

Corporate Science and Technology Institutions

*Partnerships for Inclusive and Sustainable Development
and Economic Growth*



International Crops Research
Institute for the Semi-Arid Tropics

Confederation of
Indian Industry



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Abstract

The main objective of the workshop titled *Corporate Science and Technology Institutions - Partnerships for Inclusive and Sustainable Development and Economic Growth* held at ICRISAT was to relate high-end science and technology with the corporate sector for the benefit of farmers in rainfed areas. More specifically, the potential of watershed-based activities in maximizing land and water use for sustainable development through commercially viable non-conventional and improved technologies for better livelihoods was sought. The private sector can substantially contribute to a sustainable development in the rural areas by developing a business-like model for agriculture making it profitable by providing a touch of professionalism in management systems. ICRISAT has the vision and goal to improve the well-being of the rural poor in the SAT through sustainable use of natural resources by adopting science-led development pathway. The CII partnership along with other NGOs in research and development will help to realize this vision through scaling-out the benefits by building public-private partnerships in the area of rainfed agriculture.

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Corporate Science and Technology Institutions

*Partnerships for Inclusive and Sustainable
Development and Economic Growth*

Proceedings of the CII-ICRISAT Workshop

27 February 2006

Editors

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Confederation of Indian Industry

Delhi, India

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Background

ICRISAT's over-arching vision has always been to improve the well being of the poor – focusing mainly on the regions known as the semi-arid tropics. Its mission has been to help rural farmers to increase agricultural productivity, provide food security, reduce poverty and protect the environment through agricultural research. The onset of the new millennium has significantly changed ICRISAT's task environment. The 'Millennium Development Goals' tremendously broadened the global agricultural research agenda from merely increasing food supply to embracing poverty and hunger reduction, environmental sustainability and social issues such as gender equality, health and nutrition.

To achieve this vision and goal ICRISAT adopted the Integrated Genetic and Natural Resource Management through watershed management using water as an entry point as its overall research strategy. To pursue the foregoing, ICRISAT strengthened its position as an innovations- and impact-driven organization and forged partnerships with the private sector. The institute's strategic partnerships especially with the Confederation of Indian Industry (one of the largest private associations) and other public and private sectors, NGOs, civil societies and international bodies were meant to develop novel approaches that would aid the transition from traditional production practices to sustainable systems that were more aligned with current market trends. Finally the aim is to improve the livelihoods of the poor and marginal farmers in the project villages and evolve a strategy for rapid scale-up so that optimum scale needed for translating development interventions to significant enhancements of land and water use, productivity, agri-production and rural incomes is achieved.

A one-day workshop titled Corporate and Science and Technology Institutions: Partnership for Inclusive and Sustainable Development and Economic Growth on 27 February 2006, was held at ICRISAT. Arranged jointly with the Confederation of Indian Industry, the workshop sought to address these issues and re-chart its vision and strategy to 2015.

Dr William D Dar, the Director General, chaired the inaugural session of the workshop.

Objectives of the Workshop

Welcoming the delegates **Dr SP Wani** briefly spelt out the workshop's main objectives in his introductory speech. The main purpose was to relate high-end science and technology with the corporate sector in enhancing the lives of millions of poor living in the semi-arid tropics (SAT). More specifically he elaborated on the potential of watershed-based activities in maximizing land and water use, through commercially viable non-conventional and improved technologies for better livelihoods. The semi-arid regions are in urgent need of investments and the involvement of government and corporate sector is very important. The untapped potential of dryland agriculture is very high and it is proven that investments are quite remunerative. In addition to this, it also addresses the problems of equity and poverty. The private sectors also need to join hands with the public investments to fight poverty and contribute to fulfillment of the millennium development goals (MDGs).

Inaugural Session

Dr William D Dar delivered the welcoming address and extended special greetings to Mr Sen the Co-Chair, Deputy Director CII and to SP Tucker, Principal Secretary, Department of Minor Irrigation, Government of Andhra Pradesh and rest of the participants. He introduced the representatives of other organizations to the proactive work done by ICRISAT in securing a safe environment for the rural poor. Since the past six years an innovative and impact-driven watershed management consortium approach has paid off rich dividends to the farmers since ICRISAT started partnership with the NGOs, civil societies and the corporate sector.

The fruits of partnership have also resulted in a state-of-art Agri-Science park established at the institute for the first time in the history of CGIAR. These partnerships have also seen the growth of a Hybrid Parent Research Consortia, the Agri-Business Incubator, the Biopesticide Research Consortium and other partnerships for watershed development. He also noted the fact that the Government of India used to contribute \$ 170,000 to ICRISAT but since its partnership and trust has grown, it now invests \$1.7 million for research at the institute and as a consequence 70 to 90% hybrid parent research on pigeonpea is from ICRISAT.

Mr S Sen gave a bird's eye view of the activities of CII and elaborated the ideals of the organization and its 50 offices throughout the country. He went on to explain that the slogan of CII for 2006 was 'Benefit of Economic Growth'. To put this into action, their first initiative targeted rural business hubs, improved governance, the *panchayat* sector and created employment opportunities. The

second initiative was in the northeastern regions where the CII also attempted the same by designing new products out of traditional skills and marketed it throughout the country. They also provided vocational training programs and expanded similar policies in Jharkhand and Rajasthan, where they also gave a fillip to non-conventional forms of energy. Mr Sen spoke enthusiastically of the CII initiative taken at Dungarpur, in Rajasthan (near Gujarat) about a few months ago in collaboration with the Government of Rajasthan, UNDP and the Bharat Nirman. Mr Sen evinced interest in ICRISAT activities and aspired to know whether ICRISAT could replicate this model in AP. (Dungarpur near Gujarat has, over the years, been one of the most backward districts of the country. It is not only conservative in its approach towards new technology but is also poverty-stricken and has no systematized market policies).

Mr SP Tucker spoke briefly on the contribution of the Government of AP towards the goal of halving the population by 2025. To advance this, he said, the quality of education has to improve. As the Government is unable to take up this task single-handedly, the role of the NGOs and industries here gain importance in contributing to a secure educational background to the children of rainfed areas.

He added that different kinds of policies are required to cater to different groups of farmers and they can be roughly divided into four groups: (i) the poorest of the poor who are unkindly called as 'destitutes' having poor nutrition, gender inequality and where child mortality rate is very high. (ii) the rainfed farmers who only depend on seasonal crops and migrate constantly in search of a secure livelihood (iii) the secured poor who have some means of living by having crops/lands which give them 2-3 meals a day and finally, (iv) the secured rich farmers who are the money lenders in the village whose children study abroad and who have invested in small industries.

Mr Tucker summed up his speech by remarking 'the days of charity are over' and this is the era of networking and the government cannot facilitate any policy without the active cooperation of the private sector in the country. The government has to empower the poor and employment opportunities have to be created.

Mr Mahesh Desai, Convenor, CII gave the concluding remarks for the session and complimented the speakers. He summed up the inaugural session by remarking that "this exercise has been extremely challenging and arranged at a very appropriate time".

Technical Session

The Impact of Science and Technology on Rainfed Agriculture and Rural Livelihoods.

Mr S Parthasarathy, Chairman of National Committee of Recommendations on Watershed Program chaired the session and said he looked forward to a blue print to come out at the end of the session, which could be worked on for the future. He went on to remark that research usually is in a cocoon/isolation but with rapid number of donors and private companies entering the arena, research has come to be increasingly applied on-farm. The private sector can contribute to sustainable development in the rural areas by providing decision and management support systems. Effective rural development activities require competent and professional inputs.

Dr Cynthia Bantilan spoke on the direct relationship of agricultural growth and poverty and the production chains through which the lives of people living in rainfed areas could improve. The transmission mechanisms would include a higher rural income, cheaper food, opportunities in non-farm sector and the imperative need to shift from primary to other sectors. This mechanism would be further regulated through markets, which are vital for poverty reduction. She also expanded on the factors underlying the growing importance of markets which included: A move away from subsistence agriculture, export markets, diversification into horticulture, fisheries, cash crops, etc. To facilitate the production of diversified agricultural commodities small farmers play an important role.

From ICRISAT's point of view we have anticipated International Public Goods and replicated it not only in AP but also throughout the country. Production standards meet export protocols and food safety models linking small-scale production with large-scale processing (variants of contract farming, bulk marketing, storage, vertical integration etc.). Finally she added ICRISAT has a vision and goal to become the 'premier biotech and crop improvement center in South Asia'. The Agri-Science Park at ICRISAT (ASP) is helping to realize this vision.

Finally, public-private sector partnership in research for development is gaining new grounds with the synergy between public institutions and private sector companies adding value by applying adaptive research (making and testing hybrids across environment). The private sector also has good seed production and market network and the confidence in ICRISAT to deliver promised outputs/products. In turn ICRISAT is able to show impacts in farmers' fields (increase production) through partnership with the private sector.

Supporting this theme was **Dr Wani's** presentation on improving productivity and protecting environment through integrated genetic and natural resource management (IGNRM) methods and the impact of watershed programs – a silent revolution that is changing the face of rural India. He spoke on the nexus of drought and land degradation, which resulted due to lack of water and in turn led to poverty. An interesting entry point here would be the watershed management policies through which production in rainfed agriculture could be doubled, livelihoods could be improved along with empowering the poor and protecting the environment – all finally resulting in development of social capital. However, he added, PESTs (an acronym for lack of participation, equity, sustainability and technological inputs) are holding back the potential of watershed program in India. Community participation can be improved substantially through mainly four points: Knowledge-based entry point, providing tangible economic benefits to individuals, equal partnership, trust and shared vision among the consortium partners and most importantly be demand driven.

To give an example - ICRISAT-ICAR initiative supported by Sir Dorabji Tata Trust has helped the BAIF-ITC-ICRISAT partnership in Guna, Madhya Pradesh, to yield rich dividends with improved soybean varieties along with nutrient management and cropping systems which were introduced with enhanced market links and information dispersed through *E-Chaupals*. ICRISAT also undertook the micronutrient initiative with Morarji Borax in Gujarat, Madhya Pradesh, Rajasthan, Karnataka and Tamil Nadu, which ensured availability of necessary micronutrient inputs, decentralized packaging and supply chain through self-help groups (SHGs). In addition to this farmers were co-operative in scaling-out the benefits. ICRISAT-CII initiatives are into water management, CII-Godrej Green Business Center, biodiesel initiatives and CII-Coca Cola-ICRISAT initiative to foster public-private partnerships in rainfed areas.

The next speaker was **Dr Dave Hoisington** who brought focus to the new science tools which could be used to benefit resource poor families. They are mainly:

- Genomics
- Genetic engineering
- Mycotoxin diagnostics
- Information technology

Elaborating on each point he highlighted the new research being done at ICRISAT on groundnut, chickpea and pigeonpea. He spoke of aflatoxin/mycotoxins and the fungi effect, which devastates fields and nature in general. Farmers have not yet gained enough experience in limiting its growth. Mycotoxins produced by

Aspergillus flavus infect many crops (eg, groundnut, maize, pistachio), affects human and animal health (carcinogenic) and decreases export potential.

Speaking on the role of ICRISAT's Integrated Approach to Mitigate Aflatoxin Contamination, he said ICRISAT has pioneered the development of enzyme linked immunosorbent assay (ELISA-based) diagnostic tools, for plant viruses, fungi, mycotoxins and cellular metabolites. Added to this, facilities exist to produce polyclonal, monoclonal and recombinant antibodies, and enzyme conjugates (reporter antibodies) necessary to develop ELISA-based diagnostic tools and kits. With the help of this it was reported that on 14 Jan 2005, the State Varietal Release Committee in Haryana approved release of pearl millet hybrid HHB 67-2 as a higher yielding and higher downy mildew (DM) resistant replacement for popular extra-early maturing hybrid HHB 67 using molecular assisted breeding. The first non-GMO product of marker-assisted back crossing (MABC) was also released in India which was an added achievement to ICRISAT.

The State Agricultural Universities (SAUs) developed a large volume of extension and education material in various Indian languages. ICRISAT facilitated the coming together of the SAUs and the Indian Institute of Technology (IIT) system to build an online grid of education materials that could be locally customized using the Learning Objects (LO) modules. The AGROVOC, a global thesaurus of agricultural terms will be used as the basis to search for grid materials in different Indian languages. Dr Hoisington said that this is an example of how an international public good is put to use to generate a new local advantage. The Virtual Academy for the Semi-Arid Tropics (VASAT) too was developed at ICRISAT to share knowledge on rainfed agriculture and inovated a tool to predict drought, surface ground water levels, etc, at vulnerable villages and was tested at Addakkal, AP.

Mr Raju Damle, CII, the next speaker highlighted '**Pathway for Industry-Institute Partnership for S&T Inputs** and CII commitment to 'Inclusive Growth'. He elaborated that CII has aligned with UN Millennium Development Goals but has not yet been successful in creating more jobs due to the sheer magnitude of backwardness especially in the 150 districts of India. To remedy this the CII has initiated various partnerships recently in:

- Rural Business Hubs in partnership with Ministry of *Panchayati Raj*, Government of India.
- Dungarpur Initiative Model for comprehensive development of backward districts being piloted at Dungarpur, Rajasthan in partnership with Government of Rajasthan and UNDP.

He also stressed the need to identify the specific challenges faced by rainfed areas which are mainly:

- Gaps in soil and water conservation treatment
- Demonstrate potential for enhancing productivities with judicious use of water as against unscientific excessive use by richly endowed families
- Maximizing in-situ rain utilization under different soil and hydro geological conditions

He concluded by saying that the way has already been paved and an integrated approach has been adopted. Various concerned corporates like the ITC, Titagarh Biotech, PI Industries, Jain Irrigation Systems, renewable energy systems and energy efficient pumps manufacturers, banks and insurance companies and Financial Institutions like the NABARD have jointly collaborated with ICRISAT to work with farmers in rainfed regions of the country. (For example ITC, working on knowledge enhancement program in rural India has put forth the proposal launching kiosks and *e-choupals* in every district in the state. It also gives an integrated package to scientists to link up with NRCs, SAUs, NRSA, etc).

An interactive brain storming session followed where questions on sustainability, funding and contract farming were discussed. Mr Parthasarthy summed up each speaker's presentation. A dialogue followed with four panel members discussing the role of science and technology in public and private partnership for sustainable and inclusive rural development.

The first panelist – **Mr B Venkatesham**, District Collector (Medak) remarked that it was a wrong notion to presume that government lands are not available and it follows a closed policy. Taking a very optimistic stand, he discussed briefly the recent MoU signed by Medak district, ICRISAT and CRIDA to develop government lands for research purpose.

Mr S Gangopadhyay from Titagarh Biotech Ltd. stressed on three major points:

- (i) ensure income and productivity to farmers
- (ii) farmers have to be convinced about the technology and this is a formidable challenge
- (iii) if financial problems arise they should be solved with the help of NABARD (the responsibility of investing and selling) and the government and farmers should jointly be involved in it by forming a body with stipulated rules and regulations.

Dr KK Sharma gave a bird's eye view of the way in which ICRISAT (unlike earlier) has now blossomed into becoming a public sector unit trying to sell public goods and has now discarded its earlier fears. It has now set up

an Agri-science park and signed a MoU with the AP government, mainly to enhance public-private collaboration. Added to this a consortia of hybrid seed applications is also set up with eight diverse departments coming together and providing huge opportunities for fresh graduates to set up new businesses with ICRISAT. These fresh graduates have come forth collectively to custom design technology for farmers depending on rainfall and climate – especially in the SAT. The Agri-science incubator set up is custom designed and deals with every part of agriculture from farm implements to genome transformation.

Mr Mahadevan, Director, BHP Mineral India Ltd. and **Mr Badrinarayanan, from TVS Industries Ltd.** also spoke eloquently on the role and partnership of their individual industries with ICRISAT. They reiterated the common need to district by enhancing the productivity of rainfed farming systems through sustainable management of natural resources. An inter-active group discussion followed.

The afternoon's special session was chaired by Dr Dar who warmly welcomed Mr N Raghuvveera Reddy, Honorable Minister for Agriculture. **Mr Raghuvveera Reddy** spoke on public-private partnership for inclusive and sustainable development of backward districts in Andhra Pradesh. In his presentation, he said that the AP Government is highly interested in promoting public-private partnership in agriculture. These regions are ideal places where one could develop a budding agri-business center and tap scientific resources and facilities. He complimented ICRISAT on doing commendable work since the last 6 years and said that by entering an MOU with CII would definitely bring laurels to the institute. He elaborated on ICRISAT's commendable work in the watershed management which has benefited rainfed farmers not only in AP but throughout India. Based on the work of ICRISAT in rural livelihood project, village seed banks adopted the concept and established as many as 100 village seed banks in one year.

Further he added that, under the 'National Rural Employment Guarantee Program' from April 1st the government will provide Rs 100 crores for three districts in Rayalaseema and one district of Vishakapatnam. Along with this Rs 10, 000 crores to irrigation funds is allocated. However he stressed that production and aspects of seed quality need to be worked out with the help of CII and ICRISAT. Speaking from the government's point of view he elaborated that 15 lakh acres are earmarked for *Pongamia* and expression of interest (EoI) has been solicited and full support would be extended to ICRISAT in every way. He also added that he would initiate steps to propagate ICRISAT variety groundnut ICGV 91114 in Anantapur district.

Mr N Raghuveera Reddy commended ICRISAT and its standing as one of the world's premier agricultural research organizations which is dedicated to improving the lives of poor people in the rural semi-arid tropics. He concluded by remarking that ICRISAT's innovative social marketing plan offers an excellent bridge between proven business strategies and the values of a respected scientific resource.

Mr Anil Kumar Epur, the chairperson, summed up the workshop and hoped that many more success stories would be shared next time such a conference was held. After the sessions a campus visit was organized for the participants where they had the opportunity to observe the long term experiments at BW7, value chain initiatives of distillation unit for aromatic oils, biodiesel experiments, Ecotourism Complex and the Gene Bank. The members of CII were provided with a photograph of ICRISAT's activities and facilities in its pursuit for alleviation of poverty in the SAT.

CII-ICRISAT Workshop
Corporate and Science and Technology Institutions
Partnership for Inclusive and Sustainable
Development and Economic Growth

27 February 2006
ICRISAT, Patancheru

Program

Session I:	Inaugural Session	
	<i>Chair</i> :	William D Dar, Director General, ICRISAT
	<i>Co-Chair</i> :	S Sen Deputy Director General, CII
	Objectives of the Workshop	Suhas P Wani
0930–0940	Inaugural Address	William D Dar ICRISAT
0940–0950	Address	S Sen CII
0950–1005	A Video Film on THIS IS ICRISAT'	
1005–1020	Public-Private Partnership in Agriculture	S P Tucker Principal Secretary, Dept. of Minor Irrigation Govt. of Andhra Pradesh
1020–1025	Concluding Remarks	Mahesh K Desai Convenor, SME Panel, CII-AP
1025–1045	<i>Photograph and Tea/ Coffee Break</i>	

Session 2: Technical Session on *Impact of Science and Technology on Rainfed Agriculture and Rural Livelihoods*

Chair : S Parthasarathy, IAS (Retd.),
Chairman of National
Committee of Recommendations
on Watershed Programme

Rapporteur: Rosana P Mula

1045–1050	Opening Remarks	S Parthasarathy
1050–1110	Improved Productivity and Environment	S P Wani & Team
1110–1125	New Science Tools to Benefit Resource Poor Families	David Hoisington & Team
1125–1140	Reduced Poverty through Production Chains in Rainfed Areas	Cynthia Bantilan & Team
1140–1200	Pathway for Strengthening CII-ICRISAT Partnership	Raju Damle, CII
1200–1215	Summing-up	S Parthasarathy

Panel Discussion on: Role of Science & Technology in Public-Private Partnership for Sustainable and Inclusive Rural Development

Chair : Anil Kumar Epur

Rapporteur : TK Sreedevi

1215–1245	Panel Members: M Srinivasa Rao, Head, New Business Initiatives, ITC S Gangopadhyay, Executive Director, Titagarh Biotec Ltd. K K Sharma, Principal Scientist (Cell Biology), ICRISAT B Venkatesham, Collector, Medak District, AP H Mahadevan, Project Director, BHP Mineral India Pvt. Ltd. V Badrinarayanan, TVS Industries Ltd.	
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1245–1250	Concluding Remarks	Anil Kumar Epur
1250–1330	<i>Lunch</i>	<i>204 Banquet Hall</i>
1330–1445	Visit to ICRISAT Campus [BW5 (MAP) – BW7 – Vermicompost – ICRISAT Lake – Golf Course – Gene Bank – ABI]	

Special Session with the Minister of Agriculture and Rural Development, Govt. of Andhra Pradesh on *PPP for Inclusive and Sustainable Development of Backward Districts In Andhra Pradesh*

	Chair :	William D Dar
	Rapporteur :	SP Wani
1500–1510	Opening Remarks	William D Dar
1510–1520	Summary Brief of Proceedings	Anil Kumar Epur
1520–1540	Address by Hon'ble Minister of Agriculture Govt. of AP	N Raghuvveera Reddy
1540–1550	CII's Dungarpur Initiative	S Sen
1550–1610	Open House Discussion	
1610–1615	Summing-up and Vote of Thanks <i>High Tea and Interaction with Press</i>	Anil Kumar Epur

CII-ICRISAT Workshop
Corporate and Science and Technology Institutions
Partnership for Inclusive and Sustainable
Development and Economic Growth

27 February 2006

ICRISAT, Patancheru

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Glimpses of the Workshop



William Dar inaugurating the CII-ICRISAT workshop.



Dr Wani explaining a moot point.



Mr Sen clarifying 'Benefit of Growth'.



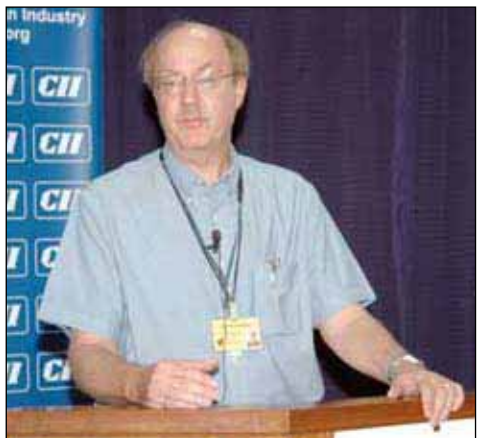
Mr Tucker speaking on quality of education.



Mr Parthasarathy and B Venkatesam keen listeners to questions raised.



Dr Bantilan making a point against poverty.



Dr Hoisington focusing on new science tools technology.



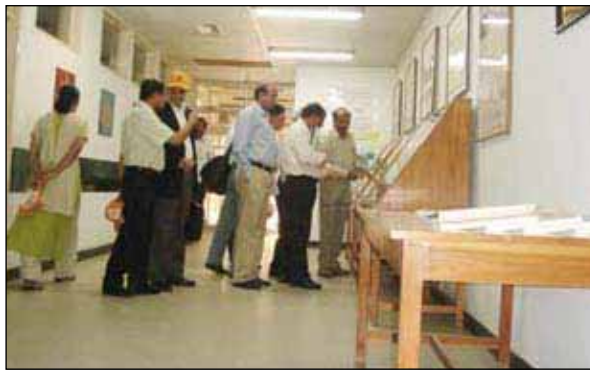
Mr Damle speaking on 'inclusive growth'.



Mr Raghuveera Reddy actively participating in the dialogue.



Mr Desai giving the concluding remarks.



Dr Gowda demonstrating the diversity of the agri science park.



Dr Wani explaining commercial vermicomposting.

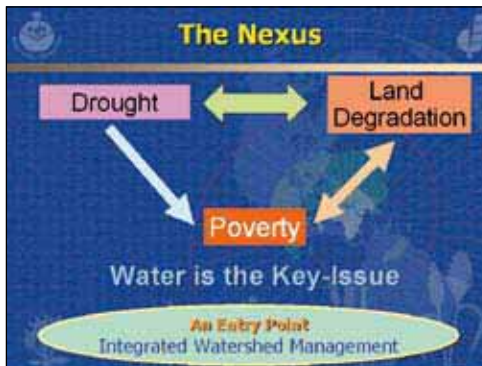


Ms Sreedevi describing distillation unit for processing aromatic plants.

Group Photograph of Workshop Participants



Powerpoint Presentations



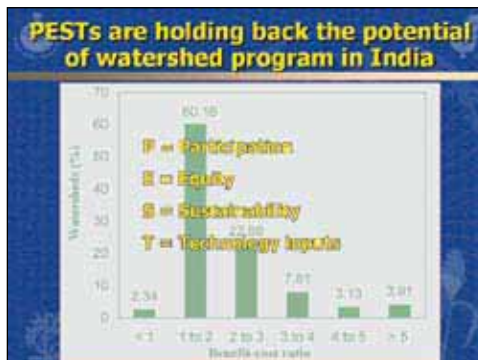
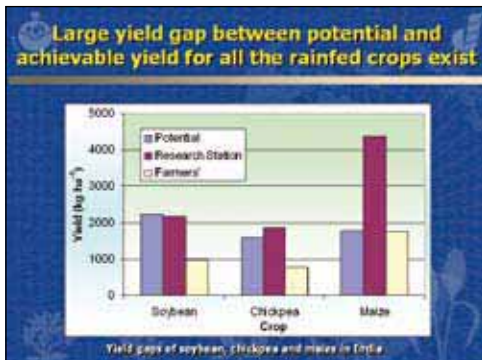
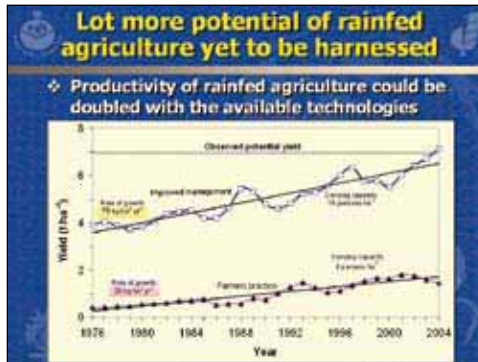
Burning Issues in the SAT

- 6 out of every 100 infants do not reach their first birth day
- On 2025 55% of world population will be affected by water scarcity
- Additional population by 2025: India 510 m people, China 211 m people, Pakistan 280 m people
- Increased loss fertility in rainfed areas to severe land degradation - Low fertilizer use efficiency

Watershed programs in India are silently revolutionizing the rainfed areas

Indicator	Particulars	Unit	No. of Watersheds	Area	Beneficiaries	Employment	Income	Yield	Value
Water	Water use	Mm	128	2.14	1.70	1.81	6.82	7.58	21.28
	WUE	Percent	48	32.54	18.50	16.59	1.88	54.00	4.54
Equity	Employment	Percent	25	161.56	75.50	127.29	91.20	340.00	8.74
	Beneficiaries	Percent	97	31.50	12.00	26.29	1.37	746.01	11.71
Sustainability	Integrated area	Percent	114	11.31	50.00	41.50	50.00	296.00	12.18
	Cropping intensity	Percent	26	-13.04	-13.00	-11.65	-4.20	-45.00	8.79
	Rate of runoff	Percent	26	-13.04	-13.00	-11.65	-4.20	-45.00	8.79
Soil loss	Ton/hectare	51	-6.82	-6.31	-4.30	-4.11	-4.34	36.28	

Source: Watershed Development Report, India, 2007



Strategy

Farmers centered watersheds as entry point for improved livelihoods

- IGNRM
- Holistic livelihood approach
- Sustainability empowerment and KS
- Social inclusion (equity & gender)
- Scaling-up and scaling-out

Integrated Watershed management: Engine of agricultural growth and development in rainfed areas

Watershed as entry point for:

- ❖ Increasing productivity
- ❖ Improving livelihoods
- ❖ Protecting environment
- ❖ Empowerment of poor
- ❖ Social capital development



Adarsha Watershed, Kothapally, India: A Brightspot

Integrated Watershed Management Model

- Mix of individual and community based interventions
- Continuous monitoring and evaluation
- Local resource based work
- Empowerment of community and stakeholders
- Consortium for technical backstopping
- Linked on-station and Off-station
- A Farmer participatory approach

Community participation can be improved substantially through:

- ❖ Knowledge-based entry point
- ❖ Tangible economic benefits to individuals
- ❖ Equal partnership, trust and shared vision among the consortium partners
- ❖ Demand driven

Sir Dorabji Tata Trust-ICRISAT Initiative

Goal: To reduce poverty and minimize land degradation through integrated watershed management approach

Widespread Deficiency of Micronutrients Holding Back the Potential in the SAT

Increased crop yields by 30 to 120 percent in AP, MP, Rajasthan and Gujarat in India, North Vietnam and China provinces benchmark sites.

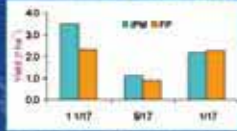
Published field crop soil micronutrient levels and crop yields in the SAT (South Asia, North Vietnam, China, and other benchmark sites).

Interventions include: 1) Soil micronutrient fertilization, 2) Crop rotation, 3) Integrated crop-livestock systems, 4) Improved crop varieties, 5) Improved crop management practices, 6) Improved crop-livestock systems, 7) Improved crop-livestock systems, 8) Improved crop-livestock systems.

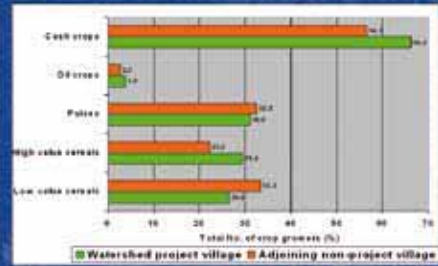
Improved Crops and Cropping Systems

Improved varieties of groundnut (ICGV 91114 and ICGS 44), chickpea (KAK 2), pigeonpea (ICPL 88020), sorghum (CSV 15) and other crops increased yields by 20 to 43 %

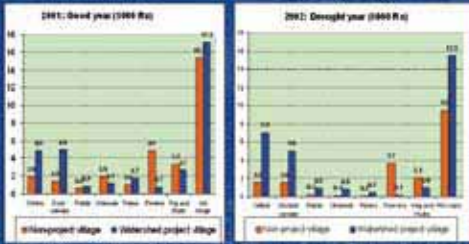
Integrated Pest Management Options



IWRM Increased Production of Commercial Crops: Kothapally, AP, India



Increased Value of Marketed Produce Due to Intensification



Micro-enterprises for landless and women members enhanced participation and their incomes



Agri-horticultural Vegetable System, and Animal Husbandry for Enhancing Incomes

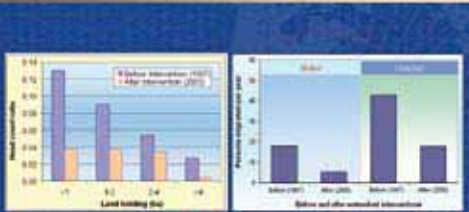
In Adaraha watershed, Kothapally 100 farmers send 10 t fresh vegetables everyday directly to supply chain with +2000 Rs t⁻¹

Milk production in the village has substantially increased (500 L day⁻¹ milk is sent to city)

Diversification of Systems for Sustainable Development

- Legumes in systems
- Sweet sorghum for ethanol
- Medicinal and aromatic plants

Migration and poverty in Devoji Ka Thana, Bundi watershed



BAIF-ITC-ICRISAT Partnership in Guna Madhya Pradesh

- Improved soybean varieties along with improved nutrient management and cropping systems
- Market links and information through E-Chaupal

Morarji Borax – ICRISAT Micronutrient Initiative

- Gujarat, Madhya Pradesh, Rajasthan, Karnataka and Tamil Nadu
- Ensuring availability of necessary inputs
- Decentralized packaging and supply chain through SHGs
- Farmers cooperative for scaling out the benefits

Community-based Initiatives Rehabilitated Degraded Lands and Conserved Biodiversity

- Collective action and convergence developed CPR in Rajasthan
- All villagers are getting grass free of cost
- Rs. 75,000 per annum from auction of grass to surrounding villages
- Enhanced below- and above-ground biodiversity



Women Played Important Role in Enhancing Impact – Main Streaming Women in Development Initiative is Must

- ❖ Women in SHGs got empowered due to financial independence and created greater impact
- ❖ Watershed development increased workload on women without appropriate remuneration
- ❖ Gender balance with improved technologies to reduce drudgery and wage parity in watersheds is required



Integrated water resource management in rainfed areas is needed

- Sustainable groundwater use policies
- Measures to enhance WUE
- Water energy nexus

Indicator	No. of wells	2007	2011
Sanitation	1995	2007	2011
Deep wells	255	308	
Bore wells	182	200	
Pumping hrs	3.23	3.47	



Close Interactions with Community Enhanced Benefits



Interactions with policymakers and opinion makers enhanced project impact



TVSASRI-ICRISAT Initiative for Sustainable and Increased Impact



ICT has important role in empowering community

- Seeing is believing
- Community information hub
- Audio video training material
- VASAT



CII-ICRISAT Initiatives

- ❖ Water management
- ❖ CII-Godrej Green Business Center
- ❖ Biodiesel initiatives
- ❖ CII-Coca Cola-ICRISAT initiative to foster north-south, and south-south exchanges between developing and advanced research institutes

Watershed Improvement thru a Consortium Approach: Impact



- Lives of 2,50,000 poor people are changed for better in 4 countries in South & SE Asia in 218 villages


Partners: NARES, ICRISAT, NGOs and CBOs

Opportunities for PPP

- ❖ Participatory research and development
- ❖ Water and land management
- ❖ Value chain for increasing agriculture incomes
- ❖ Value-addition through processing
- ❖ Biodiesel and ethanol
- ❖ Capacity building
- ❖ Scaling-out PR&D



Conclusions

- Gray to green revolution can potentially an engine to growth
- Paradigm shift to build PPP in rainfed areas
- Enhanced investments in NRM initiatives trigger private individual investment




We Gratefully Acknowledge the Support from


- ◆ **Donors**
 - Asian Development Bank
 - World Bank
 - Sir Dorabji Tata Trust
 - USAID
 - CA of Water Mgmt. in Agric.
 - Govt. of AP, Karnataka and India
 - TVS-ASRI
- ◆ **Consortium Partners**

Reduced Poverty Through Supply Chains in Rainfed Areas



OII-ICRISAT meeting on Public-Private Partnership, ICRISAT, 27 Feb 2008



Team

Cynthia Bantilan
P.Parthasarathy Rao
CLL Gowda
B Shapiro




Agricultural growth and poverty reduction

Close correspondence between agricultural growth and poverty reduction

The transmission mechanisms include:

- Higher rural incomes
- Cheaper food
- Opportunities in non-farm sector
- Shift from primary to other sectors



Markets are vital for the transmission mechanisms to bring about poverty reduction

contd....




Market exclusion

Exclusion occurs due to:

- Small marketed surplus, thin local markets
- Segmented markets
- Poor access to infrastructure, storage and processing units
- High transaction costs
- Lack of information on market intelligence
- Inability to meet quality standards

Distress sales to meet household cash needs





Factors underlying growing importance of markets

- A move away from subsistence agriculture
- Diversification of agriculture to horticulture, livestock, fisheries, cash crops
- Niche markets (pre specified or organic products)
- Markets for alternative uses of staples
- Export markets



Small farmers play an important role in the production of diversified agricultural commodities




ICRISAT led projects

Market linkages for sorghum and pearl millet grain as poultry feed






Industrial uses of sorghum (past predictions)

DFID-ICRISAT study projected that even under the most pessimistic assumptions, industrial demand for hybrid kharif sorghum in 2010 will be about double the total volume of sorghum marketed for food and non-food uses through the regulated marketing channels during the 1990's.




Recommendation of 2 track marketing system (1998)

- **Food grain marketing:** some within existing regulated market system, some outside system. **Mainly rabi** and some kharif particularly for low income consumers
- **Non-food marketing:** exclusively **hybrid kharif** (including blackened grain) generally outside existing system, involving compression of marketing chains and new institutions

Research projects

Exploring marketing opportunities through a research, industry and users coalition: sorghum for poultry feed

Funded by DFID, target area: India
Period: 2003 to 2004

Enhanced utilization of sorghum and pearl millet grains in poultry feed industry to improve livelihoods of small-scale farmers in Asia

Funded by CFC, target areas: India, China and Thailand
Period: 2005 to 2008



Project Partners

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

India

- Acharya N.G. Ranga Agricultural University (ANGRAU) and Marathwada Agricultural University
- Federation of Farmers Associations, EVK (Mh)
- Andhra Pradesh Poultry Federation
- Janaki Feeds and Venkateshwara hatcheries (feed manufacturers)
- JK AgriTech (seed producers)

China

- Sorghum Research Institute (SRI) Liaoning Academy of Agricultural Sciences, Shenyang

Thailand

- Field Crops Research Institute (FCRI) Bangkok

Project purpose

"Marketing opportunities by developing sustainable economic inter-linkages in sorghum and pearl millet - poultry feed-supply chain"





Advantages of bulk marketing (farmers)

- Better price realization
- Increases bargaining capacity of the farmers
- Minimizes middlemen charges/transaction cost
- Increases the involvement of the farmers and makes them independent
- Improves market intelligence
- Market expansion



Advantages to buyers

- Assured supply of produce
- Overcome multiple transactions
- Grain availability during all seasons
- Purity guaranteed and origin ensured (grains from particular locality with specified qualities)

Anticipated International Public Goods

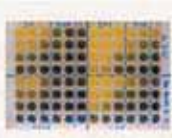

Production to meet SPS standards, export protocols and food safety

Models linking small-scale production with large-scale processing (variants of contract farming, bulk marketing, storage, vertical integration etc)

Lessons from forming Farmers Associations, Commodity Clubs etc.

RECENT ACHIEVEMENTS

Agri-Science Park @ ICRISAT

ICRISAT's Vision

ICRISAT has a vision to become the "premier biotech and crop improvement center in South Asia."

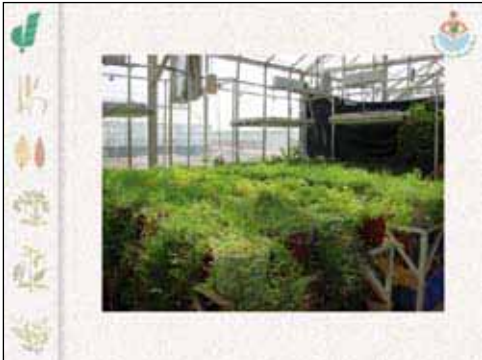
The Agri-Science Park @ ICRISAT (ASP) is meant to help realize this vision.



Public-Private Sector Partnership in Research for Development

- Synergy between public institutions and PS companies adds value
- Public Institutions have capacity for **basic/strategic** research (develop hybrid parents)
- Private sector does **applied** and adaptive research (making and testing hybrids across environment)
- PS has good **seed production and market network**
- PS confidence in ICRISAT to deliver promised outputs/products
- ICRISAT is able to show impacts in farmers' fields (increase production) through Partnership with PS



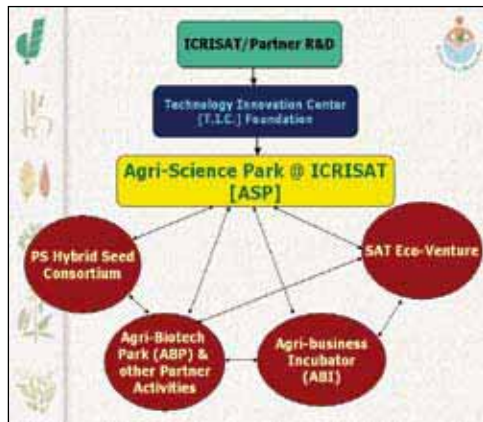


Technology Innovation Center (T.I.C.) Foundation: Functions

The Institute's foundation arm will:

- Raise Trust and other funds
- License technologies
- Enter into joint ventures
- Hold equity in ventures for profit
- Rent space and provide fee-based services
- Do contract R&D for fees/equity



ICRISAT-PS Hybrid Parents' Research Consortia

- Three Consortia: Sorghum, Pearl Millet, Pigeonpea
- PS Companies join one or more of the Consortia, paying a membership fee as donation
- Funds from Consortia augment ICRISAT resources to enhance research on hybrid parents
- Members have access to the material developed
- No exclusive rights to any Consortium partner
- Material available also to public sector institutions



The Agri-Biotech Park (AP R&D Fund Supported)

- AQUAS
 - ✓ Food and seed safety testing
- Suri Sehgal Family Foundation
 - ✓ Developing Sorghum hybrids for the poor
- World Wildlife Fund for Nature (WWF)
 - ✓ Water policy research/dialogue
- ICRISAT-led
 - ✓ Aflatoxin testing lab
- Nandan Biomatrix
 - ✓ Bio-fuel & medicinal herbs
- ICRISAT-ANGRAU
 - ✓ Rice biotech lab proposal



The Agri-Business Incubator

(Supported by DST of Govt. of India)

- Rusni Distilleries Private Limited
 - ✓ Ethanol from sweet sorghum
- BioSeed Research India Private Limited
 - ✓ Biotech training for transgenic cotton and vegetables
- SeedWorks Limited
 - ✓ Biotech backstopping on bt cotton and vegetables
- Sester-Tom & Hyglass Limited
 - ✓ Bio-reactor for fermentation
- Technologies for future startup ventures
 - ✓ Aflatoxin testing kit, HNPV, GMCs, food quality test services




"New" Bio-products Research Consortium

- "11" Consortium partners provide grants to ICRISAT to fund biopesticide & biofertilizer research
- Private sector partners to help commercialize products to benefit farmers
- Future provision for sharing of royalties
- Future projects on organic crops, herbs, condiments, medicinals



The SAT Eco-Venture

- Agricultural Eco-tourism with an educational focus
- MoU with the AP Dept. of Tourism
- Golfing range operational
- Future golf course development with private sector partner



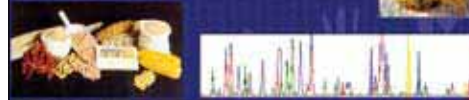
New Science Tools to Benefit Resource Poor Families

Dave Hoisington
Global Theme Leader - Biotechnology



New Tools @ ICRISAT

- Genomics
- Genetic engineering
- Mycotoxin diagnostics
- Information technology



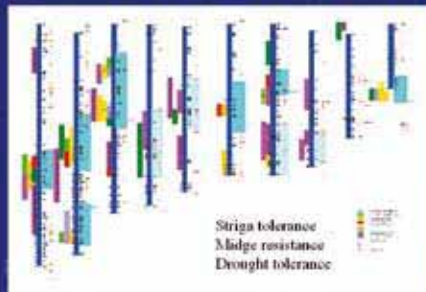
Modern approaches to crop improvement



High-throughput Genomic Applications



Sorghum Trait Map



Downy-mildew Resistant Pearl Millet

- On 14 Jan 2005 the State Varietal Release Committee in Haryana approved release of pearl millet hybrid HHB 67-2 as a higher-yielding and more downy mildew (DM) resistant replacement for popular extra-early maturing hybrid HHB 67
- DM resistance of female and male parents improved by marker-assisted backcrossing (MABC)
- The first non-GMO product of MABC released in India



Genetic Engineering



Virus-resistant Groundnuts



Insect-resistant Chickpea



World's first: transgenic chickpea (against pod borer)

Insect-resistant Pigeonpea

World's first: transgenic pigeonpea (against pod borer)



Mycotoxin diagnostics



Aflatoxins

- ✓ Mycotoxins produced by *Aspergillus flavus* and *A. parasiticus*
- ✓ Infects many crops (e.g. groundnut, maize, pistachio)
- ✓ Major human and animal health effects (carcinogenic)
- ✓ Decreases export potential



ICRISAT's Integrated Approach to Mitigate Aflatoxin Contamination



World's least-expensive test for aflatoxin



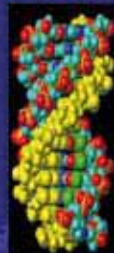
ELISA-based diagnostics @ ICRISAT

✓ ICRISAT has pioneered in development of ELISA-based diagnostic tools, for plant viruses, fungi, mycotoxins and cellular metabolites.

✓ Facilities exist to produce polyclonal, monoclonal and recombinant antibodies, and enzyme conjugates (reporter antibodies) necessary to develop ELISA-based diagnostic tools and kits.



A knowledge system for food security - A triple helix model



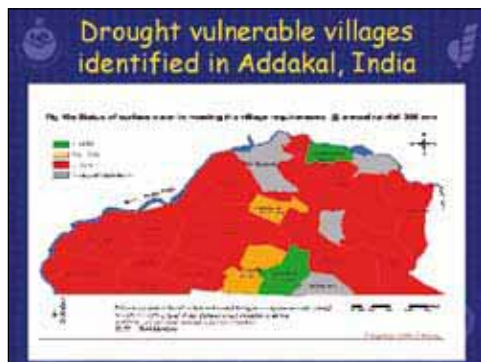
- ✓ Strand 1: Sources of agricultural information (international/national/extra-institutional)
- ✓ Strand 2: ICT4D models (hub-and-spokes type)
- ✓ Strand 3: Open Distance Learning methodologies especially needs assessment and instructional design



VASAT content generation (IIT-Kanpur)

- ✓ Outputs can be in Different Formats!
- ✓ Whether employing physical or electronic devices for output, the process of Learning Object creation does NOT change!

- Posters, Brochures, flyers
- Conventional print products
- Mobile
- Web
- Radio
- Television
- Performances



New initiative in ODL in agricultural extension

- ✓ Launch of an online grid of extension materials from seven State Agricultural Universities approved by the Vice-Chancellors
- ✓ FAO's AGROVOC will be the basis for tagging
- ✓ ICRISAT invited to be the lead resource institution

Pathway for Industry-Institute Partnership for S&T Inputs to "Bottom of the Pyramid"
Raju Damle
Confederation of Indian Industry

© Confederation of Indian Industry



Context

- ◆ CII commitment to "Inclusive Growth"
- ◆ CII has aligned with UN Millennium Development Goals
- ◆ India is currently ranked 127th in HDI- a wholly unacceptable situation
- ◆ Various CII Initiatives launched recently
 - Rural Business Hubs in partnership with Ministry of Panchayat Raj, Government of India
 - Dungarpur Initiative Model for comprehensive development of backward districts being piloted at Dungarpur, Rajasthan in partnership with GOR & UNDP

© Confederation of Indian Industry



Magnitude of Backwardness in India
150 Backward Districts in India



© Confederation of Indian Industry



Industry-institute Partnership Model

Model for Partnership with ITC e-Choupal

- E-Choupal viability requirements: turnover of 200 TPA grains per Choupal & 10,000-12,000 TPA per district
- Based on assessment of existing productivities and potential for raising productivities in the short term by S&T Institute, ITC to decide on catchment of each Choupal
- S&T Institute to undertake raising the productivity in the catchment in a limited time frame
- ITC to setup Choupals in the target catchments so as to establish mutual trust with communities.

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Role of Supportive Business Models

Improving Water Management Efficiency

- Integrated package of renewable energy, energy efficient pumps, optimised distribution and on-field irrigation systems in group mode
- Concerned Corporates to jointly suggest ways for financing pilot initiatives and business packages
- Banks to come forward with suitable credit financing models
- Insurance companies to come up with appropriate insurance products to take care of non-human factors that could affect performance

© Confederation of Indian Industry



Other Challenges

Issues in Medium-Long Duration Plantations

- Will have to be on public wastelands
- Plant care will be lacking till FCP are evolved and proliferated
- Result: rainfed, deficient, slow growth, low productivity plantations

Solutions?

- Intercropping of high value shorter duration crop/plantations that require watering
- Restoration/Improvement of existing low quality plantations

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Challenges in Rainfed Areas

- Need to identify gaps in soil & water conservation treatment
- Demonstrate potential for enhancing productivities with judicious use of water as against unscientific excessive use by richly endowed families
- Maximising in situ rain utilisation under different soil and hydrogeological conditions
- **There are many more challenges which ICRISAT will be more aware of than industry**

© Confederation of Indian Industry



Funding

- Funding at pilot stage
- Funding for up-scaling and replication (GOI?)
- Aligning with internationally funded projects, particularly loan funds, where returns on investments is a critical factor
- Integration of S&T inputs in business models (cost of S&T inputs justified by increased returns on investments, shorter gestation periods, etc.)

© Confederation of Indian Industry



Way Ahead

Form a work group of concerned Corporates & ICRISAT

- ✓ ITC
- ✓ Titagarh Biotech
- ✓ PI Industries
- ✓ Jain Irrigation Systems
- ✓ Renewable energy systems & energy efficient pumps manufacturers
- ✓ Banks & Insurance Companies
- ✓ FI-NABARD

Involvement of ICRISAT in dialogue with States, and Central Governments and International Agencies

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About ICRISAT®



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

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