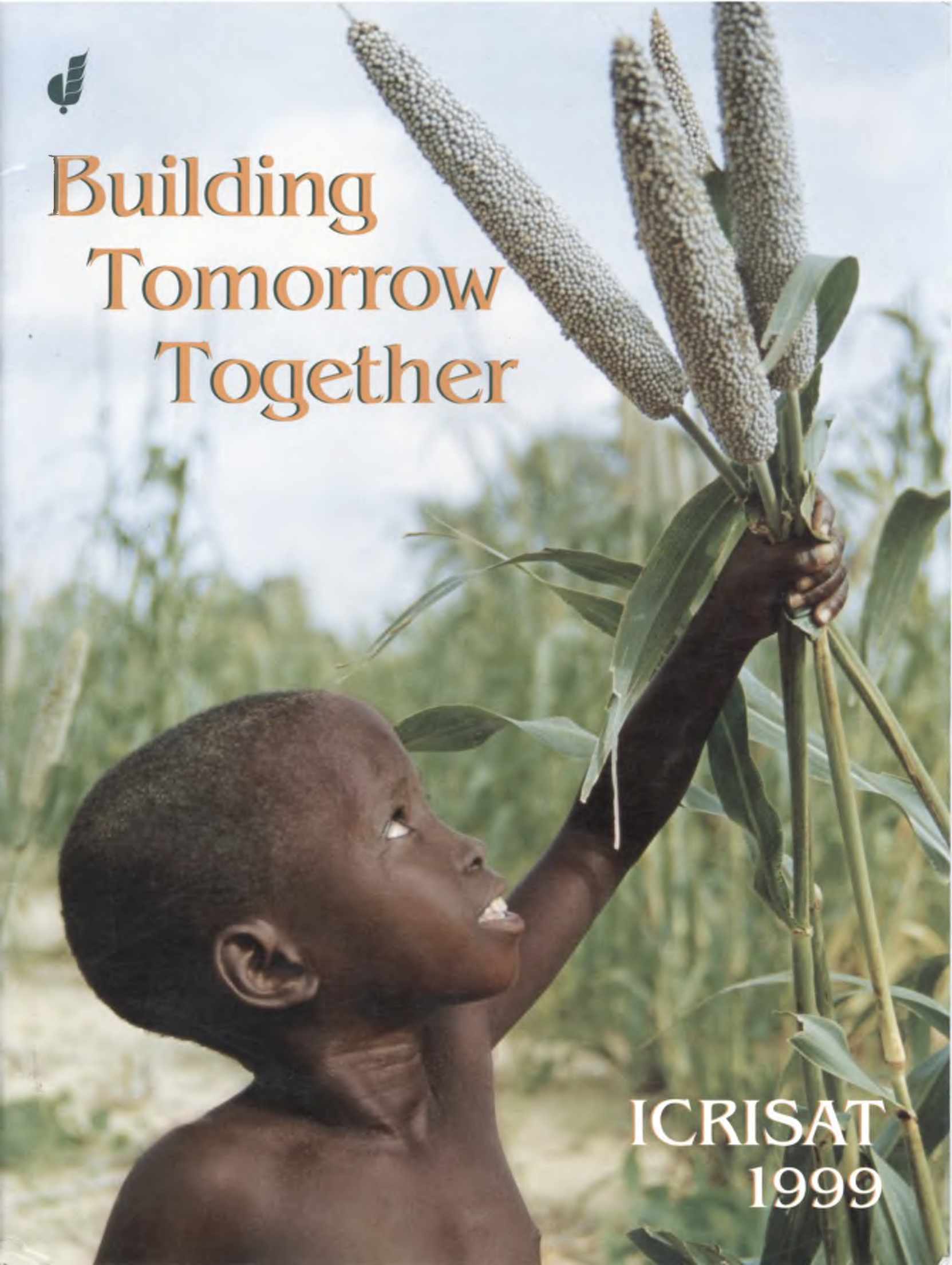
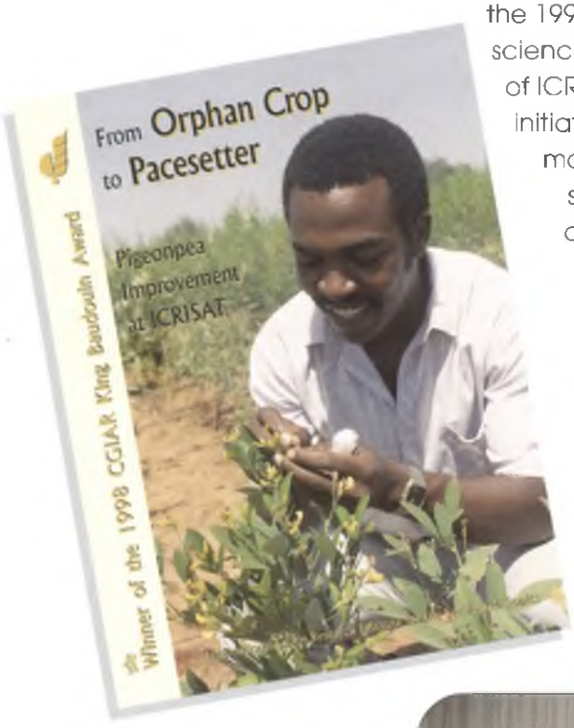
Building Tomorrow Together

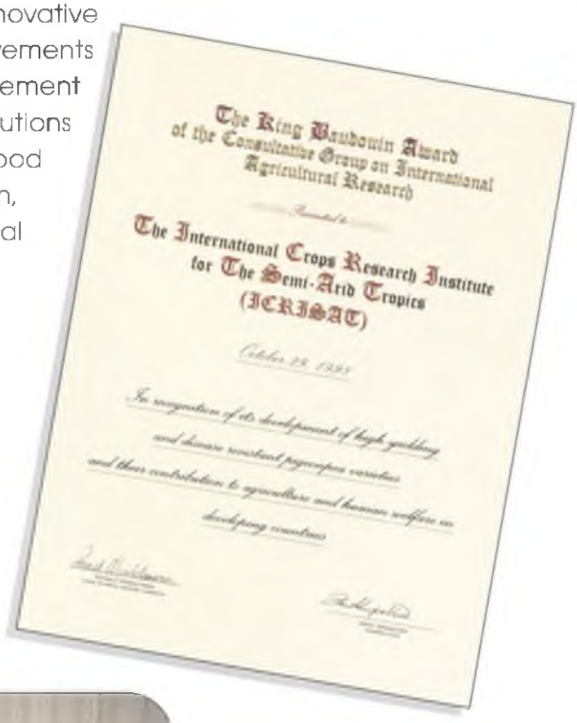


ICRISAT
1999

CGIAR King Baudouin Award

In 1998, ICRISAT became the first Center in CGIAR history to be awarded the System's highest accolade, the King Baudouin Award, for a second consecutive time. Following the 1996 award for pearl millet improvement (bottom), the 1998 award heralded the innovative science and partnership achievements of ICRISAT's pigeonpea improvement initiative. It praised the contributions made towards enhanced food security, poverty alleviation, and sustainable agricultural development in both Africa and Asia.



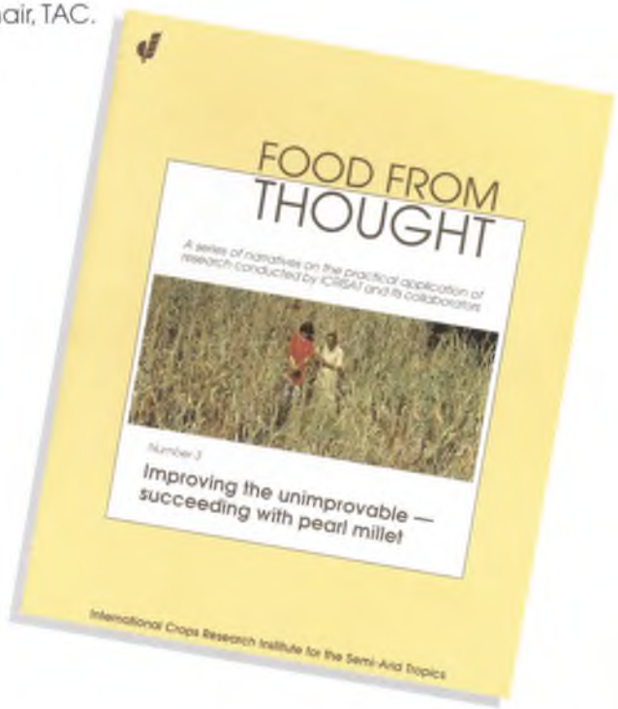

The King Baudouin Award of the Consultative Group on International Agricultural Research

The International Crops Research Institute for The Semi-Arid Tropics (ICRISAT)

ICRISAT Director General S M Barghouti receiving the 1998 King Baudouin Award in Washington.
Left to right His Excellency Adan André, Belgian Ambassador to USA, S M Barghouti, Ismail Serageldin, Chair, CGIAR, and Don Winkelmann, Chair, TAC.


The King Baudouin Award of the Consultative Group on International Agricultural Research

The International Crops Research Institute for the Semi-Arid Tropics—ICRISAT



Message from the Director General

Director General Shawki M Barghouti (left) *with Board Chairperson Ragnhild Sohlberg.*

I am delighted once again to have this opportunity to update ICRISAT's friends on our contributions to sustainable agricultural development. Let me briefly encapsulate what it is that we do. We focus on *research for development* to improve agriculture in the semi-arid (dry) tropics, where short and irregular rains, coupled with nutrient-poor soils, make food production an unpredictable enterprise. Despite this element of risk, most of the people in the dry tropics work in agriculture, or an industry dependent upon it. ICRISAT's goal is to help them improve their lives by making best use of the resources of the semi-arid tropics for agricultural production, without degrading the environment that is their children's birthright.

The word "tropics" brings to mind the lush climates of tropical rainforests. The less-publicized *dry* tropical areas, though, actually cover a huge portion of the earth's agricultural land, including the majority of the African farm landscape. People have lived in the dry tropics for millennia, including such diverse societies as those of the Nile, Niger, Senegal, and Indo-Gangetic river basins; the Abyssinian plateau (Ethiopia) and Deccan plateau (India); and parts of the Caribbean islands and Central American isthmus.

Why, it is sometimes asked, do farmers even attempt to make a living in these harsh areas? One could equally ask why wheat farmers try to survive on the dry plains of the midwestern USA, in the Australian grain belt, or in the central Asian steppe. The answer is simple. This is their home – their past and their future. They are committed to making the best of what they have.

We in turn are proud to be their partners in this noble endeavor. We've chosen "Building Tomorrow Together" as the theme for this year's report because it captures the essence of what we do. With our national partners and global development investors (the term we prefer to the traditional "donors" label), we are building towards a tomorrow in which poverty, hunger, and environmental deterioration no longer haunt humanity.

Faith in the future of course involves taking risks. Our research-for-development initiatives take years or even decades to pay off. But risk is no stranger to the farmers of dry areas, whose livelihoods are vulnerable to the erratic rainfall, uncertain supplies of inputs, sudden disease and insect outbreaks, and unpredictable markets for their produce. For them, the sowing of seed is an act of faith in itself. Inspired by their example, we, the international scientific and development community, can hardly offer less.

We cannot conceive of achieving our ambitious goals through our actions alone. Agriculture is not just technology – it is a way of life for rural peoples. Development problems and opportunities impact all dimensions of society, so broad participation is crucial to success. We work through a web of partnerships, in which international, national, local, community, public and private, government and non-governmental organizations all join hands to contribute their particular expertise to a coordinated group effort. Much of our time and energy goes to building and sustaining such partnerships.

I will illustrate a few examples of our partnerships that are currently very exciting. Throughout this Report you will encounter many others, which are by no means less significant.

We are in the midst of transforming our long-standing partnership in millet and sorghum improvement in Southern and Eastern Africa into a broader-based, long-term association encompassing a wide range of issues facing that region. This revitalized partnership is an outcome of intensive discussions we convened with regional, national,

and community partners from the government, regional, private, and non-governmental sectors, as well as development investors in the SADC countries. This initiative has been made possible through the generous and far-sighted action of the Government of Zimbabwe in hosting us on behalf of the region.

A second example is a parallel enhancement and broadening of our partnerships in West Africa, based at Bamako, Mali. As in the previous example, this enhancement is emerging from a series of in-depth consultations with partners in Mali and the region. Our partners have indicated a strong desire to gain ICRISAT's assistance in upgrading their skills in modeling and geographic information systems. Several development investors have offered support for this strengthening. To meet this request, we are in the midst of shifting some of these capabilities into that region.

The Mali base is ideally located to represent the wetter edge of the semi-arid tropical band stretching across the vast expanse of West Africa. As such, it complements our superb facilities near Niamey, Niger, which is truly on the desert fringe of the dry tropics. At Niamey we convene the ongoing, extensive partnership development and project execution of the CGIAR's Systemwide Desert Margins Program. This Program continues to gain momentum with national and regional organizations as well as development investors, and is featured in a highlight within the body of this Report.

We also continue to strengthen our close partnership with ICAR, India, the national research program of our host country in Asia, through a number of joint research-for-development projects which also include additional partners from the non-governmental, private, and community sectors. Watershed and molecular biology-related partnerships are under particularly active development now. Asian countries are concerned about the sustainability of their highly productive watershed resources, which are under increasing threat from intensified use. The new tools of molecular markers and genetic mapping are generating excitement worldwide, and facilities at our Patancheru headquarters hold the CGIAR's largest collection of crop biodiversity in trust for humanity, a fundamental input for biotechnology research.

The ultimate objective of these partnerships of course is to generate improved technologies that benefit farmers. Building on the past quarter-century of effort, a continuous stream of proven technologies is indeed flowing to the farm. Benefits from improved crop varieties jointly developed with partners now amount to more than *ten times* our budget annually, and are on the increase. Two cases in which we take special pride are illustrated on the inside front cover; they enabled us to become the CGIAR's first Center to win the system's highest accolade, the King Baudouin Award, twice in a row.

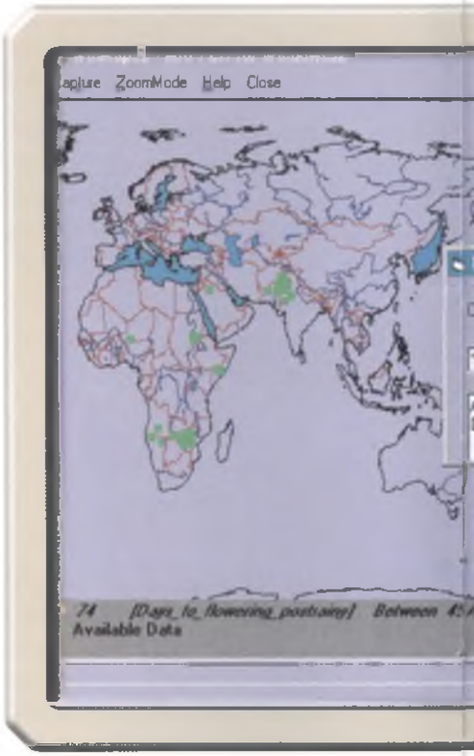
These partnerships and benefits would never have been possible without the steadfast support of the CGIAR Members, our core development investors. They have stood with us since 1972, recognizing that significant payoffs to agricultural research require steady, long-term research carried out by the best minds available. Their support has made it possible for ICRISAT to attract and retain its share of the best and brightest over the years, and provide them with the facilities and support needed to deliver the goods. This quality commitment, in fact, was recognized in two of our staff being chosen for the CGIAR Chairman's Excellence in Science Award for Outstanding Local Scientists for two years running. We will continue to hold to the highest standards of quality and accountability in our programs and operations in the coming years.

To all our partners, development investors, colleagues and friends I want to offer my sincere gratitude for your steadfast commitment to working with us to reach the ambitious goals of ending hunger, poverty, and environmental deterioration. Together, we *are* building a better tomorrow.

Shawki M Barghouti
Director General

More than a museum

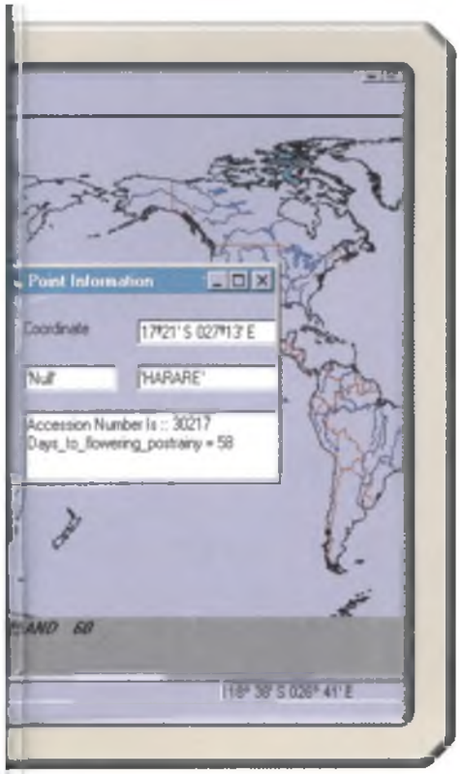
ICRISAT holds in trust the CGIAR's largest germplasm collection. These accessions are not meant to be "museum pieces" – they are intended to be used. To be truly useful, this seed treasury has to be accompanied by detailed, easily accessible information about the valuable traits it holds. Adding value to the SINGER project, which created a global database of botanical and other identification descriptors, ICRISAT is building an interactive database which includes trait evaluation and performance data. The ICRISAT Germplasm Management System is a database which can search, query, filter, and (with the user-friendly WinMap 32 application developed by ICLARM) map germplasm data for the five mandate crops – sorghum, pearl millet, groundnut, pigeonpea, and chickpea. The prototype is ready and will be beta-tested by ICRISAT staff during mid-1999. Once proven, it will be distributed on CD-ROM and the Internet to partners.



Searching the germplasm database: green spots show the collection sites for the 74 sorghum accessions in ICRISAT's genebank that flower in 45-60 days.

What do farmers know?

Over the centuries farmers have accumulated information on genotype-environment interactions that professional researchers are only beginning to tap. A collaborative project between University of Hohenheim, the Indian Government, NGOs, and ICRISAT has surveyed the views and documented the indigenous knowledge of pearl millet farmers in Rajasthan, India. The project seeks to learn how farmers perceive their own seed stocks in terms of productivity and morphological as well as genetic diversity, and their strategies for improving their varieties and maintaining seed quality. The project team is finding that farmers are most concerned with plant traits related to adaptation as well as quality aspects and potential use. For instance, they associate panicle size to yield and vigor, and grain size and density to yield, taste, storability, and nutritional value. There are significant gender differences in perception – women give more importance to quality aspects, medical use, and fodder value than do men.



Wild species improve high-performance hybrids

While hybrids are all the rage for high yields, hybrid seed production is not easy. But help from pigeonpea's wild relatives is on hand, thanks to exciting work being done by ICRISAT as part of a consortium with Indian research institutes and universities. Wild relatives of pigeonpea are emerging as excellent material to generate a stable hybrid-seed production system involving cytoplasmic male-sterility that bypasses many of the difficulties of the earlier nuclear male-sterility approach. The consortium is finding that wild species like *Cajanus sericeus*, *C. scarabaeoides*, and *C. acutifolius* (all from India) as female parents give a higher frequency of male-sterile progenies than cultivated varieties. These male-sterile progenies are now in advanced stages of backcrossing to recover the elite characteristics of the best varieties, combined with high and dependable male sterility. Fertility-restoration lines, necessary as the male parent in hybrid seed production, have also been identified.

Harvesting farmers' wisdom

Recognizing the crucial role of farmers in the conservation of biodiversity, a recent groundnut germplasm collection trip to northern Vietnam by ICRISAT scientists involved close partnership with local farmers and the Vietnam Agricultural Science Institute (VASI). The team identified 55 endangered varieties from 11 provinces to be characterized, evaluated, and conserved *in situ*, besides identifying nine accessions resistant to rust and three accessions resistant to late leaf spot. Five VASI technicians and scientists were trained. Two Vietnamese scientists worked closely with farmers to understand the special characteristics of the varieties, such as yield and resistance to diseases and insect pests.

Genetic diversity in chickpea provides breeders with valuable traits that can be incorporated into new varieties

THE BROADBED MAKER – A CATALYST IN ETHIOPIA'S GREEN REVOLUTION

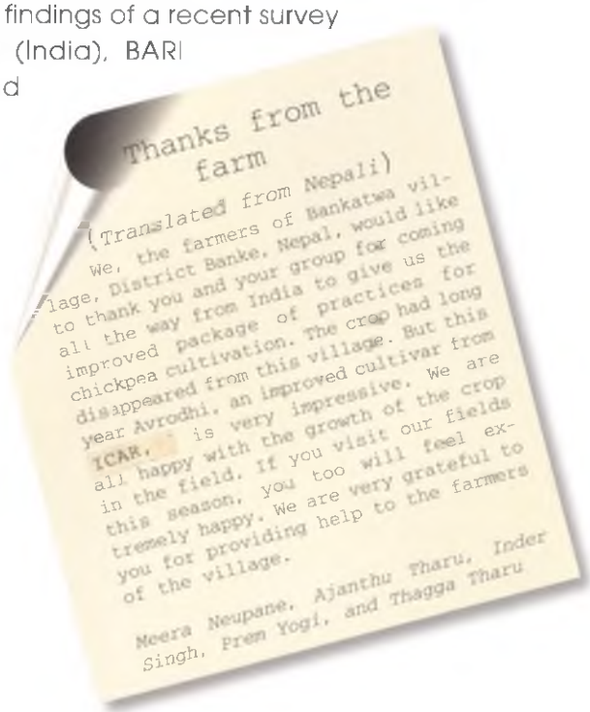
Sometimes simple interventions can have the greatest impact. The broadbed maker (BBM) is a simple, cheap, and efficient plow that is transforming smallholder farming in Ethiopia after years of agricultural stagnation. It allows farmers to use animal power to create flat, raised beds which overcome the waterlogging and soil-hardening tendencies of heavy black clay soils (Vertisols). So significant has been its impact that the technology was selected in 1998 as one of 40 outstanding innovations in developing countries by the Third World Network of Scientific Organisations. Today, there are some 25 000 BBMs in operation in Ethiopia. The success story was made possible by a coalition of partners including the Ethiopian Agricultural Research Organisation, the Alemaya University of Agriculture, the Ministry of Agriculture, ILRI, and ICRISAT under the Joint Vertisols Project (JVP) supported by the Government of Netherlands. The Project is helping increase the productivity and sustainability of Ethiopia's 13 million hectares of hard-to-manage Vertisols.

A Bangladeshi researcher assesses the complex of factors that reduce chickpea productivity on farmers' fields.

CHICKPEA IN THE GANGES DELTA THREATENED

Tributaries of the fabled Ganges river flow from the Himalayas into the fertile delta of lower Nepal and Bangladesh, sustaining the livelihoods of millions of smallholder farmers. Many of these farmers are reluctantly abandoning chickpea due to severe pressure from *Botrytis* gray mold disease and the *Helicoverpa* pod borer insect. The crop is shifting into nontraditional areas such as the Barind (northwest) of Bangladesh but farmers there still need to gain skills in managing the "new" crop. These are the key findings of a recent survey by ICRISAT, ICAR (India), BARI (Bangladesh), and NARC (Nepal), with support from the Asian Development Bank and IFAD under the aegis of the CGIAR Systemwide Rice Wheat Program.

Affordable solutions are available (e.g., IPM techniques, better timing of sowing, optimal tillage, fertility management), but they require modest investments in inputs and more awareness among farmers. Together, ICRISAT and its partners are helping to generate and disseminate such information, bringing hope to farm families in the Barind.



Thanks from the farm

(Translated from Nepali)

We, the farmers of Bankatwa village, District Banke, Nepal, would like to thank you and your group for coming all the way from India to give us the improved package of practices for chickpea cultivation. The crop had long disappeared from this village. But this year Avrodhi, an improved cultivar from ICAR, is very impressive. We are all happy with the growth of the crop in the field. If you visit our fields this season, you too will feel extremely happy. We are very grateful to you for providing help to the farmers of the village.

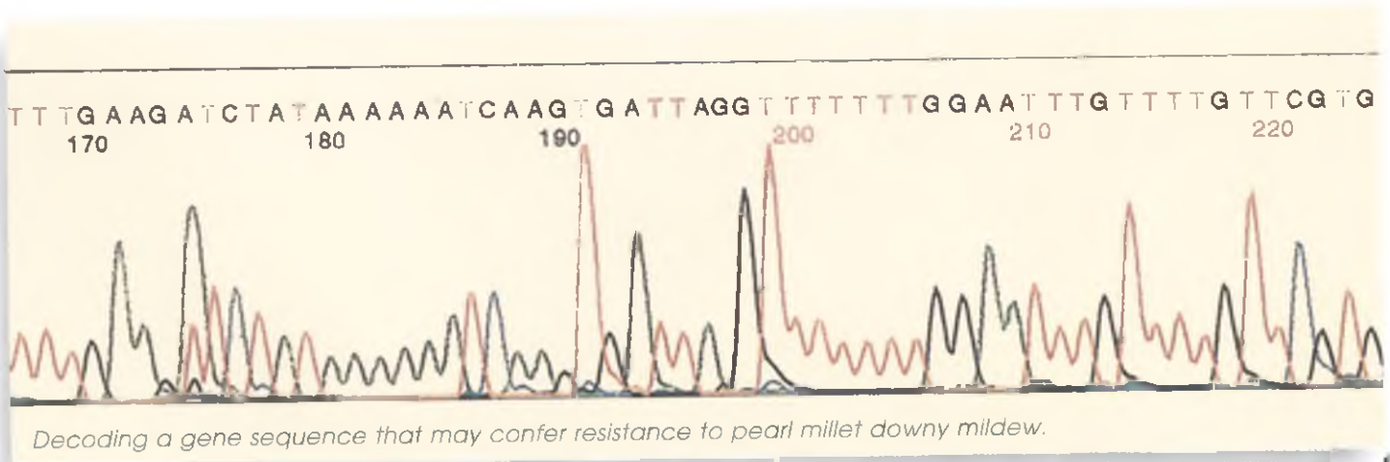
Meera Neupane, Ajanthu Tharu, Inder Singh, Prem Yogi, and Thagga Tharu

Stepping up the pace

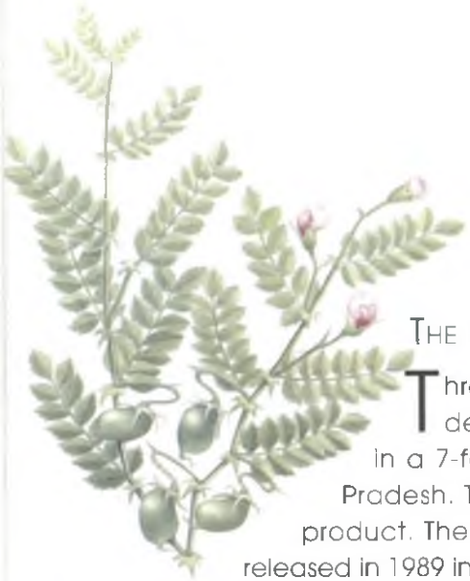
Conventional plant breeding takes over a decade to succeed, and involves many cycles of selection and blind alleys. A recent advance by millet researchers promises to speed up the process considerably, and allow breeders to manipulate genes more accurately than before. A doctoral student from Andhra University, India, working under the guidance of an ICRISAT scientist, has discovered a technique to develop homozygous plants, known as dihaploids, that can set seed normally and survive and reproduce outside the laboratory. Dihaploids have revolutionized breeding work in rice and wheat, but the process had not been perfected for pearl millet. With this achievement, breeders can now generate large numbers of homozygous millet plants, identify and isolate the genes that govern specific traits, and manipulate these genes to develop new pearl millet varieties with even higher yields, better disease and pest resistance, and improved adaptation to specific agro-ecologies.

Homing in on homology

Plants are attacked by a range of enemies, and their defense responses are correspondingly diverse. This diversity notwithstanding, the resistance genes are similar to a surprising extent; sections of different resistance genes are structurally and functionally similar (homologous), with nearly identical chunks of protein sequences. ICRISAT biotechnologists are working on these "conserved domains" for downy mildew disease of millet – isolating DNA segments, multiplying them using polymerase chain reaction (PCR) techniques, and comparing them with known resistance genes. The objective is to determine whether a particular segment does in fact contain the elusive resistance gene, and eventually to stitch together sequences from different naturally occurring genes to develop a synthetic gene with resistance to multiple races of a pathogen. This work will eventually lead to better disease management and more durable, broad-based resistance. Even the intermediate results will allow breeders to extract novel genes from germplasm, and use molecular markers.



Decoding a gene sequence that may confer resistance to pearl millet downy mildew.



The amazing chickpea revolution

Three short-duration chickpea varieties developed in partnership by the Indian NARS and ICRISAT have been instrumental in a 7-fold increase in chickpea production in the last 8 years in the state of Andhra Pradesh. The additional produce adds $ 48 million annually to the state's gross domestic product. The kabuli chickpea variety ICCV 2, identified from ICRISAT breeding material, was released in 1989 in the state as "Swetha". Since then, Swetha, Kranthi, and Bharathi have contributed to production increases from 20 000 to 140 000 tons, while chickpea productivity in Andhra Pradesh has increased from 300 to 800 kg per hectare. ICCV 2 fetches up to triple the price that farmers get for desi varieties. No wonder chickpea farmers in Madhya Pradesh call it the "dollar variety".

Ergot alert in the Americas

A disease with a propensity for rapid, uncontrollable spread has taken the sorghum industry by surprise in the Americas. Sorghum ergot, once known only in Asia and Africa, has spread to South America, Central America, the Caribbean, and North America. Less than a month after ergot was first sighted in Brazil in 1995, it had spread over an area of more than 800 000 square kilometers. To combat this menace, research and development agencies worldwide are mounting an awareness campaign among farming communities, extension agents, and policy makers in the Americas. ICRISAT, in collaboration with INTSORMIL and Brazilian researchers, is a key player in these efforts because of its past accomplishments in ergot research in India and in Eastern Africa.

Ergot is recognized by a sticky exudate produced by developing grains.

In recognition of ICRISAT's contribution, one of our researchers received the Outstanding Achievement Award presented by the National Grain Sorghum Producers Board and the Sorghum Improvement Conference of North America in 1999.

Why do some like it hot?

When temperatures soar and water supplies dry up, only the toughest plants survive. But why do some genotypes survive while others do not? Research on water-use efficiency in groundnut involving ICRISAT, the Australian Centre for International Agricultural Research (ACIAR), and the Indian Council of Agricultural Research is looking for answers. One factor is heat tolerance – the plant's ability to maintain critical physiological processes at high temperatures. Another is the ability to find scarce soil water, and use that water efficiently. Studies have shown, for example, how specific leaf area and other parameters can be measured as proxies for water-use efficiency, which is notoriously difficult to estimate. Yet another partner, the University of Reading in UK, is conducting studies on heat tolerance. This is cutting-edge science; the results will be of enormous value to farmers in drought-prone areas, and to groundnut as well as other crop breeders throughout the developing world.

Physiology experiments under controlled conditions help understand how groundnut genotypes find and use soil water.

PARTNERS JOIN HANDS TO SUSTAIN LIFE ON THE EDGE

The struggle for survival is perhaps nowhere more evident than on the desert fringes of the dry tropics. Researchers are finding that farmers in these areas hold a wealth of information about how to cope with environmental stresses. Enabled through support from key development investors and convened by ICRISAT, the Systemwide Desert Margins Program (DMP) is currently active in nine countries of Africa – Senegal, Mali, Burkina Faso, Niger, Kenya, Botswana, Zimbabwe, Namibia, and South Africa. DMP is building wide-ranging partnerships among NARS, NGOs, and CGIAR Centers to combine farmer knowledge with modern technologies, to learn ways of improving productivity and sustainability. Assisted by ICRISAT, INRAN (Niger) recently published a catalogue of smallholder-appropriate technologies in formats designed for sharing through extension specialists. A similar set has been published in South Africa. In Kenya, DMP research has confirmed that farmers carefully weigh the tradeoffs between land protection efforts and improving productivity. In Burkina Faso, Niger, and Mali, multi-scale decision support models are being developed and tested which will help scientists better understand the dynamics of farmer decision-making.

BATTLING THE AFLATOXIN THREAT

Aflatoxins produced by fungi such as *Aspergillus flavus* and *A. parasiticus* are highly carcinogenic biochemical residues. Besides endangering human health, aflatoxin contamination effectively blocks groundnut exports, a major lost income opportunity for SAT farmers. Environmental, crop handling, and genetic factors all play a role in fungal development, so integrated solutions are needed. A consortium of global, regional, and national institutions is working hard on the problem. A recent Groundnut Regional Workshop for West and Central Africa recommended that responsibility for addressing the aflatoxin issue be shared among Burkina Faso, Ghana, Nigeria, Senegal, CIRAD, the USAID-funded Peanut CRSP project, and ICRISAT. To better assess aflatoxin risk, Peanut CRSP, IER (Mali), and ICRISAT are developing predictive models based on surveys of groundnut storage practices on-farm in different climatic zones of Mali. Simultaneously, ICRISAT, CIRAD, and several US universities are applying biotechnological methods to create higher levels of resistance than is possible through conventional breeding.

Pigeonpea: measuring the benefits of cropping system diversity

Cereals provide most of the world's calories, but continuous, intensive cereal cropping creates pest, disease, and soil fertility problems. Productivity growth in the intensive rice-wheat systems in South Asia's Indo-Gangetic Plain is already leveling off, and even declining in some areas. One solution is to diversify the system by introducing legumes, which can break pest/disease cycles and improve soil fertility. A multidisciplinary team from ICRISAT, Tamil Nadu Agricultural University and Haryana Agricultural University in India, and Australia's APSIM modeling group is using simulation models to quantify these legume benefits. A related effort funded by the Government of Japan is studying how pigeonpea improves the availability of soil phosphorus, benefiting not only pigeonpea but also the succeeding crop. These collaborative efforts will help create cereal-legume systems that are more sustainable and more productive, by making them more diverse.

Scaling up, reaching out

An improved watershed management technology package for South Asia is vaulting from operational-scale research to farmers' fields. A team of ICRISAT researchers who have worked on watersheds for over 25 years have documented the value of the watershed approach for sustaining rainfed agricultural productivity. It helps to conserve natural resources, stabilize productivity through crop diversification, and reduce soil erosion. Results of long-term research at ICRISAT have shown that by using improved technology, up to 4 tons of grain per hectare can be harvested from drylands, soil loss can be reduced by 60–75% and rainwater loss through runoff by 50–60%. At the same time, the recharge of ground water increases by more than 40%. Through the generous support of the Asian Development Bank, this package will now be shared with NARS in India, Thailand, and Vietnam.

Biopesticides: the eco-friendly way

Mr Durgaiah of Nandyal, Andhra Pradesh state, India, used to spray his chickpea crop with toxic pesticides 5-6 times during the 90-day crop season. This year he used no toxic pesticides at all, but still harvested his usual 1.5 tons of chickpea. How? The answer is safe biopesticides: a combination of nuclear polyhedrosis virus (NPV), *neem* extract, and bird perches (to attract insectivorous birds to his field). This cocktail is deadly for the podborer, the key legume pest in this part of the world. It is now being prepared at the village level under the auspices of an ICRISAT-led integrated pest management project funded by IFAD and implemented in partnership with NARS, NGOs, and farmers. And as Mr Durgaiah and several IPM farmers in Kurnool district of Andhra Pradesh can testify, NPV and *neem* are an excellent substitute for the chemical pesticides on which the typical farmer had been spending $ 70 per hectare each season.

An ICRISAT scientist discusses integrated pest management methods with farmers in Andhra Pradesh.

S 35 is helping improve productivity and food security in drought-prone Chad.

Escaping Africa's drought

Rarely are farmers, researchers, and socioeconomists all impressed with a new variety. But the sorghum variety S 35 is exceptional. S 35 is capable of giving relatively high, stable yields and escaping drought. Bred at ICRISAT in India, it was selected at Samaru, Nigeria by researchers from the Institut de Recherche Agricole in Cameroon. By 1986, seeds of the variety – along with reports of its performance – reached the Gassi Research Station in neighboring Chad. By 1995 it was being grown on 64 000 hectares in Chad, about 27% of the country's rainfed sorghum area. An impact assessment study by ICRISAT and the Chad Center for Agricultural Research and Technology estimated that the internal rate of return to investment in this variety was as high as 95%. More than 70% of farmers in the drought-prone region of Guera rated it as their favorite variety. Its white grain commands a premium price, and the stalks provide both food and fodder.

Market movers

Sorghum and pearl millet are generally thought of as "subsistence" crops – good for household food security but not for industrial or commercial use. Commercialization would create new channels for smallholder farmers to market their surplus grain, leading to higher farm incomes and thus incentives for even further investment. Commercialization is a new thrust in Phase IV of the SADC/ICRISAT Sorghum and Millet Improvement Project (SMIP), funded by USAID and based in Zimbabwe. SMIP is working with national programs, universities, and the private sector to develop varieties with useful characteristics tailored to specific end uses. Project scientists have developed and standardized screening and analytical procedures for a range of grain quality traits, and tested and characterized over 4000 cultivars. Collaborative studies are focusing on developing innovative end uses, refining the mechanisms for contract-growouts by smallholder farmers for commercial buyers, and the development of intra-rural grain markets to move grain from surplus to deficit areas.

Sorghum and pearl millet products can serve many uses.

Accelerating impact in Namibia

How can research institutions maximize the impact of their work, and improve the rates of return to research investment? A recent study in Namibia provides valuable lessons. The Namibian government, with pivotal support from ICRISAT, achieved a 50% internal rate of return to investment in developing and disseminating the pearl millet variety Okashana 1. This variety was released in 1989 and now occupies almost 50% of Namibia's pearl millet area. There are several reasons for its success. First, Okashana 1 was developed from germplasm that had already been widely tested by ICRISAT, cutting down research costs and time lags. Second, it was developed through participatory breeding – smallholder farmers worked with breeders to identify and evaluate the variety, ensuring that it met their needs. Third, Okashana 1 was released very quickly in response to strong farmer interest and impressive trial results. And lastly, the government ensured that enough seed was available, and laid the foundation for a self-sustaining seed production cooperative run by small-scale farmers.

Packing for export: a dhal mill in Malawi.

Sectors in synch

Private sector firms are efficient, and plugged into rural markets. But with their focus firmly on profits, can they work effectively with public-sector research organizations and NGOs in agricultural development? Yes, say the scientists working on an African Development Bank-funded pigeonpea project in Eastern and Southern Africa. Building on the recommendations of a national pigeonpea stakeholders' meeting in Malawi, ICRISAT initiated a series of discussions with milling companies and government agencies, which culminated in the formation of the Dhal Millers Association. The Association now works with ICRISAT and the national program to improve both the supply and quality of pigeonpea grain by promoting varieties with the specific characteristics millers need, and developing a grading system that will reward farmers for producing high-quality grain. The Association is also providing funding for another initiative involving ICRISAT, NGOs, and the extension service, under which the Association will contract farmers' groups to produce certified seed of new pigeonpea varieties on a large scale, and distribute the seed to other growers.

STRENGTHENED COMMITMENT TO SOUTHERN AND EASTERN AFRICA – THANKS TO ZIMBABWE

When the Southern African Development Community (SADC) was formed in 1980, a CGIAR Center – ICRISAT – was invited by the Heads of State of member countries to establish a regional center for agricultural research and development in partnership with NARS. In 1983, USAID, BMZ/GTZ, and CIDA helped ICRISAT establish a strong regional program for sorghum and millet improvement, based at Matopos near Bulawayo, Zimbabwe. In February 1999, ICRISAT and the Government of Zimbabwe signed a new Memorandum of Understanding, expanding the depth and scope of earlier collaborative arrangements. The agreement was signed by ICRISAT Director General S M Barghouti and Zimbabwe's Minister for Agriculture, the Honorable K Kangai. The enhanced partnership will broaden the joint agenda to include sustainable crop and natural resources management, socio-economics and policy research, and legume crop improvement in addition to the historical cereal improvement thrust. Following intensive meetings with stakeholders and partners from the public, private, and nongovernmental sectors to set the priority agenda, additional ICRISAT scientific and support staff are being deployed to Bulawayo.

RESCUING DROUGHT - STRICKEN MILLET FARMERS

The 1997 drought wiped out farmers' pearl millet seed stocks in several Sahelian countries. In response, the West and Central Africa Millet Research Network (WCAMRN), in collaboration with ICRISAT, provided emergency seed aid to help get agriculture back on track. WCAMRN had already identified three improved pearl millet varieties – ZATIB, SOSAT-C-88, and GB 8735 – which had performed well in regional trials. A total of 2 tons of high-quality seed was produced at ICRISAT's station near Niamey, Niger, for distribution to eight countries in the region. NARS and NGOs undertook to distribute the seed to farmers by end May 1998, in time for sowing in the next cropping season. The feedback received from NARS and NGOs indicates that not only did the emergency aid help rebuild seed stocks and stabilize food supplies, it will continue to have a multiplier effect on variety adoption over the years.

GETTING TECHNOLOGIES OFF THE SHELF, AND ONTO THE FARM

In many developing countries, adoption of new technologies is hampered because farmers, extension agents, and NGOs are not aware they are available, or how best to use them. ICRISAT and the Institut National de Recherches Agronomiques (INRAN) in Niger are trying to plug this information gap. INRAN and ICRISAT invited participants from ILRI, IFDC, ICRAF, University of Hohenheim, extension services, NGOs, and farmers' associations to two workshops where 10 improved technologies were identified as ready for dissemination. These included improved sorghum and pearl millet varieties, nitrogen fertilizer application, cereal-legume rotations, and live fences. In addition, 22 technologies were singled out as potentially transferable to farmers with large-scale on-farm validation. To facilitate access to information on these technologies, INRAN and ICRISAT brought out a publication containing detailed descriptions as well as handy fact sheets designed for extension workers. These documents have been hailed by NARS and donors as an innovative model for sharing information and gaining farmer feedback to further guide the research process.

A QUICKENING PULSE

Grain legumes (pulses) are an important staple in Sri Lanka. But production falls well short of demand – the country spends $ 40 million per year on pulse imports. Production has grown slowly, partly because most rural communities lack processing equipment. With investment from the Asian Development Bank, ICRISAT and the Farm Mechanization Research Centre of the Sri Lankan Ministry of Agriculture have developed a new processing machine that is small, inexpensive, fabricated locally, and easy to transport. The new machine can dehull pigeonpea (and several other grains including cowpea, black gram, and soybean) to produce split peas (*dhal*) and can also clean and grade the *dhal* produced. It combines the functions and quality of large-scale machines with the convenience of a small-scale processor. Better quality brings higher market prices – a boon for smallholder incomes.

NET WORK

The Cereals and Legumes Asia Network (CLAN), hosted by ICRISAT, facilitates collaborative research and technology spillovers across the 14 CLAN member countries. In Vietnam, for example, groundnut production packages developed through NARS-ICRISAT partnerships and disseminated with CLAN support are making a big difference. Groundnut area and yield have increased by 30 percent between 1990 and 1998; and as many as 96 Vietnamese researchers have participated in training programs. As a result, the national research program has become considerably stronger, food security has improved in smallholder communities, and export incomes have increased. In January 1998, the ICRISAT scientist who coordinates the network was awarded the prestigious Medal of Agriculture and Development by Dr Ngo The Dan, Vice-Minister for Agriculture and Rural Development.

CONSOLIDATING PARTNERSHIPS FOR SORGHUM AND MILLET IMPROVEMENT IN SOUTHERN AFRICA

Hunger is a problem too formidable to be successfully tackled by any single institution. The answer is networking – bringing together a group of organizations with complementary skills, pooling knowledge and resources to reach the common goal. Regional partnerships fostered by the SADC/ICRISAT Sorghum and Millet Improvement Project (SMIP) over the past 15 years have already delivered major benefits to the SADC countries. To build on this momentum, a formal network involving a wider range of partners is being established. The Sorghum and Millet Improvement Network (SMINET) will involve the full range of stakeholders – national research institutes, farmers' organizations, public sector research and extension agencies, universities, policy makers, NGOs, and the private sector. Each stakeholder group will provide inputs into network activities starting with constraint identification and prioritization through planning, implementation, and monitoring. SMINET will provide a platform for exchanging germplasm, technologies, new research tools, and R&D experiences, and improve the access of regional researchers and others to the global knowledge base.

Special "information days" for women are helping to share new technologies in Zimbabwe.


PARC
IN COUNTRY TRAINING COURSE ON EXPERIMENTAL
DESIGNS AND DATA ANALYSIS USING GENSTAT
UNDER CLAN PROJECT
ICRISAT

ICRISAT convened skills-sharing events around the world in 1998 to build scientific capacities for sustainable agricultural development.

Event/Topic	Venue	Participants	Participating countries	Resources and collaborative support
Workshops, Conferences				
A National Workshop on Soil and Water Conservation	ICRISAT-Niamey	30	Niger	DED, INRAN and Dept. of Geography, Univ. of Niamey
Improving Management of Natural Resources for Sustainable Rainfed Agriculture	ICRISAT-Patancheru	15	India	ADB
The Latin American Sorghum and Pearl Millet Network Project Workshop	CORPOICA, Colombia	25	Brazil, Honduras, Venezuela, Colombia	CORPOICA
WCASRN/ROCARS/ICRISAT Training Workshop WCASRN on Participatory Breeding	ICRISAT-Bamako	11	8 countries in the region	CIRAD, IER, Mali,
WCASRN Workshop on Proposals Development	ICRISAT-Bamako	15	Mali	WCASRN
Regional Sorghum and Millet Hybrid Seed Workshop	ICRISAT-Niamey	100	Niger	INRAN, INTSORMIL
Participatory Research Methods	ICRISAT-Patancheru		India	MSSRF, ICAR
The Sixth Groundnut Workshop for Western and Central Africa	ICRISAT-Mali	16	Benin, Burkina Faso, Cameroon, Central African Republic, Chad, France Gambia, Ghana, India, Mali, Malawi, Nigeria, Senegal, Sierra Leone, Togo, and USA	IER, Mali, CORAF, Peanut CRSP, CFC
Improving Crop Management Options – A Working Meeting	ICRISAT-Bulawayo	18	Malawi, Zimbabwe, India, Mexico, Australia	CIMMYT, APSRU
The SADC/ICRISAT Sorghum and Millet Stakeholders Conference	ICRISAT-Bulawayo	7	7 SADC countries, USA, UK, France	USAID, CIDA, BMZ/GTZ
Using Multiple-goal Linear Programming Models to Optimize Resource Use in Semi-Arid Regions – an International Workshop	ICRISAT-Niamey	14	Botswana, Burkina Faso, Kenya, Mali, Niger	IFPRI
Efficient Soil Water Use – the Key to Sustainable Crop Production in Dry-Area Agriculture in WANA and SSA – an International Workshop	ICRISAT-Niamey		Egypt, Iran, Jordan, Kenya, Mali, Morocco, Niger, Nigeria, South Africa, UK	Inst. of Hydrology, UK, CNDC, Nigeria
Linking Seed Producers and Consumers in Zimbabwe	ICRISAT-Bulawayo	15	Zimbabwe	DFID Holdback Project R8720(H), GTZ
Linking Seed Producers and Consumers in Zambia	Zambia	21	Zambia	DFID Holdback Project R8720(H)
Linking Seed Producers and Consumers in Kenya	Kenya	24	Kenya	DFID Holdback Project R8720(H)
Linking Seed Producers and Consumers in Malawi	Malawi	11	Malawi	DFID Holdback Project R8720(H)
Linear programming (GAMS), Decision Support Systems and GPS	ICRISAT-Niamey	15	Botswana, Burkina Faso, Kenya, Mali, Niger	MUSCLUS, ORU, DMP
Workshop on Farmer Participation in Pearl millet Breeding and Farmer-based Seed Production	Mahenene and Okashana Res. Stations, Namibia	32	10 SADC countries	INTOSRMIL, SADC/GTG, SADC/ICRISAT-SMIP
Modeling of nutrient cycles	ICRISAT-Patancheru	7	Bangladesh, Nepal, Pakistan, Sri Lanka, Indonesia, Vietnam	
Training Courses				
Genetic transformation using particle-inflowgun	ICRISAT-Patancheru	12	India	ACIAR/ICAR
Groundnut genetic resources	Vietnam	5	Vietnam	GREP
Identification of *Aceria cajani*, the mite vector of the agent of pigeonpea sterility mosaic disease based on analysis of ribosomal DNA internal transcribed spacer sequences	ICRISAT-Patancheru	6	India, Myanmar, Nepal	DFID
Technology Exchange and Training Workshop on advances in sorghum anthracnose research	ICRISAT-Patancheru	4	India	ADB/CLAN
In-country training program on improvement of grain legumes	Myanmar	26	Myanmar	CLAN
In-country training course on computer-aided experimental design and data analysis in agricultural research	Pakistan	12	Pakistan	ADB/CLAN
Detection and estimation of aflatoxins in groundnut and groundnut-based products	ICRISAT-Patancheru	7	India, Iran, Myanmar, Vietnam, Yemen	CLAN/GREP

Promising young scientists come to ICRISAT to carry out their research for advanced degrees in the agricultural sciences.

Name	Country of origin	Degree sought	Study topic
Md Lutfur Rahman	*Bangladesh*	PhD	Races of chickpea fusarium wilt in India.
J P Tiendrebeogo	*Burkina Faso*	PhD	Optimizing manure management at village level in Burkina Faso.
T Abraha Negash	*Eritrea*	MSc	Selection methods and genetic variability for traits related to drought resistance in sorghum.
N Abrahaa Russom	*Eritrea*	MSc	Effect of some genes on specific traits in a pearl millet composite.
F Tefera Tesfaye	*Ethiopia*	MSc	Association of morphological characters and fusarium wilt resistance with seed yield in a kabuli x desi chickpea.
Agajie E Tesfaye	*Ethiopia*	MSc	Economics of milk production in and around Hyderabad of Andhra Pradesh (India).
Prahalad Puranik	*India*	MSc	Dynamics of sporangial production in relation to humidity in *Sclerospora graminicola*.
B Padmasri	*India*	MSc	Seed traits in relation to plant stand establishment in chickpea.
Manohar Bhukta	*India*	MSc	Effects of photoperiod on growth and partitioning in groundnut.
A V V Lakshmi	*India*	MSc	Study of diversity among sorghum genotypes using molecular markers.
R K Srivastava	*India*	MSc	Penetrance and expressivity of gene for double podding and genetic study of some important yield contributing traits in chickpea.
N V S Vijayalakshmi	*India*	MSc	Genetic studies on flower color, protein content and some important qualitative and quantitative characters in two crosses of chickpea.
Shuvendu Hazra	*India*	MSc	Pathogenic variability of anthracnose diseases of sorghum.
T Ratna Rajesh	*India*	MSc	Effect of temperature and humidity on the components of resistance to late leaf spot on groundnut.
V Kishore Kumar	*India*	MSc	Host plant resistance in sorghum against stem borer.
M Suganthy	*India*	MSc	Development of IPM strategies for the management of chickpea pod borer *H. armigera*.
K P Nagavallemma	*India*	PhD	Evaluation of land surface management practices on nutrient budgeting and soil properties of vertic inceptisols in soybean-based cropping systems.
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.
J Padmavathi	*India*	PhD	Evaluation of strains of *Beauveria bassiana* against sorghum stem borer and characterization of fungal isolates by RAPD-PCR.
M Ajitha	*India*	PhD	Characterisation of chickpea genotypes identified for core collections.
C Sudha Rani	*India*	PhD	Development of castor model for crop response to water, nitrogen, sowing dates and cultivars.
Arun Sharma	*India*	PhD	Development and application of marker-assisted selection in pearl millet.
P Padmavathi	*India*	PhD	Nitrogen management in soybean and pigeonpea under sole and intercropping systems.
K Gopal	*India*	PhD	Techniques on transmission of PNBV and screening for resistance against PBNV in groundnut.
P Lava Kumar	*India*	PhD	Assessment of genetic variation within and between populations of *Aceria cajani*, the mite vector of the agent of sterility mosaic of pigeonpea in different regions of Asia.
K Kanaka Durga	*India*	PhD	Cytoplasmic systems and hybrid type studies on yield characters in sorghum.
Yash Pal Singh	*India*	PhD	Effect of panicle surface area on grain number, size and yield in pearl millet.
M Bharathi	*India*	PhD	Integrated approach for the management of pigeonpea wilt caused by *Fusarium udum*.
K L N Reddy	*India*	PhD	Epidemiology of peanut bud necrosis virus.
T Rupa Singh	*India*	PhD	Vascular arbuscular mycorrhizae in relation to pigeonpea.
S G Geetha	*India*	PhD	Enhancement of resistance to Botrytis gray mold of chickpea using PGIP genes.
T Shyamala Rani	*India*	PhD	Tissue culture studies in pearl millet with special reference to production of haploids.
K Srinivas	*India*	PhD	Simulation modeling of the soil-plant system.
B N Motagi	*India*	PhD	Whole plant and detached leaf techniques to study the components of resistance to rust and late leaf spot in groundnut.
B Sucharita	*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.
Ranjana Bhattarcharjee	*India*	PhD	Describing the phenotypic and genotypic diversity of pearl millet in ICRISAT collections.
K Thirumala Devi	*India*	PhD	Detection tools for aflatoxins and ochratoxin.
Renuka S Singru	*India*	PhD	Molecular studies on plant pathogen interaction in pearl millet downy mildew.
V Visalakshani	*India*	PhD	Effect of IPM components on natural enemies in chickpea with special emphasis to NPV.
B Pushpavathi	*India*	PhD	Variability of *Sclerospora graminicola*.
T Srinivas	*India*	PhD	On-farm evaluation of IPM of *Helicoverpa armigera* on chickpea.
A Sunitha Daniel	*India*	PhD	Groundnut transformation for GRAV resistance by using coat protein and satellite genes.
K Vijaya Gopal	*India*	PhD	Modelling high temperature stress in groundnut.
D Harsha Vardhan	*India*	PhD	Biotechnological approaches for development of disease resistance on sorghum.
B Jayanand	*India*	PhD	Regeneration in chickpea.
S H Sabaghpour	*Iran*	PhD	Genetic studies on qualitative and quantitative traits in chickpea.
Samuel O Omanya	*Kenya*	PhD	Evaluation of indirect versus direct selection methods for *Striga* resistance in sorghum.
Souolika Boire	*Mali*	PhD	Biological control of the millet head miner.
Aissetou Drame Yave	*Mali*	PhD	Bionomics of the millet stem borer.
Su Su Win	*Myanmar*	MSc	N, P, and K balance in groundnut and sesame-based cropping systems on Alfisols.
Habou Abdou	*Niger*	MSc	Modelling stem borer population dynamics.
Siaka Boureima	*Niger*	PhD	Potential of pearl millet topcross hybrids in Niger.
M Gandah	*Niger*	PhD	Study of soil spatial variability on nutrient and water availability.
Hame A Kadi Kadi	*Niger*	MSc	Field biology and laboratory life tables assessment of millet head miner in Niger.
O James Jayeoba	*Nigeria*	MSc	Water balance study in a sorghum-based cropping system in the Sudano-Sahelien zone of Nigeria using APSIM.
Etim Sam Okpo	*Nigeria*	PhD	Evaluation of grain legumes in rotation for the control of *Striga hermonthica* in sorghum.
O G Olabanji	*Nigeria*	PhD	Growth and productivity of pearl millet and cowpea in mixture as influenced by component crop proportion and cowpea sowing date.
A Malima Perera	*Sri Lanka*	PhD	A study of waterlogging tolerance in short-duration pigeonpea.
Elasha A Elasha	*Sudan*	PhD	Evaluation of the interactions of sowing date, fertility, shoot fly protection level and cultivar in *rabi* sorghum.

Building tomorrow together, ICRISAT welcomes staff secondments from prestigious institutions around the world, to carry out joint research projects meeting shared objectives.

Name	Country of origin	Parent institution	Activity	Location
Md Abdurahman	*Somalia*	ARI, Somalia	Quantification of *Polymyxa* sp	Patancheru
A Bationo	*Burkina Faso*	IFDC	Soil fertility improvement	Niamey
C Huelsebusch	*Germany*	Univ Hohenheim	Livestock related nutrient transfers and cropland fertility	Niamey
E Schlecht	*Germany*	Univ Hohenheim	Livestock related nutrient transfers and cropland fertility	Niamey
G V Ranga Rao	*India*	IFAD	Integrated management of pulse pests	Patancheru
S Fernandez-Rivera	*Mexico*	ILRI	Feeding strategies for ruminants in crop-livestock systems	Niamey
T O Williams	*Nigeria*	ILRI	Socio-economics of livestock in mixed smallholder systems	Niamey
P Hiernaux	*France*	ILRI	Rangeland productivity, nutrient cycling, NRM	Niamey
A Ratnadass	*France*	CIRAD	Grain mold/head bug resistance in sorghum	Bamako
E Zerbini	*Italy*	ILRI	Improvement of feed quality of sorghum and millet	Patancheru
V Anjaiah	*India*	Vrije Universiteit, Brussel, Belgium	Biocontrol of soil- and seedborne diseases	Patancheru
Gurdip Singh	*India*	Punjab Agric Univ	Modeling and integrated management of BGM	Patancheru
O P Jhorar	*India*	Punjab Agric Univ	Modeling and integrated management of BGM	Patancheru
N J Shurpali	*India*	Andhra Univ	Analysis of weather data for groundnut	Patancheru
K L Reddy	*India*	Osmania Univ	Isolation of m-RNA, cloning, recombinant antibodies	SCRI, UK
Maria A Kolesnikova	*Russia*	Univ Wales, Bangor, UK	Gene mapping for pearl millet downy mildew resistance	Patancheru
K R Shivanna	*India*	Univ Delhi, India	Screening for chilling tolerance in chickpea	Patancheru
A O Ogungbile	*Nigeria*	IAR, Ahmadu Bello Univ, Nigeria	Adoption studies on sorghum in Nigeria	Kano
K Mathur	*India*	Rajasthan Agric Univ	Anthracnose variability studies	Patancheru
G L Anderson	*UK*	Univ Aberdeen, Scotland	Changes in strength characteristics in Alfisols	Patancheru
A Kristinck	*Germany*	Univ Hohenheim	Indigenous knowledge in pearl millet systems	Patancheru
P Delfosse	*Belgium*	Univ Louvain	Epidemiology and control of peanut clump virus	Patancheru
C Grenier	*France*	CIRAD	Genomic/informatic definition of core sorghum collections	Patancheru
A Hall	*UK*	NRI/ODA	Sorghum postharvest losses and quality	Patancheru
F Kimmins	*UK*	NRI/ODA	Epidemiology of groundnut rosette	Lilongwe

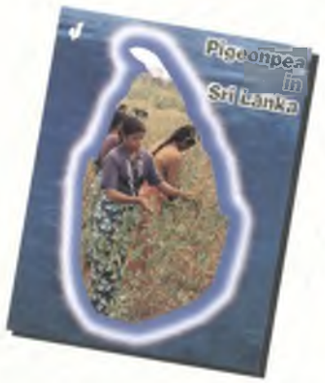
Development investors supplement the CGIAR's core support to ICRISAT to carry out projects on subjects of particular interest.

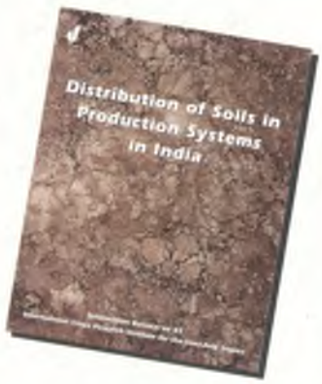
Donor	Project	Collaborators
African Development Bank	Improvement of pigeonpea in eastern and southern Africa	NARS of Kenya, Malawi, Mozambique, Namibia, Sudan, Swaziland, Tanzania, Uganda, Zambia, Zimbabwe
Asian Development Bank	Strengthening regional collaboration on cereals and legumes research in Asia	NARS of Bangladesh, China, India, Indonesia, Myanmar, Nepal, Pakistan, Philippines, Thailand, Sri Lanka, Viet Nam, NGOs, and private sector
	ICRISAT/Sri Lanka pigeonpea intercropping and diversification study	NARS of Sri Lanka
	Legume-based technologies for rice and wheat production systems in south and southeast Asia	NARS of India, Nepal, Bangladesh, Pakistan, Sri Lanka, Viet Nam
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
	Overcoming production constraints to sorghum in rainfed environments in India and Australia	APSRU, CSIRO and University of Queensland (Australia), ICAR (India)
	Impact assessment and research evaluation activity in Thailand	Department of Agriculture, Thailand; Kasetsart University, Thailand; ACIAR, Australia
	More efficient breeding of drought resistant peanuts in India and Australia	ICAR, India; ACIAR, QDPI, CSIRO, Australian National University, Peanut Company of Australia, Australia
	Development and use of molecular genetic markers for enhancing the feeding value of cereal crop residues for ruminants	ILRI, ICARDA, CIAT La Trobe University, Australia; NARS of India, Morocco, Tunisia
	Management of white grubs in peanut cropping systems in Asia and Australia	NARS of India; GRDC, Peanut Company of Australia University of Queensland, QDPI, Australia
Belgium	Integrated control of *Polymyxa graminis*, a vector of peanut clump virus	Universite catholique de Louvain, Louvain-la-Neuve (Belgium), NARS of India, Pakistan, Senegal, Burkina Faso
	Vrije Universiteit Brussel (VUB)/ICRISAT collaborative project on biotechnology	Vrije Universiteit Brussel
Canada (IDRC)	Desert Margins Initiative (Africa)	NARS and NGOs of Burkina Faso, Kenya, Botswana
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*	CENARGEN (Brazil)
DANES A/S	Training activities of students from Eritrea	Royal Veterinary and Agricultural University, Denmark
DANAGRO	Breeding programme for sorghum and millet	NARS of Eritrea
European Union (DG XII)	Climate impact on water resources and drylands agriculture	SC-DLO, The Netherlands; IIED, UK; UNIPAD, UNICAIRO, Egypt; ECRI, Egypt; CRICYT, INTA, Argentina; CAZRI, HAU, India; LIPAP, LIGG, IDRAS, GRIWC, China; ACMAD, Niger
FAO	Rapid composting of rice straw	NARS of India
France	Constitution of a sorghum core collection	CIRAD/ORSTOM
Germany	Promotion of sorghum and millet cultivation in Southern Africa	NARS, NGOs, private sector seed companies, farmers
	Promotion of legume cultivation in SADC	NARS in 12 SADC member states, NGOs
	Striga resistance in sorghum	University of Hohenheim, Eberhard-Karls Tübingen University (Germany)
	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)
ICAR/World Bank	Sustainable rainfed agriculture research and development project	ICAR (India), IFPRI
IFAD/World Bank	Collaborative research of sorghum based crop production systems in eastern lowland Wadis of Eritrea	NARS of Eritrea
IFAD	Development of IPM program for the management of pulse pests in southern Asia	ICIPE, Kenya; NARS and NGOs in India, Nepal and Bangladesh
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	ANGRAU, CRIDA, India
Japan	Sustainable cultivation of upland crops in the semi-arid tropics	JIRCAS, MAFF, Japan
	Development of the methods of evaluation of environmental changes using remote sensing techniques	JIRCAS

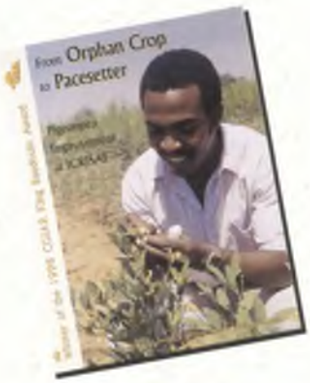
Donor	Project	Collaborators
MAHYCO	Development of cytoplasmic male-sterility in pigeonpea	ICAR, India
Netherlands	Systemwide resource management for improving and sustaining crop and livestock production on highland Vertisols in Ethiopia	Institute of Agricultural Research, Alemaya University of Agriculture (Ethiopia), ILRI
	Evolving transgenic sorghum with suitable Bt gene constructs, resistant to stemborer	National Research Center for Sorghum, India National Research Center on Plant Biotechnology, India
OPEC	Groundnut improvement program in Asia	Asian NARS
Rockefeller Foundation	Methodology to develop practical soil fertility technologies through farmer/researcher partnerships	NARS of Malawi
START, USA	Climate prediction for rainfed groundnut	IIS, ANGRAU, India
Switzerland	West and CentralAfrican millet research network, ROCAFREMI	National extension workers, NGOs and farmers, INTSORMIL
UK	Enhancement of resistance to botrytis grey mould of chickpea using PGIP genes	Scottish Crops Research Institute (SCRI), University of Auckland (New Zealand), ICAR (India)
	Assessment of the genetic variation within and between populations of *Aceria cajani*, the mite vector of the agent of sterility mosaic of pigeonpea, in different regions of Asia	SCRI (UK), ICAR (India), NARS of Nepal and Myanmar
	What makes it so tasty for the pest? Identification of *Helicoverpa armigera* feeding stimulants and the location of their production on the pod service of pigeonpea	Natural Resources Institute (NRI), 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; Dept of Agriculture, Govt of Andhra Pradesh, India
	Linking seed producers and consumers; diagnosing constrains in institutional performance	Overseas Development Institute, UK; NARS and NGOs of Kenya, Malawi, Zambia and Zimbabwe
NRI/DFID	Sorghum in India	NARS in India
	Groundnut rosette disease epidemiology	NRI, UK; NARS of Malawi and Uganda
PLAN International	Groundnut project in Malawi	NARS and NGOs of Malawi
UNDP	Comparative study on factors critical to the adoption of ICRISAT/NARS groundnut and sorghum innovations	University of Arizona (USA), OPI (Vietnam), NARS of India and Nigeria
UNDP and USA	Impacts of ICRISAT/NARS germplasm research for sorghum, groundnut and pearl millet	Yale University, USA
UNEP	Survey and evaluation of networks to support the implementation of the convention to combat desertification	The University of Arizona, WMO, United Nations Development Programme Office to Combat Desertification
USA	Seeds of freedom: Angola agricultural recovery program	CIAT, CIMMYT, IITA, ISNAR, CIP, World Vision, NARS of Angola, in-country NGOs, and farmers
	Strengthening national agricultural research systems in Africa through collaborative research networks	NARS of participating countries, NGOs, and private sector
	Regional sorghum and millet research project for southern Africa	NARS, NGOs, private sector seed companies, farmers
	Chickpea molecular marker/mapping work	Washington State University (USA)
	Molecular markers for crop improvement in groundnut	University of Georgia (USA)
	Search for *Striga* resistance in wild relatives of pearl millet	Univesity of Georgia
	Assessing hydrology and crop production in a spatially variable terrain	Michigan State University (USA)
	Biotechnological tools for improving sorghum for *Striga* resistance	Purdue University (USA)
	Biotechnological approach to grain mold resistance in sorghum	Texas A&M University (USA)
	Identification of peanut genes and gene products important in the peanut seed	Texas A&M University (USA)
	Population structure and genetic diversity of *Sclerospora graminicola*: keys to stable production of pearl millet	Texas A&M University (USA)
	Fulfilling seed requirements in famine threatened areas in West Africa: a need for emergency seed distribution	NARS of West Africa
	Strengthening drought mitigation work in southern Africa	NARS of southern Africa
University of New Jersey (Rutgers)/World Bank	Study of the seed industry in India	Private sector seed companies and the public sector (India)
Pool of donors	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
	Crop/livestock farmers in the dry savanna of West Africa working with scientists to improve the productivity and sustainability of their farming systems	IITA, ILRI, IFDC NARS of West Africa
	Resource use optimization at village and district levels in the desert margins of West Africa	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

Attributed support for Core Programs from Italy, Japan, Netherlands, Switzerland and UK is not listed – but is included in the Financial Summary.

Publications are a key component of ICRISAT's technology and information-sharing strategy.







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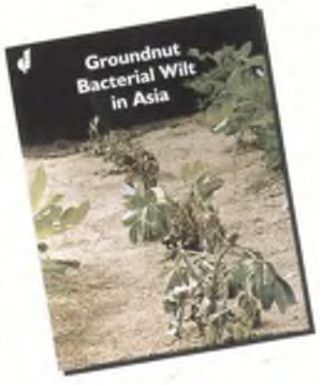
Food from Thought series

A rainbow painted on the last frontier. FTE 007

Ingredients of a successful project: donor's vision, demand-driven research, and people's readiness. FTE 008



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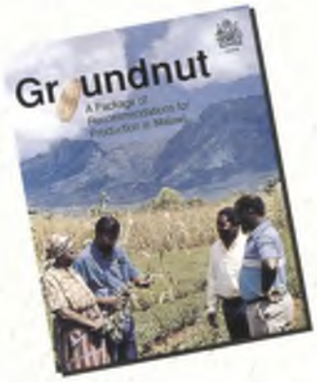

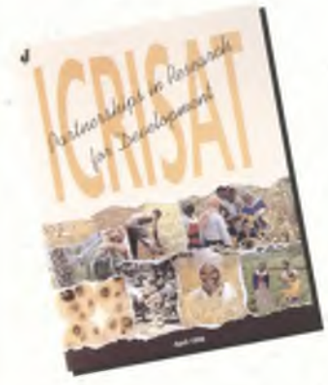

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ICRISAT ON THE WEB

Our website (www.icrisat.org) is a rich source of information on our programs, strategies, technologies, publications, and the latest news.

ICRISAT IN THE NEWS

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COMMODITY GUIDE

THE ECONOMIC TIMES NEW DELHI
FRIDAY 27 NOVEMBER 1998

The blooming of Little Orphan Annie

ICRISAT, a pigeonpea research institute, has received a prestigious award for developing high yielding and disease resistant varieties of the once insignificant crop

From an orphan crop to pacesetter, Pigeonpea (Tur/Arhar/Red Gram) has come a long way, fetching for one of its premier research institutions (ICRISAT) the prestigious King Baudouin Award of the Consultative Group on International Agricultural Research (CGIAR). India today occupies the top slot in pigeonpea production in the world.

The award was presented to ICRISAT on October 29, 1998 "in recognition of its development of high-yielding ...

... demonstrating a 25 per cent grain yield increase plus additional stem and leaf biomass for fuel and forage, and improved drought, disease and waterlogging tolerance.

It also led to substantive growth in area under the crop. Area under pigeonpea jumped from 2,655 thousand hectares in 1970-71 to 3,614 thousand hectares in 1996-97 in the country. Production during the same period went up from 1,88...

... tion during this period. The state had 8.9 thousand hectares under cultivation in 1970-71, but showed ...

... hectares in 1970-71, shooting up to 408 thousand hectares in 1996 ... and production figures rising from 40 thousand tonnes to 398 thousand tonnes in 1996-97. Its share in the state's cropped area went up from 0.8 per cent in 1970-73 to 3.8 per cent in 1990-93. Andhra Pradesh nearly doubled its area under pigeonpea, from 198 thousand hectares in 1970-71 to 359 thousand hectares in 1996-97. Production went up from 62 thousand tonnes to 137 thousand tonnes ...

... released as 'Pragati' in central and southern India in 1986, became immediately popular in the drier regions of Maharashtra and Karnataka, and now covers over 150,000 hectares in these states.

A substantial rise in the level of adoption during the period 1988 to 1994 showed adoption rates ...

... cent over the seven-year terms of the number of ... rate of adoption grew ... cent to 71 per cent in Maharashtra, and from 0 ... cent in Northern Karnataka.

A detailed on farm ... carried out by ICRISAT ... the variety-management ... resulted in an average ... yield increase over the ... replaced, and reduced cost ... duction by 12 per cent. Ap... the net income gain, another reason for adoption was ... enabled double cropping the ... ured early enough ... could still plant their ... crops of ... wheat. The ...

... variety of pigeonpea is a boon for farmers

Yet another gain from ... duration types is their suit... green pea production. ... (green) pigeonpea seeds ... sumed as a fresh vegetable ... parts of India. It attracts hi... and delivers a crop (and th... profits) more quickly than ...

Since short-duratio... months, as against 6-9 mon... ditional pigeonpea) vari... noticed to be relative ... sensitive, they can be sow... ent times of the year ... tion) to avail of higher prices for fresh produce. ... removed, repeated flushes can be stimulated and ... crops harvested from plants.

Additional benefits ... hybridity were also ... early vigour of hybrids ... to establish well and pro... and deeper roots, which ... drought resistance. They performed much better ... hybrids under Fusarium ... sure. Farm level studies ...

NEWSTIME THURSDAY 25 JUNE 1998

Icrisat b... awar...

Newstod...

Hyderabad: The In... crops research i... ...arid trop... the Kin...

...overnor's pat ...o ICRISAT

...press News Service

...yderabad, Dec 16: Governor C. Rangarajan today paid handsome tributes to ICRISAT for the work it has been doing for the benefit of small farmers of semi-arid tropics.

Addressing the staff after a visit to the institute located at Patancheru, the Governor congratulated ICRISAT for having received an international award for its ...

... due to ... varieties. The with brought under con... intensive breeding three main thrusts: ... lopment of reliable ... plot conditions for ... ding ... extensive screening of ... asm sources to identi... fielding apparent resis... ... the national and inter... laborative testing of ...

इक्रीसैट के सहयोग की प्रशंसा की

हैदराबाद, 24 जुलाई

डेली हिन्दी मिलाप, हैदराबाद
शनिवार, 25 जुलाई, 1998

Book released

A handbook on "Field diagnosis of groundnut dis... titled 'Verusenaga palrulo vyadhi nirdharana' w... by the Andhra Pradesh commissionerate of agric... the International crops research institute for th... tropics (Icrisat) on Wednesday, according to an ... press release issued here on Wednesday.

Receiving 200 copies of the publication from as... director of agriculture (publicity) AVLN Murthy ... director-general Dr Shawki M... ...ation between the governme... ...hat there would be more suc... ...g actively the disseminatio... ...s many as 10,000 copies of ... ...le and distribution to farm... ...icers in the state. Icrisat ... popular reference work ... ...lished with national ...

Kits to ... contamin... of farm p...

United News...

Hyderabad: Scie... International cro... Institute for the s... ics (Icrisat) here, ... tion with the S... research institute ... assistance from ...

ICAR members visit ICRISAT

Senior members of Agricultural Research Information ... (ARIS) belonging to ICAR and agricultural universities visited ICRISAT for attending a co... ...ormation centres". They were exp... ...ormation offered by the institute ...

ఇక్రిసాట్‌ను సందర్శించిన 'ఎక్రిస్' బృందం

Discussions held on aflatoxin control

Scientists from Australia, Indonesia, India and the United States have discussed joint research and other methods to control aflatoxin in peanuts during a three-day international conference held at Kingaroy TAFE.

The Department of Primary Industries (DPI) ... with the Department of ... Science and ...

... mist Dr Graeme Wright said the workshop had invited a number of world-leading scientists conducting research on aflatoxin in peanuts. The major aim was to de... ways in wh...

... such as implanting novel genes into new varieties that would express anti-fungal properties against the afla... producing fungus flavus.

Baudouin Award for ICRISAT again

By Our Staff Reporter

HYDERABAD, Nov 1

For the second time in a row the City-based ICRISAT has won the King Baudouin Award — the highest accolade conferred by the Consultative Group on International Agricultural Research (CGIAR). This is given in recognition of outstanding scientific work done by the 16 CGIAR centres, according to a press release.

The award for this year was for its submission "Pigeonpea Improvement at ICRISAT: From Orphan Crop to Pacesetter", which reveals on how the researchers in collaboration with a world-wide network of national organisations in private, public and community sectors mobilised to work the best of science to solve formidable problems and develop practical methods and produce for use by small farmers.

The King Baudouin award is given once in two years and ICRISAT is the first centre ... two awards in a row.

రైతులకు చేరినప్పుడే పరిశోధనకు సాఫల్యం

గవర్నర్ రంగరాజన్ ఉద్బోధ

Scientists discuss help to farmers in rain-fed areas

United News of India

Hyderabad: The two-day meeting of scientists from the Indian council of agricultural research (ICAR), state agricultural universities and the International crops research institute for the semi-arid tropics (Icrisat) which concluded here on Friday discussed collaborative projects that would benefit resource-poor farmers in rainfed areas of the country. This was stated in a press release issued by Icrisat.

Central research institute for dryland agriculture (Crida) director HP Singh said that emphasis would be accorded to pool resources and maximise efficiency. The projects reflected a diversification to work on scientific cropping systems based on rice or groundnuts as principal crops, Singh added.

King Baudouin award for Icrisat

Hyderabad, Oct 30: International crop research institute ... (ICRISAT), for the second time in a row, won the King Baudouin award, the highest award conferred by the Consultative Group on International Agricultural Research (CGIAR), in recognition of outstanding scientific ... ment.

The award is given every two years to the ... scientific ...

ADB advisor for more fund support to Icrisat

Our Hyderabad Bureau

25 SEPTEMBER

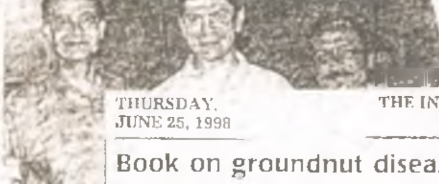
THE ASIAN Development Bank (ADB) has assured of continued fund support to the International Crops Research Institute for the Semi-Arid Tropics (Icrisat) for research on natural resource management in the semi-arid tropics of Asia.

This was disclosed by ADB's technical advisor, Dr D. Nangju currently on a week-long visit to the institute at Patancheru near Hyderab...

The ... January ...

Myanmar team visits Icrisa...

Major General Nyunt Tin, minister for agricultur... gation, government of Myanmar, visited the Inte... crops research institute for the semi-arid tropics ... on Friday, according to an Icrisat press release ... on Friday. The minister, accompanied by senior ... the Myanmar government was received by Icrisa... general Dr SM Barghouti and the management st... Barghouti ... accompanied them on a tour of Icrisat ... ...ents and the world germplasm ... minister praised the Icrisat ...



THURSDAY, JUNE 25, 1998

THE INDIAN EXPRESS HYDERABAD

Book on groundnut diseases

ఇక్రిశాట్‌కు అంతర్జాతీయ అవార్డు

BY A STAFF REPORTER

Kathmandu, Nov. 23:

With the objective of reviewing genetic research activities on cereal and legume grains, identifying ways of improving effective exchange of genetic material, technology and information among network member countries and framing guidelines for future network activities, the fifth country coordinators' meeting of the Cereals and Legumes Asia Network (CLAN) began in Lalitpur today.

Cereals and legumes experts from Bangladesh, China, India,

...ISAT kit to detect aflatoxins

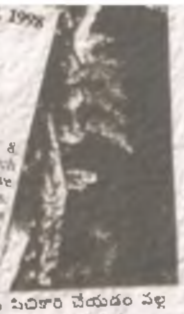
By Our Special Correspondent

HYDERABAD, July 8

Scientists at the International Crops Research Institute for Semi Arid Tropics (ICRISAT) have developed an inexpensive kit to detect aflatoxins in partnership with the Government of Andhra Pradesh and a private poultry firm called Janaki ...eeds. The United Kingdom's Department for International Development has committed funds for the project, according to Dr. D.V.R. ...ddy, a senior ...ologist at ICRISAT.

...Reddy says that aflatoxins pose a very serious problem for agricultural commodities such as maize, chillies, turmeric and groundnut. He ...hat in 1994, over two lakh chicken died in ...Pradesh after eating feeds containing ...ns. These are potent, carcinogenic, ...suppressive ... chemicals produced ...e aspergillus fungus invades agricultural commodities. However most developing ...have no aflatoxin monitoring kits ...chemical methods. Commercial kits ...ve and it costs about $12 to check ...for aflatoxins. ...ides, polyclinical antibodies have ...produced.

...July 9, 1998



...ఁ పిచికారి చేయడం వల్ల చనిపోయిన పురుగు

అద్భుతసృష్టి

శనగపచ్చపురుగు హతం

వైరస్ పిచికారీ ... చనిపోయిన ...

ఇప్పటివరకు అధికమవడమే కారణం రైతులు ... వ్యవసాయ శాస్త్రవేత్తలు ... రంగారావు ... 5 రోజులలో శనగ పచ్చపురుగు చనిపోయి ... ఎన్.పి.వి ద్రావణం తయారు చేయు విధానం: ...

Le President de la Republique visite l'ICRISAT a Sador...

ICAR, ICRISAT scientists' meet concludes

EXPRESS NEWS SERVICE

Hyderab... two-day ... from the ... icultural ... State ag... and the ... search ... Arid T... nised ... for (CRID... today. uss co... The ... work ... woul... farm... the ... try. ... CR... th... w... ...

Cultivation sans chemicals pays good dividends

By A. Saye Sekhar

GUNTUR, Feb. 11

Cultivation sans chemicals is not only possible, but profitable as well as has been proved by the farmers of Pedagottipadu, 30 km from here, in assistance the with scientists of the Regional Agricultural Research Station (RARS) in Lam Farm.

A series of interaction sessions and on-farm demonstrations have attracted the farmers — given to excessive use of chemical pesticides — to adopt an integrated pest management (IPM). Use of synthetic pyrethroids, besides the mono-cropping pattern for years, has resulted in the insects developing resistance to pesticides.

A vicious cycle has set in with the farmers having to use more pesticides leading to increase in the cost of cultivation and irreparable damage to soil.

Against this background, the RARS scientists have launched a campaign to propagate IPM, crop rotation and inter-cropping. The Associate Director of Research, Dr. A. Satyanarayana, adopted Pedagottipadu to make it a model agricultural village in 1995.

The farmers were sensitised to the need for reducing the use of pesticides and adoption of inter-cropping. However, the farmers are responding to the suggestions only now.

'Helicthis' is the major pest that attacks almost all the crops grown here. It is also ... podborer or bollworm ... farmer...

Farmers of Pedagottipadu village in Guntur district of Andhra Pradesh learning the technique of culturing 'nuclear polyhydrosis virus (NPV)' from Dr. G. V. Ranga Rao, ICRISAT scientist. — Photo: C.V. Subrahmanyam

ical one — would have ... inter-cropping ...

and chick pea. According to Dr. Ranga Rao, larvae are collected from fields and are left on chick-peas soaked in the virus inoculum. On consumption of the pea, the larva gets infected and dies. The dead larvae are crushed and the juice is filtered, centrifuged, preserved and frozen to prepare the ... This can be recycled by collecting the larv... ...ber of times.

While helioth... pillar is not ... sprayed on th... mutually ... ...been cater... ...n be...

Farmers ... functional ... are goin...

Icrisat signs new pact with Zimbabwe

Our Hyderabad Bureau

8 MARCH

THE International Crops Research Institute for the Semi-Arid Tropics (Icrisat) has signed a new agreement with the government of Zimbabwe for the establishment of a permanent Icrisat presence in Zimbabwe.

The agreement was signed recently by Mr K Kangai, minister of Lands and Agriculture, on behalf of the government of Zimbabwe, and Dr S M Barghouti, Icrisat's director general.

A press release ... states ...

Bengal gr...

Increased production of small grains encouraged

Agricultural Reporter

PRODUCTION of small grains — sorghum, pearl millet and finger millet — should be encouraged because 33 percent of the Sadc region is prone to droughts, International Crops Research Institute for the Semi-Arid Tropics director ... M...

Although there had been a marked increase in the area planted under sorghum and pearl millet, there had not been a corresponding increase in the yield. This had resulted in depressed production levels in the region.

The Sadc region produces about 1 million tonnes of sorghum ... about ...

ter maize, in the country.

Subsistence communal farmers in the low rainfall regions accounted for about 90 percent of total area planted to these crops. He said small grains were drought-tolerant and ensured household food ...

and nutrition, but will also offer commercial opportunities through value-added products in the food and feed industries and as raw materials for the manufactur... tor," said ...

THE HINDU, Friday, June 26, 1998

Telugu handbook on groundnut diseases

By Our Staff Reporter

HYDERABAD, June 25.

A Telugu version of a handbook on "Field diagnosis of groundnut diseases" entitled "Verusenaga pairalo vyadhi nirdharana", was released jointly by the AP State Commissionerate of Agriculture and the International Crops Research Institute for the Semi Arid Tropics (ICRISAT). ...V.N. Murthy, Assistant Director of (Publicity), presented 200 copies of ...to ICRISAT Director General, Mr. ...outi at the ICRISAT campus at ...dnesday.

...e kind of partnership that ...overnment should have ...this collaboration", Dr. ...ling, Mr. Murthy said ...more such co-publi... ...ing the dissemina...

Agreement

The International Crops Research Institute for the Semi-Arid Tropics and the government of the republic of Zimbabwe have signed a new agreement facilitating the establishment of a permanent ... in Zimbabwe. The ... was signed ... of lands and ... and S M ... general ...

interview

Dr Shawki M Barghouti, director general, ICRISAT:

The stress should be on water use efficiency...

For quite a few years, *INDUSTRIAL ECONOMIST* (IE) has been urging water-deficient states like Tamil Nadu to switch massively from water-gurgling crops like rice and sugarcane to horticulture, oilseeds, cotton and other commercial crops. We are happy to find an international expert, Dr Shawki M Barghouti, director general, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), providing strong ...asis for such a shift. Here are excerpts

...warn

High-yielding, short-dur... Bengalgram

By Our Agriculture Correspondent

SHORT-DURATION Bengalgram (Cicer arietinum) with a high yield potential of ...50 kg per hectare has been released for commercial cultivation by the Tamil Nadu Agricultural University (TNAU), Coimbatore, this year.

...e christened CO 4 Bengalgram, the improved variety is a hybrid derivative of ICCC 42 X ICCC 12237 effected through a collaborative programme of TNAU and ICRISAT, according to scientists at the Centre for Plant Breeding and Genetics at TNAU.

able rhizobium as a slurr... treated seeds should be ... shade drying. An espacem... rows and 10 cm between ... lowed.

The crop should be h... 15th day after sowing, a... necessary. Need-based pl... be done. The crop can be ... day after sowing. Seeds ... cent moisture level belo... grains from storage pest... clay should be mixed wit... of clay for every 100 kg ...

The variety ... anc...

For the Farmer's Notebook

The new variety is a ... CO ... maturin... weight is ... area, acc... The pl... 35-40 ... green, ... light pink ... with less ... recommend... ber-January ...

ADB to fund soil research

Hyderabad, Sept. 26: Technical advisor to the Asian Development Bank D Nargeu said that the ADB was keen on funding research that would address the problems of water and soil degradation in ... had have been bypassed ...

He was here on a week-long ... to the Icrisat from Septem... to review two ADB-spon... projects, 'Strengthening ... collaboration on cereal... legumes research in As... "Legume-based technolo... rice and wheat productio... in South and South-East ... the Icrisa...

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Donald R Marshall, Australia
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Australia

(Name, country of origin, and work location)

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A Amada, *Mali,* Bamako
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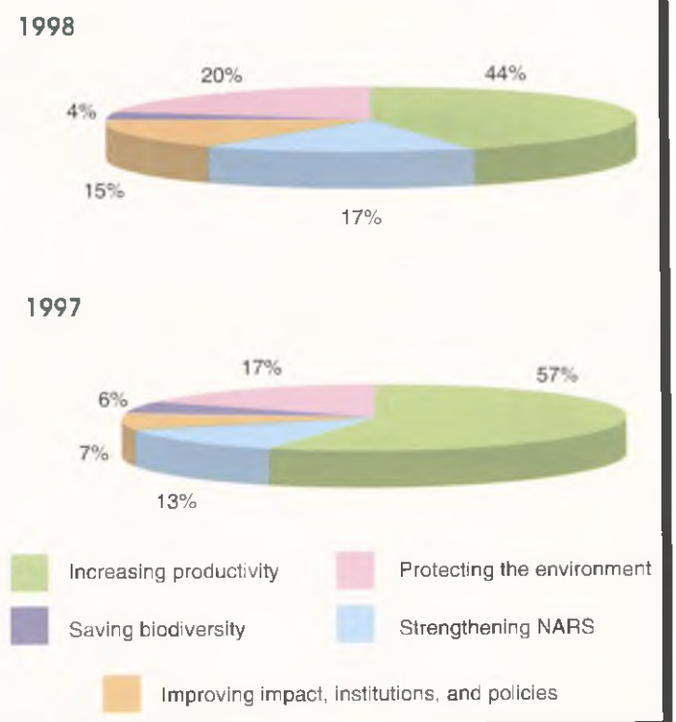
Balance Sheet

US$ thousands

	1998	1997
Assets		
Cash and cash equivalent	19,663	10,342
Accounts receivable	6,816	9,302
Inventories	806	1,283
Prepaid expenses	290	231
Fixed assets - net	41,589	44,234
Other assets	562	662
Total Assets	69,726	66,054
Liabilities		
Bank overdraft	-	78
Accounts payable	2,798	2,596
Accruals and provisions	1,248	1,377
Payments in advance from donors	5,113	6,003
In-trust funds	49	125
Long-term liabilities	6,797	7,500
Total Liabilities	16,005	17,679
Net Assets	53,721	48,375
Represented by:		
Capital invested in fixed assets	41,589	44,234
Capital fund	6,673	4,381
Operating fund	5,136	(579)
Special Purpose Fund	323	339

Agreed agenda and non-agenda costs by CGIAR undertaking

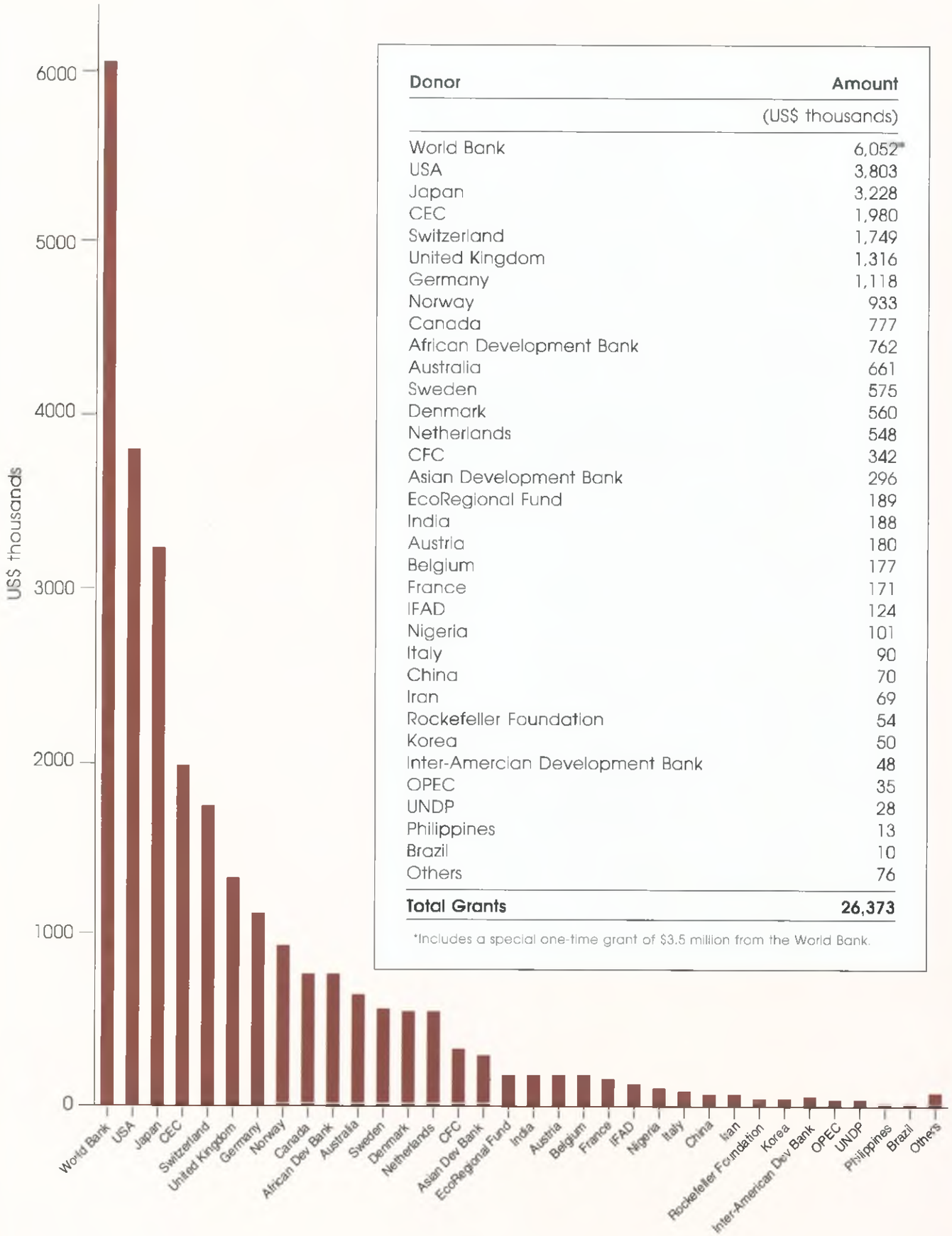


Operating Results and Movements on Operating and Capital Funds

(US$ thousands)

	1998	1997	Variance Increase/(Decrease)
Operating results			
Revenue	24,027	27,895	(3,868)
Operating expenditure	22,081	27,407	(5,326)
Operating surplus/(deficit) before extraordinary items	1,946	488	1,458
Extraordinary Items	3,785	(6,039)	9,824
Operating surplus / (deficit)	5,731	(5,551)	11,282
Operating Fund			
Opening balance	(579)	167	(746)
Surplus / (deficit) for the year	5,731	(5,551)	11,282
Interest on Housing Loans	-	(16)	16
Transfer from Capital Fund	-	5,000	(5,000)
Previous years adjustments (net)	(16)	(179)	163
Closing balance	5,136	(579)	5,715
Number of days expenditure excluding depreciation	96		
Capital Fund			
Opening balance	4,381	7,357	(2,976)
Depreciation	2,506	2,797	(291)
Assets Sale Proceeds, net	293	381	(88)
Special Grants	37	183	(146)
Transfer to Operating Fund	-	(5,000)	5,000
Assets additions	(544)	(1,337)	793
Closing balance	6,673	4,381	2,292

Grant Income from agreed agenda and non-agenda donors (for the Year Ended 31 December 1998)



Donor	Amount
	(US$ thousands)
World Bank	6,052*
USA	3,803
Japan	3,228
CEC	1,980
Switzerland	1,749
United Kingdom	1,316
Germany	1,118
Norway	933
Canada	777
African Development Bank	762
Australia	661
Sweden	575
Denmark	560
Netherlands	548
CFC	342
Asian Development Bank	296
EcoRegional Fund	189
India	188
Austria	180
Belgium	177
France	171
IFAD	124
Nigeria	101
Italy	90
China	70
Iran	69
Rockefeller Foundation	54
Korea	50
Inter-American Development Bank	48
OPEC	35
UNDP	28
Philippines	13
Brazil	10
Others	76
Total Grants	**26,373**

*Includes a special one-time grant of $3.5 million from the World Bank.

ACIAR	Australian Centre for International Agricultural Research
ADB	Asian Development Bank
ANGRAU	Acharya N G Ranga Agricultural University
APSIM	Agricultural Production Systems Simulator
APSRU	Agricultural Production Systems Research Unit
ARI	Agricultural Research Institute
BARI	Bangladesh Agricultural Research Institute
BBM	broadbed maker
BGM	botrytis gray mold
BMZ	Bundesministerium für Wirtschaftliche Zusammenarbeit, Germany
CAZRI	Central Arid Zone Research Institute
CEC	Commission of the European Communities
CENARGEN	Centro Nacional de Pesquisa de Recursos Geneticos e Biotechnologia, Brazil
CFC	Common Fund for Commodities
CGIAR	Consultative Group on International Agricultural Research
CIAT	Centro International de Agricultura Tropical
CIDA	Canadian International Development Agency
CIMMYT	Centro Internacional de Mejoramiento de Maiz y de Trigo
CIRAD	Centre de coopération internationale en recherche agronomique pour le développement, France
CLAN	Cereals and Legumes Asia Network
CORAF	Conference des responsables de la recherche agronomique africains
CRIDA	Central Research Institute for Dryland Agriculture
CSIRO	Central Scientific and Industrial Research Organisation
DFID	Department for International Development
DMP	Desert Margins Program
FAO	Food and Agriculture Organization of the United Nations
GREP	Genetic Resources Enhancement Program
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
IAR	Institute for Agricultural Research, Nigeria
ICAR	Indian Council of Agricultural Research
ICLARM	International Centre for Living Aquatic Resources Management
ICRAF	International Centre for Research on Agroforestry
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IDRC	International Development Research Centre
IER	Institut d'économie rurale (Mali)
IFAD	International Fund for Agricultural Development
IFDC	International Fertiliser Development Centre
IFPRI	International Food Policy Research Institute
ILRI	International Livestock Research Institute
INRAN	Institut national de recherches agronomiques du Niger
IPM	integrated pest management
JIRCAS	Japan International Research Centre for Agricultural Sciences
JVP	Joint Vertisols Project
MSSRF	M S Swaminathan Research Foundation
NARC	Nepal Agricultural Research Council
NARS	national agricultural research system
NBPGR	National Bureau of Plant Genetic Resources
NGO	nongovernmental organization
NPV	nuclear polyhedrosis virus
NRM	natural resources management
OPEC	Organisation of Petroleum Exporting Countries
ORSTOM	Institut français de recherche scientifique pour le développement en coopération
PCR	polymerase chain reaction
Peanut CRSP	Peanut Collaborative Research Support Program
QDPI	Queensland Department of Primary Industries
SADC	Southern African Development Community
SCRI	Scottish Crop Research Institute
SINGER	System-wide Information Network for Genetic Resources
SMINET	Sorghum and Millet Improvement Network
SMIP	Sorghum and Millet Improvement Program
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
VASI	Vietnam Agricultural Science Institute
WCAMRN	West and Central Africa Millet Research Network
WCASRN	West and Central Africa Sorghum Research Network

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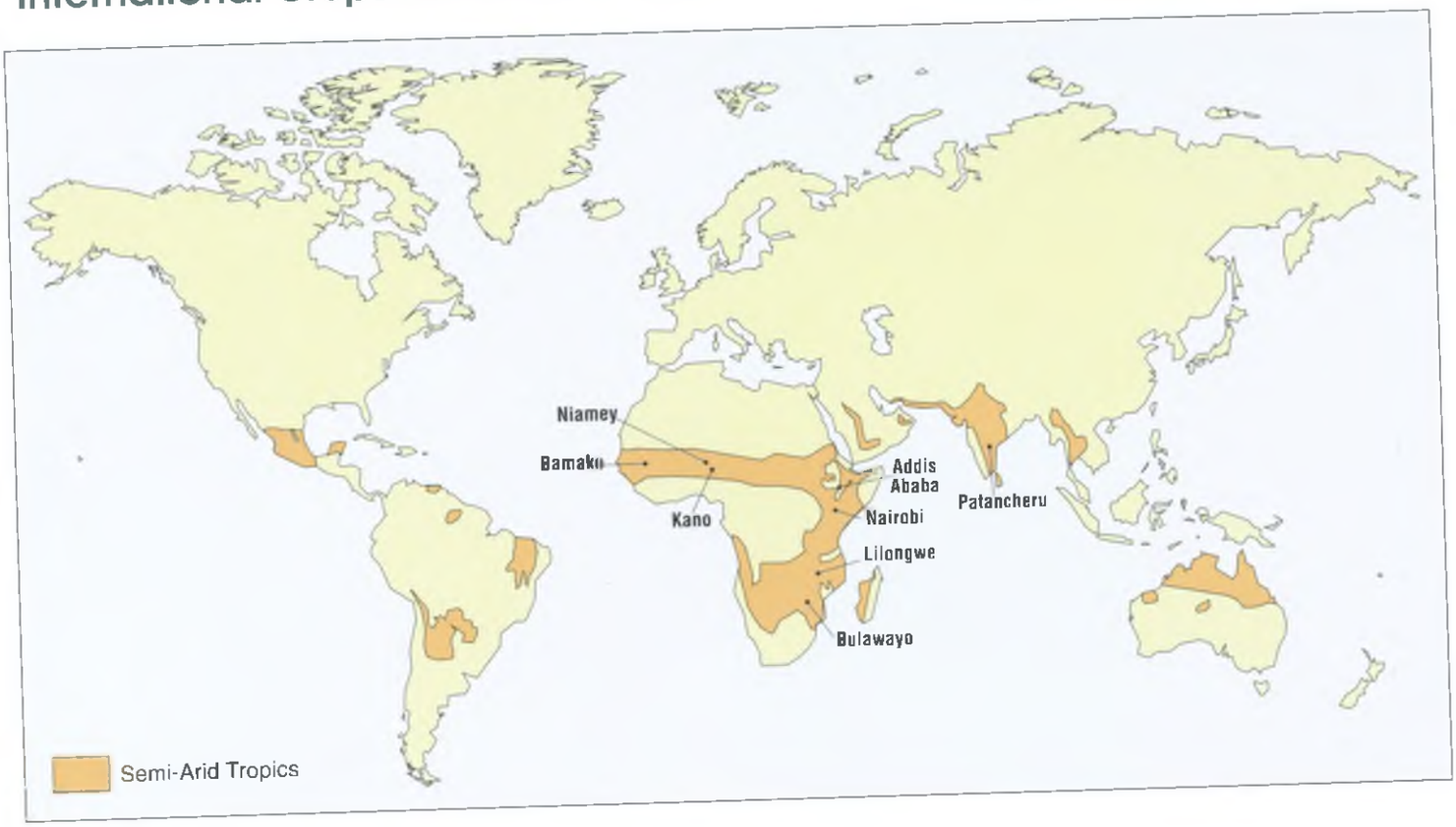
International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)



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What is ICRISAT ?

A nonprofit, apolitical, international organization for science-based agricultural development. Established in 1972, it is one of 16 centres supported by more than 50 donor governments, foundations, and development banks, through membership in the Consultative Group for International Agricultural Research (CGIAR). ICRISAT has approximately 1300 staff, and an annual budget of about US$ 26 million.

ICRISAT's mission and focus

To help developing countries apply science to increase crop productivity and food security, reduce poverty, and protect the environment. ICRISAT focuses on the semi-arid tropical areas of the developing world, where low rainfall is the major environmental constraint to agriculture. Special emphasis is placed on five crops that are particularly important in the diets of the poor: sorghum, millet, groundnut, chickpea, and pigeonpea.

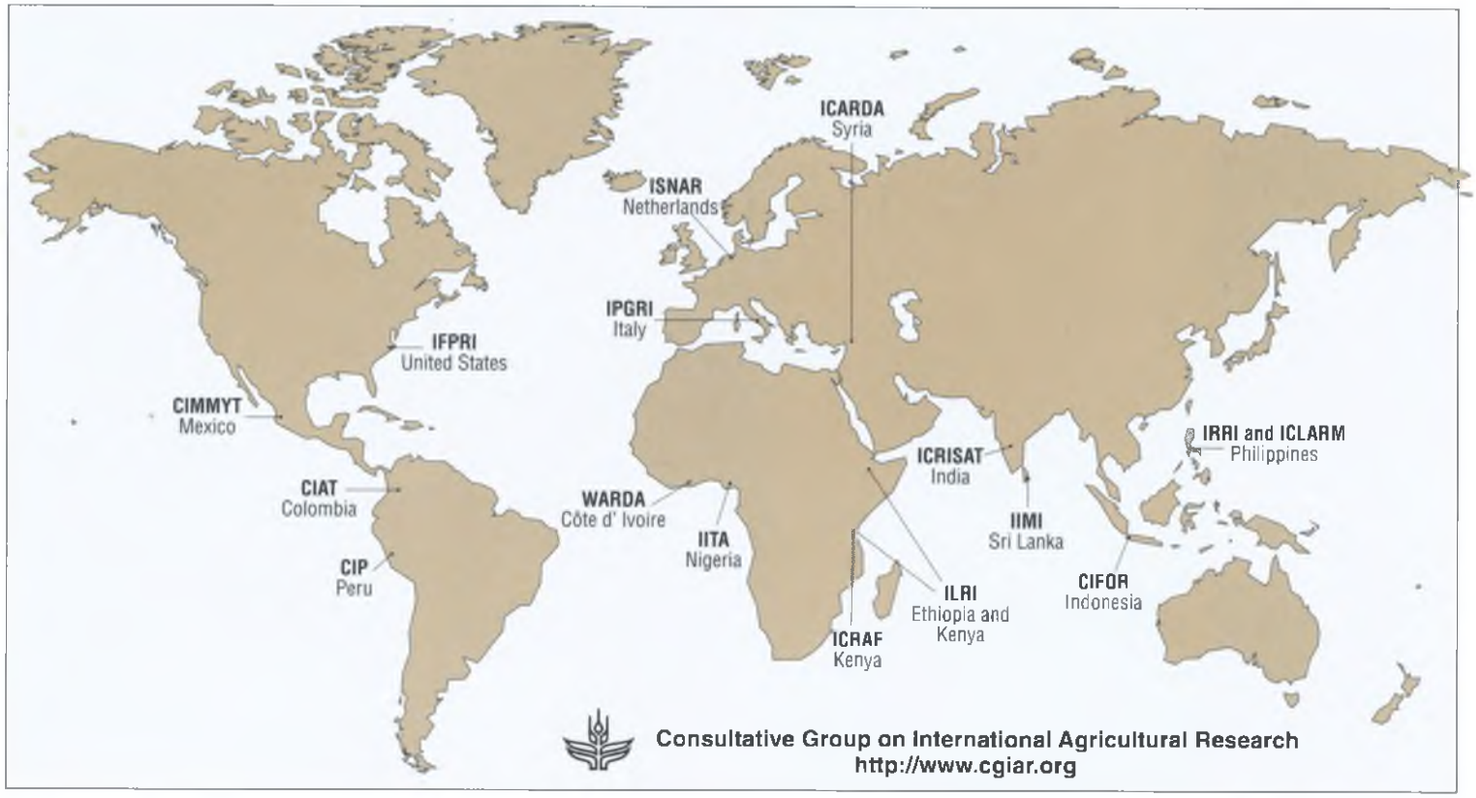
ICRISAT's strategy

To form research partnerships with governmental, non governmental, and private sector organizations in developing countries, and to link these partners to advanced research institutions worldwide. Each partner contributes its unique strengths to make the whole greater than the sum of its parts. ICRISAT excels in strategic research on global issues and on international exchanges of knowledge, technologies, and skills. These products and services help partners enhance their capabilities to meet regional national, and local development needs.

Where is ICRISAT ?

Staff are based at eight locations across Africa and Asia, shown above. From these points, they travel extensively to work with partners across the semi-arid tropical world.

ICRISAT's Sister Centers in the CGIAR



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