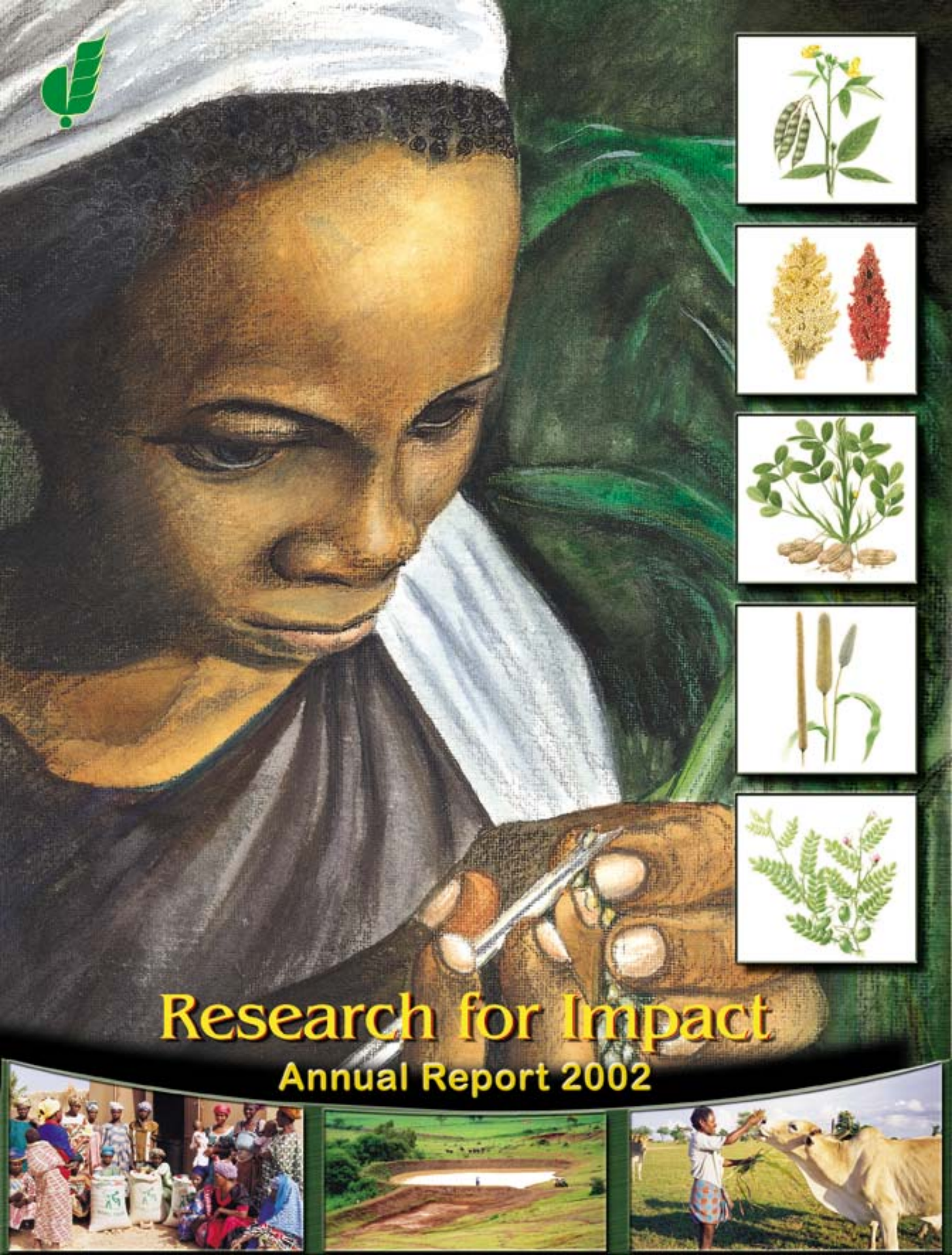


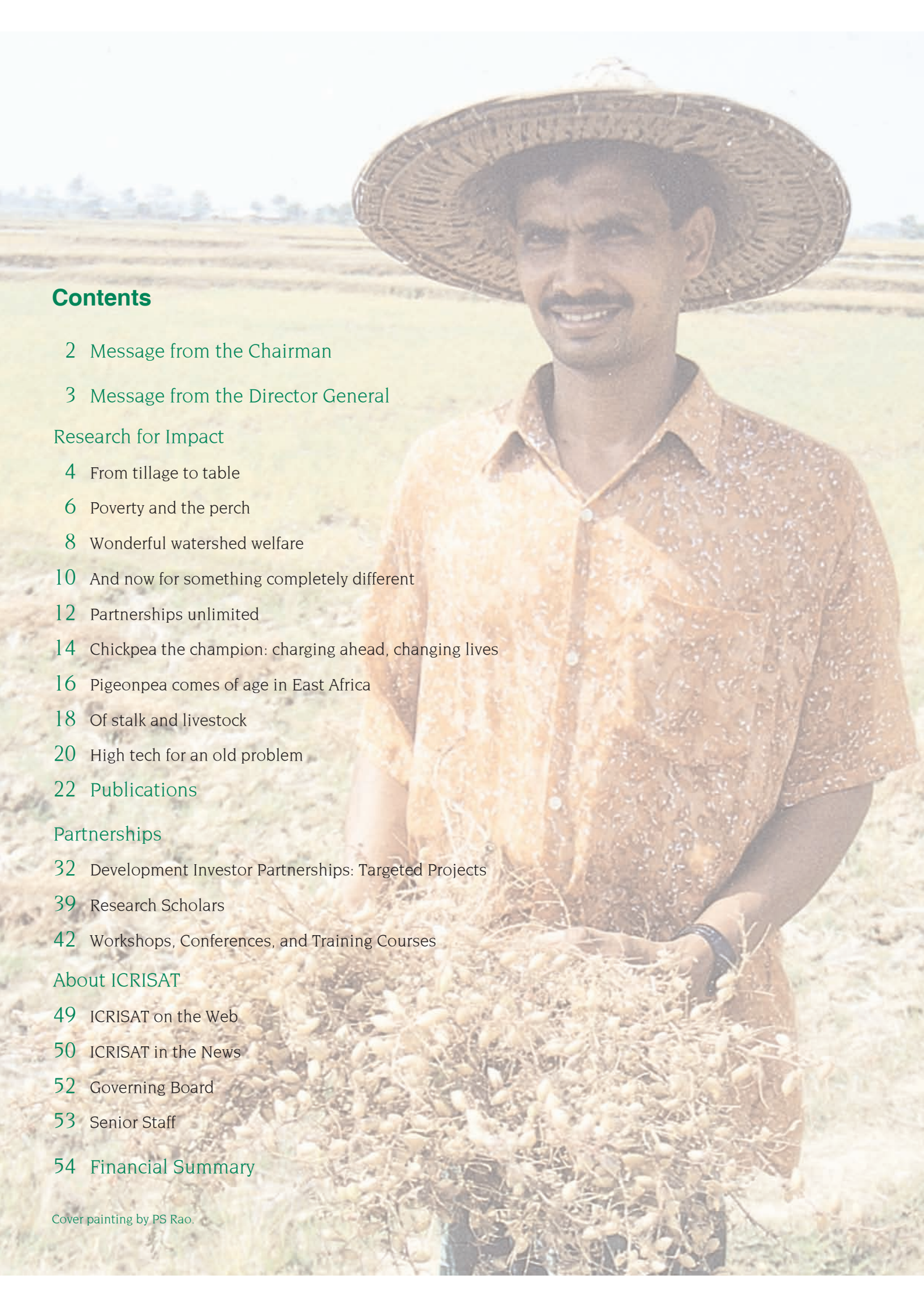
Research for Impact

Annual Report 2002

Awards

Over the 30 years since ICRISAT was founded, our scientists have been recognized for their achievements. A few visual memories are provided overleaf.


Sh.OM PRAKASH



Contents

2 Message from the Chairman

3 Message from the Director General

Research for Impact

4 From tillage to table

6 Poverty and the perch

8 Wonderful watershed welfare

10 And now for something completely different

12 Partnerships unlimited

14 Chickpea the champion: charging ahead, changing lives

16 Pigeonpea comes of age in East Africa

18 Of stalk and livestock

20 High tech for an old problem

22 Publications

Partnerships

32 Development Investor Partnerships: Targeted Projects

39 Research Scholars

42 Workshops, Conferences, and Training Courses

About ICRISAT

49 ICRISAT on the Web

50 ICRISAT in the News

52 Governing Board

53 Senior Staff

54 Financial Summary

Cover painting by PS Rao.

Message from the Chairman

Over the past year, a tremendous amount of activity was undertaken by ICRISAT. The challenge to us, as a Board, has been to digest the abundance of information about these activities, to understand the implications for the Institute, and to provide direction where necessary to ensure the realization of our mission and goals. The Director General and his management team are to be congratulated on the high quality of the leadership they have displayed to further the aims of this noble Institute.

Geopolitical forces far beyond our control have forever changed our world. It is indeed unfortunate that although the pain of last September may have subsided, the actions that resulted from that terrible event, as well as from other political developments, continue to have an impact on the way we deliver our research agenda. The challenges we face are indeed serious.

We continue to monitor various CGIAR system-wide initiatives. In March, we received an excellent briefing on the status of the International Treaty on Genetic Resources. The process by which the Board members were able to participate in information exchange regarding this very complex initiative was quite successful. Basically, a virtual meeting was held to discuss some of the critical questions and issues regarding the International Treaty and how it relates to ICRISAT. As a result we were able to be strong and vocal participants in the following consultative meeting in the Philippines. Of course the matter is far from being resolved, but this initiative serves as an excellent example of how ICRISAT's Board members can actively participate in policymaking for the Center.

The CG System continues to reinvent itself. At the last Annual General Meeting in Washington DC, several mechanisms were created to finalize the components of the new structure, including the creation of new working groups, committees and task forces. Chief among these are the Science Council (which replaces the Technical Advisory Committee), the Executive Committee, and the Systems Office. It is not clear how these changes will affect the Centers and the manner in which they deliver their research programs. Regardless, we as the Governing Board will be rigorous in our determination not to become paralyzed by the present uncertainties.

Meanwhile, the attention currently given to the identification of Challenge Programs is very interesting. In this highly competitive arena, ICRISAT has preferred to involve itself in collaborative proposals with other Centers. While some may question the legitimacy and/or value of what is clearly a top-down approach to research agenda setting, we can be comforted knowing that ICRISAT is a leader in this system-wide activity. With respect to the CGIAR system-wide agenda, the challenge for our Board is to understand how we can ensure that we effectively execute our responsibilities in our role as an instrument of governance for ICRISAT. With the centralization of decisionmaking power in the system, clearly the erosion of the authority of Center Boards has begun. It is necessary therefore that we, the ICRISAT Governing Board, adjust to the new realities.

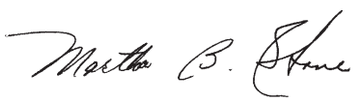
We continue to face serious financial challenges. These challenges are not new, but with the current environment they have become more profound. One aspect of the current financial reality is that donor countries are changing the manner in which they deliver their development aid. There is no doubt that the shift from sectoral programs to integrated support for strengthening national capacity, public service and governance will affect the way we design our research agenda and deliver our programs. Management has accordingly restructured the Institute's research agenda to permit it to formulate and deliver its research in a more responsive manner.

The strength of the ICRISAT staff, their commitment to the mission of the Institute and their determination to do good science will ensure that any perceived obstacles will be overcome with dedication and determination. It is gratifying to note that after a major restructuring in January, the staff has signed on to the concept of 'Team ICRISAT'. I urge my fellow Board members to consider our attributes and core values as we work together with management in meeting these challenges, and ensuring that ICRISAT remains strong and relevant in the fight against hunger and poverty.

In closing, I would like to paraphrase Professor MS Swaminathan:

> *The most powerful force is human ingenuity, for it is the only tool we have to turn obstacles into opportunities.*

With my best wishes,



Martha B Stone
Chairman
ICRISAT Governing Board

Message from the Director General

Change and evolution are central to modern society. Organizations like ICRISAT must continue to adapt, innovate and evolve. But as we move ahead, seeking ways to cope with the new challenges we face, we must strive to keep our guiding values firmly in mind. Our core principles of partnership, trust and excellence are the bedrock that hold us on course. Without them, we would be like a rudderless ship floundering at sea – our course uncertain and our destination unknown.

As ICRISAT celebrates its 30th anniversary, it is useful to reflect. When the Institute was established in 1972, the successes of the Green Revolution were just starting to become apparent. Food shortages in Asia and Africa were still a major concern and the need to build capacity in public plant breeding programs and seed production systems was still critical – particularly for crops grown and consumed by the poor.

These imperatives were reflected in the establishment of this Institute. Indeed, the creation of ICRISAT was one of the very first acts of the brand new Consultative Group on International Agricultural Research (CGIAR), which itself attains its 30th birthday this year. In the intervening years much has changed. Several features stand out.

- Increasing food production is no longer sufficient to reduce poverty. The rural poor have developed diversified livelihood strategies to cope with vulnerability and to exploit new, often market-driven, opportunities.
- International development goals have widened from increasing food supply to embracing poverty reduction and environmental sustainability. As a result, international support for agricultural science now competes with a wider set of development objectives.
- The public sector, long the main source of technological innovation, has been increasingly supplemented by the private sector and NGOs.
- Completely new technologies, notably IT and biotechnology, have emerged, and along with them unprecedented possibilities and controversies.

Perhaps the only thing that *hasn't* changed is the scourge of poverty that continues to blight the lives of millions of people. Two of every five persons living in South Asia and nearly half the population of sub-Saharan Africa live in this degraded condition right now. Most of them – a staggering total of nearly 450 million people – live in the semi-arid tropics.

To cope with this changing world, ICRISAT has restructured its research portfolio away from disciplinary programs – breeding, economics, pathology, and so forth – toward six broad thematic areas we call Global Research Themes. These six Global Themes (GTs) focus on six major developmental problems.

GT1: Harnessing biotechnology for the poor

GT2: Crop management and utilization for livelihood security and health

GT3: Water, soil and agro-biodiversity management for ecosystem health

GT4: Sustainable seed supply systems for productivity

GT5: Enhancing crop-livestock productivity and systems diversification

GT6: SAT futures and development pathways

This new structure has given the Institute a more forward-looking, opportunity-driven focus. Our work is still based on scientific excellence, but the new framework has moved us away from disciplinary contributions alone toward an agenda based on realistic developmental goals.

There is no blueprint for responding to the challenges of a changing world. We have answered the call in ways that reflect our own history – core expertise in science and long-term commitment to reducing poverty. What we see today is the result of a truly evolutionary process in which we continuously adapt our niche in international development to the changes around us.

In closing, let me refer again to the principles that have shaped the evolution of ICRISAT: the centrality of partnerships and the need to maintain scientific excellence. We must continue to make an explicit effort to emphasize, develop and build awareness of our key principles, thus ensuring that science continues to play its role in supporting the livelihoods of the poor of the dry tropics.

Yours in partnership,

William D Dar
Director General

From tillage to table

After alleviation of hunger, health is the ultimate goal of most agricultural research. New data in aflatoxin research reveals the extent to which this is true. Aflatoxin, a potent poison that contaminates groundnut and other crops, is very common but difficult to detect. A sample survey by ICRISAT researchers in Andhra Pradesh examined the extent of aflatoxin contamination in groundnuts, chilies and various spices (ginger, black pepper, turmeric and coriander). The results revealed that a frighteningly large number of groundnut byproducts like chikkies (peanut crunch candy) were contaminated.

A few years ago such a research focus for ICRISAT scientists would have been unthinkable. But, in its quest for impact, the Institute now extends its activities to the full chain of events that begins with planting and concludes with eating – *from tillage to table*. Our focus has also shifted to one that pays closer attention to food and feed quality – a part of our 'food safety' strategy.

This new approach means working with different partners. It's not a matter of *changing* our 30-year mandate for crop improvement, but rather *expanding* it to embrace and assimilate the concerns of stakeholders outside our traditional research parameters. In the case of aflatoxin research, we are tapping the expertise of such new spheres as medical and veterinary services, private sector and commercial investors like feed and food suppliers, as well as scientists. The goal is to build a partnership to deal with the aflatoxin problem in its entirety.

Aflatoxin contamination was found in commonly used herbs and spices.

ICRISAT has also developed a strategic plan for aflatoxin research, that includes genetic enhancement and management approaches. In terms of genetic enhancement, the development of cultivars with enhanced resistance will provide an effective complementary approach to control aflatoxins in groundnut. ICRISAT is exploring new sources of resistance using tools like the enzyme-linked immunosorbent assay (ELISA). ELISA kits enable technicians to screen more lines at less cost, and help to identify new sources of resistance.

Aflatoxin contamination levels are high during end-of-season drought.

ICRISAT has also explored various simple crop management practices to reduce aflatoxin contamination during harvest, post-harvest and storage.

For example, aflatoxin levels are particularly high during severe end-of-season droughts. Since drought is very common in the Asian and African semi-arid tropics, we are exploring the possibility of improving water retention in the field. Four weeks of drought can result in high contamination, but if the effects of drought are reduced to two weeks, the contamination can be contained.

The difference in our approach is that – apart from improving the adoption of harvest, post-harvest and storage practices – we are generating technology to reduce aflatoxin at field level. Besides reducing aflatoxin levels, these technologies should increase yield. In the final analysis, farmers will adopt only those practices and technologies that enhance their incomes through improved yields. ♦

ELISA to the rescue

Vimala Feeds Private Limited is a large poultry feed factory near Hyderabad. It is the largest of its kind in the state of Andhra Pradesh, and the second largest in the country. Because of high aflatoxin levels in the groundnut cake Vimala purchased from local farmers, the company was forced to buy cake from growers hundreds of kilometers away. The only alternative was to analyze each packet of cake for aflatoxin through thin layer chromatography (TLC), an expensive and time-consuming process. Transporting the groundnut cake over long distances was cheaper.

But ICRISAT's new ELISA package has changed everything. ELISA tests cost about a dollar, while TLC costs three times that amount. The end result is that Vimala now spends less on transport and can process its feed production faster. Moreover, neighboring farmers are now able to sell their groundnut cake to Vimala instead of watching the cash fly off to farmers in other states.

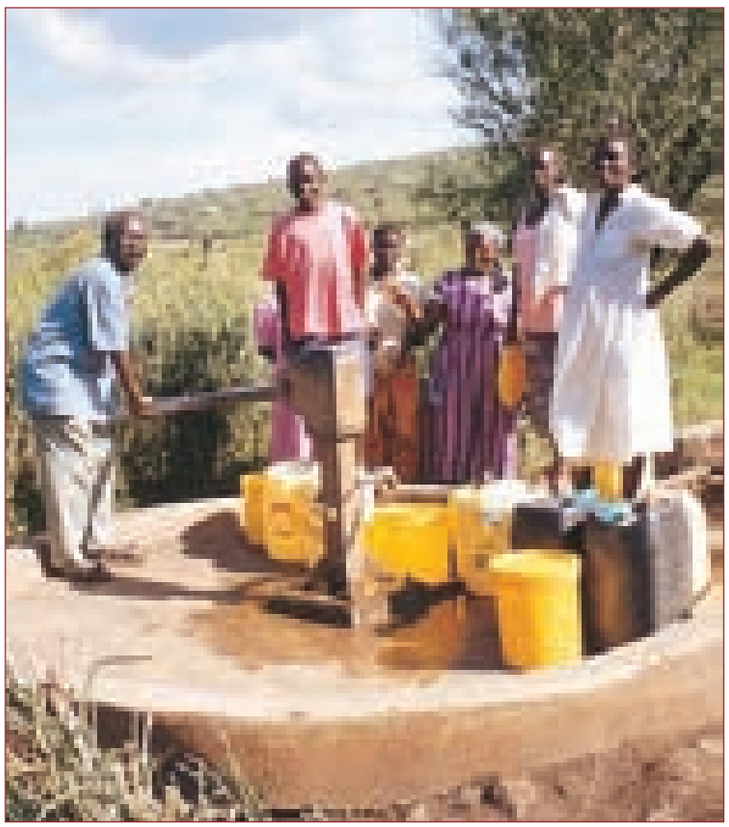
Poverty and the perch

Over half of Kenya's rural population lives in extreme poverty. And the number of poor and malnourished people, particularly women and children, is increasing. Poverty alleviation programs are in place, but often ineffective. One reason: we lack information on livelihood options for the poor, and the role and impact of institutions in poor rural areas. ICRISAT is working with the Overseas Development Group of the University of East Anglia, UK, to better understand these issues. As part of the study, economists examined a cluster of five villages near Lake Victoria. Three are fishing villages; the other two, further inland, rely more on smallholder agriculture.

The fishing industry employs over 80% of the community either directly or indirectly. But if fishing provides income, agriculture is the key to household survival. Most families must grow their own food – but few are able to grow enough. The harvest lasts them only two to six months, after which they must purchase food from the market, or depend on hand-outs.

Livelihood patterns – who does what. Livelihood strategies in these villages fall under three broad categories. The rich are able to make investments that lead to substantial profits. For example, wealthy villagers do not fish – they buy and then rent out boats or fishing equipment, earning large, stable incomes. The middle class makes more modest investments that give smaller and more variable returns. Some operate small businesses, where the daily take – revenue, not profit – rarely exceeds KSh 100 (US$ 1.25). The poor have negligible savings, and correspondingly little chance for upward mobility. Most are laborers. Some are entrepreneurs, but operate at minimal profits – they may weave sisal baskets that cost KSh 30 to make (excluding labor), and sell for only KSh 50.

Mbita market, focus of the local fish trade.



Despite the proximity of Lake Victoria, clean drinking water is a major problem.

Changes in livelihoods. 'If you haven't made your money already,' said one villager, 'then you never will.' Poverty has increased and livelihood options have become more difficult. Fish catches are significantly smaller than they were 10 years ago, and fishermen are forced to spend more time on the water. As the table shows, the costs of equipment have risen sharply. Fish biodiversity has been affected as well, as a result of over-fishing. Earlier, at least six species of fish were regularly caught. Now only three are found: omena, Nile perch and tilapia.

Cost of fishing equipment, Roo village ('000 Kenyan shillings)

	1990-94	1995-99	2000-01
Coarse net (legal)	7	16	35
Fine net (illegal)	2	7	12
Boat	15	18-20	30

Farmers are equally hard hit. They stopped growing cash crops a decade ago, when marketing parastatals were shut down as part of liberalization. Yields of food crops are

falling, for various reasons – drought, insect pests and the witchweed *Striga*. Livestock herds have become progressively smaller. Villagers estimate that the number of cows has dropped to one fourth the levels of the early 80s, partly because cash-starved owners are forced to sell their animals to buy food or pay school fees for their children.

Another factor is HIV/AIDS. It is ravaging the community – destroying lives, wiping out savings, and creating a generation of orphans. For several years the problem was not acknowledged, partly because the symptoms were attributed to *chira*, or witchcraft. Today most people are aware of the causes and the effects, as well as methods of prevention. But sexual behavior has not changed, and the death rate is increasing.

Looking at things differently. The livelihoods framework used in this study is a new approach to understanding poverty. Poverty alleviation is a complex issue, and looking at things differently could provide a better basis for more practical, effective interventions.

The challenges are formidable.

- Promoting adoption of new varieties and better crop management
- Strengthening extension services
- Strengthening private sector marketing channels for farmers to sell their crops
- Establishing fish storage facilities, credit and savings facilities to encourage fisherfolk to save and invest
- Encouraging simplicity and transparency in the bureaucracy

What livelihood options do these villagers have, and how do they make livelihood choices? What are the results – in terms of income, risk, nutrition, and sustainability? What institutions support or hamper their efforts? These studies are providing some of the answers. And as the issues become clearer, researchers and development investors can work together to help poor communities in Africa climb out of poverty. ♦

Participatory rural appraisal in the fishing village of Nyacahebe, Lake Victoria, Kenya.

Wonderful watershed welfare

Adarsha – the ideal watershed.

Efficient and sustainable use of natural resources is a must for economic development. In resource-poor countries it is especially important because agriculture dominates economics. Much of the cultivated areas of Asia and Africa are totally dependent on rainfall. If development strategies for these rainfed regions are undertaken appropriately, they can enhance farming, ensure food security and sustain the natural resource base with minimal environmental degradation – all at the same time.

This is where integrated watershed management comes in. The model, developed by ICRISAT and its NARS partners, involves both natural and human resources in a watershed area. It takes into account social, political and institutional factors to achieve specific socioeconomic and ecological objectives. The Innovative Farmer Participatory Integrated Watershed Management Model (IFPIWMM), despite its unwieldy name and frightening acronym, is the last word in the efficient use of natural resources on a sustainable basis for improving the livelihoods of poor farmers on rainfed land. It is the outcome of many years of research.

Income-generating options for youth.

The model applies, for the first time, a multidisciplinary, multi-institutional consortium approach. The consortium includes the MV Foundation (an NGO), the Central Research Institute for Dryland Agriculture and the National Remote Sensing Agency (national government agencies), the Drought Prone Area Program (a state organization), ICRISAT and, of course, the farmers themselves. The model was implemented at the Adarsha Watershed that surrounds the village of Kothapally.

The model functions with the active participation of the farmers, without which the constraints of the region and their causes cannot be identified. Once the problems were described by the farmers, they teamed up with scientists to suggest possible solutions with existing technologies. When necessary, new technologies were developed to overcome specific constraints.

Various technologies were employed.

- Low-cost soil and water conservation structures
- Environment-friendly integrated nutrient management options
- Environment- and farmer-friendly pest and disease management
- Crop diversification with legumes to avoid air and water (groundwater, streams and rivers) pollution
- On-farm income generation through innovative crops and cropping systems
- Off-season/off-farm income generation for landless laborers, women and youth

The application of this model in Kothapally yielded direct results.

- Improved groundwater levels (5-6 m)
- Improved green cover (from 129 ha in 1996 to 200 ha in 2000)
- Increased productivity (from 1998 to 2001 maize production increased from 1500 to 3300 kg/ha, and sorghum from 1070 to 2600 kg/ha)
- Improved incomes (total income increased to Rs 20,500/ha with profits up to Rs 14,600/ha)

One significant aspect of the project was a novel twist in human resource development. Farmers, NGOs, agricultural officials and researchers were trained in various integrated participatory management options. The farmers then turned the usual top-down approach to training on its head by assuming the role of trainers for the next groups of farmers. Women and youth groups were initiated specifically for income-generating activities like nuclear polyhedrosis virus (NPV) production, vermicomposting, seed production and storage. The model also sensitized policymakers to the sustainable use of natural resources and need to address these issues appropriately through research and development to improve the livelihoods of the rural poor.

Another project outcome was spillover from Adarsha to neighboring areas. Farmers from the nearby watersheds of Nawabpet and Adilabad districts keenly observed what was going on in Kothapally. Clearly, they liked what they saw because they adopted the technology. They also evinced interest in replicating various aspects of the Kothapally project, including vermicomposting, NPV production, *Gliricidia* plantations and wasteland development.

Vermicomposting – worming your way into money. (Photo: Richard Steckel)

One of the distinct advantages of the model is its flexibility. Technologies can be upscaled to similar agro-ecological environments for large-scale benefits. In fact, the successes emanating from the Adarsha Watershed experiment have been taken on board an impressive cross section of people – farmers, olicymakers, government organizations and NGOs. The Andhra Pradesh Rural Livelihoods Project wants to implement the model in three districts: Maboobnagar, Kurnool and Nalgonda. Moreover, the Sir Dorabji Tata Foundation is funding the implementation of the model, together with ICRISAT, in two districts in Madhya Pradesh and one in Rajasthan. ♦

The model has ensured water supply for the community. (Photo: Richard Steckel)

And now for something completely different

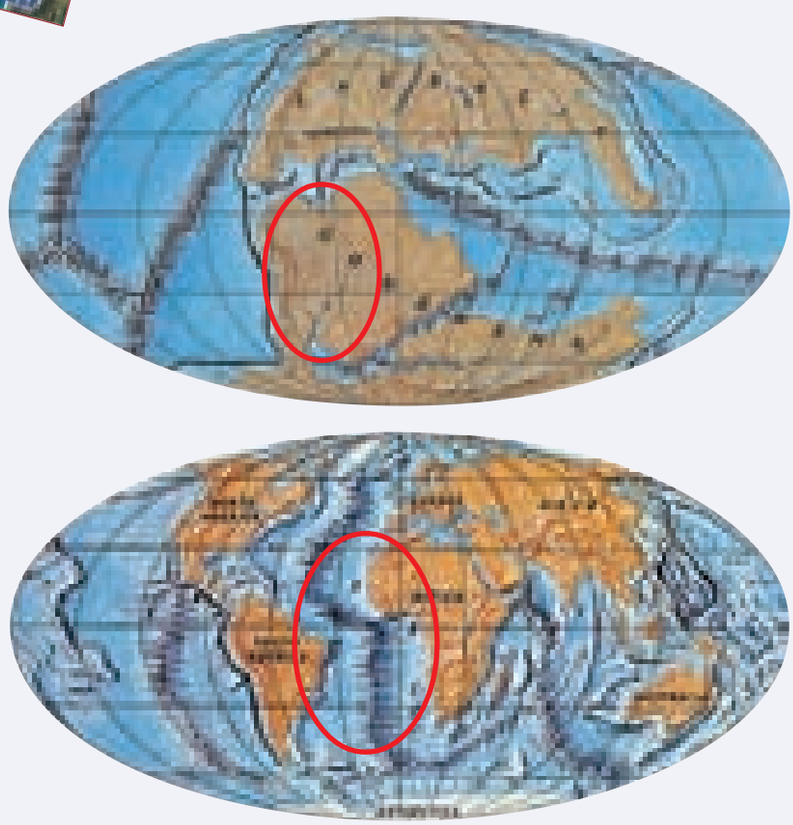
Nobody eats pearl millet in Brazil. Not even cattle. Fifteen years ago the crop was unknown here. Yet today over 2 million hectares are sown to pearl millet and the area is growing exponentially.

Like much of Brazil, the Cerrado is enormous. When soybean was introduced into its acid soils, a good crop was possible only with huge quantities of fertilizer. The solution? Sow pearl millet, which positively thrives in acid soils, and knock it down as mulch for the following cash crop. The inset shows an Embrapa plant material description of BRS 1501, a variety derived from ICRISAT germplasm. (Photo: Embrapa)

So why grow it? Because pearl millet is ideal for sustaining soybean production in Brazil's Cerrado, the vast upland region between the Atlantic and the Amazon. Why does pearl millet do well there? For the answer, look at the maps on this page. The soils of the Brazilan hump that 125 million years ago used to fit into West Africa are very similar to the soils of the Sahel, where pearl millet originated. The soils of both regions are easily eroded, highly leached and characterized by low fertility and toxic levels of aluminum. What's more, the Cerrado, like the Sahel, is plagued by prolonged droughts. The bottom line: most crops haven't got a chance of survival here.

Enter pearl millet. Nothing stands up to drought stress on poor soils better than this tough old trooper of a crop. It grows well where no other plants, not even weeds, can survive. Its roots will grow to more than two meters in pursuit of water and soil nutrients. So, because it originated on similar soils in West Africa about 40 million years ago, pearl millet should be expected to do well in Brazil – and it does!

What happens is this. First you sow your millet. When the crop is about half grown, you simply knock it down, chopping it into



These artist's renderings of the world 125 million years ago (top) and today (above) shows how Brazil and West Africa split apart. The similarity of soils in these two regions is therefore quite logical. Millets, which appeared about 40 million years ago in West Africa, only reached Brazil during the last century.

Source: National Geographic Atlas of the World.

Soybeans emerging from pearl millet mulch.

a soil-protecting mulch. Then you sow your soybeans – directly through the mulch. The dead millet protects the soil from erosion, smothers weeds, and holds slow-release nutrients for use by the soybeans. Next thing you know you have a robust soybean crop.

The introduction of pearl millet into Brazil has revolutionized no-till soybean production. Agronomic studies show that millet mulch increases soybean yields by about 15%. What's more, the mulch provides nitrogen and phosphorus to the soybean, reducing fertilizer costs.

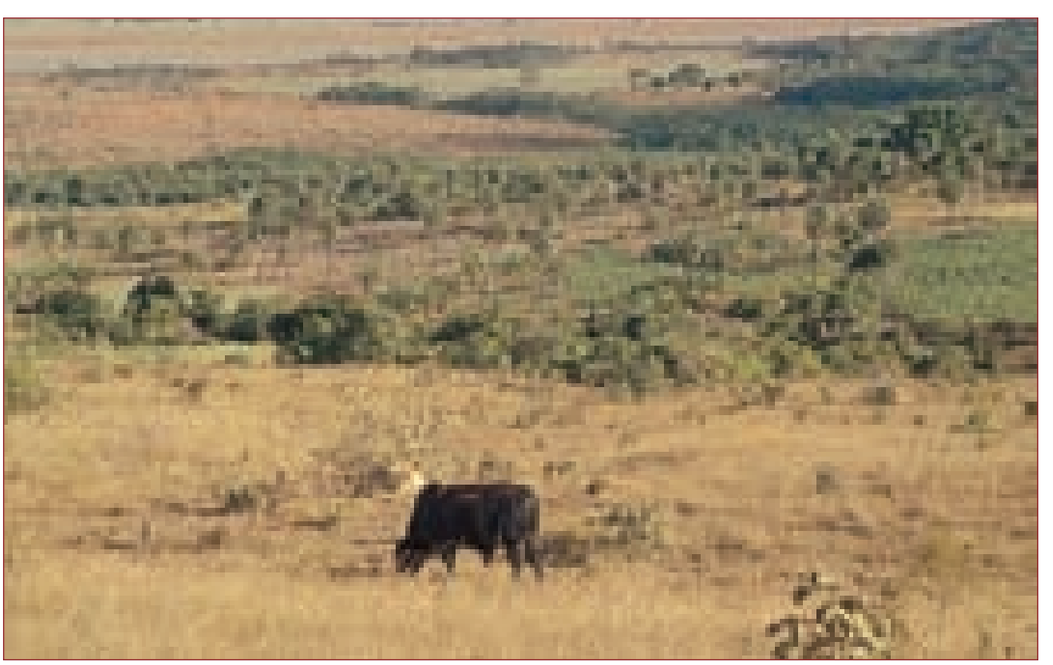
Says Dr CT Hash, ICRISAT pearl millet breeder, 'We have sent over 500 pearl millet materials to Brazil for testing. One improved population has been released by the Empresa Brasileira de Pesquisa Agropecuaria

Austeclinio Lopes de Farias Neto, a soybean agronomist, stands next to a month-old pearl millet crop at an Embrapa research station.

(Embrapa) for the no-till soybean production system.'

Dr Hash was involved with a collaborative project between the Japanese International Cooperation Agency (JICA) and Embrapa to improve productivity in the Cerrado. As part of the project, Japanese and Brazilian researchers have been trained at ICRISAT in pearl millet breeding.

If soybean, which is now grown on over 10 million hectares in Brazil's Cerrado, furnishing food and employment for thousands, can be considered king of cash crops, pearl millet is surely the power behind the throne. ♦



In Brazil, pearl millet (seen in the background) is used more to feed soybean than to feed cattle.

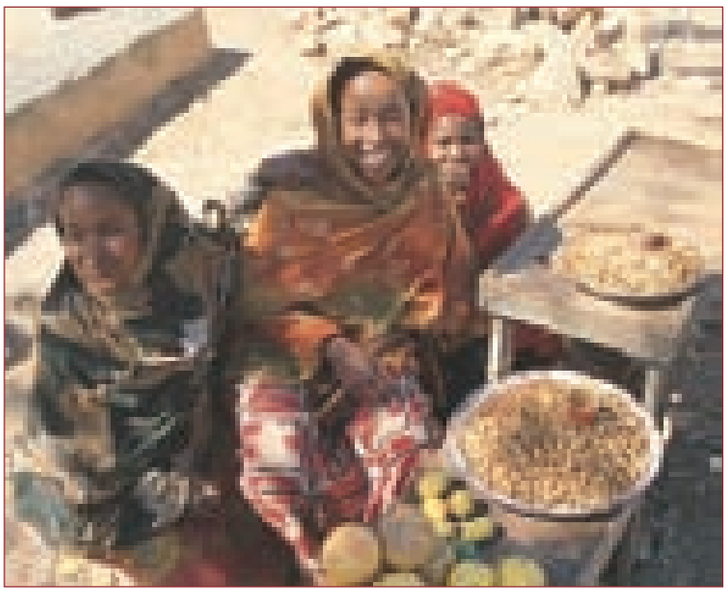
Partnerships unlimited

Life is never easy for Africa's smallholder farmers, even in normal years. And in times of crisis… But partnerships can conquer even the most formidable challenges. Consider the recent work in three countries, involving research institutes, NGOs, governments and local communities – specifically, ICRISAT, the UK's Overseas Development Institute (ODI), CARE International, Catholic Relief Services (CRS), the Government of Mozambique and small-scale seed producers and traders.

Surviving in Sudan. For the past 40 years, southern Sudan has been battered by war and conflict. As usual, the biggest victims have been smallholder farmers. Relief agencies have tried to stimulate agricultural rehabilitation by distributing seeds and tools. But a study by ICRISAT, ODI and CRS found that these well-intentioned efforts were less than useful. Despite their troubles, farmers have well-developed, resilient seed systems, and much of the relief seed is neither needed nor appreciated. Certainly there are times when farmers require seed – after being displaced because of war, for example – but short-term seed needs can nearly always be met locally.

Seed is available – what is lacking are modern varieties. For example, groundnut is an important crop, but the varieties farmers grow were introduced several decades ago, and are regularly hit by foliar diseases and rosette virus. Realizing that the farmers have had no opportunity

In Somalia, seed trading is traditionally the responsibility of women.



Modern varieties of groundnut are lacking in the horn of Africa.

to use new resistant varieties, CRS purchased seed of two modern groundnut varieties from ICRISAT and set up an extensive farmer-participatory testing program. ICRISAT helped develop trial protocols and CRS staff implemented the program in the field. Some farmers liked the new varieties, others preferred their existing ones. But even the traditionalists have retained the new seed from their harvest, and intend to re-plant this season. Local interest has been so strong that the program is expanding to include more farmers and a wider range of germplasm.

Subsisting in Somalia. Somalia is another crisis area, violent, unstable and desperately poor. But because CARE really *does* care, nothing has deterred them from working in the country. Through most of the 1990s CARE purchased local sorghum grain and distributed it free as seed to farmers. In 1998 an ODI-ICRISAT study (conducted at the request of the European Commission's Somalia Unit) took a closer look. The study concluded that Somali farmers, like those in Sudan, have strong seed systems. Seed is available even in times of shortage, sold by local women traders. But these traders are bypassed because NGOs distribute free seed every year. On ICRISAT's advice, CARE modified its program in two ways. They distributed seed of modern varieties, not traditional landraces. And instead of distributing seed for free, they marketed it through these traders. ICRISAT provided breeder seed, which CARE multiplied, and 10 tons were distributed through 30 traders. To insure traders against losses, CARE promised to re-purchase unsold stocks, but there was no need. All the seed was sold in less than three weeks, and when the project was evaluated a year later, grain produced from this seed had already found its way to the local market.

Moving ahead in Mozambique. Mozambique was devastated by floods in 2000. More than US$ 8 million was spent on distributing relief seed, but farmers benefited

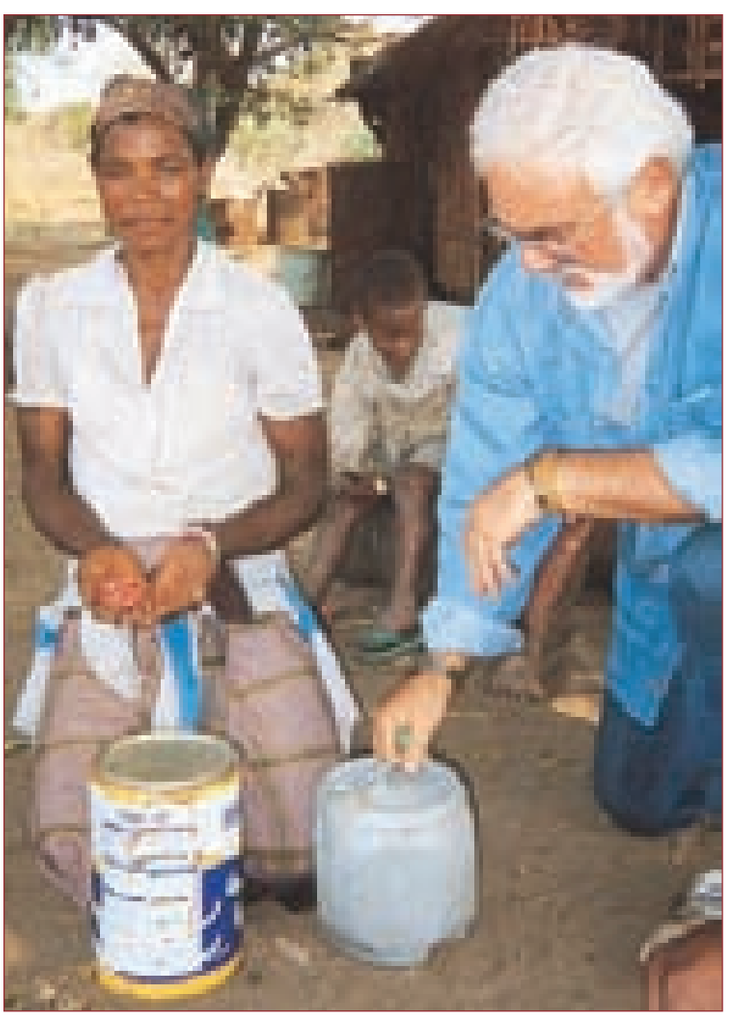
only marginally. Much of the seed was procured from commercial seed companies. Farmers had no say in the choice of varieties – some varieties were unfamiliar, others poorly adapted to local conditions. In 2001, following more flooding, FAO and the Government of Mozambique began planning further distribution. ICRISAT suggested that instead of the old system, farmers be allowed to procure seed themselves, locally.

But how to organize this? Enter another partner – CRS, the pioneer of seed fairs, where farmers are given not free seed but vouchers that can be exchanged for seed. Farmers can choose from a range of crops and varieties sold by other farmers, traders, and commercial seed companies. CRS provided training to two Mozambicans on how to plan and implement seed fairs. Less than one month later Mozambique conducted its first seed fairs, and now ICRISAT and the government are finalizing a seed fair training manual in Portuguese.

Clearly, partnerships can catalyze agricultural development even in difficult conditions. Field research by ODI and ICRISAT has provided valuable insights on how local seed systems work. CARE and CRS have planned and implemented successful interventions based on these insights. The Government of Mozambique backed up these efforts by contributing staff and facilities. These partnerships are continuing to sharpen our understanding of local seed systems, providing lessons to refine further interventions.

Seeds that reach the markets of Somalia and Sudan must be suited to local conditions.

Most important, rather than being treated as victims, farmers have become full-fledged partners in development. ♦



Short-term seed needs can nearly always be met locally. Left: Nigeria; right: Mozambique.

Chickpea the champion: charging ahead, changing lives

It's incredible. For uncounted generations, farmers who till some of the world's most productive soils have left land fallow for months after harvesting a single crop of rice.

A sight for sore eyes – a harvest during the dry season. As one farmer said, 'Chickpea is a drought-loving crop!'

Between cropping seasons, they just waited for the next rains. Stupid? Lazy? Far from it. Few farmers are smarter and none work harder. But there was simply nothing they could do. The soil, once drained of the water that nourished their rice, became as hard as rock, totally impenetrable. And that is why a total of 14 million hectares have been, for hundreds of years, left fallow in northwestern Bangladesh, southeastern Nepal and eastern India. A waste? Undeniably. An unsolvable problem? Fortunately, *no*.

One crop *can* be grown – as long as it is sown at the right time, and as long as the variety is carefully selected. That crop is *Cicer arietinum*, good old chickpea. The roots of this nutritious legume are so rugged that they can penetrate as deep as one meter into the hardpan alluvial soils. No other crop comes close.

In the east... In Bangladesh's Barind Tracts, a pilot study established that respectable yields of about one ton of chickpea per hectare can be produced during the postrainy season. That's not spectacular, but it's more than the average of the rest of Bangladesh. And it can be done without irrigation or inputs of any kind.

Growing chickpea means that farmers can *double* their incomes. Chickpea is highly valued and commands a respectable market price. In fact, prices are so good that many farmers are prepared to risk harvesting their rice a little earlier to ensure that they can get their chickpea seed into the soil before it hardens.

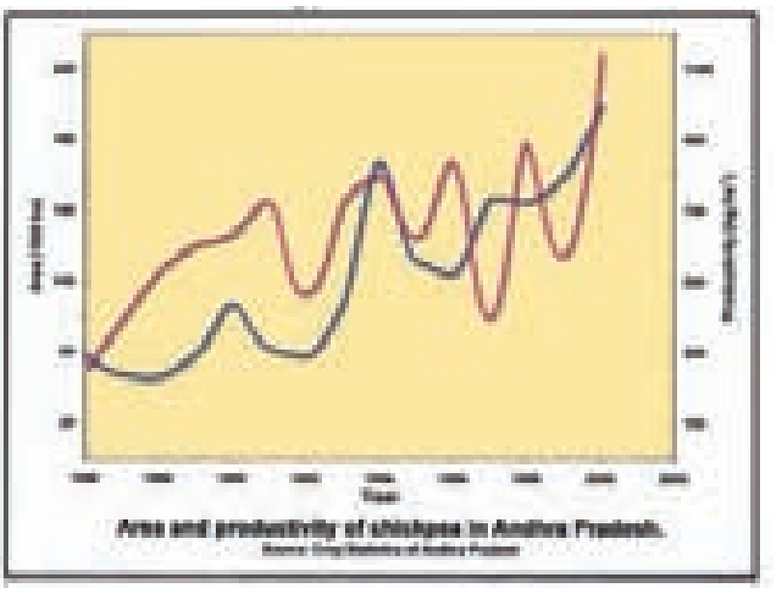
Up north... In Nepal, the situation is much the same. About 400,000 hectares of rice fallows are available in the Terai. Ironically, chickpea, which had been widely grown previously, was virtually wiped out by the 1990s by botrytis gray mold (BGM) and *Helicoverpa armigera*, the podborer. So destructive was this two-headed monster that by 1998 chickpea production was not even quantifiable. But new BGM-resistant varieties introduced to farmers' fields by ICRISAT scientists and their Nepalese partners brought the crop back with a vengeance. IPM technologies were equally effective. From a total of only 110 farmers applying IPM in 1999, no less than 7000 now practice these techniques.

Chickpea is a champion in the Barind. Nothing else can penetrate the hardpan soils of rice fallows (inset). Even when farmers have access to irrigation, as shown above, they often prefer to plant lucrative chickpea instead of another rice crop.

Down south... Chickpea originated in northern India, so it is no surprise to see it grown there. But farmers in the eastern and southern states are now cultivating the crop significantly for the first time.

In 1986 only 60,000 hectares were sown to chickpea in the southern state of Andhra Pradesh. By 2002 this figure had quintupled to 300,000. Even more impressive are the production figures: from less than 300 kg/ha in 1986 to more than 1000 kg/ha six years later. Putting these data together spells a *tenfold* increase in chickpea in the state.

Ketema Daba, a researcher at Debre Zeit, with a crop of Shasho *(ICCV 93512), a kabuli type chickpea popular with farmers.* Akaki, Worku *and* Mariye*–all* ICRISAT *derivations–are the preferred desi types.*



The significance of the adoption of chickpea in farmers' fields in Andhra Pradesh is important to understand – the crop is nontraditional there. In fact, southerners call it 'Bengal gram' because they're used to importing it from West Bengal and other northern states.

And way out west… Although ICRISAT's other pulse crop, pigeonpea, has for generations been an important legume in various African cropping systems, chickpea, for a variety of reasons, has not yet been widely adopted in that continent. Except in Ethiopia.

Salient facts:

- Over 50% of all chickpea grown in Africa is grown in Ethiopia.
- Ethiopian farmers' problems with cereal fallows lying idle are similar to those of South Asian farmers.
- In 2001, legumes (of which chickpea is one of the top three) were grown on 1.24 million ha in the country.
- Chickpea cultivation is steadily increasing: 170,000 ha in 1999; 190,000 ha in 2000; 212,000 ha in 2001.
- Ethiopia presently exports chickpea to Pakistan, India, Dubai and Afghanistan. Demand far outstrips supply.

Kenyan farmers hail the champ. Chickpea is winning support everywhere.

- The price of chickpea is about three times that of wheat and maize.
- A merchant at Debre Zeit, site of Ethiopia's most important research station, reported that chickpea is replacing coffee as a cash crop.

North, south, east, west… In soils that have lain fallow for centuries, a crop now grows where nothing grew before, and millions of farmers have a brighter future. Suffice it to say that chickpea is no longer a 'crop of the future'. It has come to stay.

♦

Pigeonpea comes of age in East Africa

Long-duration pigeonpea has proved the best bet for East African farmers seeking a legume intercrop. Because it rivals both maize and sorghum in height and matures just 3-4 weeks after the cereals, farmers can harvest a second crop after a convenient interval.

For years, we have talked about pigeonpea as an 'emerging' crop in East Africa. The news is that the crop is no longer *emerging*. It has *arrived*.

Pigeonpea can no longer be considered an exotic or novel crop in the region – it has been there for too long.

Participants of a pigeonpea workshop having lunch – not just any lunch, but a meal based entirely on pigeonpea and sorghum.

Generations of East Africans have been eating pigeonpeas from birth. In Kenya, it has become mandatory at Kikuyu wedding feasts, regardless of cost. In large areas of central and northern Tanzania, it is hard to find a farmer who does *not* cultivate it. In Malawi, it provides income for women and nutrition for children.

No doubt about it, pigeonpea research in Eastern Africa has come a long way. The crop is more important to farmers than ever before and its importance increases every year. The close rapport between the ICRISAT teams based at our Eastern African hub in Nairobi and their colleagues at our Southern African hub in Bulawayo, Zimbabwe, along with their NARS counterparts, and with NGOs and farmers, has been immensely successful.

For those with the fortitude (or calluses) to endure the bone-jarring drive from Arusha to Babati in northern Tanzania, what lies at the end of the road is well worth the effort. The farmers of Babati have enthusiastically embraced long-duration pigeonpea, which they intercrop with maize. The crops are sown in alternating rows at the same time. They harvest their maize about a month before the pigeonpea. The legume bumper crop is a tremendous boon for farmers, who use it for food as well as cash. The

ICRISAT's Said Silim (left) and Geoff Heinrich (right) examine a sorghum/pigeonpea intercrop with Dr GM Mitawa, Deputy Director of Tanzania's Department of Research and Development.

woody twigs are used as fuel and the residue as green manure. Pigeonpea is grown everywhere, virtually all of it of ICRISAT/NARS origin. ICEAP 40 and ICEAP 53 are the varieties of choice.

Although pigeonpea has been around Babati for 50 years, farmers were for a long time unable to cultivate it because of the crop's susceptibility to fusarium wilt. It was not until 1998, when ICRISAT's Said Silim and his NARS colleague Stephen Lyimo, an extension officer, took note of one particular farmer's field because it was totally devastated by wilt. Recognizing an opportunity to test resistant varieties, they introduced themselves to the farmer, Rose Frateru, and gave her seeds of ICEAP 40. In 1999 they returned with ICEAP 53. The results were impressive. Although she planted very little seed the first year, Ms Frateru harvested five 110-kg bags of pigeonpea. She sold four and kept one for sowing. The process snowballed, she started selling seed to farmers in other districts, and her importance in the community was so enhanced by her success with pigeonpea that she was elected Honourable Councillor, Babati District – no small thing for a farmer who just 3 years ago had nothing to show for her efforts!

Rose Frateru and her green gold – ICEAP 53.

Due south of Babati lies the capital town of Tanzania, Dodoma. Dodoma sits in the heart of Tanzania's sorghum belt. The farmers here know better than to risk their efforts with maize, which requires far more rainfall than can be expected. So they intercrop long-duration pigeonpea with sorghum instead of maize. The results are similar: two crops are now grown where once grew only one.

At this Field Day at Kiboko Research Station in Kenya, farmers came from miles around to make selections from the latest pigeonpea trials and to participate in discussions. The farmers' observations are crucial in tailoring future breeding work.

Of stalk and livestock

What goes in, must come out. Livestock scientists examine both.

The International Livestock Research Institute (ILRI) and ICRISAT have an important common interest. ILRI studies ruminant livestock, which contribute to human welfare by providing food, draft power and manure. ICRISAT studies crop residues, which are consumed by livestock as fodder. It's a marriage made in heaven – common ground for collaborative research.

Sorghum stover on the way to market.

A multidisciplinary research team of scientists funded by the Indian Council of Agricultural Research (ICAR), the UK's Department for International Development (DFID), the Australian Center for International Agricultural Research (ACIAR), ILRI and ICRISAT set out to identify genotypes of sorghum, pearl millet and groundnut that could be used to develop plants with greater biomass and nutritive value without sacrificing grain yield. Additionally, a new joint proposal was recently invited by BMZ of Germany aimed at enhancing the livelihoods of crop/livestock farmers through improved dual-purpose food/feed crops and better natural resource use in areas of acute rural poverty.

How do the scientists propose to investigate? Plant breeders generate thousands of entries every year to identify the best dual-purpose varieties. Animal nutritionists analyze stover quality through laboratory techniques. Because conventional laboratory analysis is inadequate for examining so many entries, ILRI introduced a shortcut called near infra red spectroscopy (NIRS). By so doing, they succeeded in establishing highly accurate equations for quick, inexpensive prediction of the optimal parameters of sorghum and millet stover, as well as

groundnut haulms. The application of NIRS has broadened the scope of cooperation between animal and plant scientists.

These laboratory techniques, however, are not enough. They must be validated through animal performance trials. Experiments with sheep devised by ILRI's Michael Blummel at ICRISAT-Patancheru meticulously measure both input and output of the animals. The ultimate aim is to identify stover that promotes high levels of animal performance and efficiently converts carbon and nitrogen into useful products such as milk and meat while reducing emission of these chemicals into the environment.

Comprehensive analysis of stover from ten millet varieties fed to sheep showed that the variety with the highest grain yield provided the best stover quality, promoting positive nitrogen balance and therefore live weight gain. This clearly shows the feasibility of breeding for dual-purpose millet varieties. Calculations of the relative efficiency of carbon and nitrogen in these ten varieties indicated similar differences.

Another DFID-funded project has shown that plant diseases have dramatic effects on the nutritive quantity and quality of sorghum stover and groundnut haulms.

For groundnut, appropriate integrated disease management could almost entirely prevent losses in quality and quantity.

Sorghum and millet stover can be stored throughout the long dry season.

Groundnut haulms are a favorite of ruminants.

For sorghum, variances caused by genotypes were significant for all field traits and for the two fodder quality traits. Fertility variances were observed for days to flower, sugar percentage, leaf dry weight, stem dry weight, head weight, grain weight, fodder weight and fiber percentage (which were significant); as well as for plant height, leaf number, senescent score, leaf/stem ratio, digestibility of stem and stem fiber percentage (which were insignificant).

Variances due to density were significant only for sugar percentage, leaf dry weight, stem dry weight, fodder weight, digestibility and leaf fiber.

The analysis included the following observations.

- Tall and late genotypes had better digestibility and less stem fiber percentage.
- As the leaf number increased, so did digestibility, while stem fiber decreased.
- High sugar percentage (high stay-green) in stems was positively correlated with high digestibility and low stem fiber percentage.
- Sugar content was found to be an ambiguous quality parameter for stover because stems (where sugar is concentrated) were rejected by sheep and cattle.
- Contrary to expectation, leaf/stem ratio exhibited a negative correlation with stem digestibility and a positive correlation with stem fiber percentage.
- As expected, stem dry weight and fodder weight were positively correlated with stem digestibility and negatively with stem fiber percentage. Head weight and grain weight showed the reverse trend.

High tech for an old problem

Drought is possibly the most complex and least understood of natural hazards. The effects of drought accumulate slowly and linger for years. It is estimated that 380 million people, 38% of the world's rural poor, live in the arid and semi-arid tropics (SAT). Of those who are vulnerable to drought, more than 90% are either smallholder farmers or landless laborers.

The Committee on Science and Technology for the United Nations Convention to Combat Desertification, in its fifth session last year, issued a note on strategies for communicating relevant information on combating the effects of drought. The committee noted the lack of suitable mechanisms for the dissemination of such information. It also indicated that communication facilitates the participation of local people and helps decisionmakers to deal with drought.

Farmers now have information at their fingertips.

Desertification and drought are the bane of farmers' livelihoods.

Information and communication technologies (ICTs) can play an important role in remote SAT regions. Contemporary ICTs can rapidly collect, analyze and disseminate data to assist farmers in responding to environmental threats. Experts can predict local climate changes by analyzing meteorological and hydrological data. Early warning systems can advise farmers on appropriate action.

What are the advantages of taking this upstream technology to the farmers? To begin with, village-level ICTs can reduce the time lag between research and adoption. Also, farmers can gain access to options for crop cultivation and livestock management. Information is essential for drought preparedness and management.

Because ICRISAT has been involved in agricultural research in the dry tropics for three decades, it is an ideal information provider on the problem of drought.

Rural women in Knowledge Society Project

Development researchers are concerned that the ICT approach may further marginalize rural women. However, pilot or experimental projects in Asia indicate that innovative processes for inclusion are available.

With the support of the Regional FAO for the Asia-Pacific, ICRISAT's Information Services Unit (ISU) is preparing a concept paper to identify new opportunities for rural women in the Asian semi-arid tropics. This is a part of the emerging process called the Knowledge Society Project. The ISU is organizing a study in Asia that analyzes such processes so that the new inclusive paradigms can be adapted.

Our hope is that we can offer insight and concepts derived from such comprehensive studies as a contribution to the preparatory processes for the World Summits on Information Society in Geneva (2003) and in Tunis (2005).

New partnership with the corporate sector: advanced database technologies for bioinformatics

Recent successes in sequencing plant genomes, notably that of rice, have generated large volumes of data. The storage and analysis of such vast data are major challenges in computing technology.

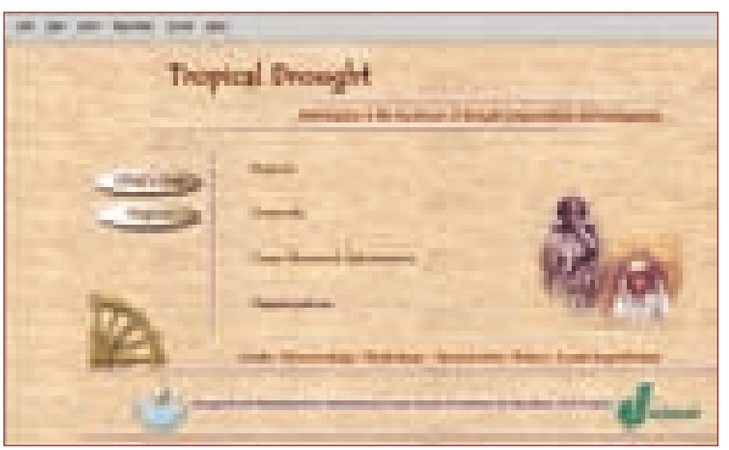
ICRISAT is in a position to combine excellence in applied genomics research with available talent in contemporary computing technology to establish a platform facility for bioinformatics specifically oriented toward crops research.

We envision its functioning as a research and training facility of international standing. ICRISAT and Sun Microsystems, one of the largest IT corporations in the world, are discussing the establishment of such a facility. An international design workshop, involving potential partners from the national research programs, advanced research institutes and the IT corporate sector, is scheduled for June 2002.

Our knowledge base provides a sharp focus around which a system can be developed with global coverage and an emphasis on sub-Saharan Africa and South Asia.

The ICRISAT-pioneered knowledge system is now deployed as a website (www.droughtweb.org) that serves as a portal for tropical drought management. It provides a database of global experts who can interact with each other as well with those who seek their advice. A collection of research papers on drought management – crops research, natural resource management, livestock, meteorology, socioeconomics, and so on – are available. The website also links to drought mitigation/management projects and networks that take up inputs from research. Another feature is an exclusive link to an annotated database on crops research information. A link to a regional information system will enable users to access forecasts of various regions so they can assess the chances of drought in the coming season.

An important consideration is the quality of website management. Because we realize that we need to be as sensitive as possible to the needs of users, we strive to maintain a user-friendly database. Whether the user is a national organization, an individual researcher, a policymaker, or an NGO – each deserves all we can give them so they can tackle the drought problem appropriately.



Droughtweb is an ICRISAT-pioneered knowledge system.

Connecting remote SAT regions.

The two phases in the development of this process are:

1. The design and launch of the portal with global data.
2. Country and sub-regional specific information. Communities of these regions can contribute ground level information (eg, soil and air temperature and water levels) and receive suggestions for remedial measures.

The combination of knowledge-sharing approaches, connectivity and interactive usage will ensure that the portal is able to deliver useful and timely information. The NGO-led movement for the establishment of rural telecenters, information kiosks and village information centers provides crucial support in this effort. ICRISAT has also developed a project to use UNICODE-compatible fonts/typefaces in various languages to ensure that information is disseminated in regional languages. India's Ministry of Agriculture has evinced keen interest in this effort. ♦

Publications during 2001

Articles, Books, Book Chapters, Conference Papers and Newsletters

Articles

Ajayi, O., Sharma, H.C., Tabo, R., Ratnadass, A., and **Doumbia, Y.O.** 2001. *Incidence and distribution of sorghum head bug,* Eurystylus oldi *(Heteroptera: Miridae) in West and Central Africa*. Insect Science and its Application. 21:103-111.

Ali, A.M., Hash, C.T., Ibrahim, A.E.S., and **Raj, A.G.B.** 2001. *Population diallel of elite medium and long duration pearl millet composites*: I. *populations and their* F_1 *crosses*. Crop Science. 41:705-711.

Bains, T.S., Sandhu, J.S., Brar, H.S., Verma, M.M., Jagdish Kumar, van Rheenen, H.A., Phul, P.S., Sarvjeet Singh, Gumber, R.K., Sandhu, T.S. and **Sidhu, P.S.** 2001. *L 551 – A new high yielding kabuli gram variety*. Journal of Research, Punjab Agricultural University. 38:143.

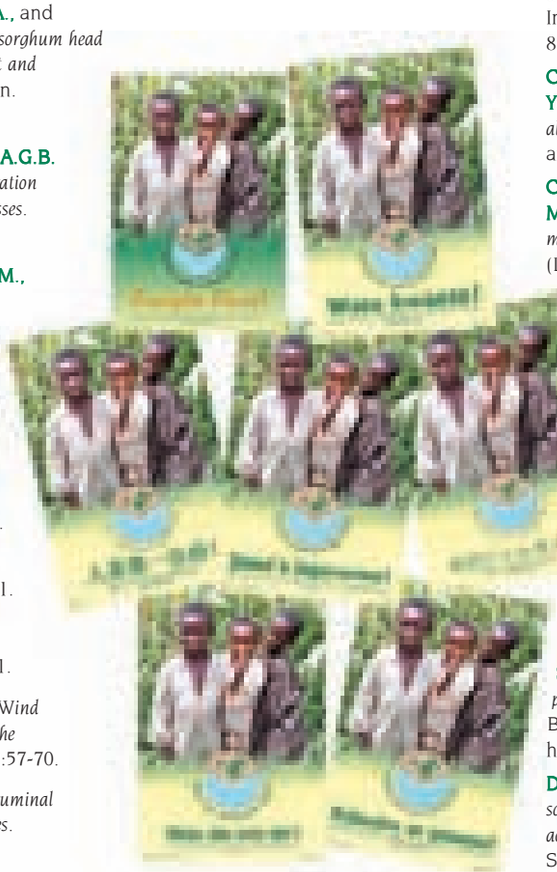
Beta, T., Obilana, A.B., and **Cork, H.** 2001. *Genetic diversity in properties of starch from Zimbabwean sorghum landraces*. Cereal Chemistry. 78:583-589.

Bidinger, F.R., Chandra, S., and **Raju, D.S.** 2001. *Genetic variation in grain filling in dwarf pearl millet* [Pennisetum glaucum (L.) R. Br.] *restorer lines*. Theoretical and Applied Genetics. 102:387-391.

Bielders, C.L., Alvey, S., and **Cronyn, N.** 2001. *Wind erosion: The perspective of grass roots communities in the Sahel*. Land Degradation and Development. 12:57-70.

Blummel, M., and **Lebzien, P.** 2001. *Predicting ruminal microbial efficiencies of dairy diets by in vitro techniques*. Livestock Production Science. 68:107-117.

Carberry, P.S., Ranganathan, R., Reddy, L.J., Chauhan, Y.S., and **Roberson, M.J.** 2001. *Predicting growth and development of pigeonpea: Flowering response to photoperiod*. Field Crops Research. 69:151-162.



Chaohang, Z., Saxena, K.B., Zhenghong, L., Xuxiao, Z., and **Shiying, Y.** 2001. *Pigeonpea diseases in China*. International Chickpea and Pigeonpea Newsletter. 8:39-41.

Chaohong, Z., Zhenghong, Li, Saxena, K.B., Jianyun, Z, Yong Gu, Shiying, Y., and **Xuxiao, Z.** 2001. *Traditional and alternative uses of pigeonpea in China*. International Chickpea and Pigeonpea Newsletter. 8:55-57.

Chhabra, A.K., Rai, K.N., Khairwal, I.S., Hash, C.T., and **Murthy, A.K.** 2001. *Influence of sterility-inducing cytoplasms on meiosis and pollen sterility in pearl millet* [Pennisetum glaucum (L.) R. Br.]. National Journal of Plant Improvement. 3:85-91.

Dahlberg, J.A., Bandyopadhyay, R., Roony, W.L., Odvody, G.N., and **Madera-Torres, P.** 2001. *Evaluation of sorghum germplasm used in US breeding programmes for sources of sugary disease resistance*. Plant Pathology. 50(6):681-689.

Devi, U.K., Padmavathy, J., Sharma, H.C., and **Seetharama, N.** 2001. *Laboratory evaluation of virulence of* Beauveria bassiana *isolates to the sorghum shoot borer* Chilo partellus *Swinhoe* (*Lepidoptera: Pyralide*) *and their characterization by* RAPD-PCR. World Journal of Microbiology and Biotechnology. 17:131-137.

Dodds, J.H., Ortiz, R., Crouch, J.H., Mahalakshmi, V., and **Sharma, K.K.** 2001. *Biotechnology, the gene revolution, and propriety technology in agriculture: A strategic note for the World Bank*. IP Strategy Today (Vol 2) http:// www.biodevelopments.org/ip/ipst2hr.pdf.

Duhan, A., Khetarpaul, N., and **Bishnoi S.** 2001. *Effect of soaking, germination and cooking on phytic acid and hydrochloric acid extractability of a pigeonpea cultivar*. Journal of Food Science and Technology, Mysore. 38:4, 374-378; 27 ref.

Dwivedi, S.L., Gurtu, S., Chandra S., Yuejin, W., and **Nigam, S.N.** 2001. *Assessment of genetic diversity among selected groundnut germplasm*. I: RAPD *analysis*. Plant Breeding. 120(4):345-349.

Elasha, E.A., Bidinger, F.R., and **Reddy, B.B.** 2001. *Intercepted radiation as a tool to document plant population effects on leaf area and dry matter in sorghum* (Sorghum bicolor). Indian Journal of Agricultural Sciences. 71:480-482.

Ferguson, M., and **Erskine, W.** 2001. *Lentils* (Lens L.). Plant Genetic Resources of Legumes in the Mediterranean. 39:125-133.

Gerard, B., Hiernaux, P., Muehlig Versen, B., and **Buerkert, A.** 2001. *Destructive and non destructive measurements of residual crop residue and phosphorus effects on growth and composition of herbaceous fallow species in the Sahel*. Plant and Soil. 228:265-273.

Girish, A.G., Singh, S.D., Chakrabarty, S.K., Rao, R.D.V.J.P., Surender, A., Varaprasad, K.S., and **Bramel, P.J.** 2001. *Seed microflora of five* ICRISAT *mandate crops*. Seed Science and Technology. 29(2):429-443.

Golombek, S.D., Adib Sultana, and **Johansen, C.** 2001. *Effect of separate pod and root zone temperatures on yield and seed composition of three Spanish cultivars of groundnut* (Arachis hypogaea *L*). Journal of the Science of Food and Agriculture. 81:1326-1333.

Grenier, C., Bramel Cox, P.J., and **Hamon, P.** 2001. *Core collection of sorghum*. I. *Stratification based on eco-geographical data*. Crop Science. 41:234-240.

Grenier, C., Hamon, P., and **Bramel Cox, P.J.** 2001. *Core collection of sorghum*. II. *Comparison of three random sampling strategies*. Crop Science. 41:241-246.

Gurunadha Rao, V.V.S., Dhar, R.L., and **Subrahmanyam K.** 2001. *Assessment of contaminant migration in groundwater from an industrial development area, Medak district, Andhra Pradesh, India*. Water, Air, and Soil Pollution. 128:369-389.

Hall, A.J., Sivamohan, M.V.K., Clark, N., Taylor, S., and **Bockett, G.** 2001. *Why research partnerships really matter: Innovation theory, institutional arrangements and applications for developing new technology for the poor*. World Development. 29:783-797.

Hall, A.J., and **Devereau, A.D.** 2001. *Low cost storage of fresh sweet potatoes in Uganda: lessons from participatory and on station approaches to technology choice and adaptive testing*. Outlook on Agriculture. 29(4):275-282.

Harris, D., Kumar Rao, J.V.D.K., and **Jagdish Kumar.** 2001. *On-farm seed priming*. Agricultural Research and Extension Network Newsletter. 44:3.

Haussmann, B.I.G., Hess, D.E, Omanya, G.O., Reddy, B.V.S., Welz, H.G. and **Geiger, H.H.** 2001. *Major and minor genes for stimulation of* Striga hermonthica *seed germination in sorghum, and interaction with different* Striga *populations*. Crop Science. 41:1507-1512.

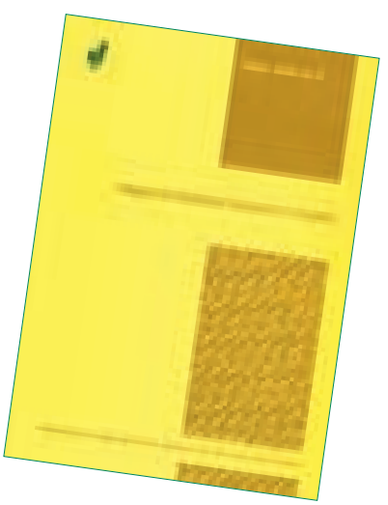
Haussmann, B.I.G., Hess, D.E., Reddy, B.V.S., Mukuru, S.Z., Kayentao, M., Welz, H.G. and **Geiger, H.H.** 2001. *Quantitative-genetic parameters of sorghum growth under* Striga *infestation in Mali and Kenya*. Plant Breeding 120:49-56.

Hill, J., Wagoire, W.W., Ortiz, R., and **Stolen, O.** 2001. *Analysis of a combined* F_1/F_2 *diallel cross in wheat*. Theoretical and Applied Genetics. 102:1076-1081.

Jagdish Kumar., Pannu, R.K., and **Rao, B.V.** 2001. *Development of a short duration chickpea for the subtropics*. International Chickpea and Pigeonpea Newsletter. 8:7-8.

Jagdish Kumar, Satyanarayana, A., Rao, B.V., Wanjari, K.B., and **Pandey, R.L.** 2001. *A superior kabuli gram variety for peninsular and central India*. Indian Farming 50:16-17.

Jagdish Kumar., Vijayalakshmi, N.V.S., and **Rao, T.N.** 2001. *Inheritance of crude fibre content in chickpea*. Legume Research. 24:24-27.



Jagdish Kumar., and **Abbo, S.** 2001. *Genetics of flowering time in chickpea and its bearing on productivity in semi-arid environments*. Advances in Agronomy. 72:107-138.

Jagdish Kumar., and **Rao, B.V.** 2001. *Registration of* ICCV 96029, *a super early and double podded chickpea germplasm*. Crop Science. 41(2):605-606.

Jagdish Kumar, and **Shahal, A.** 2001. *Genetics of flowering time in chickpea and its bearing on productivity in the semi-arid environments*. Advances in Agronomy 72:7-38.

Krishna Kishore, G., Pande, S., and **Narayana Rao, J.** 2001. *Control of late leaf spot of groundnut* (Arachis hypogaea) *by extracts from non-host plant species*. Plant Pathology Journal. 17:264-270.

Kumar, P.L., Fenton, B., Duncan, G.H., Jones, A.T., Sreenivasulu, and **P. Reddy, D.V.R.** 2001. *Assessment of variation in* Aceria cajani *using analysis of r*DNA ITS *regions and scanning electron microscopy: Implications for the variability observed in host plant resistance to pigeonpea sterility mosaic disease*. Annals of Applied Biology. 139:61-73.

Kumar, P.L., Jones, A.T., Duncan, G., Roberts, I.M., and **Reddy, D.V.R.** 2001. *Characterization of a novel mite-transmitted virus associated with pigeonpea sterility mosaic disease*. Phytopathology. 91:51.

Kumar, P.L., Jones, A.T., Sreenivasulu, P., Fenton, B., and **Reddy, D.V.R.** 2001. *Characterization of a virus from pigeonpea with affinities to species in the genus* Aureusvirus, *family* Tombusviridae. Plant Disease. 85:208-215.

Kumar, R.V., and **Saxena, K.B.** 2001. *First report of wind pollination in pigeonpea*. Indian Journal of Genetics and Plant Breeding. 61:279-280.

Kumar Rao, J.V.D.K., Johansen, C., Chauhan, Y.S., Jain, V.K., Jain, K.C., and **Talwar, H.S.** 2001. *An analysis of yield variation among long duration pigeonpea genotypes in relation to season, irrigation and plant population*. Journal of Agricultural Science. 136:291-299.

Lenné, J.M. 2001. *Pests and poverty: The continuing need for crop protection research*. Outlook on Agriculture. 29(4):235-250.

Mahalakshmi, V., and **Ortiz, R.** 2001. *Plant genomics and agriculture: From model organisms to crops, the role of data mining for gene discovery*. Electronic Journal of Biotechnolgy. http://ejb.ucv.cl/content/vol4/issue3/full/5/index.html.

Mallikarjuna, N. 2001. *Prospects of using* Cicer canariense *for chickpea improvement*. International Chickpea and Pigeonpea Newsletter. 8:23-24.

Mallikarjuna, N., and **Shanower, T.G.** 2001. Tanaostigmodes cajaninae *promotes pod growth in pigeonpea*. International Chickpea and Pigeonpea Newsletter. 8:42-43.

Marley, P.S., Bandyopadhyay, R., Tabo, R., and **Ajayi, O.** 2001. *Availability of sorghum germplasm with multiple resistance to anthracnose and grey leaf spot in Nigeria*. Tropical Science. 41:44-49.

Marley, P.S., Kehinde, A.E., Daniel, A.A., Isa, O., and **Akintayo, I.** 2001. *Reactions of sorghum genotypes to anthracnose and grey leaf spot diseases under Sudan and Sahel Savanna field conditions of Nigeria*. Sustainable Agriculture. 18:105-116.

Marley, P.S., Thakur, R.P., and **Ajayi O.** 2001. *Variation among foliar isolates of* Colletotrichum sublineolum *of sorghum in Nigeria*. Field Crops Research. 69:133-142.

Mathews, C., Jones, R.B., and **Saxena, K.B.** 2001. *Maize and pigeonpea intercropping systems in Mpumalanga, South Africa*. International Chickpea and Pigeonpea Newsletter. 8:52-53.

Mathews, C., Minja, E., Saxena, K.B., Beck, B.D.A., and **Fowler, R.** 2001. *Insect pests of pigeonpea in South Africa: Survey Report*. International Chickpea and Pigeonpea Newsletter. 8:48-50.

Mathews, C., Silim, S.N., and **Saxena, K.B.** 2001. *Evaluation of short, medium, and long duration* ICRISAT *pigeonpea cultivars in Mpumalanga, South Africa*. International Chickpea and Pigeonpea Newsletter. 8:37-38.

Minja, E.M. 2001. SP-IPM *pilot site project activities facilitate farmers in south-western Kenya to experiment with* ICRISAT *rosette resistant groundnut*. International Arachis Newsletter. 21:7-8.

Mohapatra, S. 2001. *Safeguarding the future of food security in the Semi-Arid Tropics: The role of* ICRISAT*'s genetic resource collection*. Agriculture + Rural Development. 8:23-25.

Mohapatra, S., and **Ortiz, R.** 2001. *Safeguarding the future of food security in the semi arid tropics: The role of* ICRISAT*'s genetic resource collection*. Entwicklung und landlicher Raum (Germany). 35:29-31.

Monyo, E. S. 2001. *Small-scale farmers venture into commercial seed production*. SMINET News 3:19-20.

Nam, N.H., Chauhan, Y.S., and **Johansen, C.** 2001. *Effect of timing of drought stress on growth and grain yield of extra short duration pigeonpea lines*. Journal of Agricultural Science. 136:179-189.

Navi, S.S., and **Singh, S.D.** 2001. *Genetic resistance to pearl millet downy mildew*. III. *Resistance in photoperiod sensitive accessions*. Journal of Mycology and Plant Pathology 31:165-170.

Nigam, S.N., Upadhyaya, H.D., Chandra, S., Nageswara Rao, R.C., Wright, G.C., and **Reddy, A.G.S.** 2001. *Gene effects for specific leaf area and harvest index in three crosses of groundnut* (Arachis hypogaea). Annals of Applied Biology. 139:301-306.

Ntare, B.R., and **Olorunju, P.E.** 2001. *Variation in yield and resistance to groundnut rosette disease in early and medium maturing groundnut genotypes in Nigeria*. African Crop Science Journal. 9:451-461.

Ntare, B.R., Williams, J.H., and **Dougbedji, F.** 2001. *Evaluation of groundnut genotypes for heat tolerance under field condtions in a Sahelian environment using a simple physiological model for yield*. Journal of Agricultural Science. 136(1):81-88.

Olorunju, P.E., Ntare, B.R., Pande, S., and **Reddy, S.V.** 2001. *Additional sources of resistance to groundnut rosette diseases in groundnut germplasm and breeding lines*. Annals of Applied Biology 139:259-268.

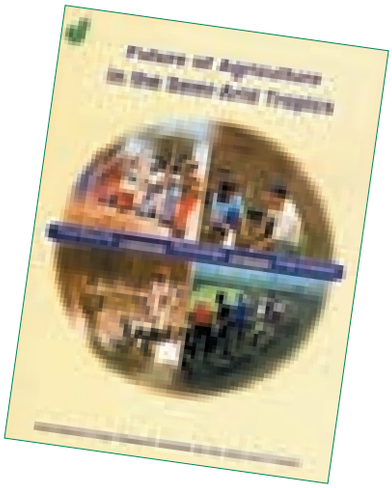
Ortiz, R., Madsen, S., Wagoire, W.W., Hill, J., Chandra, S., and **Stolen, O.** 2001. *Additive main effect and multiplicative interaction model for a diallel cross analysis*. Theoretical and Applied Genetics. 102:1103-1106.

Ortiz, R., Wagoire, W.W., Hill, J., Chandra, S., Madsen, S., and **Stolen, O.** 2001. *Heritability of and correlations among genotype by environment stability statistics for grain yield in bread wheat*. Theoretical and Applied Genetics. 103:469-474.

Pande, S., Narayan Rao, J., Upadhyaya, H.D., and **Lenné, J.M.** 2001. *Farmers' participatory integrated management of foliar diseases of groundnut*. International Journal of Pest Management 47:121-126.

Pande, S., and **Narayan Rao, J.** 2001. *Resistance of wild arachis species to late leaf spot and rust in greenhouse trials*. Plant Disease. 85(8):851-855.

Perera, A.M., Pooni, H.S., and **Saxena, K.B.** 2001. *Components of genetic variation in short duration pigeonpea crosses under waterlogged conditions*. Journal of Genetics and Breeding. 55:21-38.



Prasada Rao, R.D.V.J., Girish, A.G., Chakravarty, S.K., Sarath Babu, B., Varaprasad, K.S., Singh, S.D., Reddy, L.J., and **Bramel, P.J.** 2001. *Detection of* Pseudomonas solanacearum *in wild* Arachis spp *imported from Brazil*. Indian Journal of Plant Protection. 28:51-56.

Rai, K.N., Anand Kumar, K., Andrews, D.J., and **Rao, A.S.** 2001. *Commercial viability of alternative cytoplasmic-nuclear male-sterility systems in pearl millet*. Euphytica. 121:107-114.

Rai, K.N., Chandra, S., and **Rao, A.S.** 2001. *Potential advantages of male sterile* F_1 *hybrids for use as seed parents of three way hybrids in pearl millet*. Field Crops Research. 68(3):173-181.

Ranganathan, R., Chauhan, Y.S., Flower, D.J., Robertson, M.J., Sanetra, C., and **Silim, S.N.** 2001. *Predicting growth and development of pigeonpea: Leaf area development*. Field Crops Research. 69:163-172.

Ratnadass, A., Traore, T., Sylla, M., and **Diarra, D.** 2001. *Improved techniques for mass rearing* Busseola fusca (*Lepidoptera: Noctuidae*) *on an artificial diet*. African Entomology (South Africa). 9:167-175.

Rattunde, H.F.W., Zerbini, E., Chandra, S., and **Flower, D.J.** 2001. *Stover quality of dual purpose sorghum: Genetic and environmental sources of variation*. Field Crops Research. 71:1-8.

Reddy, A.S., Reddy, L.J., Mallikarjuna, N., Abdurahman, M.D., Reddy, Y.V., Bramel, P.J., and **Reddy, D.V.R.** 2001. *Identification of resistance to peanut bud necrosis virus* (PBNV) *in wild arachis germplasm*. Annals of Applied Biology. 137:135-139.

Reddy, L.J., Kameswara Rao, N.K., and **Saxena, K.B.** 2001. *Production and characterization of hybrids between* Cajanus cajan *x* C reticulatus *var.* grandifolius. Euphytica. 121:93-98.

Reddy, L.J., Nigam, S.N., Rao, R.C.N., and **Reddy, N.S.** 2001. *Registration of* ICGV 87354 *peanut germplasm with drought tolerance and rust resistance*. Crop Science. 41:274-275.

Reddy, L.J., Nigam, S.N., Subrahmanyam, P., Ismael, F.M. Govinden, N., and **van der Merve, P.J.A.** 2001. *Registration of groundnut cultivar Sylvia* (ICGV 93207). International Arachis Newsletter 21:20-22.

Reddy, S.V., Mayi, D.K., Reddy, M.U., Thirumala Devi, K., and **Reddy, D.V.R.** 2001. *Aflatoxins* B 1 *in different grades of chillies* (Capsicum annum *L.*) *in India as determined by indirect competitive ELISA*. Food Additives and Contaminants. 18(6):553-558.

Robertson, M.J., Carberry, P.S., Chauhan, Y.S., Ranganathan, R., and **O' Leary, G.J.** 2001. *Predicting growth and development of pigeonpea: A simulation model*. Field Crops Research. 71:195-210.

Robertson, M.J., Silim, S., Chauhan, Y.S., and **Ranganathan, R.** 2001. *Predicting growth and development of pigeonpea: Biomass accumulation and partitioning*. Field Crops Research. 70:89-100.

Roy, A., Das, K., Jagdish Kumar and **Rao, B.V.** 2001. *Dilagi: A new chickpea variety for Hills Zone of Assam, India*. International Chickpea and Pigeonpea Newsletter. 8:6-7.

Rupa, T.R., Tripathi, A.K., Rao, C.S., Singh, K.N., and **Rao, A.S.** 2001. *Distribution and plant availability of soil copper fractions following copper sulphate and farmyard manure applications*. Journal of Plant Nutrition and Soil Science. 164:451-456.

Sastry, J.G. , Sivaramakrishnan, S., Rao, V.P., Thakur, R.P., Singru, R.S., Gupta, V.S., and **Ranjekar, P.K.** 2001. *Genetic basis of host-specificity in* Sclerospora graminicola, *the pearl millet downy mildew pathogen*. Indian Journal of Phytopathology. 54:323-328.

Saxena, K.B., and **Kumar, R.V.** 2001. *Genetics of a new male sterility locus in pigeonpea* (Cajanus cajan [*L.*] Millsp.). Journal of Heredity. 92:437-439.

Saxena, K.B., and **Raina, R.** 2001. *Pattern analysis for genotype by environment effects for seed weight and grain yield in pigeonpea hybrids*. Indian Journal of Genetics and Plant Breeding. 61:226-231.

Saxena, K.B., Reddy, L.J., Yang Shiying, Zong XuXiao, Li Zhenghong, and **Zhou Chaohong.** 2001. *Wild relatives of pigeonpea in China*. International Chickpea and Pigeonpea Newsletter. 8:32-34.

Seetharama, N., Rani, T.S., and **Harshavardhan, D.** 2001. *Will the poor farmer benefit from the agricultural biotechnology revolution?* Journal of Plant Biology. 28:139-146.

Serraj, R., Vadez V., and **Sinclair, T.R.** 2001. *Feedback regulation of symbiotic* N_2 *fixation under drought stress*. Agronomie. 21:621-626.

Serraj, R., Vasquez Diaz, H., Hernandez, G., and **Drevon, J.J.** 2001. *Genotypic difference in the short term response of nitrogenase activity* (C_2H_2 *reduction*) *to salinity and oxygen in the common bean*. Agronomie. 21:645-651.

Sharma, H.C. 2001. *Cytoplasmic male-sterility and source of pollen influence the expression of resistance to sorghum midge,* Stenodiplosis sorghicola. Euphytica. 122:391-395.

Sharma, H.C. 2001. *Host-plant resistance to sorghum midge,* Stenodiplosis sorghicola (*Coquillett*): *A sustainable approach for integrated pest management and environment conservation*. Journal of Ecophysiology and Occupational Health. 1:1-34.

Sharma, H.C., and **Franzmann, B.A.** 2001. *Biology of legume pod borer,* Maruca vitrata (*Fabricius*) *and its damage to pigeonpea and adzuki bean*. Insect Science and its Application 20:99-108.

Sharma, H.C., and **Franzmann, B.A.** 2001. *Host plant preference and oviposition responses of the sorghum midge,* Stenodiplosis sorghicola (*Coquillett*) (*Dipt., Cecidomyiidae*) *towards wild relatives of sorghum*. Journal of Applied Entomology Zeitschrift Fur Angewandte Entomologie. 125:109-114.

Sharma, H.C., and **Sullivan, D.** 2001. *Screening for plant resistance to oriental armyworm,* Mythimna separata (*Lepidoptera*: *Noctuidae*) *in pearl millet, Pennisetum glaucum*. Journal of Agricultural and Urban Entomology. 17:125-134.

Sharma, H.C., Sharma, K.K., Seetharama, N., and **Ortiz, R.** 2001. *Genetic transformation of crop plants: Risks and opportunities for the rural poor*. Current Science. 80:1495-1508.

Sharma, S.B., Kaushal, K.K., Singh, M., Pande, S., Pokharel, R., and **Upreti, R.P.** 2001. *Description of a new species* Cactodera johanseni (*Nematoda*: *Heteroderidae*) *from Nepal*. International Journal of Nematology. 11:39-42.

Sharma, S.B., Pande, S., Saha, M., Kaushal, K.K., Lal, M., Singh, M., Khajan Singh, Pokharel, R., and **Upreti, R.P.** 2001. *Plant parasitic nematodes associated with rice and wheat based cropping systems in Nepal*. International Journal of Nematology. 11:35-38.

Shiv Kumar, van Rheenen, H.A., and **Onkar Singh.** 2001. *Genetic analysis of seed growth rate and progress towards flowering in chickpea* (Cicer arietinum *L.*). Indian Journal of Genetics and Plant Breeding. 61:45-49.

Shiying, Y., Wen, P., Xixiao, Z., Zhenghong, L., Chaohong, Z., Saxena, K.B., and **Hanchao, L.** 2001. *Pigeonpea: A potential fodder crop for Guangxi Province of China*. International Chickpea and Pigeonpea Newsletter. 8:54-55.

Shiying, Y., Xuxiao, Z., Zhenghong, L., Chaohang, Z., Saxena, K.B., Wen P., and **Hanchao, L.** 2001. *Performance of* ICRISAT *pigeonpeas in China*. International Chickpea and Pigeonpea Newsletter. 8:30-32.

Silim, S.N., and **Omanga, P.A.** 2001. *The response of short duration pigeonpea lines to variation in temperature under field conditions in Kenya*. Field Crops Research. 72:97-108.

Singh, S.D., and **Navi, S.S.** 2001. *An in vitro screening technique for the identification of grain mould resistance in sorghum*. Indian Phytopathology. 54:35-39.

Sivaramakrishnan, S., and **Seetharama, N.** 2001. *Identification and isolation of disease resistance genes in crop plants*. Journal of Plant Biology 28:25-38.

Solanki, Y.P.S., Khairwal, I.S., and **Bidinger, F.R.** 2001. *Panicle surface area as a selection criterion for grain yield in pearl millet* (Pennisetum glaucum). Indian Journal of Agricultural Sciences. 71:450-454.

Subrahmanyam, P. 2001. *New hosts of the parasitic flowering plant,* Alectra vogelii, *in Malawi*. Plant Disease. 85:442.

Subrahmanyam, P., Naidu, R.A., Reddy, L.J., Kumar, P.L., and **Ferguson, M.E.** 2001. *Resistance to groundnut rosette disease in wild arachis species*. Annals of Applied Biology. 139:45-50.

Talwar, Harvinder; Karim, Abdul; Fukamachi, H., Tsukaguchi, T., Komori, S., and **Hidaka, T.** 2001. *Photosynthetic response to high temperature under different levels of irradiance in mango* (Mangifera indica *L.*). Japanese Journal of Tropical Agriculture. 45:77-83.

Thakur, R.P., Rai, K.N., Rao, V.P., and **Rao, A.S.** 2001. *Genetic resistance of pearl millet male sterile lines to diverse Indian pathotypes of* Sclerospora graminicola. Plant Disease. 85:621-626.

Thirumala Devi, K., Mayo, M.A., Reddy, G., Emmanuel, K.E., Larondelle, Y., and **Reddy, D.V.R.** 2001. *Occurrence of ochratoxin A in black pepper, coriander, ginger and turmeric in India*. Food Additives and Contaminants. 18:830-835.

Thirumala Devi, K., Miller, J.S., Reddy, G., Reddy, D.V.R., and **Mayo, M.A.** 2001. *Phage displayed peptides that mimic aflatoxin B1 in serological reactivity*. Journal of Applied Microbiology. 90:330-336.

Tripp, R., and **Rohrbach, D.D.** 2001. *Policies for African seed enterprise development*. Food Policy. 26:146-161.

Umeh, V.C., Youm, O., and **Waliyar F.** 2001. *Soil pests of groundnut in sub-Saharan Africa: A review*. Insect Science and its Application. 21:23-32.

Upadhyaya, H.D., Bramel, P.J., and **Singh, S.** 2001. *Development of chickpea core subset using geographic distribution and quantitative traits*. Crop Science. 41:206-210.

Upadhyaya, H.D., Nigam, S.N., Mehan, V.K., Reddy, A.G.S., and **Yellaiah, N.** 2001. *Registration of* Aspergillus flavus *seed infection resistant peanut germplasm* ICGV 91278, ICGV 91283, *and* ICGV 91284. Crop Science. 41:599-600.

Upadhyaya, H.D., Nigam, S.N., Pande, S., Reddy, A.G.S., and **Yellaiah, N.** 2001. *Registration of early maturing, moderately resistant to rust peanut germplasm* ICGV 94361. Crop Science. 41:598-599.

Upadhyaya, H.D., Nigam, S.N., Reddy, A.G.S., and **Yellaiah, N.** 2001. *Registration of early maturing fresh seed dormant peanut germplasm* ICGV 93470. Crop Science. 41:597-598.

Upadhyaya, H.D., Nigam, S.N., and **Sube Singh.** 2001. *Evaluation of groundnut core collection to identify sources of tolerance to low temperature at germination*. Indian Journal of Plant Genetic Resources. 14:165-167.

Upadhyaya, H.D., and **Ortiz, R.** 2001. A *mini core subset for capturing diversity and promoting utilization of chickpea genetic resources in crop improvement*. Theoretical and Applied Genetics. 102:1292-1298.

Van der Merwe, P.J.A., Subrahmanyam, P., Hildebrand, G.L., Reddy, L.J., Nigam, S.N., Chiyembekeza, A.J., Busolo-Bulafu, C.M., and **Kapewa, T.** 2001. *Registration of groundnut cultivar* ICGV-SM 90704 *with resistance to groundnut rosette*. International Arachis Newsletter. 21:19-20.

Van der Merwe, P.J.A., Subrahmanyam, P., Kimmins, F.M., and **Willekens, J.** 2001. *Mechanisms of resistance to groundnut rosette*. International Arachis Newsletter. 21:43-46.

van Oosterom, E.J., Carberry, P.S., Hargreaves, J.N.G., and **O' Leary, G.J.** 2001. *Simulating growth, development, and yield of tillering pearl millet*. II. *Simulation of canopy development*. Field Crops Research. 72:67-91.

van Oosterom, E.J., Carberry, P.S., and **O' Leary, G.J.** 2001. *Simulating growth, development, and yield of tillering pearl millet*. I. *Leaf area profiles on main shoots and tillers*. Field Crops Research. 72:51-66.

Vijaya Kumar, R., and **Saxena, K.B.** 2001. *First report of wind pollination in pigeonpea*. Indian Journal of Genetics and Plant Breeding. 61:279-280.

Vijayalakshmi, N.V.S., Jagdish Kumar, and **Rao, T.N.** 2001. *Inheritance of protein content in chickpea*. Legume Research. 24:28-31.

Wood, D., and **Lenné, J.M.** 2001. *Nature's fields*: A *neglected model for increasing food production*. Outlook on Agriculture. 30:161-170.

Xuxiao, Z., Shiying, Y., Zhenghong, L., Chaohong, Z., and **Saxena, K.B.** 2001. *Pigeonpea germplasm in China*. International Chickpea and Pigeonpea Newsletter. 8:28-30.

Yadav, O.P., Weltzien, R.E., and **Mathur, B.K.** 2001. *Yield and yield stability of diverse genotypes of pearl millet* (Pennisetum glaucum (*L.*) *R. Br.*). Indian Journal of Genetics and Plant Breeding. 61:318-321.

Youm, O., Yacouba, M., and **Kumar, K.A.** 2001. *An improved infestation technique using eggs of the millet head miner*, Heliocheilus albipunctella (*Lepidoptera*: *Noctuidae*) *in millet resistance screening*. International Journal of Pest Management. 47:289-292.

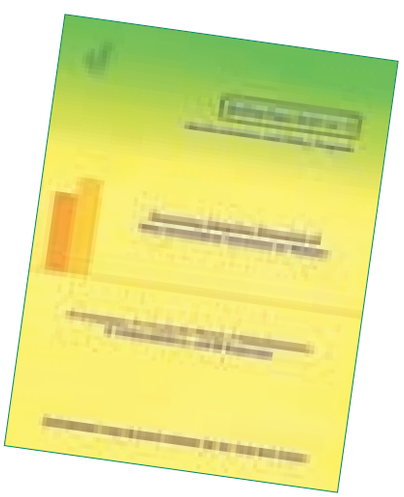
Zhenghong, L., Saxena, K.B., Chaohong, Z., Jianyun, Z., Young, G., Xuxiao, Z., and **Shiying, Y.** 2001. *Pigeonpea*: *An excellent host for Lac production*. International Chickpea and Pigeonpea Newsletter. 8:58-60.

Zhou Chaohang, Saxena, K.B., Zhenghong, L., Xuxiao, Z., and **Shiying, Y.** 2001. *Pigeonpea diseases in China*. International Chickpea and Pigeonpea Newsletter. 8:39-41.

Books

Akintayo, I., and **Sedgo, J. (eds.).** 2001. *Towards sustainable sorghum production, utilization, and commercialization in West and Central Africa*. Proceedings of a technical workshop of the West and Central Africa Sorghum Research Network, 19-22 Apr 1999, Lome, Togo. Bamako, Mali: West and Central Africa Sorghum Research Network (WCASRN/ROCARS). 306 pp.

Ananda Vadivelu, G., Wani, S.P., Bhole, L.M., Pathak, P., and **Pande, A.B.** 2001. *An empirical analysis of the relationship between land size, ownership, and soybean productivity – new evidence from the semi-arid tropical region in Madhya Pradesh, India*. (In En.) Natural Resource Management Program Report no. 4. Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics, and Manila, Philippines: Asian Development Bank. 50 pp.



Awadhwal, N.K., Gowda, C.L.L., Chauhan, Y.S., Pande, S., Flower, D.J., Haware, M.P., Rego, T.J., Saxena, N.P. Shanower, T.G., and **Johansen, C.** 2001. *Establishment of legumes following rice – A review*. Natural Resource Management Program Report no. 2. Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics. 49 pp.

Bantilan, M.C.S., Parthasarathy Roa, P., and **Padmaja, R.** (eds.). 2001. *Future of agriculture in the semi-arid tropics*. Proceedings of an international symposium on Future of agriculture in semi-arid tropics, 14 Nov 2000, ICRISAT, Patancheru, India. Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics. 93 pp.

Chauhan, Y.S., Bantilan, F.T., Padmaja, R. Ahmed, I., Moinuddin, M., Matiur Rahman, M., Haqqani, A.M., Nijamudeen, M.S. and **Johansen, C.** 2001. *Spatial and temporal distribution of soil water availability in the Indo-Gangetic plains of India, Bangldesh, Pakistan, and in Sri Lanka*. Natural Resources Management Program Report no. 3. Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics. 80 pp.

Dahiya, S.S., Chauhan, Y.S., Srivasthava, S.K., Sekhon, H.S., Waldia, R.S., Gowda, C.L.L. and **Johansen, C.** 2001. *Growing extra-short duration pigeonpea in rotation with wheat in the Indo-Gangetic Plain*. Natural Resources Management Program Report no. 1. Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics. 44 pp.

Deb, U.K., and **Bantilan, M.C.S.** 2001. *Spillover impacts of agricultural research*: A *review of studies*. Working Paper Series no. 8. Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics. 32 pp.

Freeman, H.A.. 2001. *Comparison of farmer-participatory research methodologies*: *Case studies in Malawi and Zimbabwe*. (In En.) Working Paper Series no. 10. Nairobi, PO Box 39063, Kenya: International Crops Research Institute for the Semi-Arid Tropics. 28 pp.

Freeman, H.A., van der Merwe, P.J.A., Subrahmaniyam, P., Chiyembekeza, A.J., and **Kaguoungo, W.** 2001. *Assessing adoption potential of new groundnut varieties in Malawi*. (In En.) Working Paper Series no. 11. P.O. Box 39063, Nairobi, Kenya: International Crops Research Institute for the Semi-Arid Tropics. 16 pp.

Freeman, H.A., Nigam, S.N., Kelley, T.G., Ntare, B.R., Subrahmanyam, P., et **Boughton, D.** 2001. *L'economie mondiale, de l'arachide: faits, tendances et perspectives*. (In Fr.). Patancheru 502 324, Andhra Pradesh, Inde: Institut International de recherche sur les cultures des zones tropicales semi-arides. 52 pp.

Gowda, C.L.L., Ramakrishna, A., Rupela, O.P., and **Wani, S.P. (eds.).** 2001. *Legumes in rice-based cropping systems in Tropical Asia: Constraints and opportunities*. (In En.) Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics. 146 pp.

Hall, A.J., Clark, N.G., Taylor, S., and **Rasheed Sulaiman, V.** 2001. *Institutional learning through technical projects: Horticulture technology R&D systems in India*. ODI Agricultural Research and Extension Network Paper No. 111. London, UK: Overseas Development Institute. 12 pp.

Hall, A.J., Yoganand, B., Sulaiman, V.R., and **Clark, N.G. (eds.).** 2001. *Sharing perspectives on public private sector*

interaction. Proceedings of a workshop, 10 Apr 2001, ICRISAT, Patancheru, India. Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics. 44 pp.

ICRISAT (International Crops Research Institute for the Semi-Arid Tropics). 2001. *Genetic resources and enhancement program: Highlights* 2000. (In En.) Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics. 52 pp.

ICRISAT (International Crops Research Institute for the Semi-Arid Tropics). 2001. *Grey to green*: ICRISAT *Annual Report* 2001. (In En., Fr.). Patancheru 502 324, Andhra Pradesh, India. International Crops Research Institute for the Semi-Arid Tropics. 52 pp.

ICRISAT (International Crops Research Institute for the Semi-Arid Tropics). 2001. *People first!*: ICRISAT *medium-term plan* 2002-2004. (In En.) Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics. Var. pages.

ICRISAT (International Crops Research Institute for the Semi-Arid Tropics). 2001. *Policy of the International Crops Research Institute for the Semi-Arid Tropics* (ICRISAT) *on intellectual property rights and code of conduct for interaction with private sector*. (In En.) Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics. 32 pp.

ICRISAT (International Crops Research Institute for the Semi-Arid Tropics), and **Asian Development Bank.** 2001. *Training program in development and management of integrated watersheds*. (In En.) Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics, and Manila, Philippines: Asian Development Bank. 40 pp.

Joshi, P.K., Parthasarathy Rao, P., Gowda, C.L.L., Jones, R.B., Silim, S.N., Saxena, K.B., and **Jagdish Kumar.** 2001. *The world chickpea and pigeonpea economies: Facts, trends and outlook*. Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics. 68 pp.

Longley, C., Jones, R., Ahmed, M.H., and **Audi, P.** 2001. *Supporting local seed systems in southern Somalia: A developmental approach to agricultural rehabilitation in emergency situations*. AgREN Network Paper no 115, ODI. 20 pp.

Mgonja, M.A., Chivinge, O.A., and **Monyo, E.S.,** (eds.). 2001. *Striga research in southern Africa and strategies for regionalized control options*. Proceedings of the SADC striga working group workshop, 22-23 May 2000, Dar-es-Salaam, Tanzania. Patancheru 502 324, Andhra Pradesh, India: International Crop Research Institute for Semi-Arid Tropics. 112 pp.

Pande, S., Johansen, C., Stevenson, P.C., and **Grzywacz, D.** (eds.). 2001. *On farm* IPM *of chickpea in Nepal*. Proceedings of the international workshop on planning and implementation of on-farm chickpea in Nepal, 6-7 Sep 2000, Kathmandu, Nepal. Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics; and Chatham, Kent ME4 4TB, UK: Natural Resources Institute. 132 pp.

Pandey, S.P., Pande, S., Johansen, C., and **Virmani, S.M.** 2001. *Rice-wheat cropping systems of Nepal*. Rice-wheat Consortium Paper Series 12. New Delhi 110 012, India: Rice-Wheat Consortium for the Indo-Gangetic Plains, and Patancheru 502 324, Andhra Pradesh, India: International Crops Reseach Institute for the Semi-Arid Tropics. 24 pp.

Piara Singh, Vijaya, D., Chinh, N.T., Aroon Pongkanjana, Prasad, K.S., Srinivas, K. and **Wani, S.P.** 2001. *Potential productivity and yield gap of selected crops in the rainfed regions of*

India, Thailand, and Vietnam. Natural Resource Management Program Report no. 5. Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics. 52 pp.

Rohrbach, D.D., and **Kiriwaggulu, J.A.B.** 2001. *Commercialization prospects for sorghum and pearl millet in Tanzania*. Working Paper Series no. 7. Bulawayo, Zimbabwe: International Crops Research Institute for the Semi-Arid Tropics. 27 pp.

Ryan, J.G., and **Spencer, D.C., (eds.).** 2001. *Future challenges and opportunities for agricultural* R&D *in the semi arid tropics*. Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics. 79 pp.

Shiyani, R.L., Joshi, P.K., and **Bantilan, M.C.S.** 2001. *Impact of chickpea research in Gujarat*. (in En., Summaries in En., Fr.). Impact Series no. 9. Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics. 40 pp.

Silim, S.N., Mergeai, G., and **Kimani, P.M. (eds.).** 2001. *Status and potential of pigeonpea in eastern and southern Africa*. Proceedings of a regional workshop, 12-15 Sep 2000, Nairobi, Kenya. Gembloux, Belgium: Gembloux Agricultural University, and Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics. 232 pp.

Subbarao, G.V., Kumar Rao, J.V.D.K., Kumar, J., Johansen, C., Deb, U.K., Ahmed, I., Krishna Rao, M.V., Venkataratnam, L., Hebbar, K.R., Sai, M.V.S.R., and **Harris, D.** (eds.). 2001. *Spatial distribution and quantification of rice fallows in South Asia: potential for legumes*. Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics. 315 pp.

Twomlow, S.J., and **Ncube, B. (eds.).** 2001. *Improving soil management options for women farmers in Malawi and Zimbabwe*. (In En.) Proceedings of a collaborators' workshop on the DFID-supported project, Will women farmers invest in improving their soil fertility management? Participatory experimentation in a risky environment, 13-15 Sep 2000, ICRISAT-Bulawayo, Zimbabwe. Bulawayo, Zimbabwe: International Crops Research Institute for the Semi-Arid Tropics. 150 pp.

Waller, J.M., Lenné, J.M., and **Waller, K.M.** (eds). 2001. *The plant patholgists pocketbook*, 3rd edition. CABI Publishing, Wallingford, UK. 516 pp.

Wani, S.P., and **Rego, T.J. (eds.).** 2001. *Improving management of natural resources for sustainable rainfed agriculture*. (In En.) Proceedings of the traveling workshop-cum-field visit to benchmark watersheds, 27 Aug - 12 Sep 2000. Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics. 88 pp.

Book Chapters

Bantilan, M.C.S., Deb, U.K., and **Nigam, S.N.** 2001. *Impacts of genetic improvement in groundnut*. Chapter 14 *in* Crop variety improvement of sorghum and its effect on productivity; the impact of international agricultural research. (Evenson, R., and Gollin, D., eds.). Wallingford, UK: CAB International. 21 pp.

Bantilan, M.C.S., and **Deb, U.K.** 2001. *Impacts of genetic improvement in pearl millet*. Chapter 10 *in* Crop variety improvement of sorghum and its effect on productivity; the impact of international agricultural research. (Evenson, R., and Gollin, D., eds.). Wallingford, UK: CAB International. 42 pp.

Deb, U.K., and **Bantilan, M.C.S.** 2001. *Impacts of genetic improvement in sorghum*. Chapter 9 *in* Crop variety

improvement of sorghum and its effect on productivity; the impact of international agricultural research (Evenson, R., and Gollin, D., eds.). Wallingford, UK: CAB International.

Sharma, H.C. 2001. *Cotton bollworm/legume pod borer,* Helicoverpa armigera (*Hübner*) (*Noctuidae: Lepidoptera*): *Biology and management*. Chapter *in* Crop protection compendium. Wallingford, Oxon OX10 8DE, UK: CAB International. 72 pp.

Sharma, H.C. 2001. *Sorghum shoot fly,* Atherigona soccata: *Biology and management*. Chapter *in* Crop protection compendium. Wallingford, Oxon OX10 8DE, UK: CAB International. 28 pp.

Conference Papers

Audi, P., Jones, R.B., and **Freeman, H.A.** 2001. *Farmer participation in evaluation of improved pigeonpea varieties in Eastern Kenya*. Pages 118-126 *in* Status and potential of pigeonpea in eastern and southern Africa. Proceedings of a regional workshop, 12-15 Sep 2000. Nairobi, Kenya (Silim, S.N., Mergeai, G., and Kimani, P.M., eds.). Gembloux, Belgium: Gembloux Agricultural University, and Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics.

Blummel, M., Grings, E.E., Moss, A.R., and **Givens, D.I.** 2001. A *mechanistic approach to the estimation of intake by ruminants by methane excretion and in vitro fermentation characteristics*. Pages 475-479 *in* Proceedings of Western Society of Animal Science (Vol. 52), Bozeman, U.S.A.: Montana State University.

Blummel, M., Sudekum, K.H., and **Grings, E.E.** 2001. *Predicting the efficiency of ruminal microbial production of silage based diets*. Page 31 *in* Proceedings of the Society of Nutritional Physiology (Vol. 10), Frankfurt am Main, Germany.

Freeman, H.A., and **Jones, R.B.** 2001. *Sub sector analysis as a tool for improving commercialization and market access for pigeonpea producers*. Pages 185-189 *in* Status and potential of pigeonpea in eastern and southern Africa. Proceedings of a regional workshop, 12-15 Sep 2000, Nairobi, Kenya (Silim, S.N., Mergeai, G., and Kimani, P.M. eds.). Gembloux, Belgium: Gembloux Agricultural University, and Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics.

Girish, A.G., and **Singh, S.D.** 2001. *Occurrence of perfect stages of* Drechslera avenae (EDIAM), *Acremonium species and* Oidium monilioides (*Nees*) *Link on seed*. Presented at University Grant Commission-sponsored national seminar on Recent advances in mycology, plant pathology and biotechnology, 6-7 Apr 2001, Post Graduate Department of Botany, Padmashri Vikhe Patil College, Pravaranagar, Loni, Maharashtra. 29 pp.

Grings, E.E., Short, E.R., Blummel, M., MacNeil, M.D., and **Bellows, R.A.,** 2001. *Prepartum supplementation with fat or protein for grazing cows in three seasons of calving*. Pages 501-505 *in* Proceedings Western Society of Animal Science (Vol. 52), Bozeman, U.S.A.: Montana State University.

Hall, A.J. 2001. *Public-private sector interaction: A framework*. Pages 7-10 *in* Proceedings of a workshop on sharing perspectives on public-private sector interaction, 10 Apr 2001, ICRISAT, Patancheru, India (Hall, A.J., Yoganand, B., Rasheed Sulaiman, V., and Clark, N.G., eds.). New Delhi, India: National Center for Agricultural Economics and Policy Research, and Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics.

Hall, A.J., Rasheed Sulaiman, V., Clark, N.G., and **Yoganand, B.** 2001. *Shared perspectives: A synthesis of obstacles and opportunities*. Pages 35-40 *in* Proceedings of a workshop on sharing perspectives on public-private sector interaction, 10 Apr 2001, ICRISAT, Patancheru, India (Hall, A.J., Yoganand, B., Rasheed Sulaiman, V., and Clark, N.G., eds.). New Delhi, India: National Center for Agricultural Economics and Policy Research, and Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics.

Hall, A.J., Rasheed Sulaiman, V., Clark, N.G., and **Yoganand, B.** 2001. *The policy significance of new patterns of interaction in agricultural research: An introduction*. Pages 1-3 *in* Proceedings of a workshop on sharing perspectives on public-private sector interaction, 10 Apr 2001, ICRISAT, Patancheru, India (Hall, A.J., Yoganand, B., Rasheed Sulaiman, V., and Clark, N.G., eds.). New Delhi, India: National Center for Agricultural Economics and Policy Research, and Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics.

Hall, A.J., Rasheed Sulaiman, V., Clark, N.G., Sivamohan, M.V.K., and **Yoganand, B.** 2001. *Public-private sector interaction in Indian agricultural system: An innovation systems perspective on institutional reform*. Page 15 *in* Agricultural research policy in an era of privatization; experiences from developing world (Byerlee, D., and Echeverria, R.G., eds.). Wallingford, UK: CAB International.

Hash, C.T., Abdu Rahman, M.D., Bhasker Raj, A.G., Zerbini, E., and **Spangenberg, G.** 2001. *Molecular markers for improving nutritional quality of crop residues for ruminants*. Pages 203-217 *in* Molecular breeding of forage crops, Proceedings of the 2nd International Symposium, Molecular Breeding of Forage Crops, Lorne and Hamilton, 19-24 Nov, 2000, Victoria, Australia. Dordrecht, Netherlands: Kluwer Academic Publishers.

Haussmann, B.I.G., and **Hess, D.E.** 2001. *Striga control: mechanisms and strategies for promoting sustainable sorghum production in Africa with special emphasis on host plant resistance*. Pages 101-119 *in* Towards sustainable sorghum production, utilization, and commercialization in West and Central Africa: proceedings of a technical workshop of the West and Central Africa Sorghum Research Network, 19-22 Apr 1999, Lomé, Togo (Akintayo, I., and Sedgo, J., eds.). WCASRN/ICRISAT: International Crops Research Institute for the Semi-Arid Tropics.

Haussmann, B.I.G., Hess, D.E., Omanya, G.O., Reddy, B.V.S., Seetharama, N., Mukuru, S.Z., Kayentao, M., Welz, H.G., and **Geiger, H.H.** 2001. *Towards marker-assisted selection for Striga resistance in sorghum*. Pages 212-215 *in* Proceedings of the 7th International Parasitic Weed Symposium, 5-8 Jun 2001, Nantes, France.

Hess, D.E., Bandyopadhyay, R., and **Sissoko, I.** 2001. *Reactions of sorghum genotypes to leaf, panicle and grain anthracnose* (Colletotrichum graminicola) *under field conditions in Mali*. Pages 163-177 *in* Towards sustainable sorghum production, utilization, and commercialization in West and Central Africa: Proceedings of a technical workshop of the West and Central Africa Sorghum Research Network, 19-22 Apr 1999, Lomé, Togo (Akintayo, I., and Sedgo, J., eds.). WCASRN/ICRISAT: International Crops Research Institute for the Semi-Arid Tropics.

Jagdish Kumar, and **Dua, R.P.** 2001. *Breeding for resistance to abiotic stresses in chickpea*. [Abstract] Pages 15-16 *in* proceedings of National Symposium on Pulses for Sustainable Agriculture and Nutritional

Security, 17-19 Apr 2001, Indian Council of Agricultural Research, New Delhi, India.

Jones, R.B., Audi, P., and **Silim, S.N.** 2001. *Seed delivery systems status, constraints, and potential in eastern and southern Africa*. Pages 138-147 *in* Status and potential of pigeonpea in eastern and southern Africa. Proceedings of a regional workshop, Nairobi, Kenya, 12-15 Sep 2000 (Silim, S.N., Mergeai, G. and Kimani, P.M. eds.). Gembloux, Belgium: Gembloux Agricultural University, and Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics.

Jones, R.B., Freeman, H.A., and **Silim, S.N.** 2001. *Pigeonpea technology exchange strategies, experiences, and lessons learnt in eastern and southern Africa*. Pages 111-117 *in* Status and potential of pigeonpea in eastern and southern Africa. Proceedings of a regional workshop, 12-15 Sep 2000, Nairobi, Kenya (Silim, S.N., Mergeai, G. and Kimani, P.M. eds.). Gembloux, Belgium: Gembloux Agricultural University, and Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics.

Kimani, P.M., Mergeai, G., Silim, S.N., Baudoin, J.P., Rubaihayo, P.R., and **Janssens, M.** 2001. *New regional initiatives in pigeonpea improvement*. Pages 33-35 *in* Status and potential of pigeonpea in eastern and southern Africa. Proceedings of a regional workshop, 12-15 Sep 2000, Nairobi, Kenya (Silim, S.N., Mergeai, G. and Kimani, P.M. eds.). Gembloux, Belgium: Gembloux Agricultural University, and Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics.

Lenné, J.M., and **Wood, D.** 2001. *How much biodiversity is needed for effective pest management in agroecosystems*? Proceedings of the Australasian Plant Pathology Society Conference, Sep 2001, Cairns, Australia. 7 pp.

Long, T.D., and **Ramakrishna, A.** 2001. Sustaining agricultural productivity in the rainfed sloping lands of northern Vietnam. Pages 262-271 *in* Research approaches and biology achievements in the late 20th Century: proceedings of international workshop on biology, 2-5 Jul 2001, Hanoi, Vietnam (Long, Q.L., Quy,V., Nhuong, L.V., and Ba, N. eds.). Hanoi, Vietnam: Institute of Ecology and Biological Resources.

Mallikarjuna, N., and **Saxena, K.B.** 2001. *Alleviating some biotic constraints in pigeonpea through biotechnological approaches*. Page 145 *in* proceedings of National symposium on pulses for sustainable agriculture and nutritional security, 17-19 Apr 2001, Indian Council of Agricultural Research, New Delhi, India.

Mathews, C., and **Nigam, S.N.** 2001. *Evaluation of foliar diseases resistant* ICRISAT *groundnut varieties in Mpumalanga* 1997-99. Pages 133-134 *in* Programmes and extended abstracts: Proceedings on the Joint Congress (SASCP, SAWSS, and SSSSA, eds.), 16-18 Jan 2001, University of Pretoria, South Africa.

Mathews, C., and **Nigam, S.N.** 2001. *Evaluation of* ICRISAT *short-duration and drought tolerant groundnut varieties in Mpumalanga* 1997-99. Pages 131-132 *in* Programmes and extended abstracts: Proceedings of the Joint Congress (SASCP, SAWSS, and SSSSA, eds.), 16-18 Jan 2001, University of Pretoria, South Africa.

Mergeai, G., Silim, S.N., and **Baudoin, J.P.** 2001. *Improved management practices to increase productivity of traditional cereal/pigeonpea intercropping systems in Eastern Africa*. Pages 73-83 *in* Status and potential of pigeonpea in eastern and southern Africa. Proceedings of a regional workshop, 12-15 Sep 2000, Nairobi, Kenya (Silim, S.N., Mergeai, G. and Kimani, P.M. eds.). Gembloux, Belgium: Gembloux Agricultural University, and Patancheru 502 324, Andhra Pradesh, India:International Crops Research Institute for the Semi-Arid Tropics.

Mgonja, M.A., Chivinge, O.A., and **Monyo, E.S. (eds.)** 2001. *Striga research in southern Africa and strategies for regionalized control options*. Proceedings of the SADC Striga working group workshop, 22-23 May 2000, Dar-es-Salaam, Tanzania, International Crop Research Institute for Semi-Arid Tropics/SADC ICRISAT SMIP. 112 pp.

Minja, E.M. 2001. *Insect pests of pigeonpea in southern and eastern Africa: What do we know and What should we do*? Seminario sobre Estrategias de Proteccao e Producao das Principais Culturas no Norte de Mocambique, Zambezia, Morrumbala, 13-15 de Junho 2001, Universidade Eduardo Mondlane (UEM) em colaboracao com a Instituto Nacional de Investigacao Agronomica (INIA), a Agrimo e a Visao Mundial (AGRIMO). Workshop proceedings released jointly by UEM, INIA and AGRIMO in a CD.

Minja, E.M. 2001. *Yield losses due to field pests and integrated pest management strategies for pigeonpea – a synthesis*. Pages 48-54 *in* Status and potential of pigeonpea in eastern and southern Africa. Proceedings of a regional workshop, 12-15 Sep 2000, Nairobi, Kenya (Silim, S.N., Mergeai, G. and Kimani, P.M. eds.). Gembloux, Belgium: Gembloux Agricultural University, and Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics.

Monyo, E.S., and **Mgonja, M.A.** 2001. *Striga control strategies – a brief review*. Pages 92-96 *in* proceedings of the SADC Striga Working Group Workshop, 22-23 May 2000, Dar-es-Salaam, Tanzania. P.O. Box 776, Bulawayo, Zimbabwe: SADC/ICRISAT Sorghum and Millet Improvement Program, International Crops Research Institute for the Semi-Arid Tropics, Bulawayo.

Navi, S.S., and **Bandyopadhyay, R.** 2001. *Biocontrol of fungal plant pathogens*. Pages 354-365 *in* Plant Pathologist's Pocketbook (Waller, J.M., Lenné, J.M., and Waller, S.J., eds.). Kew, Surrey, U.K.: Commonwealth Agricultural Bureau International.

Ndjeunga, J., and **Nelson, C.H.** 2001. *Prospects for a pearl millet and sorghum food processing industry in West Africa semi-arid tropics*. Pages 178-184 *in* Towards sustainable sorghum production, utilization, and commercialization in West and Central Africa. Proceedings of a technical workshop of the West and Central Africa Sorghum Research Network, 19-22 Apr 1999, Lome, Togo. (Akintayo, I., and Sedgo, J. eds.). Bamako, Mali: West and Central Africa Sorghum Research Network (WCASRN/ROCARS).

Nigam, S.N., Nageswara Rao, R.C., and **Wright, G.C.** 2001. *Breeding for increased water-use efficiency in groundnut*. Pages 1-2 *in* Abstracts – new millennium international groundnut workshop, 4-7 Sep 2001, Shandong Peanut Research Institute (SPRI), Qingdao, China.

Obilana, A.B. 2001. *Production, utilization, and marketing of sorghum in southern Africa region*. Pages 141-162 *in* Towards sustainable sorghum production, utilization, and commercialization in West and Central Africa. Proceedings of a technical workshop of the West and Central Africa Sorghum Research Network, 19-22 Apr 1999, Lome, Togo (Akintayo, I., and Sedgo, J. eds.). Bamako, Mali: West and Central Africa Sorghum Research Network (WCASRN/ROCARS).

Omanya, G.O., Haussmann, B.I.G., Hess, D.E., Reddy, B.V.S., Mukuru, S.Z., Welz, H.G. and **Geiger, H.H.** 2001. *Screening methodologies for resistance of sorghum to the parasitic weed* Striga hermonthica. Pages 170-173 *in* proceedings of the 7th International Parasitic Weed Symposium, 5-8 Jun 2001, Nantes, France.

Onyango, M.C., and **Silim, S.N.** 2001. *Effect of genotype, storage temperature, shelling, and duration of storage on quality of vegetable pigeonpea*. Pages 159-166 *in* Status and potential of pigeonpea in eastern and southern Africa. Proceedings of a regional workshop, 12-15 Sep 2000, Nairobi, Kenya. (Silim, S.N., Mergeai, G. and Kimani, P.M. eds.). Gembloux, Belgium: Gembloux Agricultural University, and Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics.

Ortiz, R., Bramel, P.J., Ferguson, M., Huamán, Z., Mahalakshmi, V., Monyo, E.S., Rao, K.N., Reddy, L.J., Singh, S.D., Upadhyaya, H.D., and **Vuylsteke, D.** 2000. CGIAR *centres and genetic resource management*. Page 54 *in* Extended Summaries. Vol. 1: Proceedings of an international conference on managing natural resources for sustainable agricultural production in the 21st Century. Indian Council of Agricultural Research – National Academy of Agricultural Sciences, 14-18 Feb 2000, New Delhi, India.

Pande, S. and **Rao, J.N.** 2001. *Farmers' participatory* IPM *in chickpea in Nepal: Opportunities and constraints*. Pages 60-78 *in* On-farm IPM of chickpea in Nepal. Proceedings of the international workshop on planning and implementation of on-farm chickpea in Nepal, 6-7 Sep 2000, Kathmandu, Nepal (Pande, S., Johansen, C., Stevenson, P.C., and Grzywacz, D. eds.). Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics; and Chatham, Kent ME4 4TB, UK: Natural Resources Institute.

Ratnadass, A., Ajayi, O., Marley, P.S., and **Akintayo, I. (eds.)** 2001. *Insects pests of sorghum in West and Central Africa*: proceedings of training workshop organized by ROCARS, ICRISAT and CIRAD, 14-23 Oct 1996, Samanko, Mali, published as a CD-Rom (ISBN-2-87614-446-8).

Ratnadass, A., Butler, D.R., Marley, P.S., Ajayi, O., Bandyopadhyay, R., Hamada, M.A., Hess, D.E., Assamoi, F., Atokple, I.D.K., Beyo, J., Cisse, O., Dakouo, D., Diakite, M., Dossou-Yovo, S., Le Diambo, B., Sissoko, I., Vopeyande M.B., and **Akintayo, I.** 2001. *Interacting effect of head bugs, molds, and climate on sorghum grains in West and Central Africa*. Pages 120-140 *in* Towards sustainable sorghum production, utilization, and commercialization in West and Central Africa: Proceedings of a technical workshop of the West and Central Africa Sorghum Research Network, 19-22 Apr 1999, Lome, Togo (Akintayo, I., and Sedgo, J., eds.). Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics.

Rattunde, H.F.W., Weltzien R.E., Touré, A., Diarra, M.B., and **Sidibaye, B.** 2001. *Understanding farmers' seed management as a basis for participatory breeding*. Pages 243-251 *in* Towards sustainable sorghum production, utilization and commercialization in West and Central Africa: Proceedings of a technical workshop of the West and Central Africa Sorghum Research Network, 19-22 Apr 1999, Lomé, Togo (Akintayo, I., and Sedgo, J., eds.). Bamako, Mali: ROCARS and Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics.

Reddy, B.V.S., Hall, A.J., and **Rai, K.N.** 2001. *The long road to partnership: Private support of public research on sorghum and pearl millet*. Pages 27-34 *in* Proceedings of a workshop on sharing perspectives on public-private sector interaction, 10 Apr 2001, ICRISAT, Patancheru, India. (Hall, A.J., Yoganand, B., Rasheed Sulaiman, V., and Clark, N.G., eds.). New Delhi, India: National Center for Agricultural Economics and Policy Research, and Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics.

Ryan, J.G., and **Spencer, D.C.** 2001. *Some challenges, trends, and opportunities shaping the future of the semi arid tropics*. Pages 4-11 *in* Future of agriculture in the semi-arid tropics. Proceedings of an international symposium on future of agriculture in semi-arid tropics, 14 Nov 2000, ICRISAT, Patancheru, India (Bantilan, M.C.S., Parthasarathy Roa, P., and Padmaja, R. eds.). Patancheru 502 324, Andhra Pradesh, India International Crops Research Institute for the Semi-Arid Tropics.

Saxena, K.B. 2001. *Heterosis breeding in pulses – Problems and prospects*. Pages 10-11 *in* Abstracts: proceedings of national symposium on pulses for sustainable agriculture and nutritional security, 17-19 Apr 2001, Indian Council of Agricultural Research, New Delhi, India.

Seetharama, N., and **Crouch, J.H.** 2001. *Keynote address*. Pages 3-4 *in* Biotechnology: current perspectives – Proceedings of a seminar, 25 Jan 2001, Montessori Mahila Kalasala, Vijayawada, Andhra Pradesh, India (Rao, C.S.V.R., ed.).

Seetharama, N., Sharma, H.C., Sharma, K.K., Reddy, L.J., Rani, T.S., and **Ortiz, R.** 2001. *Relevance of transgenic crops in developing countries*. Pages 21-23 *in* Biotechnology: current perspectives – Proceedings of a seminar, 25 Jan 2001, Montessori Mahila Kalasala, Vijayawada, Andhra Pradesh, India (Rao, C.S.V.R., ed.).

Silim, S.N. 2001. *Strategies and experiences in pigeonpea variety development for eastern and southern Africa*. Pages 11-20 *in* Status and potential of pigeonpea in eastern and southern Africa. Proceedings of a regional workshop, 12-15 Sep 2000, Nairobi, Kenya (Silim, S.N., Mergeai, G. and Kimani, P.M.,vv eds.). Gembloux, Belgium: Gembloux Agricultural University, and Patancheru 502 324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics.

Sivaramakrishnan, S., Seetharama, N., and **Seetha Kannan.** 2001. *Use of radioisotopes in agriculture: DNA based molecular markers in crop improvement*. Pages 241-249 *in* Proceedings of NARRI international conference on application of radioisotopes and radiation technology in the 21st century, 12-14 Dec 2001. (Ramamurthy, N., Ananthakrishnan, M., and Nandakumar, A.N. eds.). Mumbai, India: NARRI.

Subrahmanyam, P. 2001. *Groundnut*. Pages 103-116 *in* Handbook: Major pests and diseases of important crops in Malawi (Coyne, D., and Hoeschle-Zeledon, I., eds.). Malawi-German Plant Protection Project, Ministry of Agriculture and Irrigation/Deutsche Gesellschaft fur Technische Zusammenarbeit (GTZ) GmbH, P.O. Box 2111, Lilongwe, Malawi.

Thakur, R.P. 2000. *Host plant resistance in integrated disease management in pearl millet*. Pages 236-240 *in* proceedings of international conference on integrated plant disease management for sustainable agriculture (Vol. I.) Indian Phytopathological Society.

Upadhyaya, H.D., Ferguson, M.E., and **Bramel, P.J.** 2000. *Status of the Arachis germplasm collection at* ICRISAT. The American Peanut Research and Education Society, Proceedings 32:50.

Upadhyaya, H.D. and **Nigam, S.N.** 2001. *Strategy for breeding for early-maturity in groundnut*. Pages 39-40 *in* New millenium international groundnut workshop, 4-7 Sep 2001, Shandong Peanut Research Instiitute (SPRI), Quingadao, China.

Upadhyaya, H.D., Nigam, S.N., and **Sube Singh.** 2001. *Identification of new sources of early-maturity in groundnut core collection*. Page 43 *in* Poster abstracts of the diamond jubilee symposium on hundred years of post-Mendelian genetics and plant breeding-retrospect and prospects (Kharkwal, M.C., and Mehra, R.B., eds.), 6-9 Nov 2001.

Indian Society of Genetics and Plant Breeding, New Delhi, India.

Upadhyaya, H.D., Nigam, S.N., and **Thakur, R.P.** 2001. *Host plant resistance for reducing aflatoxin contamination in groundnut*. Page 357 *in* Poster abstracts of the diamond jubilee symposium on hundred years of post-Mendelian genetics and plant breeding – retrospect and prospects (Kharkwal, M.C., and Mehra, R.B., eds.), 6-9 Nov 2001. Indian Society of Genetics and Plant Breeding, New Delhi, India.

Upadhyaya, H.D., Ortiz, R., Bramel, P.J., and **Sube Singh.** 2001. *Development of Asia region groundnut core collection*. Pages 43-44 *in* Poster abstracts of the diamond jubilee symposium on hundred years of post-Mendelian genetics and plant breeding – retrospect and prospects (Kharkwal, M.C., and Mehra, R.B., eds.), 6-9 Nov 2001. Indian Society of Genetics and Plant Breeding, New Delhi, India.

Weltzien R.E., and **vom Brocke, K.** 2001. *Seed systems and their potential for innovation: conceptual framework for analysis*. Pages 9-14 *in* Targeted seed aid and seed system interventions: Strengthening small-farmer seed systems in Eastern and Central Africa. Proceedings of a workshop, 21-24 Jun 2000, Kampala, Uganda (Sperling, L., ed.). CIAT, Cali, Colombia.

Zope, W.N., Wanjari, K.B., and **Jagdish Kumar.** 2001. PKV *Kabuli* 2: *Extra bold kabuli chickpea variety*. Pages 15-16 *in* National symposium on pulses for sustainable agriculture and nutritional security, 17-19 Apr 2001, Indian Council of Agricultural Research, New Delhi, India.

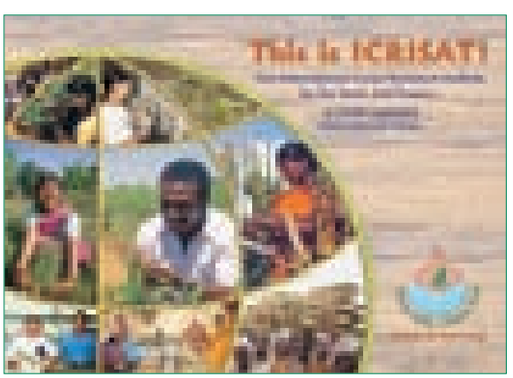
Newsletters

ICRISAT (International Crops Research Institute for the Semi-Arid Tropics). 2001. *International* Arachis *Newsletter* no. 21. Patancheru 502 324, Andhra Pradesh, India: ICRISAT. 68 pp.

ICRISAT (International Crops Research Institute for the Semi-Arid Tropics). 2001. *International Chickpea and Pigeonpea Newsletter* no. 8. Patancheru 502 324. Andhra Pradesh, India: ICRISAT. 72 pp.

ICRISAT (International Crops Research Institute for the Semi-Arid Tropics). 2001. SMINET *News*. SADC/ICRISAT Sorghum and Millet Improvement Program, Matopos Research Station, PO Box 776, Bulawayo, Zimbabwe. Vol.3, No.1. 20 pp.

ICRISAT (International Crops Research Institute for the Semi-Arid Tropics). 2001. SMINET *News*. SADC/ICRISAT Sorghum and Millet Improvement Program, Matopos Research Station, PO Box 776, Bulawayo, Zimbabwe. Vol.3, No.2. 20 pp.



Development Investor Partnerships: Targeted Projects

Donor	Project	Collaborators
Asian Development Bank	Legume-based technologies for rice and wheat production systems in south and southeast Asia	NARS of India, Nepal, Bangladesh, Pakistan, Sri Lanka, Vietnam
	Improving management of natural resources for sustainable rainfed agriculture	International Board for Soil Research and Management (IBSRAM); Central Research Institute for Dryland Agriculture (CRIDA), Jawaharlal Nehru Krishi Vishwa Vidyalaya, Dr Panjabrao Deshmukh Krishi Vidyapeeth, Marathwada Agricultural University, BAIF Development Research Foundation, India; Field Crops Research Institute, Khon Kaen Field Crops Research Centre, Department of Land Development, Thailand; Ministry of Agriculture and Rural Development, Vietnam; Vietnam Agricultural Science Institute
	Study on rapid crop improvement for poor farmers in the semi-arid tropics	NARS of Bangladesh, China, India, Pakistan, Vietnam
Australia	Increasing the effectiveness of research on agricultural resource management in the semi-arid tropics by combining cropping systems simulation with farming systems research	APSRU (Australia), ICAR-NARS (India), Kenya Agricultural Research Institute
	More efficient breeding of drought resistant peanuts in India and Australia	ACIAR, Australia; ICAR, India; Queensland Department of Primary Industries, CSIRO, Australian National University, Peanut Company of Australia, Australia
	Management of white grubs in peanut cropping systems in Asia and Australia	NARS of India; Grains Research and Development Corporation, Peanut Company of Australia; University of Queensland, Queensland Department of Primary Industries, Australia
	Seeds of life - East Timor	Australian Center for International Agriculture Research; Catholic Relief Services; World Vision International; IRRI, CIMMYT, CIAT, CIP; Executive Government of East Timor (EGOET)
	Selection for peanut varieties with low aflatoxin risk	ACIAR, Australia; Farming Systems Institute, Queensland Department of Primary Industries, Australia; Acharya NG Ranga Agricultural University, India
	Support towards publication of sorghum tissue culture and genetic engineering	Indian Council of Agricultural Research, India; Andhra Pradesh-Netherlands Biotechnology Project, Hyderabad
	Support towards publication of impact of sorghum and chickpea in Australia	ACIAR, Australia; Muresk Institute, Australia
	Support towards publication of impact evaluation of pigeonpea as green manure for sugarcane in Thailand	Department of Agriculture, Thailand; Kasetsart University, Thailand; ACIAR, Australia
	Marketing, utilization and commercialization of Stylosanthes	Commonwealth Scientific and Industrial Research Organization (CSIRO), Australia; Indian Grasslands and Forage Research Institute (IGFRI), India; Chinese Academy of Tropical Agricultural Sciences (CATAS), China; Empresa Brasileira de Pesquisa Agropecuaria (Embrapa), Brazil
	Identification of *helicoverpa* resistance in wild species of chickpea	CSIRO Entomology, Center for Mediterranean Agricultural Research, Australia
Belgium	Vrije Universiteit Brussel (VUB)/ICRISAT collaborative project on biotechnology	Vrije Universiteit Brussel
	Towards sustainability of groundnut and cereal production in West Africa: Management of peanut clump virus	Universite Catholique de Louvain, Belgium; Institut d'etudes et de recherche agricoles (INERA), Burkina Faso; Scottish Crop Research Institute, UK
Canada	Desert margins initiative (Africa)	NARS and NGOs of Burkina Faso, Kenya, Botswana
	Improving income of farmers in eastern Africa through increased chickpea yields	University of Saskatchewan, Canada; NARS in Kenya, Tanzania and Ethiopia
CFC	Conservation, evaluation and dissemination of groundnut germplasm and foundation seed production and distribution for the West African region	CIRAD (France), NARS of Senegal, Burkina Faso, Niger, Nigeria
CFC and World Bank	Preservation of wild species of arachis in South America	CENARGEN (Brazil)
Denmark	Breeding programme for sorghum and millet	NARS of Eritrea
	Kenya-Eritrea sorghum and millet seed initiative	Danida, Denmark; Ministry of Agriculture, Eritrea
	Raising income of poor farmers: Enhancing pigeonpea productivity and profitability in eastern Africa	Royal Veterinary and Agricultural University (KVL), Denmark; Kenya Agricultural Research Institute (KARI), Kenya; Ilonga Agricultural Research Institute, Tanzania; Tropical Pesticide

Donor	Project	Collaborators
		Research Institute (TPRI), Tanzania; National Agricultural Research Organization (NARO), Uganda
	Pigeonpea-based maize production in semi-arid eastern and southern Africa	Royal Veterinary and Agricultural University (KVL), Denmark; Center for Development Research, Denmark; Ilonga Agricultural Research Institute, Tanzania; NARS of Malawi, Tanzania, Niger, Zimbabwe, Kenya
European Union	CLIMAG-West Africa – A network for harmonization of climate prediction for mitigation of global change impact in Sudano-Sahelian West Africa	Applied Meteorology Foundation (FMA), Italy; International Research Institute for Climate Prediction (IRI), USA; The Regional Centre for Training and Application in Agricultural Meteorology and Operational Hydrology (AGRHYMET), Niger; African Centre of Meteorological Applications of Development (ACMAD), Niger; Malian Meteorological Service (Meteo-Mali), Institut d'Economie Rurale (IER), Mali; World Meteorological Organization (WMO), Switzerland; Global Change System for Analysis, Research and Training (START), USA; Institut du Sahel (INSAH), Mali; Conseil National de la Recherche Scientifique et Tecnologique (CNRST), Mali
FAO	Rapid composting of rice straw	NARS of India
	Integrated soil and nutrient management and conservation for farmer field schools	University of Zimbabwe, Zimbabwe; Department of Agricultural Technical and Extension Services (AGRITEX), Zimbabwe, Sorghum and Millet Improvement Program (SMIP)
	To assist in the development of a framework on crop and crop associated biodiversity and identification of a country-driven project on crop and crop associated biodiversity	FAO
	Planning grant to initiate the preparatory work for the RAPS WID regional conference on "Rural Women in Knowledge Society"	FAO
	APAARI Support for coordination of the cereals and legumes Asia network	NARS of Bangladesh, China, India, Indonesia, Myanmar, Nepal, Pakistan, the Philippines, Thailand, Sri Lanka, Vietnam, NGOs, and private sector
France	Transgenic sorghums to control stem borer	International Cooperation Center for Agronomic Research for Development (CIRAD), France
	Genetic transformation of pigeonpea to evaluate insecticidal genes for the management of resistance to legume pod borer, *Helicoverpa armigera*	International Cooperation Center for Agronomic Research for Development (CIRAD), France
Germany	Promotion of sorghum and millet cultivation in southern Africa	NARS, NGOs, private sector seed companies, farmers
	Promotion of legume cultivation in Malawi, Mozambique, Zimbabwe and Zambia – Phase V	NARS in Malawi, Mozambique, Zimbabwe and Zambia
	Enhancing the quality, diversity, and productivity of farmers' pearl millet genetic resources in Rajasthan, India	NBPGR, CAZRI, Rajasthan Agricultural University (India), University of Hohenheim (Germany)
	A comparative assessment of community seed supply strategies in Central Tanzania	NARS in Tanzania
	Evaluating ICRISAT's breeding strategy for pearl millet with farmers in West and Central Africa	Advisory Service on Agricultural Research for Development (BEAF), Germany; University of Hohenheim, Germany
IFAD	Farmer participatory testing of technologies to increase sorghum and pearl millet production in the Sahel	NARS in Burkina Faso, Ghana, Mali, Niger and Nigeria
Inter-American Development Bank	A research and network strategy for sustainable sorghum production systems for Latin America	NARS of Latin America, CIAT
Iran	Joint collaborative projects and receipt of germplasm for the improvement of pulses production in the arid regions of Iran	NARS of Iran
	Training activities for Iranians at ICRISAT-Patancheru	Acharya NG Ranga Agricultural University, Central Research Institute for Dryland Agriculture (CRIDA) (India)
India	Identifying systems for carbon sequestration and increased productivity in semi-arid tropical environments	Central Research Institute for Dryland Agriculture (CRIDA), India; Indian Institute of Soil Science, India; National Bureau of Soil Science and Land Use Planning (NBSS&LUP), India
	Aflatoxin contamination in groundnut: Mapping and management in Gujarat, Andhra Pradesh and adjoining areas	National Research Center for Groundnut, India; Gujarat Agricultural University, India
	Organic matter recyling and enrichment	Punjab Agricultural University, India; Indian Council of Agricultural Research, India; Haryana Agricultural University, India; Banaras Hindu University, India; GB Pant University of Agriculture and Technology, India
	An integrated approach to control stem necrosis disease of groundnut	National Research Centre for Groundnut (NRCG), Junagadh; National Bureau of Plant Genetic Resources (NBPGR), Hyderabad; Regional Research Station, Acharya NG Ranga Agricultural University (ANGRAU), Kadiri

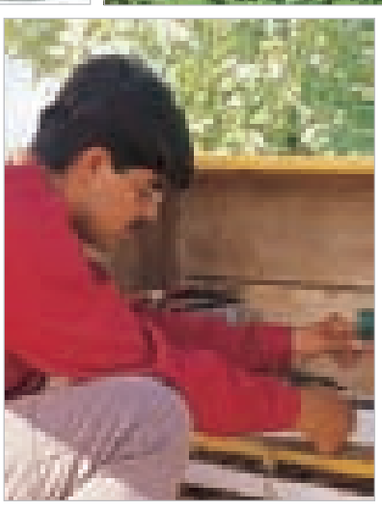
Donor	Project	Collaborators
	Molecular marker development, tagging of chickpea against abiotic stresses and cloning of R gene against fusarium wilt	National Centre for Plant Genome Research (NCPGR), India; Department of Biotechnology, Government of India, Jawaharlal Nehru University (JNU), New Delhi, India
	Technical support in developing model watersheds by ITDA in Adilabad district of Andhra Pradesh	International Fund for Agricultural Development (IFAD), Italy; Integrated Tribal Development Agency, Government of Andhra Pradesh, India
Italy	Facilitate the identification and design process of challenge programs	CGIAR
Japan	Post-doctoral fellowship to Dr Keiichi Hayashi to carry out research work in the field of natural research management at ICRISAT, Niamey, Niger	NARS in West and Central Africa
Kenya/ARF/World Bank	Increased production of pigeonpea: Farmer participatory screening, evaluation, production and marketing in semi-arid eastern Kenya to increase production	World Bank, Kenya Agricultural Research Institute (KARI), Kenya
Kenya/UNDP	Informing food security policy: Using household strategies to develop sustainable interventions for rural livelihoods and poverty reduction in Suba and Bomet districts of Kenya	UNDP; Rockefeller Foundation, Kenya; DFID, UK; NARS and NGOs in Kenya
Netherlands	Evolving transgenic sorghum with suitable Bt gene constructs, resistant to stemborer	National Research Center for Sorghum, India, National Research Center on Plant Biotechnology, India
	Development of disease resistant transgenic pigeonpea	Osmania University, India
	Genetic enhancement of pigeonpea [*Cajanus cajan* (L.) Millspaugh] for pest resistance through interspecific hybridisation	Osmania University, India; Institute of Public Enterprise, India
Norway	Sustainable natural resource management options to combat land degradation in sub-Saharan Africa	NARS of Burkina Faso, Botswana, Kenya, Mali, Niger, Namibia, Senegal, Zimbabwe and South Africa. ASARECA, IGADD, SACCAR, INSAH, IBSRAM, ICARDA, ICRAF, IFDC, IFPRI, ILRI, IPGRI, UNDP, UNEP, CIRAD, IH, ITE, IRD
OPEC	Technological empowerment of poor groundnut farmers in Asia: A step towards better rural economy	NARS in Asia
PLAN International	Groundnut project in Malawi	NARS and NGOs of Malawi
	Groundnut project in Zambia	NARS and NGOs of Zambia
Rockefeller Foundation	Field phenotyping of rice mapping populations and exploitation of synteny between rice and sorghum, for improving field response to drought stress	Tamil Nadu Agricultural University, India; University of Agricultural Sciences, Bangalore, India; Indian National Rice Biotechnology Network, India
	IER-INERA-ICRISAT collaborative project: Guinea sorghum hybrids: Bringing the benefits of hybrid technology to a staple crops of Sub-Saharan Africa	Institut D'Economie Rurale (IER), Mali Institut de l'Environnement et de Recherches Agricoles (INERA), Burkina Faso
	New approaches for technology, policy and institutions for attaining sustainable improvements in soil fertility management in drought prone areas of Zimbabwe	Department of Agricultural Technical and Extension Services (AGRITEX), Zimbabwe; FAO, Italy; Department of Research and Specialist Services, Zimbabwe; University of Zimbabwe, Zimbabwe; Care International, Zimbabwe
	To conduct workshop and training course on state-of-the-art field screening of cereals, with emphasis on rice, for drought tolerance	Tamil Nadu Agricultural University, India; University of Agricultural Sciences, Bangalore, India; Indian National Rice Biotechnology Network, India
Switzerland	West- and Central-African millet research network-ROCAFREMI	National extension workers, NGOs and farmers, INTSORMIL
Switzerland and India	Enhancing tolerance of chickpea to drought, freezing and low temperature through genetic engineeting with the CodA and P5CSF-129A genes	University of Delhi, India; Department of Biotechnology, Government of India; Laboratory of Bioenergetics, University of Geneva, Switzerland
UNEP	Environmental assessment, information and early warning (support to Africa) – desert margins programme (DMP) development	NARS of Burkina Faso, Botswana, Kenya, Mali, Niger, Namibia, Senegal, Zimbabwe and South Africa. ASARECA, IGADD, SACCAR, INSAH, IBSRAM, ICARDA, ICRAF, IFDC, IFPRI, ILRI, IPGRI, UNDP, UNEP, CIRAD, IH, ITE, IRD
UK	Management of key insect pests of sorghum in southern and eastern Africa: Developing IPM approaches with expert panels	Centre for Agriculture and Biosciences International (CABI), UK; Natural Resources Institute (NRI), UK; Kenya Agricultural Research Institute (KARI), Kenya
	Finger millet blast in East Africa: Pathogen diversity and disease management strategies	DFIC/CPP, Horticulture Research International, UK; NARS of Kenya and Uganda
	What makes it so tasty for the pest? Identification of *Helicoverpa armigera* (Hübner) feeding stimulants and the location of their production on the pod service of pigeonpea [*Cajanus cajan* (L.) Millspaugh]	Natural Resources Institute, UK, Royal Botanic Gardens, UK
	Safe to eat or why chickens die? Developing low-cost and simple technologies for aflatoxin estimation in foods and feeds	Scottish Crops Research Institute, UK, Janaki Feeds, India, Department of Agriculture, Government of Andhra Pradesh, India

Donor	Project	Collaborators
	Principal pod-boring pests of tropical legume crops: Economic importance, taxonomy, natural enemies and control	CABI Bioscience, UK; Agricultural College and Research Institute, Madurai, India; Department de Formation en Proctection des Vegetaux, Niger; Universidade Federal do Parana, Brazil
	Will women farmers invest in improving their soil fertility management? Participatory experimentation in a risky environment	Silsoe Research Institute, UK; NARS and NGOs in Malawi and Zimbabwe
	Modelling the risk of introducing transgenics into traditional cropping systems: A case study with pigeonpea	University of Birmingham, UK; National Bureau of Plant Genetic Resources, India
	Genetic enhancement of feed quality and quantity in sorghum and millet	International Livestock Research Institute, UK; NARS in India, Institute of Grassland and Environmental Research, UK; Rowett Research Institute, UK
	Evaluation of the effects of plant diseases on the yield and nutritive value of crop residues used for peri-urban dairy production on the deccan plateau in India	Natural Resources Institute, UK; International Livestock Research Institute, Kenya; Acharya NG Ranga Agricultural University, India; University of Greenwich, UK
	Contiguous segment substitution lines: New tool for elite pearl millet hybrid parental lines enhancement	Centre for Arid Zone Studies, UK; All-India Coordinated Pearl Millet Improvement Project, India; Indian Agricultural Research Institute, India
	Use of molecular markers to improve terminal drought tolerance in pearl millet	Instiute of Grassland and Environmental Research, UK
	Marker-assisted improvement of pearl millet downy mildew resistance in elite hybrid parental lines for Africa and Asia	CCS Haryana Agricultural University, India; Tamil Nadu Agricultural University, India; Centre for Arid Zone Studies, UK; All-India Coordinated Pearl Millet Improvement Project, India; Central Arid Zone Research Institute, India
	Indo-British collaborative project — Participatory varietal selection in rabi sorghum	Centre for Arid Zone Studies, UK; and NARS in India
	Characterization of the causal virus of pigeonpea sterility mosaic disease: A step towards attaining sustainability of pigeonpea production in the Indian subcontinent	Natural Resources Institute, UK; Scottish Crop Research Institute, UK; University of Agricultural Sciences, India; Sri Venkateswara University, India
	Groundnut rosette disease management	Natural Resources Institute, UK; University of Georgia, USA; NARS of Uganda and Malawi
	Optimising institutional arrangements for demand driven post-harvest research, delivery, uptake and impact on the livelihoods of the poor through public and private sector partnerships	Natural Resources Institute, UK; University of Strathclyde, UK; National Centre for Agricultural Economics and Policy Research, India
	Promotion of chickpea following rainfed rice in the Barind area of Bangladesh	University of Wales, UK; Peoples Resource Oriented Voluntary Association, Bangladesh; Bangladesh Agricultural Research Institute, Bangladesh
	Assessing potential for short duration legumes in South Asian rice fallows	University of Wales, UK; NARS in Bangladesh, India, Nepal, Pakistan
	Rapid generation advance in photoperiod sensitive sorghum	University of Wales, UK
	Interaction between on-farm seed priming, nodulation and disease incidence in chickpea	University of Wales, UK; NARS in Bangladesh
	Rapid generation of chickpea population for farmer participatory selection	University of Wales, UK
	Promotion of rainfed rabi cropping in rice fallows of India and Nepal: Pilot phase	University of Wales, UK; NARS in India and Bangladesh
	Seed priming for pigeonpea in semi-arid high elevation areas of Kenya	University of Wales, UK; NARS in Kenya
	Promoting the adoption of the improved disease and pest management technologies in chickpea by poor farmers in mid-hills and hill side cropping systems in Nepal	Natural Resources Institute, UK; Nepal Agricultural Research Council, Nepal; Natural Resources Institute, UK
	Strategies for reducing aflatoxin levels in groundnut-based foods and feeds in India: A step towards improving health of humans and livestock	Natural Resources International Ltd., UK; University of Reading, UK; The Queens University of Belfast, UK; Natural Resources Institute, UK; Acharya NG Ranga Agricultural University, Hyderabad, India; Society for Transformation, Agriculture and Alternatives in Development, Hyderabad, India; Agriculture, Man, Ecology, Bangalore, India
	Promotion of an integrated pest management program for pigeonpea in India and East Africa	Natural Resources International Ltd., UK; Natural Resources Institute, UK; National Centre for Integrated Pest Management, India; Acharya NG Ranga Agricultural University, India; Marathwada Agricultural University, India; Center for World Solidarity, India; Agricultural Research Institute, Tanzania; Serere Agricultural and Animal Research Institute, Uganda

Donor	Project	Collaborators
	Advise on the design and interpretation of the field trials covering the soil science and agronomy aspects of the project	Silsoe Research Institute, UK
	Re-survey Aurepalle and Dokur Villages	Overseas Development Institute, UK
	Seed sector study of southern Somalia	Overseas Development Institute, UK
UN/FAO/Italy	Support for associate professional officer (visiting research fellow, ICRISAT)	Government of Italy; NARS in Zimbabwe
UNDP and USA	Impacts of ICRISAT/NARS germplasm research for sorghum, groundnut and pearl millet	Yale University, USA
USA	Seeds for Freedom. Angola agricultural recovery program: An international, World Vision/CGIAR plan for the rapid recovery of food production systems in Angola	USAID/OFDA, CIAT, CIMMYT, IITA, ISNAR, CIP, World Vision, NARS in Angola, in-country NGOs, and farmers
	Improving the efficiency of emergency seed supply: Linking relief seed distribution to trade and market development	USAID/OFDA, African Seed Trade Association (AFSTA); American Seed Trade Association (ASTA); Cooperative League of the United States of America (CLUSA); Direcção de Economica (DE); Direcção Nacional de Agricultura (DINA); Direcção Provincial de Agricultura e Pescas (DPAP); International Fertilizer Development Center (IFDC); Instituto Nacional de Investigaçao Agronómica (INIA); Ministério da Agricultural e Desenvolvimento Rurais (MADER); Michigan State University (MSU); National Agricultural Research System (NARS); Non-Governmental Organization (NGO); Overseas Development Institute (ODI); Programa Nacional de Desenvolvimento Agrária (PROAGRI); Southern Africa Development Community (SADC); Sorghum and Millet Improvement Project (SMIP); Serviço National de Sementes (SNS); Special Program for African Agricultural Research (SPAAR); Sub-Saharan Africa Seed Initiative (SSASI)
	Strengthening national agricultural research systems in Africa through collaborative research networks	USAID, NARS of participating countries, NGOs, and private sector
	Agricultural research for development of SAT: A new vision and strategy	USAID, Africa Bureau, NARS in Africa and Asia
	Regional sorghum and millet research project for southern Africa	USAID, NARS, NGOs, private sector seed companies, farmers
	Chickpea molecular marker/mapping work	USAID, Washington State University (USA)
	Identification of peanut genes and gene products important in the peanut seed	USAID, Texas A&M University (USA)/Univ. of Wisconsin-Madison
	Population structure and genetic diversity of *Sclerospora graminicola*: Keys to stable production of pearl millet	USAID, Texas A&M University (USA)
	Fulfilling seed requirements in famine threatened areas in West Africa: A need for emergency seed distribution	USAID/OFDA, NARS of West Africa
	Rural prosperity is nation's economic stability: A partnership approach to attain sustainable production of groundnut and pigeonpea in smallholder agriculture for quality diet, household food security, and poverty alleviation in Malawi	USAID, Ministry of Agriculture and Irrigation, Malawi; NARS, NGOS and farmers in Malawi
	Strategic marketing of sorghum and millet food products in West and southern Africa	University of Illinois, USA, NARS in West and southern Africa
	Seeds for survival: increasing the effectiveness of emergency seed aid programs in enhancing seed security in the Greater Horn of Africa	USAID/OFDA, Catholic Relief Services, Uganda; NARS and NGOs in Uganda and Sudan
	Quantifying yield gaps and abiotic stresses in soybean-and groundnut-based rainfed production systems	USAID, University of Georgia, USA; SANREM-CRSP, USA
	Development and mapping of SSR markers for the diversification of rosette virus resistance in groundnut	USAID, University of Georgia, USA; Cornell University, USA
	Strategies for improving the adoption of seed and fertilizer in Africa	USAID, Michigan State University, USA; NARS in Africa
	Improvement of *striga* resistance of Tanzania landrace sorghum varieties	USAID, Purdue University, NARS in Tanzania
	Enhanced collaboration on genetic resources and the use of wild relatives in chickpeas	USAID, Washington State University (USA)
	Identification of peanut genes and gene products important in the peanut seed/*aspergillus* interaction	USAID, Texas A&M University (USA)/Univ. of Wisconsin-Madison
	Diversity in the sorghum ergot pathogen in India	USDA, Foreign Disease and Weed Science Research Unit, USDA, USA; National Research Center for Sorghum, India
	Support for regional workshops and publications	University of Georgia, Peanut CRSP, NARS in Africa

Donor	Project	Collaborators
Consortia of donors (via CGIAR Systemwide Programs)	Optimizing seed water contents to improve longevity in ex-situ genebanks	IPGRI, University of Reading (UK), National Seed Storage Laboratory (USA), National Genebank of China
	Resource use optimization at village and district levels in the desert margins of West Africa	ISNAR, IER, Mali; INERA, Burkina Faso; INRAN, Niger, ICRAF, ILRI, IFDC; ITC and Wageningen Agricultural University (The Netherlands)
	Improving crop-livestock productivity through efficient nutrient management in mixed farming systems of semi-arid West Africa	ILRI, IER, INERA, INRAN, ISRA, IFDC
	CGIAR gender and diversity program: Support to strengthen performance of teams partnership, in-house cultural orientation program and promote women's leadership and advancement	ICRAF and other CGIAR Centers
	Research activities on groundnut and on management of drought in chickpea, targeted to the Central Asia and the Caucasus (CAC) region.	ICARDA
	Further improving the quality and range of data available on ICRISAT's genetic resources collections (SINGER Phase II/2)	IPGRI
	Increasing livestock productivity in mixed crop-livestock farming systems in South Asia	ILRI
	Assessment of diversity in indigenous animal genetic resources	ILRI
	Scaling up participatory plant breeding: Sustainable seed delivery systems for meeting farmers' needs for diversity and varietal change over time	CIAT/PRGA, Institut d'Economic Rurale du Mali (IER), Mali; Universite du Mali, Mali; Point Sud, Research Centre on Local Knowledge, Mali; Association Villageoise de Gonsolo, Mali; Compagnie Malienne du Developement des Textiles (CMDT), Mali
	Support for workshop on Linking Logics II: A joint venture between PRGA, SWNM, ICRISAT and CIMMYT to further explore linkages between farmer participatory research approaches and computer based simulation modeling to increase crop productivity in smallholder level.	CIAT/PRGA, CIMMYT, NARS in Zimbabwe, South Africa, Kenya, Burkina Faso, Niger, Uganda, Cote d'Ivoire, United States of America, Australia, Laos, and New Zealand
	System-wide program on IPM - pilot project on IPM in the Sahelian zone	IITA, Institut d'Economic Rurale du Mali (IER), Mali; Institut d'etudes et de recherche agricoles (INERA), Burkina Faso
World Bank	Sustainable natural resource management options to combat land degradation in sub-Saharan Africa	NARS of Burkina Faso, Botswana, Kenya, Mali, Niger, Namibia, Senegal, Zimbabwe and South Africa. ASARECA, IGADD, SACCAR, INSAH, IBSRAM, ICARDA, ICRAF, IFDC, IFPRI, ILRI, IPGRI, UNDP, UNEP, CIRAD, IH, ITE, IRD
OTHERS		
Sehgal Family Foundation	Genetic enhancement of pearl millet for downy mildew resistance and fellowships to students for research on sorghum	NARS in India
CARE International	Seed distribution and production project (SDPP) in lower Shabelle region of Somalia	Care International, USAID
Catholic Relief Services	ICRISAT-CRS collaborative project in Tharaka and Mbeere districts	Catholic Relief Services, USAID, NARS in Kenya
UNA Consortium	Support to UNA's integrated pest management in Somalia in the development of a training module on stem and stalk borers	Farmers and NGOs in Somalia. Kenya Agricultural Research Institute, Kenya; CABI, Kenya
Private Seed Sector Co.	Diversification of sorghum hybrid parents for Asia	Advanta India Ltd., Ganga Kaveri Seeds Ltd., Hindustan Lever Ltd., J K Agri-Genetics, Mahendra Hybrid Seeds Co. Ltd., Nuziveedu Seeds Ltd., Proagro Seed Co. Ltd., Monsanto Technologies India Ltd., Vibha Agrotech Ltd., Pioneer Hi-bred International
Private Seed Sector Co.	Diversification of pearl millet hybrid parents	Advanta India Ltd., Ganga Kaveri Seeds Ltd., Hindustan Lever Ltd., J K Agri-Genetics; Mahendra Hybrid Seeds Co. Ltd., New Nandi Seeds Corprn., Nuziveedu Seeds Ltd., Proagro Seed Co. Ltd., Shriram Bioseed Genetics India Ltd., Pioneer Hi-bred International., Kanchan Ganga Seed Co Pvt Ltd., Navabharat Seeds Pvt Ltd., Rasi Seeds Ltd., Vibha Agrotech Ltd., Syngenta India Ltd
Maharashtra Hybrid Seeds Company (MAHYCO)	Development of cytoplasmic male-sterility in pigeonpea	NARS in India
MAHYCO Research Foundation	Management of tospoviruses in selected crops and strategies for management of tobacco streak virus	Mahyco Research Foundation, India; Sri Venkateswara University, India

Attributed support for core programs from the Commission of the European Communities (CEC), Japan, France, South Africa and UK is not listed but is included in the Financial Summary



Research Scholars

Name	Country of Origin	Degree	Topic
Completed in 2001			
Gurjeet Singh Kang	India	MSc	Soil-biological indicators of sustainability of rice-wheat cropping system
Muise Maurice	Canada	MSc	Is there a link between access to common property resources and casual wages? Evidence from rural India
V Muthusubramanian	India	MSc	Studies on diversity of sorghum ergot pathogen isolates occurring in India.
V S S Kiran Kumar	India	MSc	Chickpea genetics
G Raghu	India	MSc	The effect of earliness gene efl-1 on chickpea traits
Ananda Vadivelu	India	MPhil	An empirical analysis of the relationship between size, ownership and productivity of farms in a watershed area in Madhya Pradesh
P Azhaguvel	India	PhD	Mapping and marker-assisted backcross transfer of downy mildew resistance in pearl millet
R Sucharitha	India	PhD	Simulation of the effects of the manure quality, soil type, and climate on nitrogen and phosphorus supply to sorghum and pigeonpea in semi-arid tropical India
V Visalakshmi	India	PhD	Effect of IPM components on natural enemies in chickpea with special emphasis to NPV
Arun Sharma	India	PhD	Marker-assisted improvement of pearl millet (*Pennisetum glaucum* L.) downy mildew resistance in elite hybrid parental line H77/833-2
V Maruthi	India	PhD	Evaluation of suitable cropping systems under different land management practices in a vertic inceptisol watershed
Jagdeep Singh	India	PhD	Epidemiology and host-plant resistance for management of botrytis gray mold (BGM) of chickpea
Y Chandrahasa Reddy	India	PhD	Evaluation of Bt toxins against *Helicoverpa*
Continuing during 2001			
Kamala Venkateswaran	India	PhD	Genetic and molecular characterization of wild and cultivated species of sorghum for transferring resistance to biotic stresses
B U Singh	India	PhD	Host plant resistance to shoot fly, stem borer, or head bug in sorghum
A Sunitha Daniel	India	PhD	Groundnut transformation for GRAV resistance by using coat protein and satellite genes
B Sandhya	India	PhD	Genetic transformation of groundnut with chitinase and glucanase
G Sunitha Dayal	India	PhD	Genetic transformation studies in pigeonpea
K Anupama	India	PhD	Genetic and molecular markers in chickpea
B Pushpavathi	India	PhD	Variability of *Sclerospora graminicola*
D Harsha Vardhan	India	PhD	Biotechnological approaches for development of disease resistance on sorghum
B Jayanand	India	PhD	Regeneration in chickpea
Naveenkumar Kulkarni	India	PhD	Pigeonpea sterility mosaic disease: Transmission, virus-vector relationship and identification of resistant sources
D Anitha Kumari	India	PhD	Mechanisms and diversity of resistance to *Helicoverpa* in pigeonpea
E Sree Latha	India	PhD	Stability, mechanisms and inheritance of resistance to *Helicoverpa* pod borer in chickpea
G V Naveen Sharma	India	PhD	DNA markers, microsatelites silver staining and BSA
B Ramachandra Sarosh	India	PhD	Molecular aspects of induced systemic resistance and molecular genetics in pearl millet against the downy mildew pathogen *Sclerospora graminicola*
G M Sajjanar	India	PhD	Genetic analysis of different components of resistance to shootfly (*Atherigona soccata*) in sorghum (*Sorghum bicolor* (L.) Moench.)
J Sailasree	India	PhD	Microbiological and molecular characterization of microorganisms for the management of *Helicoverpa armigera*
G Sujana	India	PhD	Studies on mechanisms of resistance to pod borer in wild relatives of pigeonpea |[*Cajanus cajan* (L.)]
R Aruna	India	PhD	Wide hybridization of *Cajanus cajan* involving compatible wild sps
D Prabhakar Reddy	India	PhD	Introgression of pod borer resistance into pigeonpea (*Cajanus cajan*) using incompatible wild relatives
B Santha	India	PhD	Tissue culture and genetic transformation of dryland cereals with emphasis on pearl millet
Ch Anuradha	India	PhD	Genetics and molecular marker studies in chickpea (*Cicer arietinum* L.)
Dev Vart	India	PhD	Genetics of cytoplasmic-nuclear male sterility and molecular markers of fertility restorer genes in pearl millet (*Pennisetum glaucum* L.) R.Br.).
Wilhemina Quaye	Ghana	MSc	Marketing of sorghum and sorghum products

Name	Country of Origin	Degree	Topic
Joined during 2001			
P Sri Lakshmi	India	PhD	Characterization of isolates of *Trichoderma* spp. for their biocontrol ability against *Aspergillus flavus* in groundnut
B Padmaja	India	Phd	Identifying effective cropping systems for carbon sequestration and their effect on soil organic matter in semi-arid tropics
L Sivarama Prasad	India	PhD	Synteny analysis of rice and sorghum
Hared Abdullahi Nur	Somalia	PhD	Variability in *Aspergillus flavus* and biocontrol of aflatoxin contamination in groundnut
T Sivananda Varma	India	MSc	Identification of PCR-DNA markers associated with resistance to rust and determine their position on a genetic linkage map in groundnut
Surinder Kumar Gulia	India	PhD	QTL mapping and marker assisted improvement of downy mildew resistance in ICMB 89111
S V Siva Gopala Swamy	India	PhD	Pigeonpea transgenics for resistance to *Helicoverpa armigera*
V Girija Shankar	India	PhD	Transformation of sorghum explants using Bt and other gene constructs
B P Mallikarjuna Swamy	India	MSc	Characterization of Asian core collection of groundnut (*Arachis hypogaea* L.)
M Bhanu Priya	India	PhD	Study of tospoviruses infecting economically important crops
D Ramgopal	India	PhD	Studies on phenotypic and molecular characterization and evaluation in *Cicer* wild species and their interspecific populations
Hameeda Bee	India	PhD	Studies on agriculturally beneficial microorganisms: Diversity and dynamics in cropping systems contrasting for crop residues and pest management
Jonne Rodenburg	Netherlands	PhD	Host plant defence to the parasitic plant *Striga* – its nature, effectivity, adaptability and trade-offs with yielding ability
Mountaga Kayentao	Mali	MSc	Les methods de selection indirecte pour l'amelioration de la lutte integrée contre le *Striga hermonthica* au Mali
Cheick Sidia Kouyaté	Mali	MSc	Evaluation of Guinea-race sorghum core collection
N'famara Soumaré	Mali	MSc	Farmer perception of sorghum insects, control methods and their importance for integrated pest management in Kolokani region
Bréhima Koné	Mali	MSc	Stage de perfectionnement
Mamadou Hama Maïga	Mali	MSc	Evaluation de l'association Sorgho-Niébé par l'intégration agricutlure elevage dans la region de Koulikoro
Aïssata M. Ibrahim	Niger	MSc	Selection et amelioration des espèces végétales
Moussa Hama Bouréïma	Niger	MSc	Sociologie rurale
Pawindé Elizabeth Zida	Burkina Faso	MSc	Pathologie du mil
Jerome Hemberger	France	MSc	Sorghum photoperiodism
Bakary Sidibé	Mali	MSc	Density effects
Serge Diarra	Mali	MSc	Density effects
Mamane Bachir Magagi	Niger	MSc	Test d'une méthode pour améliorer l'éfficacité de la fumure par parcage du bétail
Garba Issa	Niger	MSc	Inventaire de ligneux sur image haute resolution
Yahaya Mounkaila	Niger	MSc	Erosion évlienne
Soumana Hamadou	Niger	MSc	Erosion hydrique
Ibrahim Bio Yérima	Niger	MSc	Erosion évlienne
Mme Massaladji Fatima	Niger	MSc	Lutte contre le striga à l'aide du sesame
Kabacinski Christophe Lionel	Belgium	MSc	Lutte contre le striga à l'aide du sesame
Séverine Anne Françoise Henin	Belgium	MSc	Etude du peanut clump virus (+ polymyxa)
Martina Barbara Battini	ETH, Suisse Federal Institute et Technology	MSc	Survey for virus disease of groundnut in Niger
Mounkaila Mohamed	Niger	PhD	Elaboration des documents GEF
Gaëtan Dufey	Belgium	MSc	Intensification de la production agricole au Sahel
Benjamin Wilkin	Belgium	MSc	Erosion eolienne
Muriel de Viron	Belgium	MSc	Erosion hydrique dans trois terrroirs villageois au Sahel: Evolution temporelle et cartographie des zones à risques potentiels
Guimba Guéro	Niger	MSc	Etudes des contrintes liées à la conservation des semences
Melle Saâdatou Oumarou	Niger	MSc	Stage de perfectionnement pratique dans le domaine du maraîchage exprimés

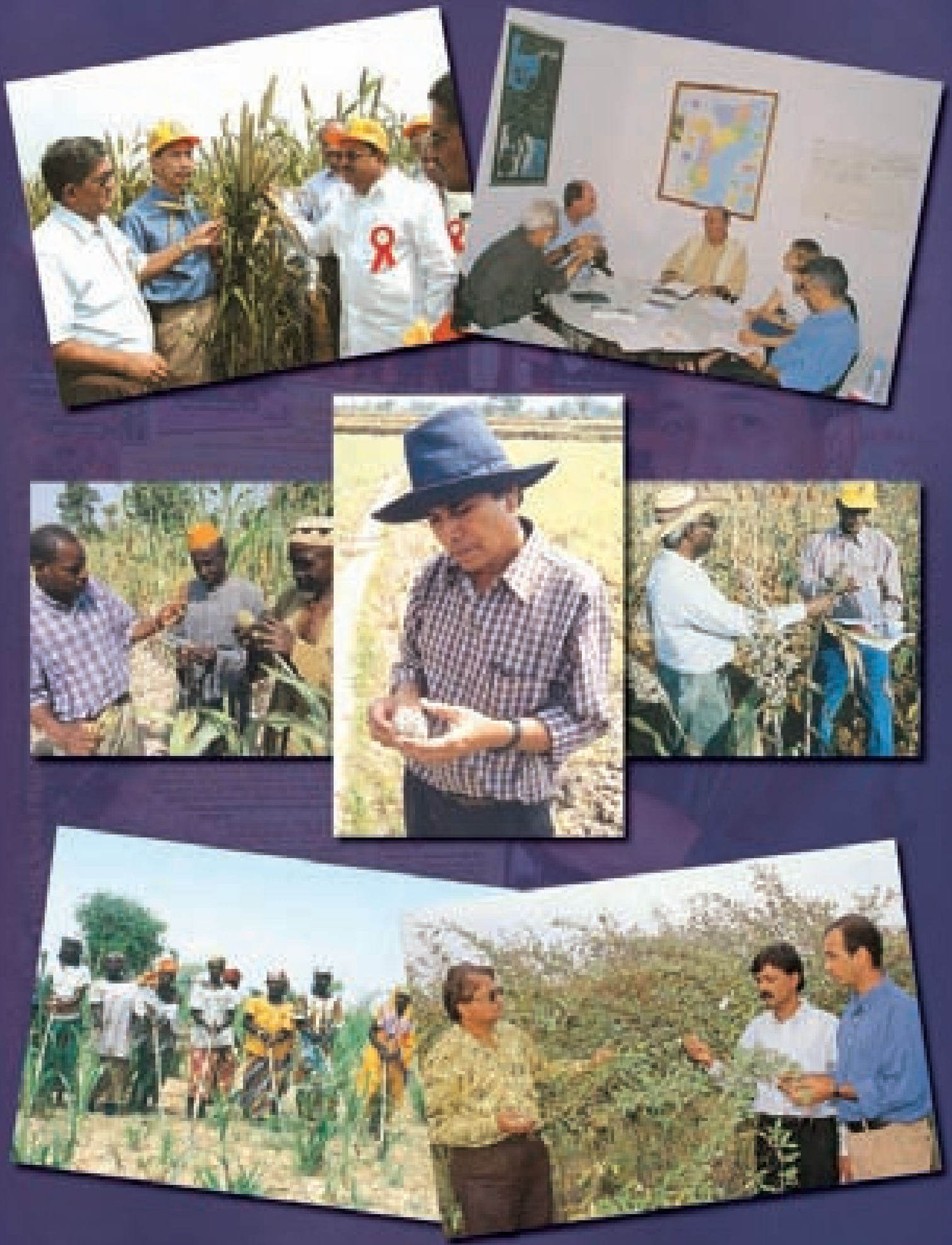
Workshops, Conferences and Training Courses during 2001

Event/Topic/Date	Location	Participants	Participating countries/Institutes	Resources and collaborative support
Consultative meeting on *Aflatoxin detection, quantitative estimation and management*, 8-9 January	ICRISAT-Patancheru	10	India, Thailand, UK	ICRISAT, DFID, and FAO
ICAR-ICRISAT chickpea breeders'meet, 10-11 January	ICRISAT-Patancheru	60	India, Bangladesh, Tanzania, Kenya, Canada, and Iran	ICAR, ICRISAT and CIDA linkage Funds
Third annual work-planning meeting of the IFAD project *Farmer participatory testing of technologies to increase sorghum and pearl millet production in the Sahel*, 15-17 January	ICRISAT-Bamako	50	Mali, IER, ICRISAT and partners	IFAD
Methodology workshop to finetune CG Center's contributions for the DMP/GEF project brief, 17-19 January	Niamey	30	ICRISAT, ICRAF, IFDC, TSBF, ILRI	DMP/GEF
Workshop on *Technology options for sustainable livestock production in India*, 18-19 January	ICRISAT-Patancheru	52	ICAR, State Agriculture Universities, NDDB and IIM	ICAR, ICRISAT, SLP
SLV – *Crop livestock systems in the dry Savanna*, 19-22 January	Niamey	25	Niger, Nigeria, Kenya, Jamaica, Togo, UK, Ethiopia	ICRISAT/ILRI
Stakeholders national consultation to finalize the DMP/GEF proposal, 24-26 January	Burkina Faso	60	INERA, Burkina Faso	DMP/GEF
Stakeholders national consultation to finalize the DMP/GEF proposal, 26-27 January	Niger	40	INRAN, Niger	DMP/GEF
Stakeholders national consultation to finalize the DMP/GEF proposal, 29-31 January	Senegal	50	ISRA, Senegal	DMP/GEG
Sub-regional workshop to synthesize countries documents on DMP/GEF – West Africa, 5-9 February	Niamey	30	INRAN, ISRA, IER, INERA	DMP/GEF

Event/Topic/Date	Location	Participants	Participating countries/Institutes	Resources and collaborative support
Stakeholders national consultation to finalize the DMP/GEF proposal, 13-15 February	Kenya	40	KARI, Kenya	DMP/GEF
Stakeholders national consultation to finalize the DMP/GEF proposal, 16-17 February	South Africa	40	National Dept of Agriculture and Depart. of Environmental Affairs & Tourism	DMP/GEF
Stakeholders national consultation to finalize the DMP/GEF proposal, 19-20 February	Zimbabwe	40	DRSS, Zimbabwe	DMP/GEF
IFAD project coordinators meeting, 19-21 February	ICRISAT-Bamako	15	Mali, Niger, Ghana, Burkina Faso, Nigeria	IFAD
Stakeholders national consultation to finalize the DMP/GEF proposal, 21-22 February	Botswana	50	DAR, Botswana	DMP/GEF
Review and planning meetings of ADB project: 16 February at Vietnam and on 23 February at Thailand	Hanoi, Vietnam and Khon Kaen, Thailand	10	India, Thailand and Vietnam	ICRISAT and ADB
Stakeholders national consultation to finalize the DMP/GEF proposal, 23-24 February	Namibia	40	DRFN, Namibia	DMP/GEF
Sub-regional workshop to synthesize countries documents on DMP/GEF – East and southern Africa, 26-28 February	Kenya	35	KARI, DRSS, DRFN,	DMP/GEF
Meeting on *South Asia regional integration*, 1-3 March	ICRISAT-Patancheru	23	CIMMYT, IRRI, ICRISAT, ICARDA, IWMI, ILRI, IPGRI, CIP, ICLARM, ICRAF, IFPRI, CIFOR, ISNAR,	CGIAR Institutes
Global DMP/GEF stakeholders meeting to finalize the DMP/GEF project brief, 5-10 March	Kenya	50	IER, INERA, INRAN, ISRA, KARI, DRSS, AVRDC, ICIMOD, ICBA	DMP/GEF
Workshop on *More efficient breeding of drought resistant peanuts in India and Australia*, 13-16, March	Pondicherry, India	15	Australia, India	ACIAR-ICAR-ICRISAT Project
Atelier sur la culture du sesame, 14 Mars	Niamey	38	Niger, Mali, Burkina Faso	ICRISAT/PROMEX/ INRAN/SNV
Meeting to discuss progress in the DFID-funded project on *Strategies for reducing aflatoxin levels in groundnut-based foods and feeds in India: A step towards improving health of human and livestock'*, 19-20 March	ICRISAT-Patancheru	25	UK, India	DFID

Event/Topic/Date	Location	Participants	Participating countries/Institutes	Resources and collaborative support
Cours sur les acridiens et autres ennemis des cultures, 26 Mars	Niamey	31	Etudiants ressortissants des Pays du CILSS	ICRISAT/AGHRYMET
Second steering committee meeting of IFAD/NARS/ICRISAT project on *Farmer participatory testing of technologies to increase sorghum and pearl millet production in the Sahel*, 9-11 April	ICRISAT-Bamako	30	Mali, Niger Senegal, Ghana, Italy, Burkina Faso, Nigeria	IFAD
A workshop on *Sharing perspectives on public-private sector interaction*, 10 April	ICRISAT-Patancheru	40	India, UK	NCAP (ICAR), ICRISAT, NRI-UK, Univ. of Strathclyde - UK
Meeting on *Molecular breeding of sorghum, chickpea and groundnut*, 16-20 April	Hanoi, Vietnam	17	Bangladesh, China, India, Pakistan, Vietnam	VASI
Production et dissemination des semences d'arachide, 19 Avril	Niamey	55	Mali, Niger	CFC/ICRISAT
Project planning meeting on *An integrated approach to control stem necrosis disease of groundnut*, 20 April	ICRISAT-Patancheru	8	India	NATP-ROPS: 18 Project
Réunions annuelles des projets ROCAFREMI et atelier du réseau et réunions comité directeur, 21-28 Avril	Niamey	60	Mali, Niger, Burkina Faso, Senegal	ROCAFREMI
Rocafremi annual meeting (Steering committee & general assembly), 19-28 April	ICRISAT-Bamako	30	14 NARS - WCA	ROCAFREMI
Joint meeting of the sorghum & millet networks (ROCARS & Rocafremi), 23 April	ICRISAT-Bamako	80	Benin, Burkina Faso, Niger, Mali	ROCARS and ROCAFREMI
Workshop on launching of project on *Climate prediction and agriculture*, 23-25 April	Bamako, Mali	35	Italy, USA, Niger, Mali, Switzerland, The Netherlands, UK.	European Union (EU)
Mid-term evaluation of the WCASERN strategic plan, 23-26 April	ICRISAT-Bamako	60	18 NARS – WCA	ROCARS
Sixth steering committee meeting of the groundnut germplasm project, 7-11 May	ICRISAT-Bamako	30	Mali, Nigeria, Burkina Faso, Senegal, France, Niger	CFC

Event/Topic/Date	Location	Participants	Participating countries/Institutes	Resources and collaborative support
Workshop on *African food security in a changing environment*, 6-9 June	Kampala, Uganda	na	USA, Japan, numerous sub-Saharan African countries	Sasakawa Global 2000
Mid-term review agenda meeting, 12-14 June	ICRISAT-Nairobi	12	Kenya	ICRISAT
Workshop on *Mozambique partnership*, 13-15 June	Morrumbala, Mozambique	24	Mozambique	AGRIMO and NGO (World Vision)
Meeting to discuss the steps to be taken during 2001 rainy season to minimize the incidence of peanut stem necrosis disease (PSND), 22 June	Anantapur, India	40	Andhra Pradesh, India	NATP
NRMP-experimental protocol review meeting, 22 June	ICRISAT-Patancheru	12	India, Africa	ICRISAT
Workshop on *Constraints and opportunities to groundnut marketing in Malawi, Zambia and Mozambique*, 26-27 June	Chipata, Zambia	37	Malawi, Mozambique, South Africa, Zambia	ICRISAT
APAARI meeting on *Agricultural research priorities for South and West Asia region*, 5-7 July	ICRISAT-Patancheru	36	Bangladesh, India, Iran, Zimbabwe, Mali, Mexico, Philippines, Sri Lanka, USA, Thailand, Ethiopia	ICRISAT, APAARI
Sixth women's leadership and management course, 8-14 July	ICRISAT-Patancheru	23	9 CG centers, 3 NARS	CGIAR Gender and Diversity Program
Meeting on *Integration of agricultural research in West Africa*, 10-12 September	IITA, Ibadan, Nigeria	40	Representatives from 9 CGIAR centers, Mali, Nigeria.	CORAF, IITA, ICRISAT and WARDA
Workshop on *Farmer participatory research approaches and computer based simulation modeling'*, 14-20 October	ICRISAT-Bulawayo	50	Zimbabwe, South Africa, Kenya, Burkina Faso, Niger, Uganda, Côte d'Ivoire, USA, Australia, Laos and New Zealand	ICRISAT and CIMMYT
Brainstorming workshop on *Policy and institutional options for sustainable management of watersheds*, 1-2 November	ICRISAT-Patancheru	32	India	ICRISAT and ADB
Workshop on A *colloquium on priorities for multidisciplinary teams: Using genomics to enhance utilization of crop genetic resources in plant breeding*, 15-16 November	ICRISAT-Patancheru	30	India	ICRISAT
Meeting to discuss progress and future plans for the DFID-funded aflatoxin project, 22 November	ICRISAT-Patancheru	20	UK, India	DFID
ADB-ICRISAT-IWMI annual project planning and review meeting and 6th MSEC assembly, 10-15 December	Hanoi, Vietnam	33	India, Nepal, Thailand, Phillippines, Vietnam, Indonesia	ICRISAT and ADB
Workshop on *Helicoverpa management – The journey ahead*, 21-22 December	ICRISAT-Patancheru	80	India, UK, Australia	ICRISAT



Event/Topic/Date	Location	Participants	Participating countries/Institutes	Resources and collaborative support
Training Courses				
Training course on *Quantitative estimation of aflatoxins using* ELISA-*based techniques*, 10-20 January	ICRISAT-Patancheru	7	India, Thailand	ICRISAT, DFID, FAO
Training course for Lalatora farmers on *Integrated watershed management*, 23-24 January	ICRISAT-Patancheru and Kothapally Watershed	10	India	ICRISAT and ADB
Training course on *Integrated watershed management* for Nawabpet Watershed Committee farmers, 7-8 February	ICRISAT-Patancheru and Kothapally Watershed	105	India	ICRISAT
Training course on *Aspergillus/aflatoxin and virus detection in groundnut*, 26 February-8 March	ICRISAT-Bamako	15	12 countries in West and Central Africa	Common Fund for Commodities (CFC)
Training workshop on seed production, storage distribution/ICRISAT/ISRA, 28 February-March 10	ICRISAT-Bamako	25	13 countries: West Africa	CFC
Training course on *Integrated watershed management* for agricultural officials of R R district, 7-8 March	ICRISAT-Patancheru and Kothapally Watershed	52	India	ICRISAT and ADB
Training course on *Groundnut production technologies*, 7-9 March	Lilongwe, Malawi	60	Malawi	ICRISAT-DARTS and USAID/Malawi
Training course on *Groundnut production technologies*, 12-14 March	Kasungu, Malawi	74	Malawi	ICRISAT-PLAN Malawi
Training course on *Groundnut seed production*, 20-30 March	Bambey, Senegal	22	13 West and Central African countries	ISRA funded by CFC
Training course on *Groundnut production*, 21-22 March	Nampula, Mozambique	30	Mozambique	SADC/ICRISAT
Training program on *Agricultural production systems simulator* (APSIM), 26 April-3 May	IER/ICRISAT	10	IER, ICRISAT	ICRISAT
One week training course in *How to run an effective demonstration*, May	District Extension Office (Singida)	15	Tanzania Development.	ICRISAT SMIP and Tanzania Dept. of Crop
Training in *Implementation and management of farmer field schools* (FFS), May–July.	ICRISAT-Bulawayo	3	Zimbabwe	ICRISAT
Training course on *Cross-validation and bootstrapping for quantitative trait loci* (QTL) *mapping in bi-parental crosses*, 21-25 May	ICRISAT-Patancheru	12	India	ICRISAT
Training program on *Integrated watershed management'* for agricultural officials of Adilabad, 29-31 May	ICRISAT-Patancheru and Kothapally Watershed	25	India	ICRISAT and ADB
Training course on *Distinguishing features of bud necrosis an stem necrosis diseases*, 1-2 June	NBPGR, Rajendranagar and ICRISAT, Patancheru	37	Andhra Pradesh, India	NATP, ICRISAT
Training program on *Quality of work, quality of life*, 5-6 June	ICRISAT-Patancheru	19	India	ICRISAT
Collaborative alliances course, 7-11 June	Nyeri, Kenya	14	Kenya, Ethiopia	ICRISAT
Training course on *Assessment of diversity: Principles and procedures*, 26-28 June	ICRISAT-Patancheru	40	India, UK	DFID & ICRISAT
Training course on *Pigeonpea production technologies*, 10-12 July	Mulanje, Malawi	65	Malawi	ICRISAT, DARTS and USAID/Malawi
Training workshop on *On-farm participatory methodology*, 26-31 July	Khon Kaen, Thailand	12	India, Thailand, Vietnam, Indonesia	ICRISAT and ADB research
Training course on *GIS*, 7 August	ICRISAT-Bamako	15	Mali	IER and ICRISAT
Training course for farmers of Adilabad dist. on *Integrated watershed management*, 27-28 August	ICRISAT-Patancheru and Kothapally Watershed	31	India	ICRISAT and ADB
Training course on *Teaching principles of integrated soil water and nutrient management in* FFS, 17-21 September	Matopos	14	Zimbabwe	ICRISAT SMIP and University of Zimbabwe

Event/Topic/Date	Location	Participants	Participating countries/Institutes	Resources and collaborative support
Training course for farmers of Adilabad dist on *Integrated watershed management*, 24-25 September	ICRISAT-Patancheru and Kothapally Watershed	31	India	ICRISAT and ADB
Training course on *African market garden* (AMG), 25-27 September	ICRISAT-Niamey	10	Niger	ICRISAT and NGO
Training course for farmers of Medak dist. on *Integrated watershed management*, 3-13 October	ICRISAT-Patancheru and Kothapally Watershed	500	India	ICRISAT and ADB Peace Corp Niger
Training program on HIV/AIDS, Zimbabwe, 12-13 October	Matopos	13	Zambia, Tanzania, Mozambique,	ICRISAT SMIP
Training course on *Sorghum processing and utilization*, 14-16 October	Ouagadougou, Burkina Faso	47	Mali, Burkina Faso, Nigeria, Ghana, Togo, Senegal, France	ROCARS, IFAD SG2000
Regional training course on *African market garden* (AMG) *and date palm cultivation techniques: Pilot farmers*, 17-25 October	ICRISAT-Niamey	26	Burkina Faso, Mali, Niger and Senegal	IPALAC and ICRISAT
Training program for NOG-PIAs of APRLP on *Integrated watershed management*, 22-23 November	ICRISAT-Patancheru and Kothapally Watershed	25	India	ICRISAT
Training course on *Groundnut seed production technologies*, 26-28 November	Vietnam	25	Vietnam	LRDC, Vietnam


ICRISAT on the Web

ICRISAT in the News

The Hindu Sunday 18 March 2001

ICRISAT makes strides in chickpea breeding

Business Line New Delhi

'Policy support to pulses, coarse cereals not adequate'

'Second Green Revolution possible with biotech, IT'

Action plan t groundnut di

Business Line

4 SATURDAY, MAY 12, 2001 DECCAN CHRONICLE, HYDERABAD

ICRISAT SUBMITS ACTION PLAN TO CHIEF MINISTER

Crop disease under siege

Icrisat gets help in breeding research

Nepal can cash chickpea cultiv

The Rising Nepal Kathmandu

PM could double GDP in ten years

Times of In

Scie

CM reviews steps to prevent spread of groundnut disease

Alpha constate les réalisati

Tech award winner keen to develop AP

Disease eats into massive peanut crop

Icrisat donates millet seed quake-hit farmers in Guj

ndia Hyderabad

ntists told to meet IPR challenge

ICRISAT Governing Board

Martha B Stone, *Canada*
Chairman of the Board
Senior Partner, Moenston Associates
470 Laurier Ave. W Suite
Ottawa, Ontario
Canada K1R 7 W9
Tel: 1-613-235-2252
Fax: 1-819-457-2359
Email: mbstone@ca.inter.net

Panjab Singh, *India*
Vice-Chairman
Secretary, Government of India
Department of Agricultural Research and Education, and
Director General, Indian Council of Agricultural Research (ICAR)
Krishi Bhavan
New Delhi 110 001, India
Tel: 91-11-338-2629
Fax: 91-11-338-4773
Email: psingh@icar.delhi.nic.in

William D Dar, *Philippines*
Director General
International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)
Patancheru 502 324
Andhra Pradesh, India
Tel: 91-40-329-6161
Fax: 91-40-329-6180
Email: w.dar@cgiar.org

P V Rao, IAS, *India*
Chief Secretary, Government of Andhra Pradesh
Secretariat
Hyderabad 500 022, Andhra Pradesh, India
Tel: 91-40-345-2620
Fax: 91-40-345-3700
Email: csap@ap.nic.in

J N L Srivastava, IAS, *India*
Secretary, Government of India
Department of Agriculture and Cooperation
Ministry of Agriculture, Krishi Bhavan
New Delhi 110 001
India
Tel: 91-11-338-2651/ 8444
Fax: 91-11-338-6004
Email: jnls@krishi.delhi.nic.in

Bo Bengtsson, *Sweden*
Nybyvaegen 1304
S-243 93 Höör,
Sweden
Tel: 46-413-26139
Fax: 46-413-25-476
Email: bengtsson.bo.m.i@telia.com

Marc Latham, *France*
Domaine de St.Laurent
Route De Maureilhan
34500 Beziers
France
Tel: 33-4-67-285-302
Fax: 33-4-6749-3895
Email: mlatham@club-internet.fr

Donald R Marshall, *Australia*
41 Worthey Street
Balmain
New South Wales 2041
Australia
Tel: +61-2-9818-6487
Fax: 61-2-9818-1402
Email: marshallpbs@aol.com

Augustine Uzo Mokwunye, *Nigeria*
Director
The United Nations University
Institute for Natural Resources in Africa
Private Mail Bag
Kotoka International Airport
Accra, Ghana
Tel: 233-21-500-396
Fax: 233-21-500-792
Email: mokwunye@inra.unu.edu.gh

Gladys M N Mutukwa, *Zambia*
Gladys Mutukwa & Associates
PO Box 33717
Lusaka
Zambia
Tel: 260-1-293-009
Fax: 260-1-225-166 and 260-1-221-075
Email: msodzi@hotmail.com

Simon G Best, *UK*
Chief Executive Officer
Ardana Bioscience Limited
58 Queen Street, Edinburgh
EH2 3NS,
Scotland, UK
Tel: 44-131-226-8550
Fax: 44-131-226-8551
Email: simon@ardana.co.uk

Joao Ambrosio de Araujo Filho, *Brazil*
(from 1 Apr 2002)
Empresa Brasileira de Pesquisa Agropecuaria
Centro Nacional de Pesquisa de Caprinos
Fazenda Tres Lagoas
Estrada Sobral- Groairas, Km 4
Caixa Postal D-10, Sobral, Ceara
Brazil, CEP 62011-970
Tel: +88-677-7033

Roger N Beachy, *USA*
President
Donald Danforth Plant Science Center
975 N Warson Road
St. Louis, MO 63132
USA
Tel: 1-314-587-1201
Fax: 1-314-587-1301
Email: rnbeachy@danforthcenter.org

Tadakatsu Yoneyama, *Japan*
Department of Applied Biological Chemistry
Graduate School of Agriculture and Life Sciences
The University of Tokyo
Yayoi 3-1-1, Bunkyo-Ku
Tokyo 113-8657,
Japan
Tel: 81-35841-5104
Fax: 81-35841-8032
Email: atyone@mail.ecc.u-tokyo.ac.jp

Jose T Prisco, *Brazil*
(until 31 Mar 2002)
Professor
Plant Physiology Laboratory
Department of Biochemistry and Molecular Biology
Federal University of Ceará
PO Box 1065, 60.001-970
Fortaleza, CE
Brazil
Tel: 55-85-288-9827/9829
Fax: 55-85-224-4159
Email: prisco@ultranet.com.br

ICRISAT Senior Staff[1]

(Name, *country of origin*, and work location)

Director General's Office

William D Dar, *Philippines*, Patancheru
C Geetha, *India*, Patancheru
Stuart Markham McLay, *UK*, Hyderabad

Public Awareness

Eric M McGaw, *USA*, Patancheru
T R Kapoor, *India*, Patancheru

Resource Mobilization

Barry I Shapiro, *USA*, Patancheru

Internal Audit

T N Menon, *India*, Patancheru

Deputy Director General's Office

J M Lenné, *Australia*, Patancheru*
Y S Chauhan, *India*, Patancheru

Impact Assessment

H A Freeman, *Sierra Leone*, Nairobi

Information Resource Management

Rex L Navarro, *Philippines*, Patancheru
V Balaji, *India*, Patancheru
S Srinivas, *India*, Patancheru
B Ram Kumar, *India*, Patancheru

Farm and Engineering Services

N S S Prasad, *India*, Patancheru
M Prabhakar Reddy, *India*, Patancheru
K Ravindranath, *India*, Patancheru

Genebank

N Kameswara Rao, *India*, Patancheru

Global Theme 1

Jonathan H Crouch, *UK*, Patancheru
Hutokshi K Buhariwalla, *UK*, Patancheru
Morag Ferguson, *UK*, Patancheru
Emma Mace, *UK*, Patancheru
R Folkertsma, *Netherlands*, Patancheru
Maria K Allen, *Russia*, Patancheru
Junichi Kashiwagi, *Japan*, Patancheru
Kiran K Sharma, *India*, Patancheru
Rachid Serraj, *Morocco*, Patancheru
C T Hash, *USA*, Patancheru
Lava Kumar, *India*, Patancheru
N Seetharama, *India*, Patancheru
Jagdish Kumar, *India*, Patancheru
V Mahalakshmi, *India*, Patancheru
Nalini Mallikarjuna, *India*, Patancheru
H C Sharma, *India*, Patancheru
Subhash Chandra, *India*, Patancheru

Global Theme 2

C L L Gowda, *India*, Patancheru
S N Nigam, *India*, Patancheru
Farid Waliyar, *France*, Patancheru
A B Obilana, *Nigeria*, Nairobi
S N Silim, *Uganda*, Nairobi
Pala Subrahmanyam, *India*, Lilongwe
B R Ntare, *Uganda*, Bamako
Ousmane Youm, *Senegal*, Bamako
H F W Rattunde, *USA*, Bamako
Eva W Rattunde, *Germany*, Bamako
I Akintayo, *Togo*, Bamako
Gospel O Omanya, *Kenya*, Niamey
Botorou Ouendeba, *Niger*, Niamey
P Delfosse, *Belgium*, Niamey
E S Monyo, *Tanzania*, Bulawayo
Mary A Mgonja, *Tanzania*, Bulawayo
R P Thakur, *India*, Patancheru
O P Rupela, *India*, Patancheru
K B Saxena, *India*, Patancheru
Belum V S Reddy, *India*, Patancheru
K N Rai, *India*, Patancheru
Suresh Pande, *India*, Patancheru
H D Upadhyaya, *India*, Patancheru
P N Mathur, *India*, Patancheru
G V Ranga Rao, *India*, Patancheru

Global Theme 3

S J Twomlow, *UK*, Bulawayo
J V D K Kumar Rao, *India*, India
R J K Myers, *Australia*, Bulawayo
Paula Bramel, *USA*, Bulawayo
John P Dimes, *Australia*, Bulawayo
G M Heinrich, *USA*, Bulawayo
Joseph Rusike, *Kenya*, Bulawayo
T J Rego, *India*, Patancheru
Prabhakar Pathak, *India*, Patancheru
Piara Singh, *India*, Patancheru
S P Wani, *India*, Patancheru
A Ramakrishna, *India*, Patancheru
K P C Rao, *India*, Patancheru

Global Theme 4

R B Jones, *UK*, Nairobi
Catherine Longley, *UK*, Nairobi
Carlos E Dominguez Otero, *Colombia*, Mozambique
David D Rohrbach, *USA*, Bulawayo

Global Theme 5

Bruno Gerard, *Belgium*, Niamey
Ramadjita Tabo, *Chad*, Bamako
Dov Pasternak, *Israel*, Niamey
S Koala, *Burkina Faso*, Niamey
K Hayashi, *Japan*, Niamey
Joseph J Adu-Gyamfi, *Ghana*, Kano
P C S Traore, *France*, Bamako

Global Theme 6

M C S Bantilan, *Philippines*, Patancheru
Andrew J Hall, *UK*, Patancheru
Bekele Shiferaw, *Ethiopia*, Patancheru
Jupiter Ndjeunga, *Cameroon*, Bamako
Gabriele G Lo Monaco, *Italy*, Bulawayo
Jane Alumira, *Kenya*, Bulawayo
P Parthasarathy Rao, *India*, Patancheru
K Purnachandra Rao, *India*, Patancheru

Assistant Director General – Operations

S Parthasarathy, *India*, Patancheru

Purchase, Supplies, and Disposal Services

D K Mehta, *India*, Patancheru
T Kulashekar, *India*, Patancheru

Transport Services

K Jagannadham, *India*, Patancheru

Security Office

K K Sood, *India*, Patancheru

Housing and Food Services

K Ravi Shankar, *India*, Patancheru

New Delhi Office

P M Menon, *India*, Delhi

Finance and Human Resources

Kwame Akuffo-Akoto, *Ghana*, Patancheru

Human Resources Services

I R Nagaraj, *India*, Patancheru
A J Rama Rao, *India*, Patancheru
C Narasimha Reddy, *India*, Patancheru

Finance Services

S Sethuraman, *India*, Patancheru
M S Diolombi, *Nigeria*, Niamey
Modibo Diarra, *Mali*, Bamako
C N Orare, *Kenya*, Bulawayo

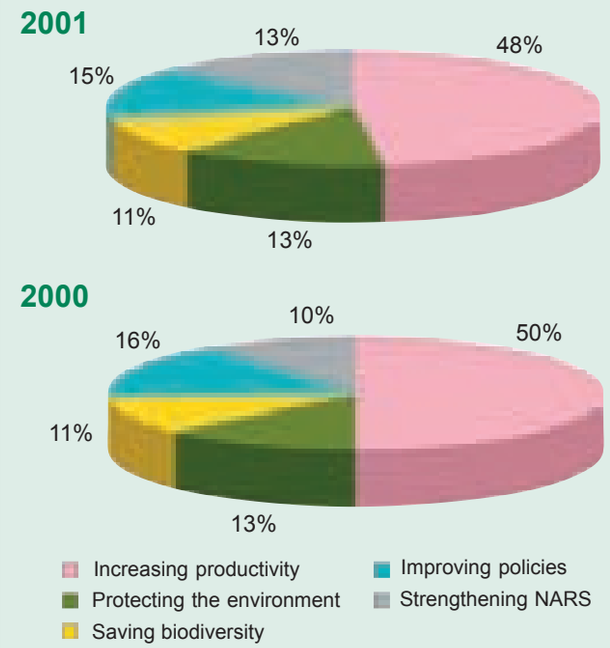
1. Profiles of work and email contact addresses for ICRISAT staff are available on ICRISAT's website at www.icrisat.org
*Until 9 April 2002

Financial Summary

Balance Sheet

	US$ thousands	
	2001	**2000**
Assets		
Cash and cash equivalents	12,278	13,746
Investments	3,377	4,198
Accounts receivable	4,259	4,781
Inventories	776	942
Prepaid expenses	340	400
Property and equipment - net	7,604	7,291
Other assets	2,175	2,229
Total	**30,809**	**33,587**
Liabilities		
Accounts payable	2,518	2,687
Accruals and provisions	1,183	1,153
Payments in advance from donors	3,462	3,433
In-trust funds	121	79
Long-term liabilities	5,986	6,202
Total	**13,270**	**13,554**
Net Assets		
Unrestricted		
Unappropriated	3,485	5,137
Appropriated	14,054	14,896
Total	**17,539**	**20,033**

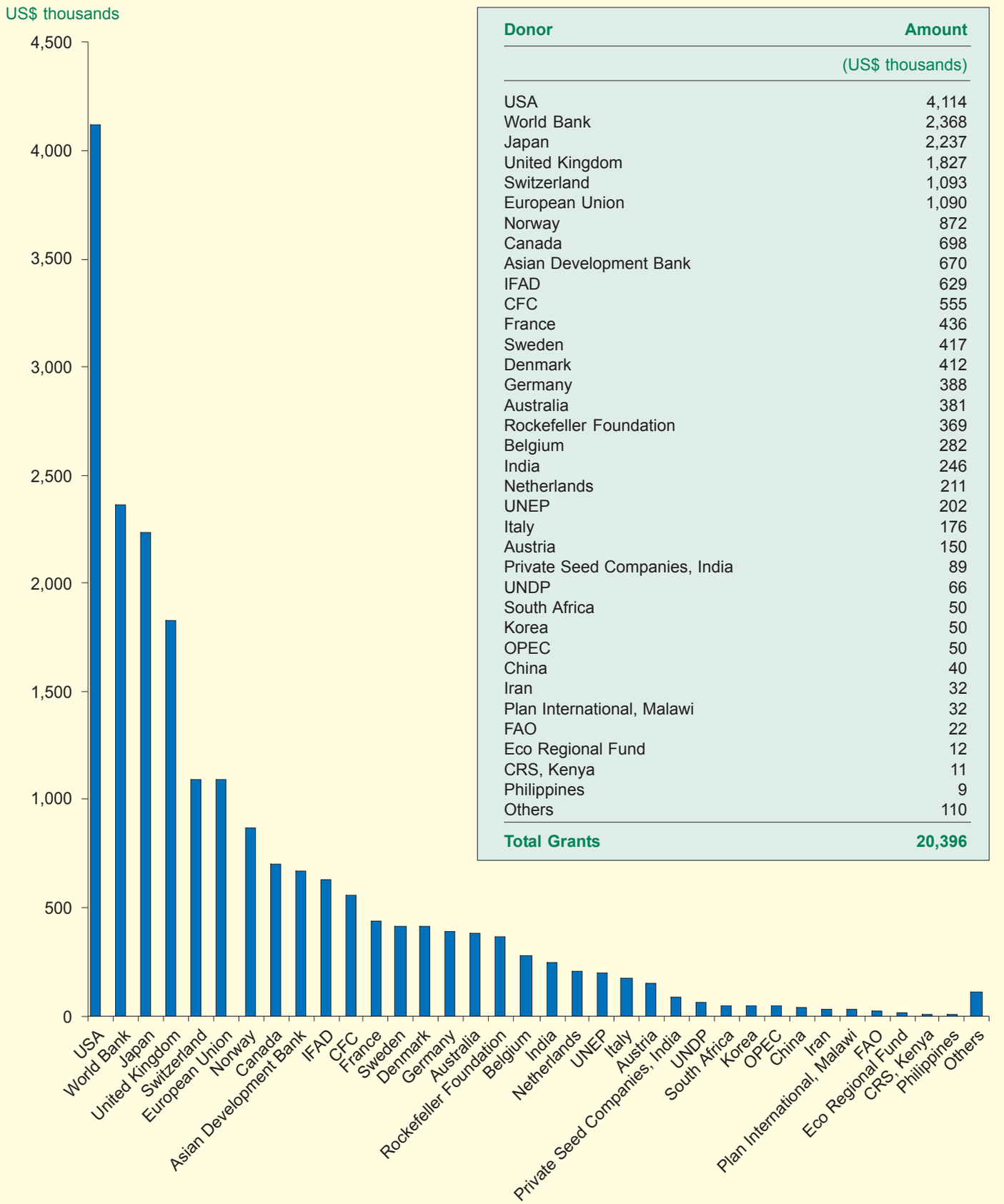
Expenditures by CGIAR Activity



Operating Results and Movements in Net Assets

	(US$ thousands)	
	2001	**2000**
Operating Results		
Revenue	21,977	23,542
Expenditure	24,078	23,387
Change in net assets, operational	(2,101)	155
Extraordinary Items	-	761
Change in net assets, operational (net)	**(2,101)**	**916**
Net Assets – Unrestricted		
a) Unappropriated		
Balance, beginning of the year	5,137	4,248
Operating (deficit)/surplus for the year	(2,101)	916
Improvements to physical facilities	(255)	-
Transfer from appropriated net assets	255	-
Changes in Accounting Policies		
Depreciation on assets in custody	121	-
Depreciation on buildings	328	-
Prior year charges	-	(27)
Balance, end of the year	**3,485**	**5,137**
b) Appropriated		
Balance, beginning of the year	14,896	14,931
Changes in Accounting Policies		
Depreciation on assets in custody	(121)	-
Depreciation on buildings	(328)	-
Restricted projects assets	(137)	89
Transfer to unappropriated net assets	(255)	-
Loss on sale of fixed assets	164	103
Deletion of assets	(164)	(103)
Acquisition of physical facilities	-	(99)
Housing loans, net of interest	3	(25)
Prior period charges	(4)	-
Balance, end of the year	**14,054**	**14,896**
Total Net Assets - Unrestricted	**17,539**	**20,033**

Grant Income from Donors for the year 2001



Donor	Amount
	(US$ thousands)
USA	4,114
World Bank	2,368
Japan	2,237
United Kingdom	1,827
Switzerland	1,093
European Union	1,090
Norway	872
Canada	698
Asian Development Bank	670
IFAD	629
CFC	555
France	436
Sweden	417
Denmark	412
Germany	388
Australia	381
Rockefeller Foundation	369
Belgium	282
India	246
Netherlands	211
UNEP	202
Italy	176
Austria	150
Private Seed Companies, India	89
UNDP	66
South Africa	50
Korea	50
OPEC	50
China	40
Iran	32
Plan International, Malawi	32
FAO	22
Eco Regional Fund	12
CRS, Kenya	11
Philippines	9
Others	110
Total Grants	**20,396**

SATrends

ICRISAT's monthly e-newsletter

Keep in touch with ICRISAT... through SATrends!

Our brief yet exciting monthly e-newsletter of progress and achievement.
A front-row seat for the Grey to Green revolution!

ICRISAT HOME PAGE
www.icrisat.org

ICRISAT

A CGIAR-supported Future Harvest Center

Our Vision, Mission, and Mandate

Vision

To improve the well-being of the poor who live in the semi-arid tropics through agricultural research for impact.

Mission

To help the poor of the semi-arid tropics through *Science with a Human Face* and partnership-based research and to increase agricultural productivity and food security, reduce poverty, and protect the environment.

Mandate

To enhance the livelihoods of the poor through integrated genetic and natural resource management strategies.

ICRISAT will:

- Make crops more productive, nutritious, and affordable
- Diversify utilization options for staple food crops
- Develop tools and techniques to manage risk and use the natural resource base sustainably
- Develop options to diversify income generation
- Strengthen delivery systems to key clients

ICRISAT's locations

www.icrisat.org

FUTURE HARVEST

www.futureharvest.org

www.cgiar.org

Western and Central Africa

ICRISAT – Niamey (Regional hub)
BP 12404
Niamey, Niger (Via Paris)
Tel +227 722529, 722725
Fax 734329
icrisatsc@cgiar.org

ICRISAT – Bamako
BP 320
Bamako, Mali
Tel +223 223375, 227707
Fax 228683
icrisat-w-mali@cgiar.org

ICRISAT – Kano
c/o IITA, Sabo Bakin Zuwo Road
PMB 3491 Kano, Nigeria
Tel +234 64 662050
Fax 669051, 645352
iita-kano@cgiar.org

Eastern Africa

ICRISAT – Nairobi (Regional hub)
PO Box 39063,
Nairobi, Kenya
Tel +254 2 524555
Fax 524001
icrisat-nairobi@cgiar.org

Southern Africa

ICRISAT – Bulawayo (Regional hub)
Matopos Research Station
PO Box 776,
Bulawayo,
Zimbabwe
Tel +263 83 8311
Fax 83 8253
icrisatzw@cgiar.org

ICRISAT – Lilongwe
Chitedze Agricultural Research Station
PO Box 1096
Lilongwe,
Malawi
Tel +265 707297
Fax 707298
icrisat-malawi@cgiar.org

ICRISAT – Maputo
c/o INIA, Av. das FPLM Nº 2698
Caixa Postal 1906
Maputo,
Mozambique
Tel +258-1-461657
Fax 461581
icrisat@zebra.uem.mz

Headquarters

ICRISAT – Patancheru
Patancheru 502 324
Andhra Pradesh, India
Te +91 40 3296161
+91 11 581 9291
(New Delhi Office)
Fax 3241239, 3296182
icrisat@cgiar.org
icrisatnd@cgiar.org
(New Delhi Office)

. . . through research, impact !

ICRISAT
International Crops Research Institute for the Semi-Arid Tropics
Patancheru 502 324, Andhra Pradesh, India
www.icrisat.org

FUTURE HARVEST
Science for Food, the Environment, and the World's Poor

CGIAR
Consultative Group on International Agricultural Research

ISSN 1017–9933 IRE 012 336–2002