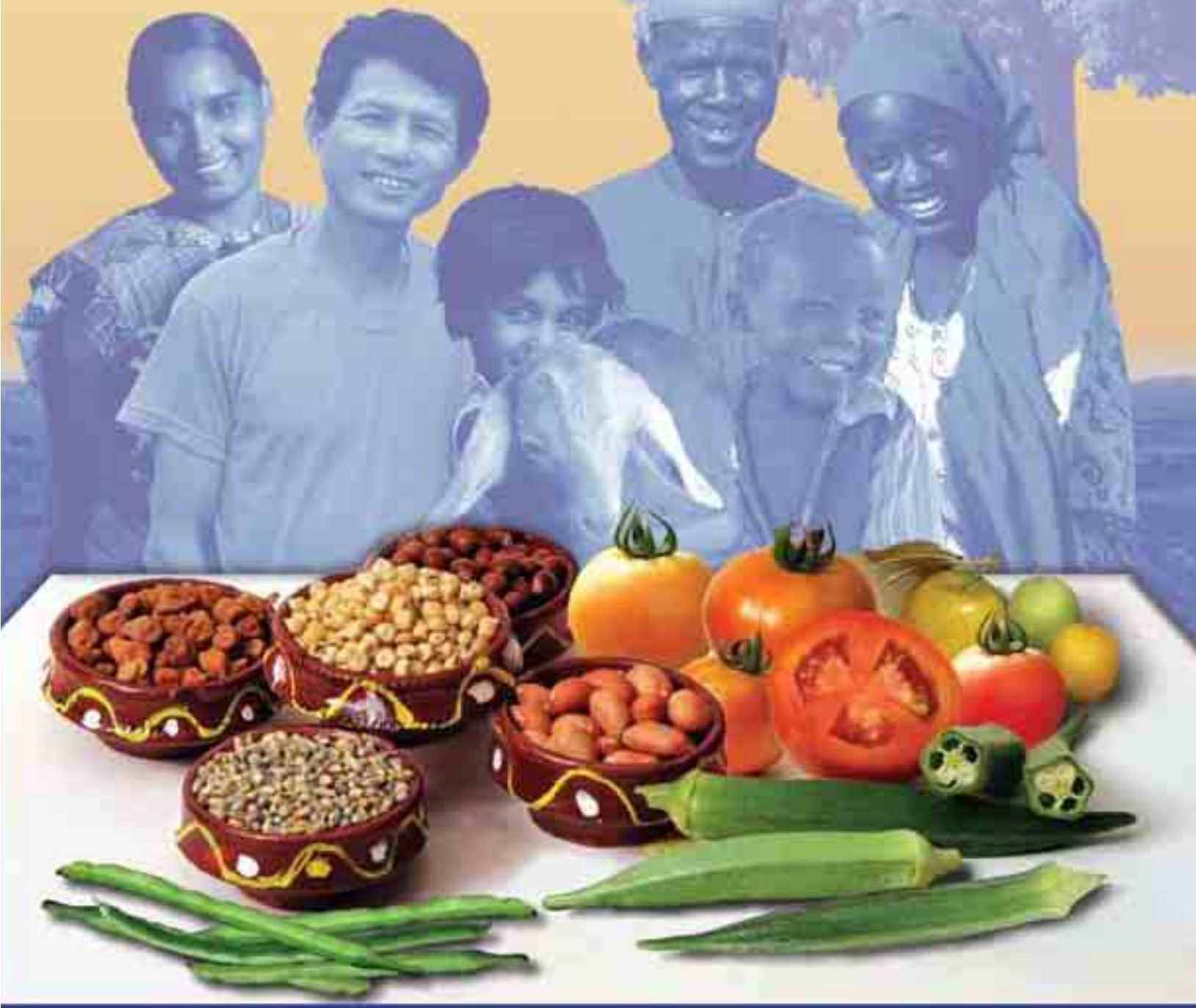
ICRISAT

Food Security and Diversification in the Drylands

Annual Report 2009



ICRISAT
Science with a human face

International Crops Research Institute for the Semi-Arid Tropics

Aerial view of ICRISAT headquarters, Patancheru, India.

Contents

*Included here as these reports were not published in the 2008 Annual Report due to a change in the publication date.

Zeno, the Greek philosopher who died in 264 BC, said, "The goal of life is living in agreement with nature," reminding us that although we live in a diverse world with diverse needs, it is imperative that we live in harmony with nature.

However, the unabated loss of biodiversity taking place today reveals the imbalance between human needs and nature's capacity. Loss of genetic diversity could endanger agriculture; the Irish potato famine and the Soviet wheat loss are striking examples.

While effective conservation efforts begin in the fields, forests and watersheds, complementary governmental efforts are also needed, as is international cooperation, given the global nature of the biodiversity crisis.

General interest in biodiversity has grown rapidly in recent years, in parallel with the growing concern about nature conservation, largely as a consequence of natural habitat loss, degradation and the extinction of species. It is our duty to safeguard the variety of life on earth.

ICRISAT's mission is, "To reduce poverty, enhance food and nutritional security and protect the environment of the semi-arid tropics by empowering the poor through partnership-based science with a human face." Our report for 2009 portrays our multipronged efforts to ensure food security in the semi-arid tropics.

Biotechnology and bioinformatics facilitate giant steps in research and we employ these modern science tools to delve into the mysteries of genetics towards creating new and more vigorous crop varieties. While we are still trying to overcome an old enemy in the dreaded *Striga* weed, we are also elated with our partnership successes and the resultant improved varieties. Not only are we developing improved varieties of food crops, we are also providing the infrastructure for development of healthy foods through our Agri-Science Park.

Our efforts in natural resource management are fostering diversified vegetation in hitherto barren lands, drawing attention from governments who seek our expertise to help develop viable watersheds at the community level. Our seed systems promise the availability of good seed for the poor farmer, and of course, our research is guided by the Village Dynamics Studies that help us to focus on our mission.

The CGIAR is going through a change process, and although the framework for the "new" CGIAR is laid, there is still an air of uncertainty about the role individual centers will play. Have we done our part to make our strengths known? How relevant will we be in the future?

Whatever the final analysis, we know that we must play a larger role in strengthening capacities, reducing poverty and enhancing livelihoods. We recognize that our interventions will not necessarily be limited to mandate crops; but we are certain that it is our mission goals that will finally guide our actions. The Institute is in the process of mapping out a new strategic plan to 2020. The conservation and use of mandate crop biodiversity is a high priority.

As always, we acknowledge the support and guidance given to us by our Governing Board, our donors, our partners, and the immense loyalty and hard work of our staff members, who contribute to the fulfillment of our mission.

William D Dar
Director General

In the one year that I have been Board Chair, I have witnessed the enormous mission of ICRISAT - "to help empower 600 million poor people to overcome hunger, poverty and a degraded environment in the dry tropics through better agriculture". In that short period I have also been very impressed with the successes of "Team ICRISAT".

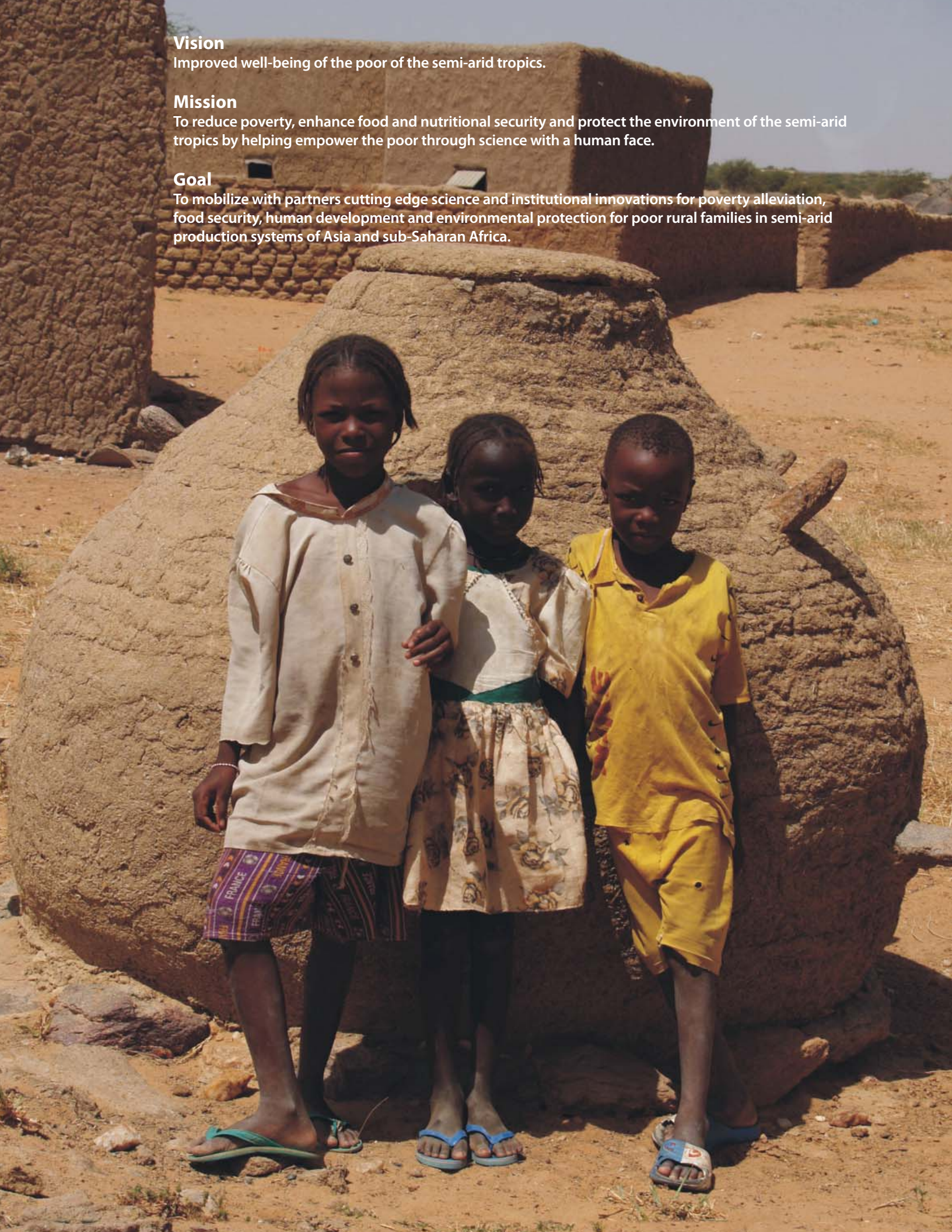
President Dwight D Eisenhower famously said, "Farming looks mighty easy when your plow is a pencil, and you're a thousand miles from the corn field." The complexity of agricultural research, the very real problems faced by poor farmers, and the enormity of our responsibility to use science to find solutions, hits home when one takes a close look at the activities of agricultural research institutes such as ICRISAT.

One of my heroes, the novelist Douglas Adams once said, "It is a mistake to think you can solve any major problems just with potatoes." ICRISAT does not claim to be a problem-solver with just its scientific research. I am very proud of the fact that ICRISAT has pursued strategic partnerships to both develop agricultural solutions and to disseminate its knowledge and findings. I laud the fact that in addition to the scientific research being done in Asia and in sub-Saharan Africa, ICRISAT efficiently transfers information, knowledge and benefits from one continent to the other.

Research institutes must always be looking for ways of doing things better. The research thrusts must also change with changing needs and new knowledge. I see that ICRISAT is living up to its expectations. ICRISAT has developed climate ready crops to help poor farmers adapt to climate change; ICRISAT is discovering and developing alternate uses for the crops it researches; ICRISAT is linking with partners to diversify the farming systems where necessary so long as it satisfies its mission to improve the livelihoods of poor farmers in the semi-arid tropics.

We have a large task ahead of us. We must remember the 600 million poor people we have committed to help. I would like to paraphrase the words of the Chair of the CGIAR Consortium Board, Carlos Perez del Castillo, who said that agriculture is an essential element in all the crises we face today – food security, energy crisis, persistent poverty. We need collective action against these global challenges. We need collective responsibility and collective ownership. I am confident that ICRISAT and its excellent leadership is up to the task, and extend my very sincere and best wishes to the Institute for success in their noble mission.

Nigel Poole
Chairman, Governing Board



Vision

Improved well-being of the poor of the semi-arid tropics.

Mission

To reduce poverty, enhance food and nutritional security and protect the environment of the semi-arid tropics by helping empower the poor through science with a human face.

Goal

To mobilize with partners cutting edge science and institutional innovations for poverty alleviation, food security, human development and environmental protection for poor rural families in semi-arid production systems of Asia and sub-Saharan Africa.

Food security and diversification in the drylands

Bioinformatics Tools for Molecular Breeding

Data capture through handheld electronic fieldbooks, the first step in the journey to ICIS.

Over the past few decades, major advances in the field of information technology coupled with advances in genomic technologies, have led to more efficient applications of genomics in crop improvement programs. Today, large and complex sets of data are being routinely generated. Bioinformatics tools for the capture, curation, integration and analysis of these large volumes of data are therefore a necessity for increased efficiency and improved quality within the molecular breeding process.

To efficiently manage the extensive amounts of information generated by ICRISAT and its partners, a number of bioinformatics tools are currently being developed and implemented. These tools and technologies are part of the analytical pipeline being developed under the Integrated Breeding Platform (IBP) of the CGIAR's Generation Challenge Program (GCP).

Crop information systems

Chickpea and sorghum implementations of the International Crop Information System (ICIS) are currently being evaluated for the management and integration of global information on genetic resources and germplasm improvement. ICIS provides for the integration of phenotypic (traits) and genotypic (genes) information, which is crucial for modern breeding. Electronic data capture through handheld electronic fieldbooks is also being implemented in collaboration with other GCP 'Crop Lead Centers' established as a part of the IBP.

Laboratory information management system

One of the major constraints in molecular breeding projects is the timely and accurate availability of information from the laboratory to scientists who may be geographically dispersed. ICRISAT has developed a highly customized workflow-

based Laboratory Information Management System (LIMS) that allows efficient tracking of samples in the genomics laboratory as well as availability of the data to collaborating scientists through the internet. The LIMS ensures that the process of collecting genotypic information is validated and traceable for quality assurance purposes. It also facilitates standardization of protocols and methods within the laboratory.

Reviewing the development of the ISMAB system.

Information system for marker-assisted breeding

Data visualization is becoming critical in agricultural research, because of the large amount of complex data generated in genomics and crop breeding. A major challenge in crop improvement programs is in interpreting and decision making from large data sets that combine information on genotypes, phenotypes and environments. Visual analytics allow breeders to view their information in a graphical environment, where they can more easily understand the relationships underlying the data, identify trends and patterns, and make discoveries based on information visualization. The Information System for Marker-Assisted Breeding (ISMAB) focuses on visualization of marker-assisted backcrossing experiment datasets, to provide a workbench that can integrate information from various experiments, across generations and identify the best individuals by visual analysis.

Computational architecture

Molecular breeding projects have an inherent requirement to connect to various sources of publicly available information and databases. In order to facilitate the querying and interaction between and across databases as well as species, especially within the IBP, a layer of computational architecture is being developed collaboratively. This is based on a consensus blueprint of a scientific data model, as well as standardization through common and controlled vocabularies (ie, so that a pearl millet panicle can be equivalent to a sorghum head).

Crop vocabularies for sorghum and chickpea have already been developed at ICRISAT, and these are now being used to further develop trait dictionaries to be used within the crop information systems mentioned above.

Due to the specifics of different crops and breeding schemes, there is no one-size-fits-all solution. However, with the current tools under development at ICRISAT, and the collaboration with a consortium of partners through the IBP, a learn-by-doing approach is proving most useful in designing data management and informatics for molecular breeding.

Analyzing and managing complicated breeding data has become a demanding issue for the community of plant breeders. Data sources and software applications developed at ICRISAT will help breeders to keep track, manage and efficiently analyze large amounts of data generated in breeding programs. These tools will also help to interpret large and complex data sets by combining information on genotypes, phenotypes and across multiple environments and different generations. Understanding the relationship underlying the data, identifying trends and patterns and making new discoveries by analyzing breeding data *in silico* will definitely benefit the crop improvement programs in realizing their goals to accelerate the rate of genetic gain and lead to more productive varieties in a shorter time.

Orphan Legume Crops are NOT Orphan Anymore!

A scientist inspecting the development of a high density marker array being held by a research technician.

Legumes are the third largest family among flowering plants, accounting for 27% of the world's crop production, with grain legumes (eg, beans, chickpea, groundnut, lentils, peas, peanut/groundnut) alone contributing 33% of the dietary protein needs of humans. Grain legumes are also a rich source of essential vitamins, minerals and important amino acids. Grain and forage legumes are grown on some 190 million hectares, and their production is about 300 million metric tons globally. However, legumes are often grown in marginal environments of the semi-arid tropic (SAT) regions by smallholder farmers, where the production of these crops is heavily challenged by a range of biotic and abiotic stresses. Researchers have been working for many years to improve crop productivity by using traditional breeding strategies and better crop management practices; and several improved varieties, including hybrids (eg, pigeonpea), have been developed by ICRISAT and its partners. Still, we need to increase the speed at which we can develop better varieties, and ICRISAT believes that one way to accomplish this is through the application of modern genomics.

Importance of genomic interventions in legume breeding

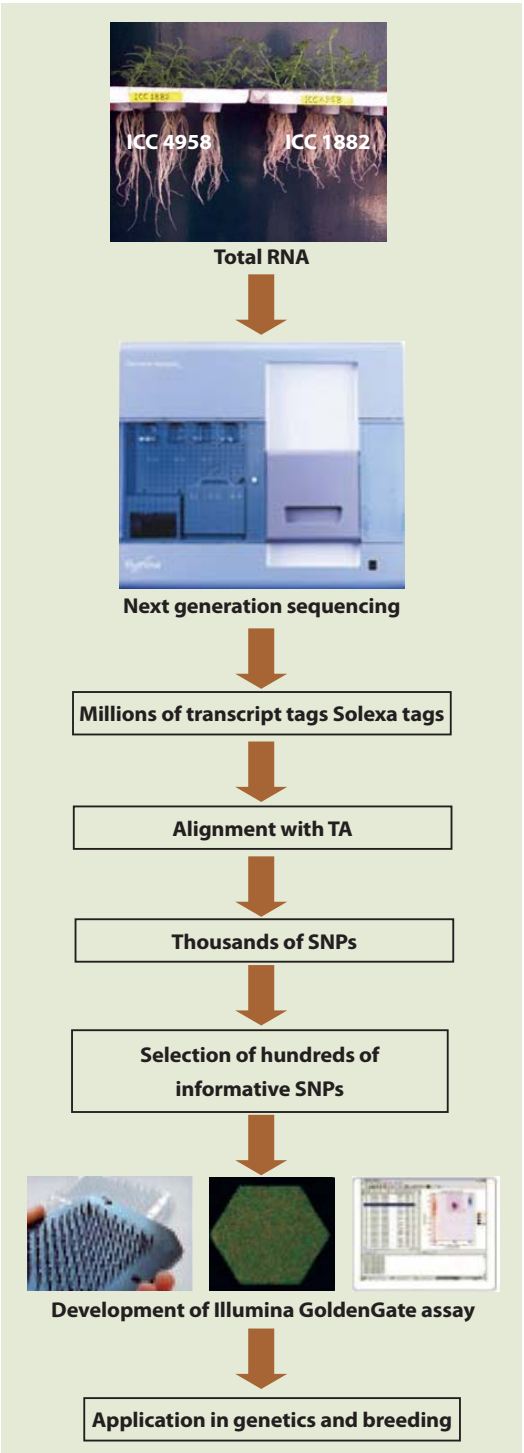
Recent advances in the area of genomics offer several opportunities to enhance breeding for many biotic and abiotic constraints that affect crop production. While a significant amount of genomic resources have been developed for a few legume species, most of the legume species important in the SAT have not had sufficient resources for modern breeding approaches. As a result, these legume crops were often referred to as "orphan" crops. However, during the last five years, as a result of several national and international initiatives, concerted efforts have been made to develop genomic resources in the legume crops of the SAT, and as a result these crops are now turning into resource-rich crops.

Use of next generation technologies

Novel sequencing technologies, such as Roche 454/FLX and Illumina/Solexa, are being used to sequence the genes of chickpea and pigeonpea. Using 454/FLX sequencing, over 100,000 chickpea and nearly 500,000 pigeonpea gene sequences have been

generated. Further analysis of these sequences has resulted in over 100,000 tentative unique sequences for chickpea and over 125,000 sequences for pigeonpea. Similarly, the Illumina/Solexa sequencing approach has resulted in around 120 million sequences for chickpea and 180 million sequences for pigeonpea. Efforts are now underway to assemble all of the sequence data into a genome map for chickpea and pigeonpea. Just a few years ago, this would have seemed impossible for such species, but today it is a reality.

Advances in trait mapping and molecular breeding: Given the low level of genetic variation and a paucity of molecular markers, the development of dense genetic trait maps were difficult for the SAT legumes. However, with the development of large-scale genomic resources described above, it has been possible to develop the genetic maps with sufficient marker density. For example, a genetic map has been developed using a segregating population of cultivated groundnut. Combining this map with data from field experiments that analyze the effects of drought on the population has indicated that drought tolerance in groundnut is controlled by many genes (termed Quantitative Trait Loci or QTL), each contributing a small amount of drought tolerance. On the other hand, QTL analysis for root traits in a population of chickpea has revealed a single genomic region that contains several QTL contributing up to 36% of the variation for several root traits. Efforts are now underway at ICRISAT to cross this major root trait QTL into three elite chickpea lines (JG 11, Chefe and KAK 2) in collaboration with Egerton University (Kenya), Ethiopian Institute of Agricultural Research (EIAR, Ethiopia), Lake Zone Agricultural Research Institute (LZARI, Tanzania) and Indian Institute of Pulse Research (IIPR, India).



Erstwhile orphan legumes have a prosperous future

Clearly, significant progress has been made towards developing genomic resources in model species (Medicago and lotus), major legumes (soybean, common bean and peanut) as well as so called orphan crops (cowpea, chickpea and pigeonpea). While some legume crops now enjoy the availability of initial genome sequences (eg, soybean, Medicago and lotus), legume species important in the SAT regions now have appropriate numbers of molecular markers and genetic maps for use in breeding and research programs. Similarly, large amounts of genome and gene sequence data is available for several legume crops, and will be expanded several fold in the coming years due to increasing use of next generation sequencing technologies. Analysis and use of this 'tsunami' of genomic information is going to be an even more challenging task than generating the resources in the first place. ICRISAT and its partners are up to this task and look forward to continuing the efforts to apply the best technology in the improvement of crops critical for the livelihoods of smallholder farmers in the semi-arid tropics.

Pearl Millet Diversity in West Africa

Diversity of WCA pearl millet panicle traits (note the 12 inch scale for comparison).

Pearl millet [*Pennisetum glaucum* (L.) R. Br.] is a highly stress-tolerant staple cereal grain for the hottest, driest regions of sub-Saharan Africa and South Asia. West and Central Africa (WCA) is the primary centre of origin and diversity for pearl millet. The picture above illustrates the tremendous diversity of local pearl millets in WCA for panicle characters, representing also different ecotypes. As all these ecotypes are cultivated in WCA, the picture also illustrates the diversity of farmer preferences, and that there is no 'one size fits all' regarding farmer-preferred pearl millet cultivars in WCA.

Genetic diversity is the capital of each breeding program. The ICRISAT-WCA pearl millet improvement program, together with its NARS partners in Burkina Faso, Mali, Niger, Nigeria and Senegal, aims at a better understanding and use of the WCA pearl millet diversity in the development of improved, farmer-preferred cultivars. Thereby, diversity is studied and exploited at different levels.

Understanding the extent of phenotypic diversity and geographic differentiation, and promoting regional germplasm exchange

Within the frame of the BMZ-funded project *Mobilizing Regional Diversity*, 424 pearl millet landraces from all over WCA were characterized in Burkina Faso, Mali, Niger, Nigeria and Senegal. The landraces revealed wide ranges for all morphological, agronomic and resistance traits assessed. From these characterization trials, each participating country identified promising landraces for breeding, and morphologically contrasting germplasm groups for crossing. This resulted into important diversification of breeding materials in each partner country.

Linking phenotypic observations to the geographic origin of the pearl millet landraces revealed certain patterns of geographic differentiation. Flowering time was correlated to latitude, reflecting higher frequency of early flowering accessions in the north and later flowering accessions in the south, corresponding to the rainfall patterns in the region. But the correlation is rather loose, as two types of millets are usually grown in the wetter south – early millets to cover the 'hungry period' and late-maturing ones for higher productivity. Geographic differentiation for panicle length revealed two main groups: (1) longer panicle accessions originating from West Niger, North-East Benin, North Burkina Faso, and Senegal; and (2) shorter panicle accessions originating from East Niger, West Benin, Cameroon, Central African Republic, South Burkina Faso, and Mali.

Enhancing heterozygosity (=intra-genotypic diversity) through heterotic grouping

Being highly allogamous (outcrossing), the natural stage of pearl millet is heterozygous, ie, it needs to have two different alleles at most of the genome loci to be performing. The degree of heterozygosity in pearl millet cultivars can be enhanced by crossing

genetically distinct materials. To identify genetically distinct parental materials, heterotic groups were identified for WCA pearl millet landraces in the BMZ-funded project *Mobilizing Regional Diversity*. Heterotic groups represent germplasm groups that are genetically distinct from each other and that produce superior hybrids when crossed. The heterotic grouping was done through the study of agro-morphological differentiation and the characterization of genetic diversity at the DNA level via molecular markers. Heterotic groups identified via diversity analysis were then validated through multi-location evaluation of putative intra- and inter-pool crosses. This enables identification of the optimal genetic distance among parental materials for attaining maximal hybrid vigor.

In pearl millet, the detection and use of heterotic pools provide a basis for sustainable breeding of both open-pollinated and hybrid cultivars, as both types profit from heterozygosity and hybrid vigor. A first fruit of the heterotic grouping is a cross of genetically distinct landraces from Niger and Senegal, "Tiouma × Souna" that revealed outstanding performance and high farmer-preference indices in on-station and on-farm trials in Niger.

Studying intra-varietal diversity as mechanism of adaptation to variable climates

Local landraces of pearl millet are not uniform but rather highly heterogeneous. Data gained from full-sib selection trials funded by the IFAD-PROMISO project revealed that pearl millet landraces from Niger dispose significant genetic variability, eg, for flowering time. Differences between the earliest and the latest full-sib families derived from the same landrace were 16 days at minimum (in Bondabia landrace) and 39 days at maximum (in Bazagome). Such an intra-varietal diversity for adaptation traits can reduce the vulnerability of the landrace (eg, in the case of a dry spell, not all plants will be hit in their most sensitive stage) and therefore enhance yield stability. It may not be by chance that WCA pearl millet landraces are displaying such a "populational buffering" mechanism against environmental variability. As this characteristic has evolved during

Farmers selecting their preferred varieties in participatory selection trials.

thousands of years of natural and human selection, it must bear some advantage for survival, grain yield performance and stability. Therefore, plant breeders must also question how much genetic heterogeneity is desirable, or necessary, to obtain improved, stable varieties that are able to out-yield local cultivars under extreme and variable growing conditions such as in the Sahel.

Offering diversity to the diversity of farmers and farming conditions

Growing conditions and farmer preferences in WCA are highly diverse. Therefore ICRISAT-Niamey works together with partner NARS in a McKnight-Foundation–funded project to develop efficient participatory population improvement methodologies. The aim is to "offer diversity to the diversity of farmers". The approach includes community management of diversified pearl millet populations and training women and men to select within these populations for target traits according to their specific production objectives. This participatory breeding research contributes to development of farmer-preferred cultivars, to maintenance of genetic diversity in farmers' fields and even tries to develop concepts for *in-situ* conservation of crop genetic resources.

Stalking *Striga* the Cereal Killer

***Two views of an on-station trial showing the combined effect of sorghum resistance, intercropping and organic amendments** (right) **compared to the control** (left).*

Purple witchweed ... the very name has a mysterious, menacing ring to it. This is the common name of *Striga hermonthica,* the dreaded parasitic weed that infects and feeds on the roots of cereal crops and wild grasses, and commonly referred to as *Striga*.

S. hermonthica is arguably the most important biological constraint to production of rainfed cereals of the semi-arid tropics (SAT) in sub-Saharan Africa. It thrives in fields with a high frequency of cereal cropping and very low soil fertility, attacking pearl millet, sorghum, maize and upland rice. The effect of the parasite on these crops is devastating and yield losses for pearl millet and sorghum are estimated at between 40-80% where infestations are high. A single mature *Striga* plant can produce up to 200,000 tiny (dust like) seeds that will spread easily with contaminated crop seeds, farm tools, wind, water and animals, and that may stay viable in the soil for up to ten years or more.

Many potential options to control *Striga* have been developed through research efforts in the last 30 years (Fig 1). Despite these efforts, adoption of control options by farmers has been limited and the infestation area and density of *Striga* has increased. On the one hand, options such as mineral fertilizer and resistant varieties are not readily available to farmers, and on the other hand, many farmers are not aware of the available options (intercropping cereals with legumes at a high density). Furthermore, some options may not be effective or practical for farmers if applied as a single control method. While any individual technique may not be effective, a combination of options could reduce the *Striga* population to manageable or even acceptable (low or no damage) levels, providing increased crop yields and profitability of the cropping system. Research to find effective control options for an integrated *Striga* and soil fertility management (ISSFM) strategy is necessary to improve adoption by farmers.

ICRISAT efforts

ICRISAT and its partners in Mali, Niger and Nigeria are using on-station breeding and experimentation, modeling and participatory on-farm research to develop effective, applicable and profitable ISSFM

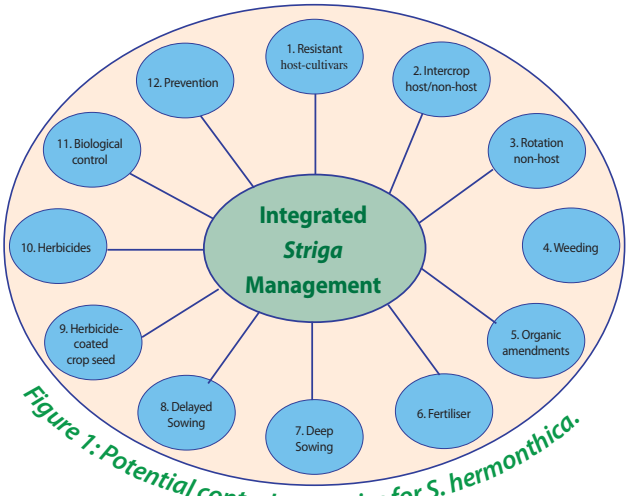


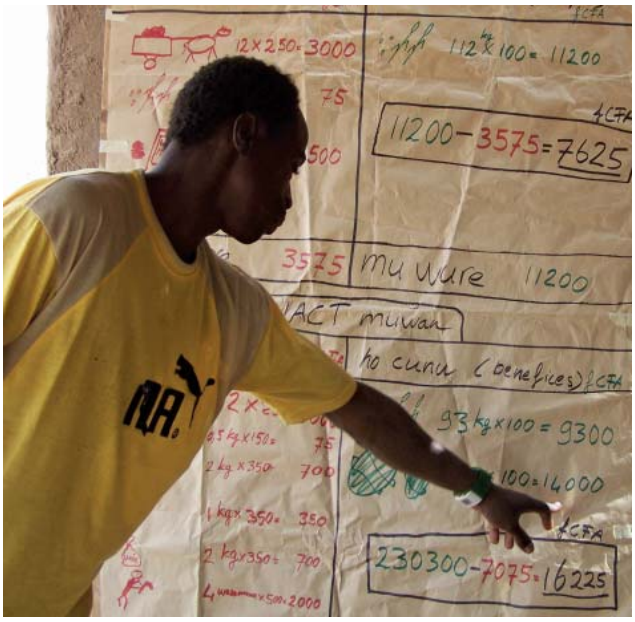
Figure 1: Potential control strategies for S. hermonthica.

strategies for resource-poor farmers in the West and Central Africa region.

ICRISAT is also searching for and selecting sources of resistance to *Striga* in pearl millet. In sorghum, good *Striga* resistance found in a poorly adapted variety is being introgressed into farmer-preferred varieties using marker-assisted selection to produce adapted farmer-preferred *Striga* resistant varieties. *Striga* resistant sorghum and pearl millet varieties will become an essential part of an ISSFM strategy (Fig 1). Through on-station experimentation, the efficacy of single and combined control techniques to increase crop yields and decrease *Striga* seed bank densities (the reserve of the viable seeds in a given volume of soil) is being studied. Results from trials on sorghum indicate that there are clear benefits to the combination of control methods as compared to single control methods in terms of crop yields and *S. hermonthica* control (pictures on previous page). Data obtained from on-station trials will feed into a *Striga* seed bank model to simulate and forecast long-term *Striga* population dynamics and potential cereal crop yields. Already from simulations, it is apparent that rigorous control of *Striga* seed production is necessary to prevent *Striga* population explosions and eventual damage to crop yields. This stresses the importance of intensive monitoring of fields by farmers to prevent escaping *S. hermonthica* plants from producing thousands of tiny seeds and infesting the field for years to come.

Overcoming constraints to application

Besides efficacy of control options, there are other constraints to the adoption of ISSFM by farmers, such as limited knowledge and socio-economic



Results of a participatory cost-benefit analysis of ISSFM and farmer practice for a rigorous evaluation of ISSFM under farmer conditions.

constraints. Farmers are not always knowledgeable about the biology of *Striga*, its damaging potential for the cereal crop and the options for control. This limited knowledge about the available control options and their effects, is a very important constraint to the control of this parasite and the application of ISSFM by farmers. To develop and test the efficacy of the ISSFM strategy, we have found that it is best to apply and evaluate the strategy with the farmers themselves in their own fields. To this end, ICRISAT uses the Cluster Based Farmer Field School approach. This approach provides a platform for farmers and scientists to exchange knowledge on *Striga* biology and control options, and to conceptualize and develop practical ISSFM strategies. Farmers are guided by the scientists in experimentation and observation of the *Striga* control and evaluation of the strategy in agronomic and economic terms (see picture above). Farmers, in turn, provide practical knowledge that catalyzes the innovative process in the search for efficient, practical and profitable ways to control *Striga* and improve soil fertility.

All these activities will lead to a broad range of information and data that is currently being gathered by ICRISAT and its partners. A thorough analysis will enable us to understand the technological, cognitive and socio-economical bottlenecks to the application of ISSFM by farmers and how to overcome these. Together, we hope that one day, Africa could be free of the purple witchweed scourge.

Understanding the Drivers of Development

Interviewing farm men and women to evoke local level perspectives.

What better way to understand the livelihoods of the people we serve, the smallholder farmers of the semi-arid tropics, than by meeting them face-to-face and getting first-hand information about the forces that shape their lives and fortunes? And why do we need to understand? It is because knowledge about rural economies can help us determine where we need to focus efforts in order to bring about development and improvement.

A good example of this is the Dokur village case study, one of the study villages of ICRISAT's Village Dynamics Studies (VDS) covering 42 villages in India and Bangladesh. The VDS is a coordinated program of research, which aims at broadening the understanding of rural labor, financial markets, risk attitudes and technological change in the rural semi-arid tropic economy.

Dokur village economies

Dokur village is located in Devarkadra mandal, Mahabubnagar district, one of the poorest and drought prone districts of Andhra Pradesh State in India. An analysis traced changes in household welfare and poverty dynamics relative to the income of a household.

During the last 30 years, livelihoods in Dokur have changed substantially. Food security of poor households improved, due mainly to the greater diversity in livelihood options. The attention of Dokur farmers has shifted from crop productivity for subsistence to profitability. They now prefer to grow cash crops like castor and paddy due to their higher profits. Cultivation of labor intensive crops has created greater demand for labor, which substantially increased the bargaining power of this labor sector, and wage rates have significantly increased.

All was not positive though as the share of crop incomes were seen to be declining due to repeated droughts. At the same time, households turned to non-farm sources of livelihood. Poor households acquired land or increased their holdings, thus reducing their participation in the labor market. Non-farm employment opportunities increased due to higher education, better skills and technical knowledge. Seasonal out-migration as a source of livelihood has significantly increased with around

30% of the population migrating to cities in search of off-farm employment. Formal credit sources have reduced the role of the private moneylenders, but the latter still constitute an important source of credit. The reduction in poverty may be attributed to the benefits accruing from government welfare programs like the Public Distribution System (PDS), old age pension schemes, housing schemes and support to self-help groups. It was also observed that women are playing an important role in decision making on cropping patterns, input use, adoption of improved agricultural technology and managing farm operations.

Observations

This profile of Dokur is an illustration of a village whose transformation was driven not by agriculture but by the opportunities presented by diversification into non-agricultural sources of livelihood. It has shown that higher education, improved awareness, and women empowerment have facilitated this process. However, though livelihood options have increased and have provided substantial opportunities for the poor to enhance incomes and move out of the poverty trap, the increasingly non-viable nature of farming in Dokur presents a challenge to rural development practitioners and policymakers. The long term observations from Dokur emphasize the significance of the need for innovative technologies that address water scarcity and frequent droughts, institutional arrangements that link farmers to markets, and appropriate investments to manage the natural resource base and provide supplemental irrigation. Such desirable features are imperative to give an impetus to revitalize rainfed agriculture as a source of livelihood among the rural poor in villages like Dokur.

This study, which chronicles the agro-economic, socio-institutional dynamics and pathways of development of the village economy, provides a good overview for scholars and development practitioners worldwide in their analysis of the decision-making process and technological change in the SAT. It also presents useful insights of changes in the village economy through a coordinated program of research.

Non-farm sources of livelihood (eg, road building) especially for women.

A unique dimension of this coordinated approach is the generation of local level perspectives on global issues and its local manifestations (eg, global warming, climate change, globalization and feminization of agriculture) and identification of new sources of vulnerabilities, risk and coping mechanisms. The emerging trends on the institutional and social fronts (such as rapid differentiation of village communities due to economic and political processes, decline of collective risk sharing, and marginalization of commons) are given greater attention in this project to make them more relevant in the changing contexts. This makes VDS a vehicle for research-response to emerging challenges in rural and agricultural transformation.

Helping understand agricultural transformation

Insights such as those derived from Dokur will help us in understanding the drivers of agricultural and economic transformation. It will also throw more light on the dynamics of poverty. Why do some households escape and some dive into poverty? The Village Dynamics Studies also help us understand gender-based differences and strategies for moving out of poverty. Thinking beyond Asia, in the sub-Saharan Africa context, why is agricultural transformation slow to occur? What are the technological, institutional and policy issues preventing agricultural (economic, social, environmental) transformation from occurring? As we obtain answers to these questions, we can develop solutions for helping improve the livelihoods of smallholder farmers and families in Asia and sub-Saharan Africa, one of ICRISAT's most important mission goals.

The West Africa Seed Alliance (WASA)

Participants of a WASA workshop held in Bamako.

Agriculture is an integral part of the West African economy and an important lever for economic development, poverty alleviation and increasing rural incomes.

In the 1960s and 1970s, a number of multinational input suppliers entered the West Africa input market, but most have withdrawn from the region over the past decade. Tariff and non-tariff trade barriers, the very low purchasing power of the majority of West African farmers, and the failure of a modern, commercial-scale farming industry to evolve, all contributed to the decision to pull out. Government and donor seed schemes, inconsistent enforcement of regulations, inadequate protection of intellectual property, governance and mismanagement issues, and the breakdown of the rule of law were additional factors that led to the lack of investment from the private sector.

Seeds hold the future

Over the past several decades, many development donors, including USAID, have made large investments in agricultural research and are promoting seed production in sub-Saharan Africa, including West Africa. However, the ultimate impacts of these investments on food security, agricultural productivity and farmer incomes have been below expectations, largely because of the lack of a viable, sustainable private seed industry.

Currently, with the exception of certain commercial crops (eg, cotton), a large part of West African agriculture is at a subsistence level, and smallholder farmers cultivate most of the land. In the majority of cases, farmers rely on their own-saved seed or seed sourced through informal networks. Such seed is often inconsistent in terms of quality, vulnerable to new pests and diseases, and requires valuable land to produce due to extremely low productivity. Fertilizer or chemical inputs tend to be wasted on simply seed production. As a result, the cost per ton of output is exceedingly high, profitability is low, and smallholder farmers are trapped in a cycle of low productivity, which prevents them from generating a marketable surplus.

Future agricultural development of West Africa requires a reliable and sustainable commercial seed industry to supply enough quality seed and complementary inputs (fertilizer, crop protection products and information) to smallholders to boost agricultural productivity and generate marketable surpluses. These surpluses can be supplied to food deficit areas, exported, or processed into value-added products for local consumption or export.

WASA

In October 2009, the United States Agency for International Development (USAID), Alliance for a Green Revolution in Africa (AGRA), African Seed Trade Association (AFSTA) and Economic Community of West African States (ECOWAS) jointly formed the West Africa Seed Alliance (WASA). WASA's goals are to establish a sustainable commercial seed industry capable of ensuring that smallholder farmers have affordable, timely and reliable access to adapted genetics and traits in high quality seeds and planting materials; play a leading role in the growth and development of viable agricultural inputs systems; support the overall growth of the West Africa agricultural sector; and improve the agricultural enabling environment. USAID provides its support to WASA through the 'Seeds Project' that is being implemented by ICRISAT in partnership with CNFA Inc., and the Seed Science Center at Iowa State University.

WASA is addressing constraints to seed sector development in several areas: training of breeders at MSc and PhD level; providing support to breeders in national breeding programs to develop and release improved varieties of a range of food crops; establishing a network of agro-dealers that can distribute and market improved quality seed and complementary inputs to farmers; supporting new and existing seed companies to produce and market improved quality seed; and supporting seed trade harmonization at the regional level.

The Seeds Project has a regional technical team based in Bamako, Mali that provides technical support to country teams in Ghana, Mali, Niger and Nigeria, and which is being expanded to include Burkina Faso and Senegal. This mode of operation allows for locally appropriate project interventions to be developed in consultation with national stakeholders, while also enabling national teams to draw upon knowledgeable technical expertise and management support from the regional team.

In 2009, the Seeds Project initiated the testing of commercially available vegetable and field crop varieties alongside locally developed varieties from the national agricultural research systems and their CGIAR partners. ICRISAT, with its strong links to commercial seed companies in India that are members of the hybrid seed parents consortia, has been able to stimulate the interest of companies that were for the most part unaware of the commercial opportunities in the largely untapped West African market.

Inside a seed processing factory.

ICRISAT and its sister centers in the CGIAR can utilize the technical expertise at both regional and national levels to support the dissemination of improved quality seed. In Nigeria, IITA has worked closely with the national teams to demonstrate the triple bag method for improved legume storage, and is keen to see the seed trade agreements being implemented. ICARDA has provided technical expertise in the description of varieties to ensure that plant breeders, seed producers, and regulators internalize the need to focus on quality seed production (the limited seed that is commercially available tends to be of inferior quality).

Rome was not built in a day, but perseverance and skill ultimately led to a city that is still admired and copied today, and the expectation is that WASA will lead to a vibrant seed sector in West Africa that draws upon the combined expertise of both the public and private sectors working in collaboration. ICRISAT is proud to be a part of such an important initiative.

Assessing the Watersheds of China and India

A lush chickpea field thrives in the Jhalawar watershed in Rajasthan, India.

Agriculture depends on water, and for farmers in the semi-arid or dry regions, access to water takes on the nature of a lifeline. These farmers often must rely only on rainwater for food production as irrigation from other sources is either very difficult or impossible to obtain. Watersheds can provide such a lifeline.

Watershed research, which began in the 1920s, aims to increase the productivity of rainfed areas by the physical management of soil, water and forest in its natural context. Through the decades, the concept has been reformed leading to profound farming system changes, improved food self sufficiency, expanded employment and commerce, and enhanced incomes, thus impacting the livelihoods of all communities living near a watershed.

Today, on-farm benchmark community watershed demonstration/learning sites in China, India, Thailand and Vietnam demonstrate the power of a science-led approach for improving rural livelihoods and conserving natural resources. This participatory research and development approach has triggered an interest among policy makers in India and China to scale-up technologies towards sustainable growth in rainfed areas.

Watersheds in India

At a request from the Government of India, an ICRISAT-led watershed consortium undertook a Comprehensive Assessment of rainfed agriculture in the semi-arid and sub-humid tropics. The assessment showed that the world's food demand can be met and the millennium development goal of reducing the number of poor by half can be achieved through unlocking the potential of rainfed agriculture. Following the assessment, it was recommended that the small catchment/watershed management approach is the best course of action.

In the Bundi district of Rajasthan in India, an ICRISAT-led wasteland rehabilitation project funded by the Sir Dorabji Tata Trust not only increased the availability of good quality fodder and wood, providing additional income to the farmers, but also empowered women. Innovations such as micro-nutrient application and water storage constructions have helped farmers increase the cultivated area and harvest greater yields of maize, soybean, mustard and lentils. Farmers don't have to find employment in the cities, and are in fact saving some money each month.

The Comprehensive Assessment also revealed that the watershed programs are silently revolutionizing

the dryland areas in India. The average Benefit:Cost ratio for the watershed programs based on the analysis of 636 case studies was 2:1. Only in less than 1% of the programs, was the ratio less than 1.

The consortium made twenty-five recommendations to the Ministry of Agriculture and Ministry of Rural Development. The Planning Commission revised the watershed guidelines after interactions with the concerned ministries and inputs from members of their task force. All the watershed programs in India have been brought under the Department of Land Resources, Ministry of Rural Development as the nodal ministry and are part of the Integrated Watershed Management Program (IWMP). The Common Guidelines for the IWMP have adopted a science-based consortium approach to use GIS and remote sensing datasets along with other scientific tools for planning, monitoring and evaluating watersheds by doubling the investments (from $130 to $270 per hectare), increasing the duration from five to seven years, increasing the size from 500 to 5000 hectares and most importantly, adopting the productivity enhancement and livelihood approach.

ICRISAT has a representation on the Central Level Nodal Agency, which is the supreme national body to implement the IWMP in the country. The Indian Council of Agricultural Research is establishing model watersheds in nine states of India. Besides this, ICRISAT has also been requested to provide the necessary capacity building support as well as assistance to the IWMP in implementing the guidelines by establishing thirteen model watersheds in different states of India.

Watersheds in China

ICRISAT's earlier work on community watersheds has had great impact in China as well. Impressed with the results from the benchmark watershed sites at Lucheba and Xia Xin Cun in southern China, the Government of China and the Asian Development Bank put together a project to upscale this watershed approach in selected provinces of China.

A watershed makes it easier for this smallholder Chinese farmer to grow vegetables.

Further, ICRISAT, ICARDA and the Chinese Academy of Agricultural Sciences (CAAS) established the Center of Excellence in Dryland Agriculture at CAAS, Beijing in August 2009 to enhance impact among the rural populations of China. The focal areas of the collaboration are watershed management, enhancing crop-livestock systems and improving climate ready crops. This has opened the doors to greater research for development partnerships with universities (and other organizations) from different parts of the country.

The result

The increased availability of irrigation water has enabled farmers to cultivate diverse crops and also grow two crops per season in some areas. It also facilitates the cultivation of high value crops such as fruits, vegetables and flowers, thus providing greater incomes to the rural communities in areas where model community watersheds have been established. Diverse uses of particular crops as food, feed and fodder (and also fuel from sweet sorghum), has been made possible. Future success depends on people-centered interventions and the use of new tools such as GIS, remote sensing and simulation modelling.

Such innovations for scaling up technologies for impact, and those that result in enabling policies and institutional changes, are small but prominent steps in the long journey toward unlocking the potential of rainfed agriculture in India and China.

Nourishment from NutriPlus

Delicious and healthy snacks made from pearl millet and sorghum.

Food is one of our basic needs and pleasures. Everyone needs food, and the better the food, the better is our health and nutrition.

The NutriPlus Knowledge Center (NutriPlus) is the latest initiative of the Agri-Science Park@ ICRISAT. NutriPlus activities are geared towards meeting the mandate of ICRISAT in nutritional security and poverty alleviation. NutriPlus offers a world class facility with services to support new ventures in the development of high value food products. The aim is to enhance the excellence of the food industry through innovative research and development, technology, marketing and allied services.

Initial success

The year 2009 saw successful initiatives as part of the NutriPlus effort in new product development, technology exchange and commercialization. Chief among its activities is research to create high value products and processes that can directly benefit the poorest of the poor farmers and entrepreneurs, besides making a mark on the food industry. For this, NutriPlus started with products from ICRISAT crops.

The first notable achievement was the development of prototypes of healthy snacks from pearl millet and sorghum using extrusion technology. Extrusion processing is widely used to make ready-to-eat snack and breakfast cereal products. In this process, pressure and heat are combined to cook and finally expand the grain, producing a light, crunchy, tasty product.

The high levels of starch in the normally used raw materials make them perfect for extrusion, but of limited nutritional value, putting them in the category of "empty calories" (having caloric content but small nutrient content). In addition, many products are coated with oils and/or syrup, adding to the caloric levels.

Promoting NutriPlus at ANUGA 2009 in Germany.

NutriPlus saw the potential of sorghum and pearl millet, crops not yet commercially exploited for such products in spite of having a better balanced nutritional profile.

In 2009, NutriPlus developed extruded "crispies" using sorghum and pearl millet instead of starchy rice. The result? A healthy low-fat snack. These snacks have a more balanced nutritional profile, and are free of trans fat and cholesterol. The products developed will provide immense value addition to these two mandate crops, which have been showing a decreasing trend in value share. NutriPlus will take forward this study to profile and enhance the nutritional properties of these developed products through both product and process based studies.

Pursuing the potential

Based on this success story, NutriPlus has identified that the extrusion technology has immense potential to promote the use of ICRISAT's mandate crops, by development of innovative value added products. Using this technology, products can be developed that can be targeted at both the high end consumers as well as deliver nutritious products to the undernourished. NutriPlus is working with local food manufacturers to partner in commercializing the developed products. Simultaneously, plans are in progress to establish a "Food Extrusion Center" at NutriPlus to conduct pilot scale experiments on the development of value added extruded snacks using all ICRISAT crops. The proposed facility will also support entrepreneur development programs on extrusion technology.

Promoting sweet sorghum

NutriPlus also understands that a huge opportunity exists to promote sweet sorghum juice as a healthy value added food alternative in addition to its present use as a source of food, feed and biofuel. NutriPlus has developed an improved processing technology for obtaining sweet sorghum syrup with superior color and flavor than the existing available product. The resulting syrup is also a good source of vitamins and has a high content of essential minerals such as calcium, potassium and iron. A pilot facility for scaling up of the technology is being established at NutriPlus. NutriPlus is presently exploring the use of this product as a replacement for liquid glucose, malt extract, and in developing value added products such as toppings and spreads. Using the sweet sorghum juice and syrup, prototypes of refreshing flavored beverages have also been tested that will deliver another value added product category based on sweet sorghum to the consumers.

NutriPlus plans to train entrepreneurs in this technology, thus transferring the developed technology, and enabling development and commercialization of value added products based on sweet sorghum juice. This NutriPlus initiative on sweet sorghum juice and its successful implementation would directly impact the livelihoods of farmers involved in the cultivation of sweet sorghum.

We hope that by adding value to the crops traditionally grown by smallholder farmers, we will provide renewed interest in their cultivation and lead to improved livelihoods in the semi-arid tropics.

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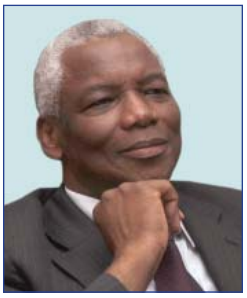

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Financial Summary

Balance Sheet

	US$ thousands	
	2009	2008
Assets		
Cash and Cash equivalents	5,738	5,378
Investments	48,349	35,208
Accounts receivable	11,819	10,262
Inventories	852	881
Prepaid Expenses	312	277
Property and Equipment - net	6,169	5,460
Other assets	2,303	1,203
Total Assets	**75,542**	**58,669**
Liabilities		
Accounts payable	12,990	9,969
Accruals and provisions	1,527	1,353
Payments in advance from donors	23,375	12,730
Long-term liabilities	12,194	11,176
Total Liabilities	**50,086**	**35,228**
Net Assets		
Unrestricted		
Unappropriated	15,120	12,993
Appropriated	8,294	8,294
Permanently Restricted	2,042	2,154
Total Net Assets	**25,456**	**23,441**
Total Liabilities and Net Assets	**75,542**	**58,669**

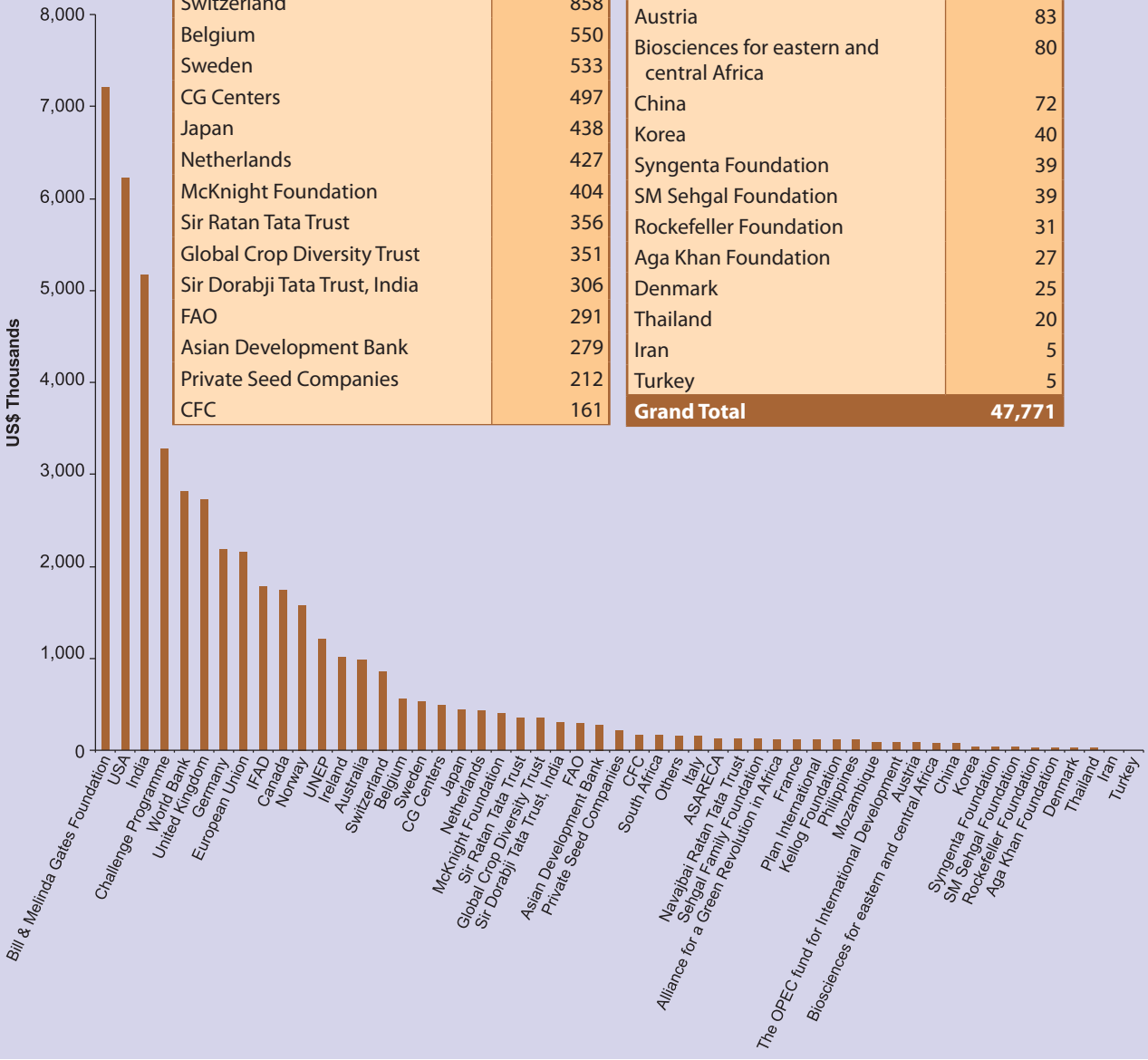
Operating results and movements in Net Assets

	US$ thousands	
	2009	2008
Operating results		
Revenue	52,019	50,285
Expenditure	49,892	47,547
Change in net assets, operational	**2,127**	**2,738**
Net Assets - Unrestricted		
Unappropriated		
Balance, beginning of the year	12,993	10,255
Operating (deficit)/surplus for the year	2,127	2,738
Changes in accounting policies	-	-
Balance, end of the year	**15,120**	**12,993**
Appropriated		
Balance, beginning of the year	8,294	9,522
Changes in accounting policies		
Acquisition of physical facilities	-	(1,228)
Total Net Assets - Unrestricted	**8,294**	**8,294**
Net Assets - Permanently restricted	**2,042**	**2,154**
Total Net Assets	**25,456**	**23,441**

Grant income from donors for 2009

Donor	US$ '000
Bill & Melinda Gates Foundation	7,199
USA	6,219
India	5,168
Challenge Programme	3,277
World Bank	2,808
United Kingdom	2,729
Germany	2,180
European Union	2,159
IFAD	1,785
Canada	1,743
Norway	1,573
UNEP	1,217
Ireland	1,010
Australia	988
Switzerland	858
Belgium	550
Sweden	533
CG Centers	497
Japan	438
Netherlands	427
McKnight Foundation	404
Sir Ratan Tata Trust	356
Global Crop Diversity Trust	351
Sir Dorabji Tata Trust, India	306
FAO	291
Asian Development Bank	279
Private Seed Companies	212
CFC	161

Donor	US$ '000
South Africa	160
Others	150
Italy	147
ASARECA	132
Navajbai Ratan Tata Trust	126
Sehgal Family Foundation	120
Alliance for a Green Revolution in Africa	118
France	118
Plan International	116
Kellog Foundation	109
Philippines	108
Mozambique	93
The OPEC fund for International Development	90
Austria	83
Biosciences for eastern and central Africa	80
China	72
Korea	40
Syngenta Foundation	39
SM Sehgal Foundation	39
Rockefeller Foundation	31
Aga Khan Foundation	27
Denmark	25
Thailand	20
Iran	5
Turkey	5
Grand Total	**47,771**



ICRISAT ratings under the CGIAR Performance Measurement System

Indicator	ICRISAT's performance 2008
Output targets achieved (%)	To be provided in CGMAP
Outcomes assessment (scale of 1-10)	6.0
Impact culture (scale of 1-10)	7.6
Peer-reviewed publications per scientist	2.5
Normalized sample journal impact factor score	1.9
Publications with developed country partners (%)	45
Financial health indicators:	
Long-term financial stability (range 75-90 days)	127
Cash management on restricted operations	0.3
Has the Center completed a Board-commissioned CCER on Center governance and management during last 3 years	Yes
Does the Board have a clear strategy for communicating with stakeholders (including CGIAR members, other Centers, Partners)?	Yes
Did the Board discuss and act on any significant deviations?	
from previously announced targets and strategic goals as defined in the MTP?	Yes, fully
from the budget planned (more than 10%)?	No deviations
Has the Board reviewed the adequacy of Center's risk management and internal control mechanisms?	Yes
Does the Board have an approved schedule for CCERs on program matters?	Yes
Are procurement policies and their implementation fully consistent with the CGIAR guidelines?	Yes, fully enforced
Board members having professional qualification in financial management	2
Board members having professional expertise in corporate governance	3
Assessment of Board Statements (scale of 1-4)	3.5
Does your Center have Board-approved gender diversity goals?	Yes
Overall rating by World Bank	Superior

ICRISAT Senior Staff and Collaborative Staff

Name, Designation, (Location), *Nationality*

Patancheru (Headquarters)

William D Dar, Director General, *Philippines*

C Geetha, Senior Manager, DG's Office, DG's Office, *India*

TN Menon, Head, Internal Audit, *India*

T Kulashekar, Senior Manager, Internal Audit, *India*

Prabhat Kumar, Director, Business & Country Relations, *India* (New Delhi)

Communication Office

Rex L Navarro, Director, Communication Office and Special Assistant to the DG, *Philippines*

Lydia Flynn, Senior Editor-in-Chief, *India*

Murali M Sharma, Manager, Visitors and Travel Services, *India*

Resource Planning and Marketing

Peter J Ninnes, Director, Resource Planning and Marketing, *Australia*

Human Resources and Operations

Hector V Hernandez, Director, Human Resources and Operations, *Philippines*

AJ Rama Rao, Head, Human Resources Services (NRS), Human Resources Services, *India*

CN Reddy, Head, Medical Services, *India*

K Mohan Sharma, Manager, Human Resources Services, *India*

Housing and Food Services

K Ravi Shankar, Head, Housing and Food Services, *India*

Security Office

TD Peter, Head, Security Services, *India*

Purchase, Supplies and Disposal Services

PN Mallikarjuna, Head, Purchase and Supplies Division, *India*

Financial Services

Rajesh Agrawal, Director, Finance, *India*

S Sethuraman, Head, Financial Services, *India*

PV Gopiramanan, Manager, Treasury and Operations, *India*

MS Raju, Manager, Project Finance, *India*

Deputy Director General's Office

Dave Hoisington, Deputy Director General (Research), *USA*

B Hanumanth Rao, Manager - Intellectual Property, O/o Deputy Director General, *India*

Global Theme – Agroecosystems (GT-AE)

S Marimuthu, Scientist (Agronomy), *India*

Prabhakar Pathak, Principal Scientist (Soil & Water Management), *India*

RC Sachan, Special Project Scientist, *India*

Piara Singh, Principal Scientist (Watershed), *India*

Suhas P Wani, Principal Scientist (Watersheds), *India*

Takeshi Watanabe, Special Project Scientist, *Japan*

Hiroshi Uchino, Post Doctoral Fellow, *Japan*

K Ramu, Scientist (Post Doctoral), *India*

Global Theme – Biotechnology (GT-Biotech)

Michael Keith Butterfield, Principal Scientist and Global Theme leader, Biotechnology, *South Africa*

Pooja Bhatnagar, Scientist (Cell/ Molecular Biology), *India*

Mukesh Dhillon, Special Project Scientist, *India*

CT Hash, Principal Scientist (Breeding), *USA*

Nalini Mallikarjuna, Principal Scientist (Cell Biology), *India*

L Krishnamurthy, Scientist (Plant Physiology), *India*

Abhishek Rathore, Scientist (Biometrics), *India*

S Senthilvel, Scientist (Biotechnology), *India*

Kiran K Sharma, Principal Scientist (Cell Biology), *India*

Vincent Vadez, Principal Scientist, Plant Physiology, *France*

Rajeev K Varshney, Principal Scientist (Applied Genomics Laboratory) & Leader, Sub-Program 2 - Generation Challenge Program, *India*

Varsha Wesley, Special Project Scientist (Plant Pathology), *Australia*

Trushar Shah, Scientist – Bioinformatics, *Kenya*

Jana Kholova, Associate Scientist, Cereals Physiology, *Czechoslovakia*

Zaman-Allah Mainassara, Postdoctoral Fellow, *Niger*

V Sashi Bhushan Rao, Special Project Scientist (Biotechnology), *India*

D Srinivas Reddy, Special Project Scientist, (PTTC), *India*

Global Theme – Crop Improvement (GT-CI)

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Ashok S Alur, Project Coordinator, ICRISAT-DRD Project, *India*

Pratap Singh Birthal, Principal Scientist (Socioeconomics), *India*

Pooran M Gaur, Principal Scientist (Breeding), *India*

S Gopalakrishnan, Scientist - Bioproducts, *India*

SK Gupta, Scientist (Pearl Millet Breeding), *India*

T Nepolean, Scientist, Molecular Breeding, *India*

SN Nigam, Principal Scientist (Breeding), *India*

Suresh Pande, Principal Scientist (Pathology), *India*

KN Rai, Principal Scientist (Millet Breeding) and Director, HarvestPlus-India Biofortification, *India*

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Belum VS Reddy, Principal Scientist (Breeding), *India*

KB Saxena, Principal Scientist (Breeding), *India*

HC Sharma, Principal Scientist (Entomology), *India*

Mamta Sharma, Scientist (Legumes Pathology), *India*

Rajan Sharma, Scientist-Cereals Pathology, *India*

Rakesh Srivastava, Scientist (Pigeonpea Breeding), *India*

RP Thakur, Principal Scientist (Pathology) & Head, Plant Quarantine Lab, *India*

HD Upadhyaya, Principal Scientist and Head, Gene Bank, *India*

Shailesh Tripathi, Scientist (Breeding), *India*

Ch Ravinder Reddy, Scientist, Technology Exchange, *India*

Hari Kishan Sudini, Scientist, Groundnut Pathology, *India*

Venuprasad Ramaiah, Scientist - Groundnut Breeding, *India*

G Basavaraj, Special Project Scientist (Economics), *India*

Global Theme – Institutions, Markets, Policy and Impacts (GT-IMPI)

MCS Bantilan, Global Theme Leader - Institutions, Markets, Policy and Impacts, *Philippines*

VR Kiresur, Senior Scientist (Economics), *India*

Kamanda Josey Ondieki, Associate Professional Officer (Institutional Innovation Specialist), *Kenya*

P Parthasarathy Rao, Principal Scientist (Economics), *India*

K Purnachandra Rao, Principal Scientist (Village Level Studies), *India*

Naveen P Singh, Senior Scientist (Agricultural Economics), *India*

Agri-Business Incubator (ABI)

SM Karuppanchetty, Senior Manager - ABI, *India*

S Aravazhi, Deputy Manager - ABI, *India*

R Bhubesh Kumar, Assistant Manager, ABI, *India*

Agri-Science Park (ASP)

Abdul Rahman Ilyas, Chief Operating Officer, ASP, *India*

Saikat Dutta Mazumdar, Technical Director, NutriPlus Knowledge Center, ASP, *India*

Purushotham Rudraraju, Manager-Operations, *India*

Farm, Engineering and Transport Services (FETS)

M Prabhakar Reddy, Program Leader, Farm, Engineering and Transport Services (FETS), *India*

C Buchappa, Manager, Engineering Services, *India*

K Jagannadham, Head - Transport Services, *India*

Mohd Aslam Shariff, Manager, Transport Services, Farm, Engineering and Transport Services (FETS), *India*

Suresh C Pillay, Manager, Farm Services, *India*

K Hanmanth Rao, Manager, Farm Services, *India*

Knowledge Management and Sharing (KMS)

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S Srinivas, Head - Library & Documentation Services, *India* (Expired Nov 2009)

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Development Investor Partnerships Initiated in 2009

Supplementing the CGIAR's core support to carry out new targeted projects

Donor/ Country	Donor Agency / Organization	Project	Partners
ADB	Asian Development Bank	Promoting climate change adaptation in Asia and the Pacific (climate risk management assessment for agriculture in Thailand and Viet Nam)	Chiang Mai Field Crops Research Centre, Thailand Vietnam Academy of Agricultural Sciences (VAAS), Viet Nam
AGRA	Alliance for a Green Revolution in Africa	Backstopping and coordinating the fertilizer microdosing and inventory credit system project in Burkina Faso, Mali and Niger	Institut de l'Environnement et de Recherches Agricoles (INERA), Burkina Faso; Institut d'Economie Rurale (IER), Mali; Institut National de la Recherche Agronomique du Niger (INRAN), Niger; The African Network for Soil Biology and Fertility (AfNet) of the Tropical Soil Biology and Fertility Institute of CIAT (TSBF-CIAT)
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa	Fighting *Striga*: Resistance genes deployed to boost sorghum productivity	
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa	Integrated improved pearl millet varieties with crop and natural resource management practices for improved productivity and livelihoods in drought stressed environments	
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa	Making the best of climate - Adapting agriculture to climate variability	
Australia	Australian Centre for International Agricultural Research (ACIAR)	Cropping system diversification, capacity building and rural livelihoods in Afghanistan	
Australia	Crawford Fund	Impact Assessment Master Class during March 2009 for economists in Asia	
Austria	Austrian Development Agency (ADA)	Sesame improves livelihoods of farmers: Enhancing agricultural productivity and profitability in Northern Uganda	National Semi-Arid Resources Research Institute (NaSARRI), Uganda; Austrian Institute of Technology (AIT), Austria; Africa Innovations Institute (AFRII), Uganda
Canada	The International Development Research Centre (IDRC)	Assessing the dynamics of poverty and land degradation in the Sahelian countries of West Africa	IFPRI, USA; INERA, Burkina Faso; INRAN, Niger

Donor/ Country	Donor Agency / Organization	Project	Partners
CGIAR	Bill & Melinda Gates Foundation (BMGF) through the International Food Policy Research Institute (IFPRI)	Exploring the scope of cost-effective aflatoxin risk reduction strategies in maize and groundnut value chains so as to improve market access of the poor in Africa	
CGIAR	Bioversity International	Collective action for the rehabilitation of Global Public Goods in the CGIAR genetic resources system: Phase 2 (GPG2) - Activity 4: Assess knowledge and gaps in the diversity and genetic quality of the collection. 4.1.1 Completion of passport data entry system-wide	
CGIAR	International Center for Tropical Agriculture (CIAT)/ CH2MHILL, USA	Africa trial sites catalogue - Reaching out to farmers, agronomists and plant breeders with spatially efficient, participatory testing networks	
CGIAR	CIAT/IFPRI/ HarvestPlus	Coordination between HarvestPlus and Indian Biofortification Program - Phase II	NA
CGIAR	CIAT/IFPRI/ HarvestPlus	Genetically enhanced micronutrient-dense pearl millet for improved human nutrition in the Western Africa region and India- Phase II	All India Coordinated Pearl Millet Improvement Project (AICPMIP), Agricultural Research Station, Rajasthan Agricultural University, Mandor, India; Spriha Biosciences Private Limited, India; Ganga Kaveri Seeds Private Limited, India; Nuziveedu Seeds Limited, India; JK Agri Genetics Limited, India; Bioseed Research India Private Limited, India; Devgen Seeds and Crop Technology Private Limited, India
CGIAR	CIAT/IFPRI/ HarvestPlus	Genetically enhanced pearl millet with high grain iron density for improved human nutrition in India - Phase II	AICPMIP, Agricultural Research Station, Rajasthan Agricultural University, Mandor, India; 6 private seed companies from Pearl Millet Consortium, India
CGIAR	HarvestPlus/CIAT/ IFPRI	Coordination of biofortification research and development activities in grain and tuber crops to enhance nutritional security in India	Department of Biotechnology, India; Indian Council of Agricultural Research (ICAR), India

Donor/ Country	Donor Agency / Organization	Project	Partners
CGIAR	International Maize and Wheat Improvement Centre (CIMMYT)/ World Bank	GPG2 activitity 3.1. Safe movement of germplasm: Seed crops	
CGIAR	Generation Challenge Program (GCP)/CIMMYT	Ensuring "good" and relevant phenotypic data to feed molecular breeders: The need for long-term training of scientists of NARS partners	
CGIAR	GCP/CIMMYT	Establishing a Genetic Resource Support Service (GRSS) for the plant breeding community	Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD), France (Lead institution)
CGIAR	GCP/CIMMYT	Marker-assisted backcrossing (MABC) for drought tolerance in chickpea- Studentship	
CGIAR	GCP/CIMMYT	Molecular Breeding Platform (MBP) Funded by donors other than the BMGF	
CGIAR	GCP/CIMMYT	The CGIAR Generation Challenge Program (GCP) 2009 Annual Research Meeting (ARM)	
CGIAR	GCP/CIMMYT/BMGF	Molecular Breeding Platform (MBP) Funded by BMGF	
CGIAR	GCP/CIMMYT	Mapping and validation of QTLs associated with drought tolerance traits in chickpea	University of Agricultural Sciences (UAS), Bangalore, India; Regional Agricultural Research Station, Nandyal, India; Agricultural Research Station, Durgapure, India; RAK College of Agriculture-Sehore, India
CGIAR	GCP/CIMMYT	Phenotyping sorghum reference sets for drought tolerance	University of Agricultural Sciences (UAS), Dharwad, India; Kenya Agricultural Research Institute (KARI), Kenya; National Plant Genetic Resources Centre (NPGRC), Tanzania; IER, Mali; Institut Sénégalais de Recherches Agricoles/ Centre d'Etude Régional pour l'Amélioration de l'Adaptation à la Sécheresse (ISRA/ CERAAS), Senegal

Donor/ Country	Donor Agency / Organization	Project	Partners
CGIAR	GCP/CIMMYT	Improving molecular tools for pearl millet	AICPMIP, India; Central Arid Zone Research Institute (CAZRI), India; Rajasthan Agricultural University (RAU), India; International Livestock Research Institute (ILRI)
CGIAR	GCP/CIMMYT	Data analysis support for existing projects in SP2 with emphasis on analysis of Next Generation Sequencing data	National Center for Genome Resources (NCGR), UK; Sainsbury Laboratory, UK; International Rice Research Institute (IRRI)
CGIAR	GCP/CIMMYT	Development of data standards and community of practice enabling the capture of and access to GCP quality data sets	Bioversity International (Lead institution)
CGIAR	IFPRI	Collaboration on case studies in Niger and Nigeria on climate change and sustainable land management	IFPRI, USA; International Center for Research in Agroforestry (ICRAF), Kenya
CGIAR	IFPRI	Study on sustainable land management (SLM) public expenditure review and analytical underpinnings for prioritizing investments in the governments' SLM investment frameworks	
CGIAR	IFPRI/Sweden	Capacity strengthening through Strategic Analysis and Knowledge Support for Agricultural Development in Mozambique (Moz-SAKSS)	Ministry of Agriculture/Directorate of Economics (MINAG/DE), Mozambique; IFPRI; International Water Management Institute (IWMI); University of Eduardo Mondlane, Mozambique; Michigan State University, USA; University of Pretoria, South Africa
CGIAR	International Rice Research Institute (IRRI)/World Bank	Reducing and managing the loss of genetic integrity of conserved germplasm (Collective Action of the Rehabilitation of Global Public Goods in the CGIAR Genetic Resources System: Phase 2)	
EC	Through Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD)	Sweet sorghum: An alternative energy crop	CIRAD, France (Lead institution)

Donor/ Country	Donor Agency / Organization	Project	Partners
FAO	Food and Agriculture Organization (FAO)	Maintenance and enrichment of the AGROVOC concept server	
FAO	FAO	Seed production of sorghum, groundnut, cowpea, pearl millet and maize varieties	
FAO	FAO	Agricultural research for development and innovation: Addressing emerging challenges and exploiting opportunities through Information and Communications Technologies	
FAO	FAO, Zimbabwe	Seed production of sorghum, pearl millet, groundnut and cowpea in Zimbabwe	
France	CIRAD	Predictability of climate information for reducing tropical agriculture vulnerability (PICREVAT)	
Germany	The Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), New Delhi	Capacity building in cultivation of Jatropha and usage	
Germany	GTZ-New Delhi	Decentralized generation of electricity from SVO for productive applications	
IFAD	International Fund for Agricultural Development (IFAD)	Improved management of agricultural water in Eastern & Southern Africa (IMAWESA)	ASARECA, Uganda
IFAD	IFAD	UNCCD-CST Scientific Conference Working Group II – Monitoring and assessing sustainable dryland management	International Center for Agricultural Research in the Dry Areas (ICARDA)
India	Centromere Biosolutions (CENBIOS)	Determination of lethal effect and dosage of proprietary insecticidal proteins on various insect pests	
India	Department of Biotechnology (DBT), Government of India (GOI)	Organizing the Third annual interactive meeting of the Indian Biofortification programme in collaboration with ICRISAT and HarvestPlus, 9-10 July 2009 at ICRISAT	

Donor/ Country	Donor Agency / Organization	Project	Partners
India	DBT, GOI	Deployment of molecular markers in chickpea breeding for developing superior cultivars with enhanced disease resistance	Jawaharlal Nehru Krishi Vishwa Vidyalaya (JNKVV), Jabalpur; Indian Institute of Pulses Research (IIPR), Kanpur; Mahatma Phule Krishi Vidyapeeth, Rahuri; University of Agricultural Sciences, Dharwad
India	DBT/ISCB, GOI	Characterization and evaluation of transgenic events of chickpea containing the DREB1A transcription factor for tolerance to drought stress under contained greenhouse and field conditions	
India	DBT, GOI	Evaluation and characterization of transgenic events of groundnut containing the DREB1A gene drought tolerance traits under greenhouse and contained field conditions	
India	Department of Agriculture & Cooperation, Ministry of Agriculture, GOI	Improving heat tolerance in chickpea for enhancing its productivity in warm growing conditions and mitigating impact of climate change	IIPR, Kanpur; Punjab University, Chandigarh; JNKVV, Jabalpur; Regional Agricultural Research Station, Nandyal
India	Department of Agriculture & Cooperation, RFS Division, Ministry of Agriculture, GOI	Implementation of 9 model watershed projects in UP, Tamil Nadu, Andhra Pradesh, Karnataka, Rajasthan, Madhya Pradesh, Maharashtra and Gujarat	
India	Department of Agriculture, Government of Karnataka	Mission project on rainfed agriculture: Bridging yield gaps through science-led interventions for sustainable use of natural resources in Karnataka	
India	DBT, GOI	In support of the conference on bio-safety and environmental impact of genetically modified organisms and conventional technologies for pest management	
India	Department of Land Resources, GOI	National workshop on operationalizing new watershed guidelines: Productivity enhancement approach and needs assessment for senior executives, April-May 2009	

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India	Department of Land Resources, Ministry of Rural Development, Govt of India	Establishment of model watersheds in Maharashtra, Madhya Pradesh, Rajasthan and Tamil Nadu states	
India	Department of Rural Development, Government of Andhra Pradesh	Improving rural livelihoods through integrated agricultural development in Mahbubnagar district of Andhra Pradesh	Foretell Business Solutions (P) Limited, India; Regional Agricultural Research Station, Palem/Acharya NG Ranga Agricultural University (ANGRAU), Hyderabad; Sri Venkateswara Veterinary University, Tirupati, Regional Station Hyderabad; Extension Education Institute, Hyderabad; Peoples Action for Rural Development (APARD), Kurnool; I Kisan, Hyderabad; Department of Rural Development, Government of Andhra Pradesh; Department of Agriculture, Government of Andhra Pradesh; Department of Animal Husbandry, Government of Andhra Pradesh; Department of Horticulture, Government of Andhra Pradesh; Department of Sericulture, Government of Andhra Pradesh
India	Indian Council of Agricultural Research/National Agricultural Innovation Project (ICAR/NAIP) through the Directorate of Rice Research (DRR)	Development and maintenance of Rice Knowledge Management Portal	Central Rice Research Institute (CRRI), Cuttack; Indian Council of Agricultural Research (ICAR)-NEH, Meghalaya; Centre for Development of Advanced Computing, Jawaharlal Nehru Technological University (JNTU), Hyderabad; Regional Agricultural Research Station (RARS), Raigad; Indian Agricultural Research Institute (IARI), New Delhi; Birsa Agricultural University, Ranchi; Zonal Agricultural Research Station (ZARS) (University of Agricultural Sciences, Bangalore); Directorate of Rice Research (DRR), Patna; International Rice Research Institute (IRRI), Philippines
India	ICAR/NAIP through Yashwantrao Chavan Maharashtra Open University	Innovations in technology-mediated learning: An institutional capacity building in using re-usable learning objects in agro-horticulture	Indira Gandhi National Open University (IGNOU), New Delhi; Tamil Nadu Agricultural University, Coimbatore
India	Ministry of Micro, Small and Medium Enterprises (MSME), GOI	Support for entrepreneurial and managerial development of SMEs through incubators	

Donor/ Country	Donor Agency / Organization	Project	Partners
India	NAIP (Comp I), ICAR	Handholding and mentoring of BPD units of NARS	
India	National Bureau of Agriculturally Important Micro-organisms (NBAIM), ICAR, GOI	Application of micro-organisms in agriculture and allied sectors (Harnessing agriculturally beneficial micro-organisms for production and protection of sorghum and rice)	
India	SM Sehgal Foundation	Development of maize cultivars with resistance to stem borer using conventional and biotech tools	
Others	Seed companies	Groundnut and Chickpea Research Consortium for variety development	Ajeet Seeds Limited; Akshay Seed Tech Company; Krishidhan Seeds Limited; Nimbkar Seed Private Limited
Others	Seed companies	Diversification of pearl millet hybrid parents for increased stable production (Phase III)	Adriana Seed Company; Ajeet Seeds Limited; Ankur Seeds Private Limited; Bayer BioScience Private Limited; Biostadt MHseeds Limited; DeVGen Seeds and Crop Technology Private Limited; Energy Seed International; JK Agri Genetics Limited; Kanchan Ganga Seed Company Private Limited; Kaveri Seed Company Private Limited; Metahelix Life Sciences Private Limited; Navbharat Seeds Private Limited; Nu Genes Private Limited; Nuziveedu Seeds Limited; Pioneer Overseas Corporation; Bioseed Research India Private Limited; SM Sehgal Foundation; Spriha Biosciences Private Limited; Vibha Agrotech Limited
Others	Seed companies	Diversification of pigeonpea hybrid parents for increased stable production (Phase III)	Adriana Seed Company; Ankur Seeds Private Limited; Biogene Agritech; Bioseed Research India Private Limited; Krishidan Seeds Limited; Nimbkar Seeds Private Limited; Vibha Agrotech Limited
Others	Seed companies	Diversification of sorghum hybrid parents for increased stable production (Phase III)	Advanta India Limited; Ajeet Seeds Limited; CERES Inc., USA; Cleanergy Seeds Limited, Israel; Dow Agro-Sciences Industrial Limited, Brazil; Ganga Kaveri Seeds Private Limited; Kanchan Ganga Seed Company Private Limited; Nuziveedu Seeds Limited; SM Sehgal Foundation; Vibha Agrotech Limited

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India	SKOL Breweries Ltd	Implementing activities on sustainable water resources in the surrounding areas of the SKOL Brewery while contributing to improving the livelihoods of the people dependent on agriculture	
Japan	Japan International Research Center for Agricultural Sciences (JIRCAS)	Japan-CGIAR Fellowship Program 2009-2010 – Dr Takahiro Hara – Molecular breeding for drought tolerance in chickpea	
Japan	JIRCAS	Upgrading of the Central Analytical Services Laboratory (CASL) at ICRISAT	
Japan	Ministry of Agriculture, Forestry and Fisheries (MAFF), Japan	Development of sustainable soil fertility management for sorghum and sweet sorghum through effective use of Biological Nitrification Inhibition (BNI)	
Nether-lands	Common Fund for Commodities (CFC)	Enhanced livelihood opportunities of smallholders in Asia: Linking smallholder sweet sorghum farmers with the bio-ethanol industry	Marathwada Agricultural University (MAU), Parbhani; Field Crops Research Centre (FCRC), Department of Agriculture, Thailand; The Sorghum Research Institute (SRI), China; JK Agri-Genetics, AP; Pacific Seeds (Thai) Limited, Thailand; Bioseed Genetics International Inc., Thailand; Tata Chemicals Limited (TCL), India; Bioenergy Development Company Limited, China
Norway	Royal Ministry of Foreign Affairs, Norway	Producing more food grain with less water - Promoting farm-based methods to improve water productivity	WWF-International
Others	OPEC Fund for International Development (OFID)	Groundnut research to enhance food and nutritional security in Asia	
Others	Africa Harvest Biotech Foundation International, Inc (AHBFI)	African biofortified sorghum for humanitarian purposes	
Others	Aga Khan Foundation, Switzerland	Improving the production of millet- and sorghum-based cropping systems in rainfed areas in the Mopti region, Mali	Aga Khan Foundation, Bamako, Mali

Donor/ Country	Donor Agency / Organization	Project	Partners
Others	The World Vegetable Center (AVRDC) for the West Africa Seed Alliance (WASA)	Quality vegetable seeds for the West Africa Semi-Arid Tropics	
Others	CH2MHill Inc., USA	Geospatial technology program for the developing world	IER, Mali; Association Malienne d'Eveil au Développement Durable (AMEDD), Mali
Others	Global Crop Diversity Trust	Evaluation of pearl millet germplasm for sustainable production under changing climate: Heat tolerance	Central Arid Zone Research Institute (CAZRI), Jodhpur, India
Others	Government of Taiwan through AVRDC	Improving livelihoods through affordable micro-irrigation for vegetables (AMIV) in Western Africa	
Others	Infinitus Agri	Field evaluation of various plant nutrients against insect pests and agronomic traits of selected crops	
Others	Mercy Crops, Zimbabwe	Providing technical support to Mercy Crops for the promotion of conservation agriculture in Buhera Chipinge and Chiredzi districts, Zimbabwe	
Others	Organization of the Petroleum Exporting Countries (OPEC) through the International Center for Biosaline Agriculture (ICBA)	Sorghum and pearl millet for enhanced crop-livestock productivity in saline lands	ICBA, UAE
Others	Pioneer Overseas Corporation	SSR marker genotyping support services for proprietary elite inbred pearl millet lines	
Others	WWF	Producing more food grain with less water - Promoting farm-based methods to improve water productivity	
Philippines	Bureau of Agricultural Research (BAR), Department of Agriculture (DA), Philippines	Field testing of ICRISAT legume varieties and technologies in selected regions of the Philippines	DA-BAR, Philippines

Donor/ Country	Donor Agency / Organization	Project	Partners
Switzerland	Indo-Swiss Collaboration in Biotechnology (ISCB)/SFIT-L	Characterization and evaluation of transgenic events of chickpea containing the DREB1A transcription factor for tolerance to drought stress under contained greenhouse and field conditions	Assam Agricultural University (AAU), India; University of Basel; Madurai Kamaraj University, India
Switzerland	ISCB/SFIT-L	Genetic transformation of chickpeas *(Cicer arietinum* L.) using a chimeric Bt-*Cry2Aa* gene to confer protection against pod borer (*Helicoverpa armigera)*	Assam Agricultural University (AAU), India
USA	BMGF	Harnessing Opportunities for Productivity Enhancement (HOPE) of Sorghum and Millets	IER, Mali; INERA, Burkina Faso; INRAN, Niger; Lake Chad Research Institute (LCRI), Nigeria; Institute for Agricultural Research (IAR), Nigeria; Association des Organisations Professionnelles Paysannes (AOPP), Mali; Mooriben (Farmers organization), Niger; Fuma Gaskiya (Federation of Farmers), Niger; Action Contre la Faim (ACF), Niger; Fédération des Professionnels Agricoles du Burkina (FEPAB), Burkina Faso; Union de Groupements Pur la Commercialisation des Produits Agricoles (UGPCA), Burkina Faso; Ethiopian Institute of Agricultural Research (EIAR), Ethiopia; Amhara Regional Agricultural Research Institute (ARARI), Ethiopia; National Agricultural Research Institute (NARI), Eritrea; KARI, Kenya; Ministry of Agriculture, Govt. of Southern Sudan (GoSS); Department of Research and Development, Tanzania; Ugandan National Agricultural Research Organization (NARO), Uganda; National Agricultural Advisory Services (NAADS), Uganda; Zanobia Seeds, Tanzania; Namburi Seeds, Tanzania; Victoria Seeds, Uganda; Kenya Seed Co., Kenya; Africa Harvest Biotechnology Foundation (AHBFI), Kenya & South Africa; Eastern Africa Grain Council (EAGC), Kenya; Egerton University, Kenya; IFPRI, USA; All-India Coordinated Pearl Millet Improvement Project (AICPMIP), India; National Research Center for Sorghum (NRCS), India; Marathwada Agricultural University, Parbhani, India; Mahatma Phule Krishi Vidyapeeth, Rahuri, India

Donor/ Country	Donor Agency / Organization	Project	Partners
USA	BMGF	Tracking change in rural poverty in household and village economics in South Asia	International Rice Research Institute (IRRI), Indian Council of Agricultural Research (ICAR)
USA	CH2MHILL	A geospatial technology program for the developing world	
USA	International START Secretariat	Hosting Dr Mamadou Traore, Post-Doctoral Fellow at ICRISAT-Niamey, under START's African Climate Change Fellowship Program (ACCFP) for the project "The potential for agronomic enhancement via application of *Jatropha curcas* oilcake as a fertilizer on maize plots"	University Polytechnic of Bobo Dioulasso, Burkina Faso
USA	International START Secretariat	Hosting Dr SW Charles Recha, Doctoral Research Fellow at ICRISAT-Mali, under START's African Climate Change Fellowship Program (ACCFP) for the project "An assessment of potential climate impacts and associated vulnerabilities at the household level: Livelihoods and water in the semi-arid Tharaka district"	Kenyatta University, Nairobi, Kenya
USA	International START Secretariat	Hosting Dr Tiganadaba Lodoun, Doctoral Research Fellow at ICRISAT-Mali, under START's African Climate Change Fellowship Program (ACCFP) for the project "The impact of climate variability and change on food security in Burkina Faso".	INERA, Burkina Faso; Institute of Environmental and Agricultural Research, University of Ougadougou, Burkina Faso; Centre National pour la Recherche Scientifique et Technique (CNRST), Burkina Faso
USA	McKnight Foundation	Enhancing child nutrition and livelihoods of rural households in Malawi and Tanzania through post-harvest value chain technology improvements in groundnuts	Compatible Technology International, Malawi; Sokoine University of Agriculture, Tanzania; Ministry of Agriculture and Food Security, Tanzania
USA	United States Agency for International Development (USAID)	Platform Mozambique -- Increasing the profitability of legume production in Mozambique through technology discovery, development and delivery linked to markets	

Donor/ Country	Donor Agency / Organization	Project	Partners
USA	USAID	Platform Mozambique - Implementation of the Consortium Facilitation Unit (CFU) to support agricultural research in Mozambique	
USA	USAID	Using crop growth models to develop adaptation strategies to minimize climate change impacts on production of ICRISAT mandate crops	University of Florida, USA
USA	USAID	Geo-ecological and agronomic drivers of *Striga hermonthica* genetic diversity and population density	University of Georgia, USA
USA	USAID	Developing monitoring and evaluation systems for seed alliance activities in sub-Saharan Africa – Case of West Africa Seed Alliance	Rutgers, the State University of New Jersey, USA
USA	USAID	Combating pod borers of pigeonpeas in Africa	University of Nebraska, Lincoln, USA
USA	USAID through Chemonics International Inc	Maximizing Agricultural Revenue and Key Enterprises in Targeted Sites (MARKETS): Development of the seed value chain and identification of sorghum varieties for use as hybrid parents	CNFA, Inc, USA; Institute for Agricultural Research, Samaru, Nigeria
USA	USAID, University of Georgia	Peanut Collaborative Research Support Program (Peanut CRSP)	Virginia Polytechnic Institute and State University (Virginia Tech), USA
World Bank	World Bank	Work on rainfall insurance	
World Bank	World Bank	Implementing the third phase of the follow-up survey of farming households in the districts of Mahabubnagar and Anantapur	
Zimbabwe	GRM International Ltd/DFID	Protracted Relief Programme Phase II (PRP-II) in Zimbabwe	CARE International-Zimbabwe; CAFOD-Zimbabwe; Catholic Relief Services-Zimbabwe; World Vision-Zimbabwe; Save the Children, UK; Action Contre la Faim (ACF), Zimbabwe; Christian AID, Zimbabwe; Concern Worldwide, Zimbabwe; Department of Agriculture, Technical and Extension Services (AGRITEX), Zimbabwe; River of Life Church, Zimbabwe; University of Reading, UK
Attributed support for core programs from the Commission of the European Communities, India, Iran, Italy and Japan is not listed but is included in the Financial Summary			

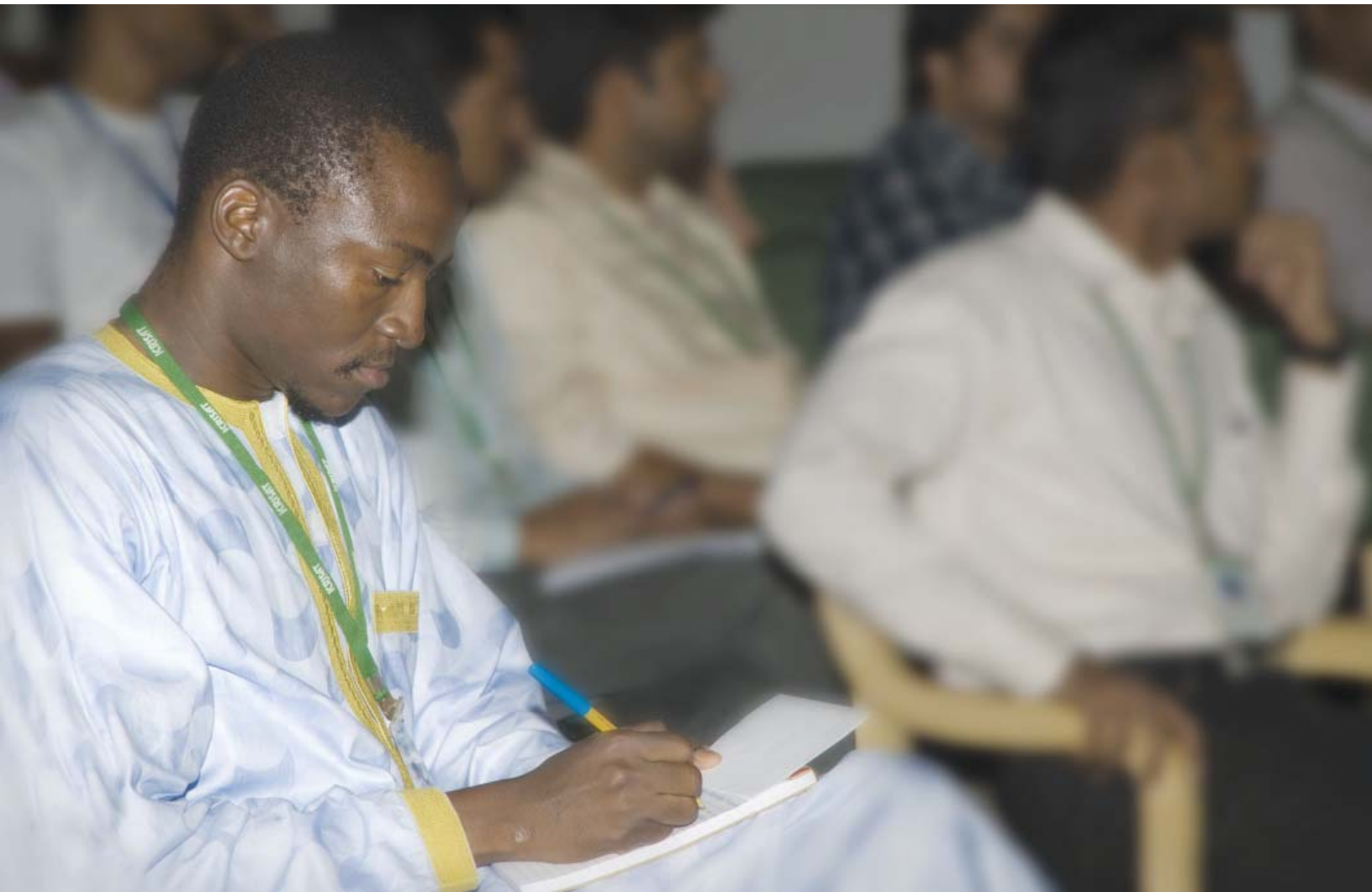
Research Scholars during 2008

Name	Country	Degree	Topic
Completed during 2008			
K Gopal Reddy	India	PhD	Genetics of SCMR and SLA, the traits related to drought tolerance in groundnut (*Arachis hypogaea* L.)
G Velu	India	PhD	Genetic variability, stability and inheritance of grain iron and zinc content in pearl millet (*Pennisetum glaucum* (L.) R. Br)
Jyotsna M Devi	India	PhD	Identification of mechanisms for drought response in groundnut (*Arachis hypogaea* L.)
Continuing during 2008			
T Jyothi	India	PhD	Shoot fly resistance marker-assisted backcrossing
G Kalyani	India	PhD	Transgenic groundnut with resistance to foliar diseases
Fatema S Husain	India	PhD	Introgression of fungal disease resistance from wild *Arachis*
Madhurima Bhatnagar	India	PhD	Development and characterization of transgenic groundnut plants for enhanced production of β-carotene to combat vitamin A malnutrition
Namita Srivastava	India	PhD	Molecular and physiological characterization of genetic variation for salinity tolerance in the core germplasm of pigeonpea and groundnut
A Bharathi	India	PhD	Phenotypic and genotypic diversity in finger millet germplasm
T Mahender	India	PhD	Genetic and genomic mapping of pearl millet using EST and other markers for abiotic stress tolerance
J Shridhar Rao	India	PhD	Work on abiotic stress tolerance in groundnut transgenic
V Surekha Devi	India	PhD	Interaction of acid exudates in chickpea on the biological activity of CRY toxins from *Bacillus thuringiensis* against *Helicoverpa armigera*
P Ramu	India	PhD	Development and application of EST-SSR marker in sorghum
V Vengadessan	India	PhD	Genetics of panicle and seed size in pearl millet
MT Vinayan	India	PhD	Exploiting gene synteny to improve stem borer resistance mapping in sorghum (*Sorghum bicolor* L.)
Jana Kholova	Czech Republic	PhD	Comparative study of tolerance of pearl millet under drought stress
N Lalitha	India	PhD	Genotypic and phenotypic diversity in chickpea (*Cicer arietinum* L.) germplasm reference collection
Spurthi Nagesh Nayak	India	PhD	Identification of QTLs and genes for drought tolerance using linkage mapping and association mapping approaches in chickpea (*Cicer arietinum*)

Name	Country	Degree	Topic
G Harini	India	PhD	Biological control of *Aspergillus flavus* invasion in groundnut (*Arachis hypogaea* L.) – an approach for the management of aflatoxin contamination
Sunita Choudhary	India	PhD	Physiological and molecular characterization of pearl millet for salinity tolerance
Vinod Dadarao Parde	India	PhD	Inhibition of *Helicoverpa armigera* gut zymogene activation by plant protease inhibitors
S Annemie Maertens	Belgium	PhD	The effects of networks and identity on investments and market participation behavior
Sowmini Sunkara	India	PhD	Development of groundnut transgenic for resistance to *Aspergillus flavus*
B Ratna Kumari	India	PhD	Pesticide residue monitoring and management in different cropping systems
S Srinivasan	India	PhD	Physiology, inheritance and molecular mapping of salinity tolerance in chickpea, (*Cicer arietinum* L.)
I Parama Siva	India	PhD	Influence of gut micro-flora of *Helicoverpa armigera* on biological activity of *Bacillus thuringiensis*
B Ravi Sankar Reddy	India	MSc	Assessing the potential for polymorphism detection across different cereals using EST-SSR primer pair's development from sorghum and pearl millet
Jagbir Singh	India	MSc	SSR-based genetic diversity analysis in elite chickpea genotypes
Sushil Kumar	India	PhD	Pearl millet drought tolerance mapping
Peter M Vijay	India	MPhil	Biochemical mechanisms of resistance to *Helicoverpa amigera* in wild relatives of chickpea
Joined during 2008			
BN Gnanesh	India	PhD	Generation of expressed sequence tags for sterility mosaic disease resistance in pigeonpea
Naresh Kumar	India	PhD	Molecular mapping of Fusarium wilt in pigeonpea
Supriya	India	PhD	Pearl millet DarT plant form development
E Sudhir	India	PhD	Adaptability and provenance of *Jatropha curcas* in different agroecosystems

Name	Country	Degree	Topic
Sarikonda Raghu Deepika	India	PhD	Genetics of seed traits in chickpea (*Cicer arietinum*)
M Kiruthika	India	PhD	Study program on groundnut transgenics for resistance to tobacco streak virus
Sarvamangala S Cholin	India	MSc	Study program on genetic mapping of quality traits in groundnut
Rachit Kumar Saxena	India	PhD	Inheritance and identification of molecular markers linked to the fertility restoration gene in pigeonpea
Mohammed Mubarak	India	MSc	Development and analysis of transgenic chickpea for resistance to *Helicoverpa armigera*
B Keerthi Kiran	India	PhD	Endophytic microorganisms associated with selected plants and their potential role in crop production and protection
M Govindaraj	India	PhD	Genetic variability of grain Fe and Zn uptake and partitioning in pearl millet
Naravula Jalaja	India	PhD	Tilling in pearl millet
Neha Gujaria	India	PhD	Development of intraspecific genetic maps for chickpea
V Rajaram	India	PhD	Creating EST-based marker to facilitate marker-assisted selection for drought tolerance in pearl millet
SL Sawargaonkar	India	PhD	Study of heterosis, combining ability and stability of yield quality parameters in CMS-based pigeonpea hybrids
Ramana Kumari Basava	India	PhD	Study program on development and evaluation of pearl millet contiguous segmental substitution lines
B Gautami	India	PhD	Study program on linkage mapping and QTL analysis of drought related tracts in groundnut (*Arachis hypogaea* L.)
Magdalena Ndafapawa	Namibia	MSc	Comparative evaluation of ground and un-ground grain samples of sorghum, pearl millet for Fe and Zn estimation

Name	Country	Degree	Topic
Matthew England	United Kingdom	BSc	Water resource management in the context of climate change and variability at the river basin level
Tadasse Sefera	Ethiopia	MSc	Genetic diversity analysis and DNA fingerprinting of Ethiopian chickpea cultivars
Anuja Dubey	India	PhD	Development of genomic resources for pigeonpea (*Cajanus cajan* L.) Millsp
Timothy Taity Changa	Kenya	MSc	Study program on optimization of genetic transformation of pigeonpea varieties adapted to eastern and southern Africa
Sarah Nabulime Seruwagi	Uganda	DST	Assessment of genetic diversity on sorghum collections in Uganda
Mbeyagala Kapande Emmanuel	Uganda	MSc	Assessment of genetic diversity on sorghum collections in Uganda
Susan Muthoni Maina	Uganda	MSc	Evaluation of the regeneration response in tissue culture of groundnut varieties adapted to eastern and southern Africa



Research Scholars during 2009

Name	Country	Degree	Topic
Completed during 2009			
G Kalyani	India	PhD	Transgenic groundnut with resistance to foliar diseases
Fatema S Husain	India	PhD	Introgression of fungal disease resistance from wild *Arachis*
Namita Srivastava	India	PhD	Molecular and physiological characterization of genetic variation for salinity tolerance in the core germplasm of pigeonpea and groundnut
T Mahender	India	PhD	Genetic and genomic mapping of pearl millet using EST and other markers for abiotic stress tolerance
J Shridhar Rao	India	PhD	Work on abiotic stress tolerance in groundnut transgenic
V Surekha Devi	India	PhD	Interaction of acid exudates in chickpea on the biological activity of CRY toxins from *Bacillus thuringiensis* against *Helicoverpa armigera*
P Ramu	India	PhD	Development and application of EST-SSR marker in sorghum
V Vengadessan	India	PhD	Genetics of panicle and seed size in pearl millet
MT Vinayan	India	PhD	Exploiting gene synteny to improve stem borer resistance mapping in sorghum (*Sorghum bicolor* L.)
Jana Kholova	Czech Republic	PhD	Comparative study of tolerance of pearl millet under drought stress
Spurthi Nagesh Nayak	India	PhD	Identification of QTLs and genes for drought tolerance using linkage mapping and association mapping approaches in chickpea (*Cicer arietinum*)
Sunita Choudhary	India	PhD	Physiological and molecular characterization of pearl millet for salinity tolerance
S Annemie Maertens	Belgium	PhD	The effects of networks and identity on investments and market participation behavior
Jagbir Singh	India	MSc	SSR-based genetic diversity analysis in elite chickpea genotypes
BN Gnanesh	India	PhD	Generation of expressed sequence tags for sterility mosaic disease resistance in pigeonpea
Naresh Kumar	India	PhD	Molecular mapping of *Fusarium* wilt in pigeonpea
Sarvamangala S Cholin	India	MSc	Study program on genetic mapping of quality traits in groundnut
Mohammed Mubarak	India	MSc	Development and analysis of transgenic chickpea for resistance to *Helicoverpa armigera*
Magdalena Ndafapawa	Namibia	MSc	Comparative evaluation of ground and un-ground grain samples of sorghum, pearl millet for Fe and Zn estimation
Matthew England	United Kingdom	BSc	Water resource management in the context of climate change and variability at the river basin level

Name	Country	Degree	Topic
Tadasse Sefera	Ethiopia	MSc	Genetic diversity analysis and DNA fingerprinting of Ethiopian chickpea cultivars
Mutai K Geoffrey	Kenya	Attachment during BSc program	Field attachment
Seydou Ouattara	Burkina Faso	MSc	Mapping of biophysical, infrastructural and varietal data in historical ICRISAT trials sites of SSA
Peter Muth	Germany	MSc	Individual and combining effects of five quantitative traits on resistance to the parasitic wood *Striga* in *Sorghum bicolor* under field conditions in Mali and Sudan
Alinguissi Diatta	Sénégal	BSc	Evaluation des options de gestion et varietal pour maximiser la production du sorgho sucré, jus, grain et le rendement en sucre
Fatim Zaklouta	France	MSc	Database development and management
Mamary Traoré	Mali	MSc	Familiariser avec les operations d'amélioration de l'arachide, les methodologies pratiques et théoriques
Youssouf Camara	Mali	MSc	Sélection participative des variétés d'arachide pour leur tolérance aux maladies foliaires
Sarah E Stern	UK	MSc	Aflatoxin intake
Adama Gouanlé	Mali	Techn	Préparation de grains de sorgho pour leur évaluation en fer et zinc
Kadiatou Sanogo	Mali	Techn	Initiation à la production de semences d'hybrides de sorgho
Datolou Kilareou	Tchad	Bachelor	Etude sur le sorgho et adaptation aux sols pauvres en phosphore
Gassinta Prosper	Tchad	Bachelor	Etude de variétés d'arachide pour la résistance à la sécheresse
Anne Rietveld	Netherlands	MSc	Aspects des diffusion de semences
Gatien Faconnier	France	Bachelor	Analyse du milieu Physique
Continuing during 2009			
N Lalitha	India	PhD	Genotypic and phenotypic diversity in chickpea (*Cicer arietinum* L.) germplasm reference collection
G Harini	India	PhD	Biological control of *Aspergillus flavus* invasion in groundnut (*Arachis hypogaea* L.) – an approach for the management of aflatoxin contamination
Vinod Dadarao Parde	India	PhD	Inhibition of *Helicoverpa armigera* gut zymogene activation by plant protease inhibitors
Sowmini Sunkara	India	PhD	Development of groundnut transgenic for resistance to *Aspergillus flavus*

Name	Country	Degree	Topic
S Srinivasan	India	PhD	Physiology, inheritance and molecular mapping of salinity tolerance in chickpea (*Cicer arietinum* L.)
B Ratna Kumari	India	PhD	Pesticide residue monitoring and management in different cropping systems
I Parama Siva	India	PhD	Influence of gut micro-flora of *Helicoverpa armigera* on biological activity of *Bacillus thuringiensis*
Sushil Kumar	India	PhD	Pearl millet drought tolerance mapping
Supriya	India	PhD	Pearl millet DarT plant form development
E Sudhir	India	PhD	Adaptability and provenance of *Jatropha curcas* in different agroecosystems
M Kiruthika	India	PhD	Study program on groundnut transgenics for resistance to tobacco streak virus
Rachit Kumar Saxena	India	PhD	Inheritance and identification of molecular markers linked to the fertility restoration gene in pigeonpea
Naravula Jalaja	India	PhD	Tilling in pearl millet
Neha Gujaria	India	PhD	Development of intraspecific genetic maps for chickpea
V Rajaram	India	PhD	Creating EST-based marker to facilitate marker-assisted selection for drought tolerance in pearl millet
SL Sawargaonkar	India	PhD	Study of heterosis, combining ability and stability of yield quality parameters in CMS-based pigeonpea hybrids
Ramana Kumari Basava	India	PhD	Study program on development and evaluation of pearl millet contiguous segmental substitution lines
B Gautami	India	PhD	Study program on linkage mapping and QTL analysis of drought related tracts in groundnut (*Arachis hypogaea* L.)
Anuja Dubey	India	PhD	Development of genomic resources for pigeonpea (*Cajanus cajan* L.) Millsp
M Govindaraj	India	PhD	Genetic variability of grain Fe and Zn uptake and partitioning in pearl millet
Madhurima Bhatnagar	India	PhD	Development and characterization of transgenic groundnut plants for enhanced production of β-carotene to combat vitamin A malnutrition
Saidou Kaboré	Burkina Faso	BSc	Study on current food processing practices in Mali
Yacine Ware Larissa	Burkina Faso	BSc	Etude de la fréquence de consummation des aliments dans deux zones du Mali: Mandé et Dioïla
Joined in 2009			
Jewel Jameeta Noor	India	PhD	Physiological studies on heat tolerance in maize
Kiara Sage Winans	USA	PhD	Carbon dynamics in Kothapally Watershed
K Prabhavathi	India	PhD	Soil degradation in relation to land use
Constance Therese Marie Aurore Vagne	France	Master's Degree	Deciphering the conditions leading to DREB1A expressions in transgenic groundnut-relation with plant water use

Name	Country	Degree	Topic
Boubacar	Niger	MSc	Pearl millet *Striga* resistance QTL mapping
T Jaya Kumar	India	MSc	Detection of polymorphism in parental of selected mapping populations of groundnut
S Anitha	India	PhD	Assessment of aflatoxin exposure among Indian populations
A Krithika	India	PhD	Studies on the development of abiotic stress tolerance by over expressing EBIA transcription factor in transgenic chickpea (*Cicer arietinum*)
Pavana J Hiremath	India	PhD	Development of genetic resources in chickpea
K Aparna	India	PhD	Dissection and QTL mapping of physiological traits involved in the drought tolerance of 863B
Abhishek Bohra	India	PhD	Molecular mapping of Sterility mosaic disease (*SMD*) resistance in pigeonpea
Shaik Mohammed Akbar	India	PhD	Biochemical Studies on mitochondria and storage proteins of *Helicoverpa armigera*
V Sujay	India	PhD	Identification of molecular markers for biotic stress resistance in groundnut
Shiddalingappa Virupaxappa Hugar	India	PhD	Studies on host genotype - *Helicoverpa armigera*-natural enemy interactions under laboratory and field conditions
Laroche Silvere	France	MSc	Effects of drought on reproduction in groundnut
Khin Lay Kyums	Myanmar	MSc	Hybrid pigeonpea
Nancy Wathimu Njogu	Kenya	MSc	Evaluation of chickpea lines for resistance to *Helicoverpa armigera*
Viola Devasirvatham	Australia	MSc	The basis of chickpea tolerance under semi-arid environments in India & Australia
M Maryanna Mayomba	Tanzania	PhD	Pigeonpea hybrids
I Sudhir Kumar	India	PhD	Genetic analysis of sugar and its components traits in sweet sorghum
M Vetriventhan	India	PhD	Phenotypic and genetic diversity in the foxtail millet core collection
K Seetharam	India	PhD	Phenotypic assessment of sorghum germplasm reference set for yield and related traits under post-flowering drought conditions
T Kiran Babu	India	PhD	Epidemiology, virulence diversity and host-plant resistance of blast disease (*Pyricularia grisea*) of finger millet (*Eleusine coracana*)
G Chitti Babu	India	PhD	Nutritional and environmental requirements for survival and development of cotton boll worm/legume pod borer, *Helicoverpa armigera*
Kiran Yadav	India	PhD	Impact of ICT-mediated information management in agricultural extension services
G Sreedhar	India	PhD	Spatial drought susceptibility estimation

Name	Country	Degree	Topic
Zaratou C Djimbeido	Niger	MSc	Etude de voies d'intensification de mécanismes bioécologiques pour la régulation des populations de ravageurs dans des agrosystèmes horticoles et vivriers sahéliens
Mariama Idi Nadaré	Niger	MSc	Aflatoxin management
Rabani Adamou	Niger	PhD	Quantitative determination of Cation Exchange Capacity (CEC), Organic Carbon and Soil Texture on Clay Soils in the regions of Maradi and Tillabery, Niger
Djibo Seidou	Niger	MSc	Evaluation of the effect of millet glumes residues on cowpea and millet
Fanna M Abdoulaye	Niger	BSc	
Hinsa H Ramatou	Niger	MSc	Residual effect of some early cowpea varieties on millet in sandy soil
Idi S Sani	Niger	MSc	Criblage des variétés résistantes aux nématodes et au virus OLVC chez *Hibiscus esculentus* (Gombo africain)
Moussa Akourki	Niger	MSc	Etude du potentiel de 3 plantes-pièges pour la régulation bottom-up et top-down des populations des ravageurs du gombo
Oumarou Yabo	Niger	MSc	Phenological study comparison of trap crops (pigeonpea, maize, cotton) for integrated pest management on okra and tomato crops with use of neem and Jatropha extracts
Rachidou Hindatou	Niger	MSc	Morphological and physiological characterization of fifteen genotypes of groundnut for Nitrogen fixation and drought tolerance
Amadou T Mamoudou	Niger	MSc	Socio-economic impact of technologies developed at ICRISAT
Maazou MN Rahila	Niger	MSc	Socio-economic evaluation of technologies developed by ICRISAT
Housseini Malam Laminou Rabi	Niger	MSc	Market study on technologies developed at ICRISAT
Ide Katouné	Niger	MSc	Use of *Jatropha curcas* for cowpea protection in field and for post-harvest storage
Idrissa A Maimouna	Niger	MSc	Simulation of pearl millet yield components under mineral fertilizer microdosing using DSSAT
Ousmane Abdou	Niger	MSc	
Derra Moumouni	Burkina Faso		Learning Laboratory techniques
Christof Johann Bohm	Germany	MSc	Validation of heterotic groups/ determination
Stefan Haffke	Germany	MSc	Assessment of different methods of farmer-participatory selection in diversified pearl millet populations at three pilot sites in Niger
Hamadou Idé	Niger	BSc	Purchasing and supply management

Name	Country	Degree	Topic
Zalika Mouza	Niger	BSc	
Hassane A Abdoulkarim	Niger	BSc	Finance management
Bohari D Tanimoune	Niger	BSc	Computer management
Djamilatou A Oumarou	Niger	BSc	Human Resources management
Mamadou Traoré	Burkina Faso	PhD	The potential for agronomical enhancement via application of *Jatropha curcas* oilcake as fertilizer on maize plots
Lodoun Tiganadaba	Burkina Faso	PhD	The impact of climate variability and change on food security in Burkina Faso

Workshops, Conferences, Meetings during 2008

Event/Topic/Date	Location	Participants	Participating countries/Institutes	Resources and collaborative support
Launch Workshop for the Consortium for ICT-mediated KM in Indian Agriculture, 11–12 Jan	ICRISAT–Patancheru	28	ICAR, NAIP, ICRISAT, NAARM, UAS Dharwad, IIT B, IITMK, IIT Kanpur, GB Pant Univ., ANGRAU	NAIP, ICRISAT
Writers Workshop, 28 Jan–1 Feb	ICRISAT–Patancheru	15	ICAR, ICRISAT, GIDR, ISEC, TNAU, ISRO	ICRISAT
Project kick-off meeting for "Integrating genomics and mapping approaches to improve pearl millet productivity in drought prone regions of Africa and Asia", 28 Feb	ICRISAT–Patancheru	8	ICRISAT, IGER, AICPMIP	ICRISAT
ABI-ICRISAT sensitization workshop for ICAR business incubators, 8–9 Apr	ICRISAT–Patancheru	18	NAIP, ICAR IAR, CIRCOT	ABI - ICRISAT
AGROCURI Stakeholders Consultation Meeting, 21–22 Apr	ICRISAT–Patancheru	30	UK, USA, Italy, Kenya, Ethiopia, Syria, Zimbabwe, Sri Lanka, Malaysia, Philippines and India	ICRISAT
ICRISAT and CARE International launched the Support to vulnerable groups to achieve food security project, 22–26 Apr	Kasungu Inn, Malawi	15		
A planning meeting of two TATA-ICRISAT-ICAR projects on Productivity Enhancement Initiatives in India, 24–25 Apr	ICRISAT–Patancheru	25	ICAR institutions, SAU, departments of agriculture and NGOs of Madhya Pradesh (MP), Rajasthan and Jharkhand; officials from SDTT and SRTT, and participants from ICRISAT	Sir Dorabji Tata Trust (SDTT) and Sir Ratan Tata Trust (SRTT)
RCC meeting held in Nairobi, 28 Apr	Nairobi		RCC members	ICRISAT-Nairobi
A three-day workshop on Climate Change and its Effect on Conservation and Use of Plant Genetic Resources and associated Biodiversity for Food Security, 28–30 Apr	ICRISAT–Patancheru	26	ICRISAT and FAO	ICRISAT

Event/Topic/Date	Location	Participants	Participating countries/Institutes	Resources and collaborative support
Planning and Launching Workshop "GTZ-Govt of India Ministry of Agriculture project for Consortium on Capacity Building for Decentralized Watershed Management in India", 29–30 Apr	ICRISAT–Patancheru	20	GTZ, MANAGE, Univ. of Agricultural Sciences, Karnataka and Rajasthan, NGOs and Commissioner of Sujala Watersheds Program, Karnataka and Special Commissioner, Rural Development, Government of Andhra Pradesh	MANAGE, ICRISAT
ICRISAT/IFAD Biofuels project Launching Meeting, 1–2 May	ICRISAT–Patancheru	40	Italy, China, Colombia, Mali, Vietnam	ICRISAT, IFAD
VLS scoping meeting, 3–5 May	ICRISAT–Patancheru	50	USA, Nepal, Bangladesh, Philippines and India	ICRISAT with support from the Bill & Melinda Gates Foundation (BMGF)
ICRISAT, under its CFC-FAO-ICRISAT project on Enhanced utilization of sorghum and pearl millet in poultry feed industry to improve the livelihoods of small-scale farmers in Asia, 6–7 May	UAS-Dharwad	28	UAS Dharwad SVVU, MAU, Neighbors Association for Integrated Development (NAID) and farmer representatives from the project villages of Dharwad cluster, Karnataka	KVK Dharwad, NAID India with ICRISAT
ADB project inception workshop on Vulnerability to Climate Change: Adaptation Strategies and Layers of Resilience, 7–9 May	ICRISAT–Patancheru	40	Bangladesh, India, Pakistan, People's Republic of China (PRC), Sri Lanka, Thailand and Vietnam	ADB and ICRISAT
ABLE AgriBio Seminar Gene Revolution in Indian Agriculture, 22 May	ICRISAT-Patancheru	60	ABLE, CCMB, Dept. of Biotechnology and seed companies	ABI

Event/Topic/Date	Location	Participants	Participating countries/Institutes	Resources and collaborative support
ICRISAT helps develop Treasure Legumes in Kenya, 23–24 Jun	ICRAF campus in Nairobi	30	Kenya Agricultural Research Institute (KARI), Ministry of Agriculture, TechnoServe, private sector seed companies and linked IFAD projects in Kenya	ICRISAT
Training workshop on IMPACT-WATER model, 28 Jun–2 Jul	ICRISAT–Patancheru	15	Staff from the GT-IMPI, along with Frank Agbola from the University of Newcastle, Callaghan and Daniel Njiwa from the Malawi Agriculture Sector Investment Programme	University of Newcastle and GT-IMPI at Patancheru
Longitudinal Data for Evidence-Based Decision making - a Project Proposal to BMGF, 9–11 Jul	ICRISAT–Patancheru	20	USA, Philippines, South Africa, India	ICRISAT
Integrating gender and social issues in watershed management projects of the Indo-US Agricultural Knowledge Initiative (AKI): A pilot study, 11 Jul	ICRISAT–Patancheru	25	Univ. of Florida and ICRISAT	ICRISAT
BMZ sorghum *Striga* project workshop, 21–25 Jul	Univ. of Hohenheim, Stuttgart, Germany	30	Eritrea, Germany, Kenya, Mali, Sudan, UK, ICRISAT	University of Hohenheim, ICRISAT
TL II Review and Planning meeting for Chickpea Component of South Asia (Objective 5 and Objective 8.5), 17–18 Jul	ICRISAT–Patancheru	10	India	ICRISAT
Training of Trainers of Improved Production Technology of Pulse (Legume) Crops, 18 Sep	ICRISAT–Patancheru	26	India	ICRISAT
Think Tank Meeting on Knowledge Infomediaries, 22–23 Sep	ICRISAT–Patancheru	27	COL, IGNOU, MAFSU, TANUVAS, YCMOU, ANGRAU, TNAU, ICAR and ICRISAT	COL and ICRISAT
TL II Project First Annual review and planning meeting, 29 Sep–3 Oct	Addis Ababa, Ethiopia	50	ICRISAT, ILRI, EIAR and CIAT	ICRISAT, Bill & Melinda Gates Foundation
CGIAR IT Managers meeting, 29 Sep–3 Oct	ICRISAT–Patancheru	17	All CGIAR Centers except IITA, Word Fish, CIFOR	ICRISAT and CGNET Services

Event/Topic/Date	Location	Participants	Participating countries/Institutes	Resources and collaborative support
Crop diversity data analysis workshop, 6–10 Oct	ILRI, Nairobi	30	ICRISAT, IITA, Mozambique, Tanzania, Kenya, Uganda, Rwanda, Ethiopia	ICRISAT, IITA, BecA
Sorghum Scientists' Field day, 7–8 Oct	ICRISAT–Patancheru	70	ICAR, ICRISAT and private seed companies	ICRISAT
Jatropha World Conference, 20–21 Oct	Hamburg, Germany	250	EU policy makers, private companies and researchers	
Symposium on Global Climate Change, 21–22 Oct	Tsubuka, Japan	150	23 countries from the Asia-Pacific region	ICRISAT, APAARI, JIRCAS
NFSM Chickpea project Launching and workplan meeting, 31 Oct–1 Nov	JNKVV, Jabalpur (MP)	75	NFSM, JNKVV and farmers	ICRISAT
Third International Workshop on Peanut Research community on Advanced *Arachis* through Genomics and Biotechnology (AAGB-2008), 4–8 Nov	ICRISAT–Patancheru	70	USA, South America, Africa and Asia	American Peanut Council and ICRISAT
Workshop on Comprehensive assessment of watershed programs and their impact on the lives of the rural population, 5 Nov	NAAS, New Delhi	55	India	ICRISAT, The Ministry of Agriculture and the Ministry of Rural Development, Govt of India
A Planning workshop on model watershed, 6–7 Nov	ICRISAT–Patancheru	45	State NGOs, Govt. depts, Agricultural Universities	ICRISAT, Govt. of India
Training Workshop on Digital content creation and management for crop specific information, 8–12 Dec	ICRISAT–Patancheru	14	ICAR, ICRISAT	NAIP and ICRISAT

Workshops, Conferences, Meetings during 2009

Event/Topic/Date	Location	Participants	Participating countries/Institutes	Resources and collaborative support
Workshop on Crop Knowledge Models and Agropedia, 12–13 Jan	New Delhi	37	India	ICRISAT, NAIP
Exposure cum orientation program of Watershed management, 20–22 Jan	ICRISAT–Patancheru	19	Senior Officers from 11 different states of India	GTZ, MANAGE, ICRISAT
Chickpea scientists meet, 8–9 Jan	ICRISAT–Patancheru	40	India, Ethiopia, Kenya, Tanzania, Myanmar, Philippines and Australia	ICRISAT
Workshop on Crop Knowledge Models and Agropedia, 19–20 Feb	ICRISAT–Patancheru	20	India	ICRISAT, NAIP
ICRISAT-IFAD Biofuel Project First Annual Review meeting, 31 Mar–1 Apr	ICRISAT–Patancheru	56	ICAR, ICRISAT	ICRISAT
Master Class on Impact Assessment: Concepts and Tools for Agricultural Research Evaluation and Impact Assessment, 18–27 Mar	ICRISAT–Patancheru	26	10 countries of Asia and Pacific	The Crawford Fund, ACIAR and ICRISAT
ICRISAT-CFC-FAO project workshop, 18–20 Mar	ICRISAT–Patancheru	50	India, Thailand, China, Sri Lanka, Nepal, Philippines and Myanmar	CFC, FAO
Training workshop on key steps in developing seed and plant variety protection laws, 9–12 Mar	Pretoria, South Africa		Botswana, Lesotho, Madagascar, Mauritius, Namibia and Swaziland	USAID
Village Dynamics Studies planning meeting, 29–30 Mar	ICRISAT–Patancheru	25	IRRI, Bangladesh, ICAR and ICRISAT	Bill & Melinda Gates Foundation
Workshop on Awareness Building for Clean Development Mechanisms in Biofuel Production, 2–3 Apr	ICRISAT–Patancheru	85	Scientists from ICAR, ICRISAT and farmers	ICRISAT
Groundnut Scientists meet, 22–24 Apr	ICRISAT–Patancheru	55	Scientists working on groundnut research from different parts of India	ICRISAT, ANGRAU
Workshop on Capacity building of watersheds, 28–29 Apr	Dehradun, Uttarakhand		ICRISAT and MANAGE	GTZ

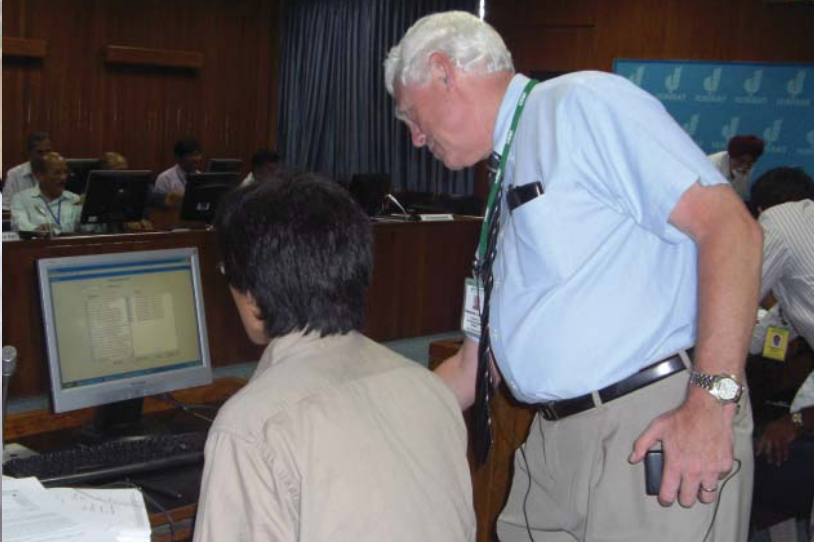
Event/Topic/Date	Location	Participants	Participating countries/Institutes	Resources and collaborative support
National workshop on rainwater harvesting and reuse through farm ponds, 21–22 Apr	CRIDA, Hyderabad	70	India	CRIDA
Workshop for state lead agricultural institutes on agri-business incubation, 11–12 May	ICRISAT–Patancheru	15	ICAR and SAUs	ABI-ICRISAT
Workshop on Integrated Education, Research and Extension - e-Tools & Reusable Learning Objects (RLOs), 11–15 May	ICRISAT–Patancheru	27	India, Kenya and USA	ICRISAT, NAIP
Meeting on Bio-fortified pearl millet, 18–19 May	ICRISAT–Patancheru	22	TNAU, AAU, BAUJKVVK, HAU and ICAR	ICRISAT and HarvestPlus
Fourth Annual Interactive meeting on Crop biofortification for alleviating micronutrient deficiency	ICRISAT–Patancheru	45	ICAR, IRRI, CIMMYT, CIAT and ICRISAT	GOI, HarvestPlus and ICRISAT
Workshop on Open Educational Resources in Agriculture, 13 Jul	ICRISAT–Patancheru	15	ICAR and SAUs	ICRISAT
International Workshop on Next Generation Sequencing Data Analysis, 21–23 Jul	ICRISAT–Patancheru	30	USA, UK, France, Korea, Japan, Australia, Mexico and Philippines	ICRISAT
First Regional Work Plan meeting (HOPE), 11–12 Aug	ICRISAT–Patancheru	45	Research Managers from Indian national program and ICRISAT	Bill & Melinda Gates Foundation (BMGF)
Consultation on Enhancing Open Access in Indian Agriculture: Prospects, Opportunities, Advantages and Challenges, 6–7 Sep	ICRISAT–Patancheru	26	ICAR, NGOs and agricultural universities	NAIP-ICAR and ICRISAT
A two day review and planning meeting on Chickpea in rainfed rice fallow lands, 8–9 Sep	ICRISAT–Patancheru	26	India	ICRISAT
Orientation Program on Establishing and enhancing chickpea production in Rainfed Rice Fallow Lands, 8–9 Oct	ICRISAT–Patancheru	15	India	ICRISAT
A Planning workshop for the HOPE project ESA, 27–28 Oct	Nairobi	45	National Agricultural Research Institutes, private sector, NGOs, seed companies and universities	ICRISAT

Event/Topic/Date	Location	Participants	Participating countries/Institutes	Resources and collaborative support
AGROCURI Workshop, 12–16 Oct	University of Nairobi	21	Faculty members from 15 countries of ESA region	ICRISAT and IFPRI
Fourth International Conference on Peanut research community, 20–22 Oct	Azalai Grand Hotel in Bamako, Mali	30		ICRISAT, Peanut Science Council USA, IER
Strategic Communication training workshop, 21–23 Oct	New York	55		The Bill & Melinda Gates Foundation
Crawford Fund International Conference, 27–28 Oct	Canberra, Australia		Decision makers, diplomats and NGOs	ACIAR, ICRISAT
Open Field days on sorghum and groundnut, 27–28 Oct	Mali	145	Farmers	ICRISAT
Project Planning Meeting of chickpea molecular breeding, 29 Oct	ICRISAT–Patancheru	10	India	ICAR
International Conference on Nurturing Arid Zones for people and the Environment, 24–28 Nov	Jodhpur			ICRISAT, ICAR, FAO, WMO, ISRO and ICARDA
Launch meeting of HOPE, of Sorghum and Millets in Sub-Saharan Africa and South Asia, 23 Nov	Bamako, Mali	40	Africa, AGRA, INTSORMIL, WASA and India	ICRISAT
Workshop of the project Backstopping and Coordinating the Fertilizer Microdosing and Inventory, 1–4 Dec	Burkina Faso	50	Burkina Faso, Ghana, Kenya, Mali and Niger	AGRA and ICRISAT
Training workshop on resource mobilization, 7–11 Dec	Ifugao State University	143	Faculty and Research staff from six universities	Ifugao State University
International Consultation on Agricultural Research for Development and Innovation; Addressing Emerging Challenges and Exploiting Opportunities through Information and Communication Technologies, 7–11 Dec	Patancheru	53	Participants from 25 countries and 8 international organizations	GFAR, ICRISAT, FAO and APAARI

Training Courses during 2008

Event/Topic/Date	Location	Participants	Participating countries/Institutes	Resources and collaborative support
Training Course on Chickpea Breeding and Seed Production, 7 Jan–5 Feb	ICRISAT–Patancheru	7	India	ICRISAT
Training course, 18–22 Mar	Madras Veterinary College, Chennai	40	India	NAIP/ICRISAT
First ICRISAT-CEG Course on Molecular Marker Applications in Crop Genetics and Breeding, 17–28 Mar	ICRISAT–Patancheru	16	Indian scientists from ICAR Centers, SAUs, RRS	ICRISAT
Second ICRISAT-CEG Molecular Marker Applications in Crop Genetics and Breeding, 31 Mar–11 Apr	ICRISAT–Patancheru	20	India (ICAR Centers, SAUs, RRS, Private Sector Seed Companies, Governmental Organizations) Malaysia and Mauritius (Research Institutes)	ICRISAT
Enhancing Water Use Efficiency for farmers from Madhya Pradesh, 9–11 Apr	ICRISAT–Patancheru	15	India	ICRISAT

Event/Topic/Date	Location	Participants	Participating countries/Institutes	Resources and collaborative support
Training of Trainers for Productivity Enhancement in Management of Sujala Watersheds, Karnataka, 15 Apr	Bangalore	75	India	ICRISAT
Training course on Phenotyping for Drought	ICRISAT–Patancheru	27	Technicians and scientists from African NARS covering Mali, Ethiopia, Malawi, Nigeria, Zimbabwe, Senegal and Tanzania	GCP/TLI
Phenotyping course for drought related traits across tropical legumes – Concepts and practices, 3–28 Mar	ICRISAT	28	India, Senegal, Mali, Niger, Burkina Faso, Kenya, Malawi, Tanzania, Zimbabwe, Mozambique, USA (UC Riverside), CIAT Colombia	GCP/ICRISAT
Training program on ICT Applications in Agricultural Research, 24–29 Mar	CRIDA, Hyderabad	27	India	ICRISAT
African Market Garden (AMG) and Vegetables production techniques, 1–4 Apr	ICRISAT–Niamey	15	Niger	ANPIP
Statistical Training for the CCRP West Africa Community of Practice, 7–12 Apr	Ouagadougou	18	Burkina Faso, Mali, Niger, ICRISAT, NARS, farmers ONG	The McKnight Foundation
Acacia senegal nursery techniques, 23–30 Apr	ICRISAT–Niamey	8	Niger	PAC
Training of World Vision technicians and farmers on the technology of Sahelian Ecofarm (SEF), 17 Apr–2 May	ICRISAT–Niamey	40	Niger	World Vision
A training course on Scaling-out soil health management, 12–13 May	ICRISAT–Patancheru	92	Farmers and women from SHG of AP	NAIP ICRISAT and CRIDA



Event/Topic/Date	Location	Participants	Participating countries/Institutes	Resources and collaborative support
Trainers Training on Vermicomposting and Organic Matter Generation, 12–13 May	ICRISAT–Patancheru	92	India	ICRISAT
Learning Program on Germplasm Management and Utilization of Vegetables and Legumes, 26–29 May	ICRISAT–Patancheru	26	ICAR, NGOs	AVRDC
Two courses on trial conception and initial statistical analysis, 5–9 and 12–16 May	ICRISAT–Niamey	22 + 13	Nigeria, Niger, Burkina Faso, ICRISAT, INRAN, INERA, LCRI, ACMAD, Projet Intrants FAO, JIRCAS Research Assistants and Technicians	ICRISAT scientists, the McKnight Foundation
Training on Experimental Design Analyses, Crop Production System and Scientific Report Writing, 28 Jun–14 Aug	ICRISAT–Patancheru	5	Mozambique, Malawi	ICRISAT
Training on crop production, statistical design and scientific report writing, 1 Jul–15 Aug	ICRISAT–Patancheru	5	Mozambique	ICRISAT
Training on Production Technologies of Sweet Sorghum, 15–16 Jul	ICRISAT–Patancheru	10	India	ICRISAT
The K-Agrinet Study Mission, 10–17 Sep	ICRISAT–Patancheru	14	Philippines	ICRISAT
Training of Trainers on Improved Production Technology of Pulse (Legume) Crop, 18 Sep	ICRISAT–Patancheru	26	SAMETI	ICRISAT
Training of Trainers on Improved Production Technology of Pulse (Legume) Crop, 25 Sep	ICRISAT–Patancheru	18	SAMETI	ICRISAT

Event/Topic/Date	Location	Participants	Participating countries/Institutes	Resources and collaborative support
Production Technologies of Sweet Sorghum, 1–2 Sep	ICRISAT–Patancheru	19	TCL, Rusni Distilleries and Praj Industries	ICRISAT
Training on field and socio-economic research methods and Agricultural Technologies, 6 Oct–5 Nov	ICRISAT–Patancheru	7	Kenya, Sudan	ICRISAT
Third ICRISAT-CEG Training Course on Molecular Marker Applications in crop genetics and breeding, 6–24 Oct	ICRISAT–Patancheru	22	ICAR Centers, State Agricultural Universities and Regional Research Centers	ICRISAT
Training program on Dryland Agriculture, 6–10 Oct	ICRISAT–Patancheru	9	Vietnam, Cambodia Australia	ICRISAT
Training Program on Improved Paddy seed production for seed entrepreneurs, 6–7 Nov	Nagapatnam Dt, Tamil Nadu	45	Rural entrepreneurs	ICRISAT–ABI
Molecular methodologies for assessing and applying genetic diversity in crop breeding, 17–28 Nov	ICRISAT–Patancheru	26	ICAR, Malaysia, Pakistan, the Philippines and Thailand	ICRISAT
Training workshop on Proposal Development, 17–19 Nov	ICRISAT–Patancheru	25	ICRISAT	ICRISAT–PDMO
Farmers' field day, 26–27 Nov	Bomet, Kenya	120	Farmers, District Agricultural Officers	ICRISAT–Nairobi
Basic Computer Applications Course, 26–27 Nov	ICRISAT–Patancheru	9	India	ICRISAT
Nursery Management training in West Africa, 1–5 Dec	ICRISAT–Niamey	40	Burkina Faso, Togo and Niger	ICRISAT
Digital content creation and management for crop-specific information, 8–12 Dec	ICRISAT–Patancheru	13	India	ICRISAT

Training Courses during 2009

Event/Topic/Date	Location	Participants	Participating countries/ Institutes	Resources and collaborative support
Training workshop on Groundnut breeding methodologies and techniques, 26 Jan–6 Feb	ICRISAT–Bamako	9	IER, Mali, INRAN Niger, IAR, Nigeria and ICRISAT-Bamako	ICRISAT-Bamako
Statistical training for research assistants and technicians from ICRISAT and NARS, 26–30 Jan	ICRISAT–Niamey	20	ICRISAT-Niamey, IAR-Nigeria, ICRISAT-Bamako, ACMAD/ Niger, INRAN/Niger	ICRISAT, FIDA, BMZ/ GTZ, TLII, McKnight Foundation, JIRCAS, GCP
Statistical training for research assistants and technicians from ICRISAT and NARS, 2–6 Feb	ICRISAT–Niamey	22	Niger, GTZ	ICRISAT, FIDA, BMZ/ GTZ, TLII, McKnight Foundation, JIRCAS, GCP
Groundnut breeding methodologies, 26 Jan–6 Feb	Bamako, Mali	8	Mali, Niger and Nigeria	ICRISAT
Training program on Watersheds, 4–6 Feb	Bangalore, Karnataka	32		ICRISAT, MANAGE, Ministry of Agriculture and GTZ
Data management and analysis using GENSTAT, 9–13 Feb	Bamako, Mali	17	Nigeria, Mali, Senegal	ICRISAT, AVRDC, ICRAF
Data management and analysis using GENSTAT, 16–20 Feb	Bamako, Mali	15	Mali	ICRISAT
Seed production Training, 27 Mar	ICRISAT–Bulawayo	50	Farmers	ICRISAT
Regional Course on Seed multiplication and storage, 23–27 March	ICRISAT–Niamey	62	ICRISAT-Niamey, ICRISAT-Bamako, PAFAST-Burkina Faso, WINROCK International-Mali, CIDAP/Togo, Deutsche Welle hausa/Niger, World Vision/Senegal, ADESKA SELF/Benin	ADF, ADRA Mali, CIDAP Togo, ONG Songhaï Benin, PAFASP Burkina Faso, WinRock Mali, ONG SELF Benin, WASA/ICRISAT, FCMN Niyya, Millennium Village Project Mali
Training on Fundamentals of e-Course Creation and Development of Digital Repositories, 27–29 Apr	Thoothukudi	30	Scientists from ICAR	ICRISAT and NAIP
Training course on Molecular Marker Technology for Crop Improvement, 18–29 May	ICRISAT–Patancheru	25	India, Africa	DBT, Government of India
Safety Awareness Program, 21 May	ICRISAT–Patancheru	51	ICRISAT	ICRISAT

Event/Topic/Date	Location	Participants	Participating countries/ Institutes	Resources and collaborative support
Training on pearl millet breeding operations and multi-location data analysis with GENSTAT, 9–11 May	ICRISAT–Niamey	23	ICRISAT–Niamey, ICRISAT–Bamako, ICRISAT–Patancheru, INRAN-Niger, LCRI-Nigeria, IER-Mali, INERA-Burkina Faso, ISRA-Senegal	ICRISAT
Small-scale seed business management, 4–6 May	Bamako, Mali	27	Mali	ICRISAT
Rainy season vegetables production techniques, 4–5 Jun	ICRISAT–Niamey	22	Niger (Tillabery Region)	GTZ
Rainfed crops (millet and cowpea) production techniques, 18–22 Jun	Tahoua, Niger	150 (Group of 30 producers per day)	Niger (Tahoua Region), GTZ	GTZ
Moringa seed production and storage techniques, 22–25 Jun	ICRISAT–Niamey	60	Niger (Tillabery, Maradi, Zinder and Tahoua regions), CLUSA NGO, GTZ	CLUSA NGO
Training course on aspiring women entrepreneurs, 19 Jun	ICRISAT–Patancheru	14	Private sector entrepreneurs	ICRISAT
Training on pigeonpea agronomy and seed production from 30 Jun–1 Jul	Wote, Kenya	22	Ministry of Agriculture, progressive farmers, Government affiliated institutions	IFAD funded treasure legumes project for financial resources. ICRISAT-Nairobi and Kenya Agricultural Research Institute for technical resources
Rainy season vegetables production techniques, 30 Jun–2 Jul	Tahoua, Niger	12	Niger (Tahoua Region), GTZ	GTZ
Short Course on GIS for Landscape Analysis, 27–31 Jul	ICRISAT–Patancheru	16	ICAR, Agricultural Universities	UF and ICRISAT

Event/Topic/Date	Location	Participants	Participating countries/ Institutes	Resources and collaborative support
Techniques de production de moringa feuilles à l'intention des producteurs de l'ONG CLUSA des regions de Maradi et Tillabery, 13–16 Jul	Niamey	50	Maradi, Tillabery	ICRISAT, ONG CLUSA
Training Course for Philippine Scientists on Groundnut, Pigeonpea and Chickpea, 20 Sep–17 Oct	ICRISAT–Patancheru	6	Participants from the Philippines	ICRISAT
Short Course on Cropping Systems Models: Applications in Land Resources Management, 12–16 Oct	ICRISAT–Patancheru	26	ICAR, NGOs and Agricultural Universities	UF and ICRISAT
Training seed production Techniques, 22 Oct	Mehboob–nagar, AP	50	Members of the village seed committees and cluster activists	ICRISAT and DRDSERP
Training Program on Advances in Plant and Atmospheric Interactions, 27 Oct	ICRISAT–Patancheru		CRIDA	ICRISAT
Farmer training program on Hybrid pigeonpea seed production technology and insect management, 27 Oct	ICRISAT–Patancheru	37	Farmers, seed producers, NSC representatives and students from ANGRAU	ICRISAT
Safety Awareness Program, 27 Oct	ICRISAT–Patancheru	48	ICRISAT	ICRISAT

Event/Topic/Date	Location	Participants	Participating countries/ Institutes	Resources and collaborative support
Training on harvesting sweet sorghum	Samanko, Mali		Scientists and technicians from IER research station	ICRISAT-Bamako
Training course on Molecular Marker Technology for Crop Improvement, 16–27 Nov	ICRISAT–Patancheru	30	Scientists from India and Africa	DBT, Government of India
Training program on the procedures and practices of harvesting sweet sorghum for collaborative trials of ICRISAT and IER	Samanko research station, Mali		IER scientists and technicians and students from Samanko	ICRISAT-Bamako
Training on Screening for resistance to Helicoverpa, 3–11 Dec	ICRISAT–Patancheru	18	India, Kenya and ICRISAT	Technology Mission on Oilseeds, Pulses and Maize (TMOP) and ICRISAT
Formation en techniques de pépinières du projet PDRI Dosso, du 07 au 11 décembre		12	Dosso	PDRI Dosso
Principles and practice of groundnuts seed production and marketing, 16–17 Dec	Malawi - Mchinji	Fourteen NASFAM Field Officers (Training of trainers)	Malawi	Irish Aid support through Malawi Seed Industry Development Project budget; Ministry of Agriculture and Food Security support by providing additional resource persons
Training on National Agricultural Research System on applications of Integrated decision support system for marker assisted plant breeding (iMAS), 18–19 Dec	ICRISAT–Nairobi	21	Eritria, Ethiopia, Ghana, Kenya, Sudan, Tanzania and Uganda	ICRISAT-Nairobi

Event/Topic/Date	Location	Participants	Participating countries/ Institutes	Resources and collaborative support
Short course on Integrated Watershed Development, 21–27 Dec	ICRISAT–Patancheru	25	Senior officials and scientists from ICAR	ICRISAT and University of Florida
Principles and practice of groundnuts seed production, marketing and branding, 21–22 Dec	Malawi – Salima	Twenty Agro-dealers participating in certified groundnuts seed production & marketing	Malawi	Irish Aid support through Malawi Seed Industry Development Project budget; Ministry of Agriculture and Food Security support by providing additional resource persons
Principles and practice of rice seed production, marketing and branding, 23–24 Dec	Malawi - Salima	Ten Agro-dealers participating in certified rice seed production & marketing	Malawi	Irish Aid support through Malawi Seed Industry Development Project budget; Ministry of Agriculture and Food Security support by providing additional resource persons

Publications

**(List available on CD version.
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About ICRISAT

ICRISAT
Science with a human face

The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) is a non-profit, non-political organization that does innovative agricultural research and capacity building for sustainable development with a wide array of partners across the globe. ICRISAT's mission is to help empower 600 million poor people to overcome hunger, poverty and a degraded environment in the dry tropics through better agriculture. ICRISAT is supported by the Consultative Group on International Agricultural Research (CGIAR).

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