	821	1,002
Prepaid Expenses	436	496
Property and Equipment - net	6,349	6,040
Other assets	4,753	3,257
Total Assets	103,902	86,937
Liabilities		
Accounts payable	22,937	19,299
Accruals and provisions	3,781	2,401
Payments in advance from donors	30,793	23,027
Long-term liabilities	13,023	11,621
Total Liabilities	70,534	56,348
Net Assets		
Unrestricted		
Unappropriated	19,064	17,345
Appropriated	10,113	9,113
Permanently Restricted	4,191	4,131
Total Net Assets	33,368	30,589
Total Liabilities & Net Assets	103,902	86,937

Operating results and movements in Net Assets		
	US\$ thousands	
	2012	2011
Operating results		
Revenue	69,128	67,014
Expenditure	65,373	65,316
Change in net assets, operational	3,755	1,698
Net Assets - Unrestricted		
Unappropriated		
Balance, beginning of the year	17,345	18,647
Operating surplus for the year	3,755	1,698
Gratuity/Pension Charge	(1,036)	-
Transfer to Appropriated	(1,000)	(3,000)
Balance, end of the year	19,064	17,345
Appropriated		
Balance, beginning of the year	9,113	6,113
Transfer from unappropriated	1,000	3,000
Total Net Assets - Unrestricted	10,113	9,113
Net Assets - Permanently restricted	4,191	4,131
Total Net Assets	33,368	30,589

Grant income from donors for 2012



Capacity Strengthening

a. Number and diversity of degree students trained/being trained at ICRISAT

ICRISAT Location	Interns		Scholars				Fellows		Countries
			Master's Program		PhD				
	M	F	M	F	M	F	M	F	
South Asia	24	35	4	1	16	16	7	14	South Asia (India, Bangladesh)
	-	-	-	-	-	-	5	4	South East Asia (Vietnam, Philippines, Myanmar)
	-	1	-	-	-	-	-	-	East Asia (Taiwan)
	1	4	-	1	-	-	-	1	North America (United States)
	-	1	-	-	-	-	-	-	West Asia (Syrian Arab Republic)
	1	-	1	1	1	-	5	1	East Africa (Sudan, Kenya, Ethiopia, Tanzania, Uganda)
	-	-	-	-	-	-	1	-	North Africa (Egypt)
	-	-	-	-	-	-	3	2	West Africa (Mali, Burkina Faso, Togo, Senegal)
	2	2	-	-	-	-	-	1	Europe (Germany, Sweden, United Kingdom, Switzerland)
	-	-	-	-	-	-	-	-	Oceania (Australia)
Totals	28	43	5	3	17	16	21	23	156
	71		41				44		
(Joined and completed in 2012)	52		2				44		
(Joined before 2012 and completed in 2012)	8		7				4		
(Joined in 2012 and continuing onwards)	11		14				13		
(Continuing from previous year)	0		18				1		
Eastern and Southern Africa (ESA)	3	0	9	3	0	1	0	0	East Africa (Kenya)
Totals	3		13				0		16
West and Central Africa (WCA)	15	6	16	4	5	1	1	0	West Africa (Niger, Mali, Senegal, Nigeria)
	1	0	0	0	1	2	0	0	Europe (Italy, Belgium, Germany)
	0	0	0	0	0	1	0	0	East Africa (Kenya)
Totals	16	6	16	4	6	4	1	0	53
	22		30				1		
(Joined and completed in 2012)	12		5				1		
(Joined before 2012 and completed in 2012)	2		1				0		
(Joined in 2012 and continuing onwards)	7		18				0		
(Continuing from previous year)	1		6				0		
Grand Total	96		84				45		225

b. Number of formal courses offered with number and diversity of participants

ICRISAT Location	Name of the Course/Scientific Visit	No. of Students			Countries
		M	F	Total	
Patancheru, India	National Training on Carbon Sequestration and Carbon Trading, 06-17 February 2012	15	1	16	India
	Capacity Building Training Cum Exposure Visit of Seed Certification Personnel and Seed Entrepreneurs of Orissa, 13-16 February 2012	16	-	16	India
	Training Program for IAARD Scientists from Indonesia, 19-23 March 2012	3	2	5	Indonesia
	Scientific Visit of Philippine Academic and Agricultural Administrators/ Leaders, 12-17 March 2012	7	3	10	Philippines
	Philippine agriculture scientists/administrators visit ICRISAT-Patancheru, 22-27 July 2012	5	3	8	Philippines
	Scientific Visit of SUC Presidents of the Philippines, 03-07 September 2012	3	4	7	Philippines
	Scientific visit of two Filipino research managers, 13 September 2012	1	1	2	Philippines
	Scientific visit of a research leader, 26-28 September 2012	1	0	1	Philippines
	Scientific visit (Interactive session on fundamental of scientific writing), 06-11 October 2012	0	2	2	Philippines
	Scientific visit of Philippine agricultural scientists, 21-27 October 2012	1	2	3	Philippines
	Training-cum Field Exposure on Pigeonpea Seed Production, 30-31 October 2012	19	1	20	India
	Scientific visit of Philippines agricultural scientists, 26-27 November 2012	0	2	2	Philippines
	ICRISAT-ICAR International training course on high throughput phenotyping for chickpea and pigeonpea diseases, 3-9 December 2012	0	2	2	Philippines
Sub-total (Patancheru)		71	23	94	
ICRISAT-Niamey, Niger	Training Workshop on Data Analysis, Niamey, Niger, 23-27 January 2012	17	2	19	Niger, Burkina Faso, Benin, Senegal
	BMZ Abiotic Stress Project Planning Meeting, Niamey, Niger, 12-15 March 2012	15	3	18	Niger, Mali, Burkina Faso, Senegal, Germany
	GCP Training Workshop at the Grand Hotel, Niamey, Niger, 15-16 March 2012	20	3	23	Niger, Mali, Nigeria, Mexico, Ghana, Burkina Faso, Senegal

Capacity Building Training-cum-Exposure Visit of Seed Certification personnel and Seed Entrepreneurs of Odisha, 13-16 Feb 2012.



Photos: ICRISAT

ICRISAT Location	Name of the Course/Scientific Visit	No. of Students			Countries
		M	F	Total	
	Atelier Sur Le Contrôle De Qualité Et La Certification Des Semences, Niamey, Niger, 26-28 March 2012	14	5	19	Niger, Ghana, Senegal, Burkina Faso
	Atelier De Formation Sur Les Techniques De Maraichage, Sadoré, 02-06 April 2012	5		5	Niger
	Atelier De Formation Sur Les Techniques De Production De Plants Et Gestion Des Pépinières, ICRISAT- Niamey, Niger, 16-20 April 2012	5		5	Niger
	Atelier D'analyse Des Données Socio-Économiques En Utilisant Le Logiciel STATA, Niamey, Niger, 23 May-01 June 2012	2	3	5	Niger, Burkina Faso
	Gestion des Pépinières et Techniques de propagation des Arbres, à Sadoré, 16-20 July 2012	18	11	29	Niger
	Pearl Millet Downy Mildew Greenhouse Screening, Sadoré, Niger, 01-02 August 2012	19	5	24	Niger, Nigeria, Mali, Senegal, Burkina Faso
	Atelier de formation sur l'utilisation du logiciel cahier électronique du GCP, TVC, Niamey, Niger, 04 August 2012	19	5	24	Senegal, Niger, Mali, Burkina Faso
	Atelier de formation sur l'opinion des experts sur l'adoption des variétés d'arachide, de mil et de sorgho en Afrique de l'ouest, Hôtel Sahel, Niamey, Niger, 06-07 August 2012	19	2	21	Senegal, Burkina Faso, Mali, Nigeria, Niger



Photo: ICRISAT

Groundnut harvest time.

ICRISAT Location	Name of the Course/Scientific Visit	No. of Students			Countries
		M	F	Total	
	Atelier de formation sur les méthodes d'évaluation d'impact des technologies et innovations et d'analyses des chaînes de valeurs, Hôtel Sahel, Niamey, Niger, August 2012	11	1	12	Niger, Nigeria, Burkina Faso, Mali, Ghana, Benin
	GIS and Remote Sensing Course for Agriculture and Natural Resources Management at ICRISAT- Niamey, 6-17 August 2012	27	3	30	Niger, Nigeria, Mali, Burkina Faso, Ghana, Benin, Germany
	Atelier régional de formation sur l'analyse des sols et des plantes, Hôtel Sahel, Niamey, Niger, 10-21 September 2012	17	9	26	Niger, Mali, Burkina Faso
	Atelier régional de formation sur les GLP/ Recommandation de fertilisation, Ouagadougou, Burkina Faso, 07-16 November 2012	11	4	15	Niger, Mali, Nigeria, Burkina Faso
	Formation in situ sur les techniques améliorées de maraichage, Birni NGaouré Niger, 12-16 November 2012		40	40	Benin
	Formation in situ sur les techniques améliorées de maraichage, Kalale Benin, 19 November-01 December 2012		40	40	Benin
	English Training Course, 29 November 2012-29 January 2013	20	8	28	Niger
	Atelier de formation sur la gestion des risques climatiques, Niamey-Niger, 10-15 December 2012	28		28	Niger, Mali, Senegal, Burkina Faso, UK, Germany
	Formation des Formateurs sur la Bio-récupération des terres dégradées (BDL), Sadoré, Niger, 10-15 December 2012	64	8	72	Niger
	Formation in situ sur les techniques améliorées de maraichage, Banizoumbou Niger, 26-28 December 2012		40	40	Niger
Sub-total (Niger)		331	192	523	
ICRISAT-Bamako, Mali	Formation sur l'installation des tests participatifs, Koutiala, 09 May 2012	15	5	20	Mali
	Formation sur les techniques culturelles, de récolte et de conservation de l'arachide, Mountougoula, Tièlè, Sanankoroba 10-11 May, 12-13 May, 14-15 May et 16-17 May 2012		702	702	Mali
	Atelier de formation sur « Approche champ paysan par grappe, la gestion du striga et la fertilité du sol et outils pour la dissémination des technologies à grande échelle », Koutiala, Mali, 15-18 May 2012	29	1	30	Mali
	Formation sur l'installation des tests participatifs, Kita, 28 May 2012	24	3	27	Mali
	Formation sur la Production et la conservation de semences certifiées de sorgho, Kita, 29 May 2012	21	3	24	Mali
	Formation sur les techniques culturelles, de récolte et de conservation de l'arachide, Koutiala, 30 May-02 June 2012		147	147	Mali
	Atelier de formation sur le Compostage en fosse et en tas pendant la saison de pluie, distribution et utilisation des vidéos d'instruction paysan-au-paysan et production de semences de sorgho, niébé, mil et oseille, Koutiala, 02-06 June 2012	28	7	35	Mali
	Formation sur la Production de semences d'hybride de sorgho, Dioila, 04 June 2012	50	5	55	Mali

ICRISAT Location	Name of the Course/Scientific Visit	No. of Students			Countries
		M	F	Total	
	Formation sur la Production de semences d'hybride de sorgho, Koutiala, 06 June 2012	26	0	26	Mali
	Formation sur l'installation des tests participatifs, Yorobougoula (Yanfolila), 07 June 2012	33	5	38	Mali
	Formation sur la Collecte des données des tests participatifs, Dédougou, 07-08 June 2012	24	1	25	Burkina Faso
	Formation sur la Production et la conservation de semences certifiées de mil et de sorgho, Koutiala, 07-08 June 2012	38	4	42	Mali
	Formation sur la Production et la conservation de semences certifiées de sorgho, Yorobougoula, (Yanfolila), 08 June 2012	15	3	18	Mali
	Atelier de formation sur le compostage en fosse et en tas pendant la saison de pluie, distribution et utilisation des vidéos d'instruction paysan-au-paysan, Yorobougoula, Mali, 12-13 June 2012	20	10	30	Mali
	Formation sur l'Évaluation participative des nouvelles variétés de sorgho et mil, Ségou, 13-14 June 2012	26	3	29	Mali
	Formation sur les techniques culturelles de récolte et de conservation de l'arachide, Bougoula, Dialakoroba, Garalo, 21-22 June 2012		133	133	Mali
	Formation sur l'Évaluation participative des nouvelles variétés de sorgho et mil, Kati, 12 July 2012	19	5	24	Mali
	Formation sur les techniques culturelles, de récolte et de conservation de l'arachide, Didiéni, 13-14 July 2012	27	30	57	Mali
	Formation sur l'Évaluation participative des nouvelles variétés de sorgho et mil, Kati, 20 July 2012	22	2	24	Mali
	Formation sur la Production de semences hybrides de sorgho, Samanko, Siby, Sotuba, 06-08 October 2012	40	0	40	Mali
	Formation sur la gestion intégrée de l'aflatoxine, Tiélé (Ouéléssébougou), 16 October 2012		317	317	Mali
	Formation sur la gestion intégrée de l'Aflatoxine, Zone de Kolokani, 18 October 2012	300	600	900	Mali
	Formation sur la gestion intégrée de l'Aflatoxine, Sanankoroba, Dialakoroba, 23 October 2012	317		317	Mali
	Formation sur la Méthode d'échantillonnage de l'arachide, Kolokani, 09 November 2012	1		1	Mali
	Formation sur la transformation de l'arachide dans le cadre de la gestion intégrée de l'Aflatoxine, Mopti, 14 November 2012	127		127	Mali
	Formation sur la gestion intégrée de l'Aflatoxine, Koutiala, 30 November-01 December 2012	30	10	40	Mali
Sub-total (Mali)		1232	1996	3228	
ICRISAT-Kano, Nigeria	Training Workshop for seed lab technicians, at the Central Seed testing laboratory, Abuja, Nigeria, 27-28 February 2012	35	20	55	Nigeria
	Training for Seed Certification officers, seed companies, Seed production officers and ADPs, National Agricultural Seed Council, Samaru, Zaria, 26-27 March 2012	47	5	52	Nigeria
	Business plan development Training at IAR Conference room, Zaria, Nigeria, 24 April 2012	42	6	48	Nigeria
	Training on Linkages for Agro dealers and Seed companies, IAR Samaru, Zaria, 25 April 2012	60	10	70	Nigeria

ICRISAT Location	Name of the Course/Scientific Visit	No. of Students			Countries
		M	F	Total	
	Actor Identification Training at Kano State Agricultural and Rural Development Authority, Kano, 25 April 2012	39	3	42	Nigeria
	Pre-season Training for Extension Agents and Lead Farmers, at Federal Crop Protection School, Hotoro, Kano, 24 May 2012	41	4	45	Nigeria
	Training on Data collection and reporting at ICRISAT Station Kano, 5 December 2012	14	1	15	Nigeria
	Training on Data collection and reporting, ICRISAT Station Kano, 11 December 2012	16	3	19	Nigeria
Sub total (Nigeria)		294	52	346	
ESA, Nairobi	Training of farmers in understanding probabilistic climate information, 3-22 September 2012	200	259	459	Wote, Kenya
	Workshop on experimental designs and data analysis, Nairobi, Kenya, 15-19 October 2012	33	3	36	Kenya, Malawi, Mozambique, Tanzania, Uganda, Ethiopia
	Pigeonpea production technology with emphasis on hybrid breeding, ICRISAT-Patancheru, 26 October-7 November 2012	4	1	5	Kenya, Uganda, Tanzania
	Training in climate, crop and economic models to assess impacts of climate change, Adama, Ethiopia, 3-8 December 2012	30	6	36	Kenya, Tanzania, Uganda and Ethiopia
Sub-total (ESA)		267	269	536	
GRAND TOTAL		2195	2532	4727	



Photo: J Hansen, CCAFS

Farmers' workshop on climate information, Senegal.

Publications

Full list available at <http://www.icrisat.org/icrisat-staff-publications-2012.htm>

To access digital versions of publications go to <http://oar.icrisat.org>



Workshops, Conferences and Meetings in 2012

Full list available at <http://www.icrisat.org/icrisat-workshops.htm>



Photo: L Vidysagar, ICRIAT

Awards 2012



Dr Dar receiving the Honorary Degree of Doctor of Technology from TCA President Max P Guillermo.



Dr Rajeev Varshney being honored by GAAS Vice President Dr Chen Dong.



R Varshney receiving the certificate of appointment from Professor Huangming Yang, Chairman, BGI.



HC Sharma re-elected president of International Congress of Entomology.



H Upadhyaya elected Honorary Fellow of ISPGR.



Dr CLL Gowda (left) receiving the International Service in Crop Science Award from CSSA President Dr Jeffrey Volenec.



(L) Abdul Rashid War and (R) Md Riyazaddin receiving their gold medals for Environmental Biology.

Annual Report 2012

ICRISAT locations in the semi-arid tropics



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International Crops Research Institute for the Semi-Arid Tropics

The **International Crops Research Institute for the Semi-Arid Tropics** (ICRISAT) is a non-profit, non-political organization that conducts agricultural research for development in Asia and sub-Saharan Africa with a wide array of partners throughout the world. Covering 6.5 million square kilometers of land in 55 countries, the semi-arid tropics have over 2 billion people, of whom 644 million are the poorest of the poor. ICRISAT innovations help the dryland poor move from poverty to prosperity by harnessing markets while managing risks – a strategy called Inclusive Market-Oriented Development (IMOD).

ICRISAT is headquartered in Patancheru near Hyderabad, Andhra Pradesh, India, with two regional hubs and five country offices in sub-Saharan Africa. It is a member of the CGIAR Consortium. CGIAR is a global research partnership for a food secure future.

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