

ICRISAT Surging Ahead with **INNOVATIONS**

A Compendium of Speeches
and Presentations
by **William D Dar**
January-December 2008



ICRISAT

Science with a human face



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International Crops Research Institute for the Semi-Arid Tropics

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Contents

Biographical Sketch	v
Foreword	ix
Speeches	1
Moving ICRISAT to the Next Level and Beyond	2
Science Innovations: The Foundation for Ending Hunger and Poverty	8
Developing a Pro-poor Biodiesel Industry	12
Biofuels for Rural Development and Environmental Protection	16
Biofuel Crops for Sustainable Global Energy Production	20
Working Hand in Hand for Energy Security	24
The Youth as Agents of Change	30
Conserving Nutritious Small Millets for a Healthier Population	36
Upholding NVSU's Culture of Scaling Greater Heights	40
Giving the Poor a Chance with Biofuels	44
Creating a Critical Information Repository for Better Rural Livelihoods	48
Communities Coping against Climate Change: The C4 Initiative	52
Exploiting Legumes for Greater Productivity	58

Using Genomics-assisted Breeding for Groundnut Improvement	62
A Green Revolution in the Drylands of Africa: Israel-ICRISAT Ties.....	66
Technology-mediated Open Learning: Advances in ICRISAT and the CGIAR.....	72
Knowledge in the Service of the Poor	76
Let's go for the Hat Trick!	78
ICPH 2671: First Pigeonpea Hybrid to be Commercialized by the Private Sector.....	82
Let's Rise from the Ashes like a Phoenix	86
Fueling a Green Revolution in Nueva Ecija.....	90
Adding Value and Creating Alternatives by Working for and with Farmers	94
Emerging Concepts in Global Agriculture.....	98
Innovative Knowledge Sharing for Greater Food Security	104
Soil is Precious, Water is Life.....	108
Forging Partnerships for Greater Pearl Millet Adaptation in New Areas	112
Science in Service to the UNCCD Global Commitment to Combat Desertification and Land Degradation.....	116
Tailoring Proposals to Maximize Success	120
The Farmer Must Come First	124
Riding the Wave of Success.....	128
Surging Ahead with Innovations and Impacts for the Poor	132

Biographical Sketch



William D. Dar, PhD, is Director General of the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) near Hyderabad in Andhra Pradesh, India, since January 2000. ICRISAT is a non-profit, non-political and pro-poor institute and a member of the Alliance of Centers supported by the Consultative Group on International Agricultural Research (CGIAR).

Dr Dar holds the distinction of being the first Filipino and Asian to be Director General of ICRISAT and Chair of the Alliance Executive of the Alliance of Centers in 2005, a collegial body that facilitates collective action among the fifteen (15) CGIAR Centers. He was recently elected Chair of the Committee on Science and Technology (CST) of the United Nations Convention to Combat Desertification (UNCCD). Dr Dar was Member of the UN Millennium Task Force on Hunger.

Prior to joining ICRISAT, he served as Presidential Adviser for Rural Development, and Secretary of Agriculture in the Philippines (equivalent to Minister of Agriculture), the first ever alumnus of the University of the Philippines Los Baños (UPLB) to become one. Before this, he was Executive Director of the Philippine Council for Agriculture, Forestry, and Natural Resources Research and Development (PCARRD) and Director of the Bureau of Agricultural Research (BAR) of the Philippine Department of Agriculture (DA).

Dr Dar also served on the governing boards of the Australian Center for International Agricultural Research (ACIAR) and the CGIAR's International Maize and Wheat Improvement Center (CIMMYT) as well as of ICRISAT. Moreover, he was Chair of the Asia-Pacific Association of Agricultural Research Institutions (APAARI) and the Coarse Grains, Pulses Research and Training (CGPRT) Center based in Indonesia.

Dr Dar received a Doctor of Philosophy (PhD) in Horticulture from the University of the Philippines Los Baños and an MS (Agronomy) and BS in Agricultural Education from Benguet State University

(BSU) in La Trinidad, Benguet, Philippines. He taught at BSU for 11 years and rose from the ranks to become full Professor and Vice President for Research and Extension.

He has received a number of awards and honors, including the Ten Outstanding Young Men (TOYM) of the Philippines, Outstanding Young Scientist of the Year, and the Crop Science Society of the Philippines' Achievement Award for Research Management and Outstanding Science Administrator given by the Philippines Department of Science and Technology. He was also awarded as Distinguished Alumnus of UPLB and the Most Outstanding Alumnus of BSU and the Ilocos Sur Polytechnic State College (ISPSC). In November 2002, PCARRD honored him with its highest and most prestigious award, the Symbol of Excellence in R&D Management.

In April 2008, Dr Dar was conferred an honorary degree of Doctor of Technology by the Isabela State University (ISU). In November 2007, the Benguet State University conferred the honorary degree of Doctor of Resource Management on him. Earlier in April 2003, he was conferred the honorary degree of Doctor of Science by the Mariano Marcos State University (MMSU) in Batac, Ilocos Norte, Philippines.

In October 2003, the Vietnamese Government honored him with the "For the Sake of Agriculture and Rural Development in Vietnam Award" while the Philippine Bureau of Agricultural Research awarded him with a Plaque of Recognition for his outstanding performance as its First Director. He is also the recipient of the "Anahaw Leaf Award" for being the Most Outstanding Alumnus of the Ilocos Sur Polytechnic State College (ISPSC) High School Class of '69.

In April 2004, the Central Luzon State University in the Philippines awarded him the Golden Grain Award, commending him for his "deep concern and intense advocacy for the promotion of a global yet equitable program for food security and reduction of poverty through pioneering scientific and technological innovations".

In the same year (2004), he was given the Research Leadership Excellence Award, the most prestigious award of the Philippine Association of Research Managers (PhilARM). In 2005, he was given a plaque of recognition by the Philippine Department of Agriculture for his outstanding contributions when he was Secretary of Agriculture. In 2006, he was awarded the "KALSA: The Most Distinguished Alumnus Award" by the Benguet State University in recognition of his being the first Filipino and Asian to serve ICRISAT and for the heights he has reached in the management of research and agricultural resources, through Science with a Human face. Recently,

the Professional Regulation Commission (PRC) of the Philippine Government awarded him the 2007 Outstanding Professional of the Year Award in the field of Agriculture for displaying professional excellence in both private and public practice in the Philippines and abroad and for his noble advocacy of promoting a global yet equitable program of food security in Asia and Sub-Saharan Africa.

With his outstanding leadership as Chair of the Alliance Executive (2005), the Alliance of Centers was made the third pillar of the CGIAR system.

Since leading ICRISAT, Dr Dar has intensively advocated a Green to Grey Revolution in the dry tropics of Asia and Sub-Saharan Africa through Science with a Human Face. Towards this, he spurred the development of a new vision, mission and strategy for the Institute. In pursuing it, he has strengthened strategic partnerships with an array of stakeholders – NARS, ARIs, NGOs, development agencies and the private sector. These initiatives led to a stronger ICRISAT working for a food-secure SAT.

In 2008, ICRISAT led by Dr Dar, won for the fifth time the King Baudouin Award (the most prestigious in the CGIAR) together with eight other CGIAR Centers for its work in the Eco-Regional Collaborative Research Program for Sustainable Agricultural Development in Central Asia and the Caucasus (CAC Program). Earlier in 2004, it had bagged the award along with CIMMYT, IRRI, IWMI and other national systems in the CIMMYT-led Rice-Wheat Consortium for the Indo-Gangetic Plains. In 2002, again under his leadership, the Institute together with ICARDA had won the award for developing new chickpea varieties with higher tolerance to drought and heat, and greater resistance to pests and diseases that provide stable and profitable yields. ICRISAT is the only CGIAR Center to have bagged this award five times.

In 2003, ICRISAT underwent two external reviews from the CGIAR, acknowledging outstanding science quality and sound and excellent management under Dr Dar. These reviews gave the impetus for ICRISAT to carve out a new strategy for its transformation and renewal as a premier center of scientific excellence for the people of the dry tropics in the 21st century. In the same year, ICRISAT stood second among the 15 CGIAR Centers in terms of financial health indicators developed by the World Bank. Dr Dar's astute and decisive leadership was repeatedly manifest in the Institute's surplus budgets in the years 2000, 2003, 2004, 2005, 2006 and 2007.

There were more research outputs and impacts created by the Institute during the last 9 years as well, both in Asia and Sub-Saharan Africa. The turnaround for the Institute was possible because of his effective and human-oriented management, big-picture decisions and innovations and the positive attitude and high morale he infused in the staff. As a demonstration of the strong faith in his outstanding leadership in turning ICRISAT around, the Governing Board awarded Dr Dar a new five-year term starting January 2005. In 2006, he led the whole Institute in the formulation of the new ICRISAT Vision and Strategy to 2015, a road map to empowering the poor in the drylands.

Dr Dar's transformational leadership has turned ICRISAT into a forward looking institution, which was ranked 'Outstanding' consecutively in 2006 and 2007 among the CGIAR centers. A man on a mission and a champion of the poor, Dr Dar has made a big difference and continues with conviction his mission of helping alleviate the condition of the poor people living in the drylands of Asia and Sub-Saharan Africa.

Foreword

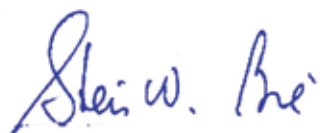
I have been associated with the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) since 1991, when I was a member of the Governing Board till 1996. My second stint began in 2003. Since then, I have been witness to the transformation of the Institute. Willie Dar has played a pivotal role. ICRISAT has proved its eagerness to explore frontiers hitherto unexplored, such as bioethanol from sweet sorghum and its resilience in the face of adversity. Its inherent urge to be in the picture is what separates it from other players in the field.



Though transformation sounds appealing with its flow charts, diversity programs, and team-building exercises, in reality, organizations are filled with old and tough norms that make new and innovative ideas difficult to embrace. Legitimate transformation has been assiduously cultivated and nourished in ICRISAT, creating a climate of commitment to the cause of science for the poor. Leaders may come and go, products may become obsolete, markets may change, and new technologies may emerge, but ICRISAT's core ideology, the spirit of TEAM ICRISAT, is what endures and serves as a source of inspiration to its scientists, leading to high performance.

The speeches in this compendium capture the spirit of scientific inquiry prevalent in ICRISAT, the vigor of its cutting edge science that is meant to build lives and restore livelihoods in the light of the new CGIAR agenda and priorities and its three emerging overarching goals of food for people, environment for people, and policies for people. They revolve around the bigger and strategic issues that are threatening the livelihoods of the poor - food prices, energy crisis, financial crunch, impending regional and global recession, and climate change. The Institute's Operational Research Strategies on water scarcity, climate change, land degradation, high value crops, health and nutrition reflect the Institute's urgency to deal with these issues.

ICRISAT is surging ahead with its innovations, which are described in detail in this publication. It is in fact creating a legacy of innovations. Egged on by its dynamic leadership, its budding scientists have always displayed a keen sense of awareness of the changing context of agricultural research with its inherent complexities, and have risen to the occasion to become champions of the poor.



Stein W. Bie
Chair, ICRISAT Governing Board



Speeches

Moving ICRISAT to the Next Level and Beyond



*Address, ICRISAT Global in-house review,
4 February 2008, ICRISAT-Patancheru,
Andhra Pradesh, India.*

Team ICRISAT good morning and welcome to the global in-house review!

I would first like to acknowledge the presence of our colleagues who have come all the way from Sub-Saharan Africa (SSA) to be with us today.



This time, our global in-house review is very crucial as it comes at the threshold of our External Program and Management Review (EPMR). The outputs of our review will definitely add tremendous value to the body of scientific information we will present to the panel.

Moreover, this review comes at a time when ICRISAT faces the emerging challenges posed by the nexus of climate change, desertification, hunger and poverty. Team ICRISAT and its partners must wage and win a war to surmount these challenges. We will win by constantly thinking ahead outside of the box, being proactive and creating new opportunities for the poor people of the semi-arid tropics (SAT).

Global agriculture is today confronted with climate change. I am very proud to say that ICRISAT's work is at the forefront of addressing this challenge. The heart of our work lies in making plants and people adapt and be resilient to the vagaries of climate change.

Along with this, we are pursuing a strategy within two timeframes. Our short-to-medium-term strategy helps farmers cope better with rainfall variability. Our medium-to-long-term strategy adapts crops such as pearl millet, sorghum, chickpea, groundnut and pigeonpea to grow in a water-scarce and warmer world.

I am also happy to announce that all our four Center Commissioned External Reviews (CCERs) had very successful

results. As you well know, the successful CCERs will place ICRISAT in a position of strength for our forthcoming EPMR.

Allow me to share some highlights of our recent CCERs. Our panel for the CCER on Governance and Support Services noted that “the Institute is working from a new position of strength”, and recommended that ICRISAT “must now see how it can move to the next level and beyond.”

The panel also cited that in moving to the next higher level, ICRISAT “needs to balance the key drivers of its program and strategy, namely the priorities of the Consultative Group on International Agricultural Research (CGIAR) with the tensions between upstream and downstream work, its place in the Alliance and new resource mobilization opportunities.”

We will win by constantly thinking ahead outside of the box, being proactive and creating new opportunities for the poor people of the semi-arid tropics (SAT).

Finally, the panel challenged us “to make changes from a strong organizational platform and break a common pattern among Centers in which change is mainly made in response to crises.”

On science issues, the panel for the CCER on Agro-Ecosystems recommended us to:

- Explore market-led intensification with a crop-livestock focus in Southern Africa and a market-led legume-focused strategy in Eastern Africa;
- Encourage better coordination of inputs from International Agricultural Research Centers and Advanced Research Institutes in the Desert Margins Program;
- Realign the African Market Garden’s (AMG) research-development balance towards research;
- Pursue a more comprehensive approach to the theme of water; and
- Ensure greater visibility of International Public Goods (IPGs) produced by scientists of the Global Theme on Agro-Ecosystems (GTAE).

The panel for the CCER on Crop Improvement and Biotechnology praised ICRISAT for its excellent research progress. It recommended us to:



- Expand research on finger millet and foxtail millet;
- Continue addressing viable and sustainable seed systems in different regions;
- Set up and publish pearl millet mini-core;
- Strengthen sweet sorghum research;
- Focus on farmer participatory varietal selection rather than farmer participatory plant breeding;
- Reference map construction and publication;
- Narrow down transgenic crops research to most important traits such as insect-resistant pigeonpea and chickpea, tobacco streak virus-resistant groundnut and rosette-resistant groundnut; and
- Exchange promising breeding lines and germplasm across regions for evaluation, use and possible release.

On the other hand, our panel for the CCER on Institutions, Markets, Policy and Impacts including Knowledge Management and Sharing (KMS), recommended us to:

- Strengthen the research design of the Virtual Academy for the Semi-Arid Tropics (VASAT);
- Establish a competitive internal seed money fund for research to establish baseline data and improved methodology for measuring impact; and



- Set up our own human subjects review committee, among other things.

On the whole, our CCERs have acknowledged the good science that we are producing at ICRISAT. We need to constantly pursue follow up actions on these recommendations.

Commenting on our Medium-Term Development Plan, the Science Council (SC) commended us for clearly identifying IPGs to be generated under each project. Calling it a great improvement over last year's medium-term plan (MTP), the Science Council praised ICRISAT for the great lengths it has gone to demonstrate how outputs are aligned with System priorities. The Council has also noted our venture into the potential of sweet sorghum.

At the System level, a change management process is going on in the CGIAR. This process involves repositioning research priorities and programs, and strengthening strategic partnerships, funding mechanisms and governance at the System and Center levels.

On the international front, we are witnessing other major trends such as biofuels, linking farmers with markets and value addition in their products; public-private convergence, transparency and good governance; and increasing emphasis on nutrition and food safety. We need to tailor our work to these global trends and also adapt them to the new priorities of emerging new donors, guided by our vision and strategy.

Along with this, we have made major strides in obtaining funding from new non-traditional donors such as the Bill and Melinda Gates Foundation. This combination of new philanthropy and big

funding will definitely give a big push to our work in empowering the poor people of Asia and Sub-Saharan Africa.

With these achievements, I can say with pride that the spirit of Team ICRISAT is the cohesive and creative force that is earning us an Outstanding rating from the CGIAR.

We have arrived, but we need to go to the next higher level of excellence and relevance.

In my address on this occasion in 2006, I had emphasized the need for institutional innovations, team spirit, visionary thinking and proactive action. Let me say today that these have made ICRISAT an Outstanding Center of the CGIAR.

In this review, let us further think out of the box and critically examine the quality of the science that we do and its relevance to the needs of the poor.

By doing these, we turn adversities into opportunities – our battlecry to rise to the next higher level in surmounting the new challenges of improving agriculture in the semi-arid tropics.

Thank you and good day.

Science Innovations: The Foundation for Ending Hunger and Poverty



*Keynote address, Valedictory session,
BioAsia 2008, 9 February 2008,
HICC, Hyderabad, Andhra Pradesh, India.*

Mr B P Acharya, Chairman & Managing Director, APIIC;
Prof Syed E Hasnain, Vice Chancellor, Hyderabad
Central University; Dr Manel Balcells, president, Biocat;
Prof Martin J Evans; Dr Ron D Watts, Chairman, MIBRT;
Dr D Balasubramanian, Director, L V Prasad Eye Institute;
Dr B S Bajaj, Secretary General, Federation of Asian Biotech
Associations; distinguished delegates of BioAsia 2008, ladies
and gentlemen, good afternoon!

Let me thank the organizing committee of BioAsia 2008 for inviting me to deliver the keynote address for the valedictory function of BioAsia 2008, one of the best annual global biotech happenings and Genome Valley's flagship event.

ICRISAT has been part of Genome Valley, the first state-of-the-art biotech cluster in India for life science and agricultural biotechnology research, training and commercialization activities in agricultural biotechnology, through its Agri-Science Park (ASP) initiative and also an active participant in BioAsia since its inception. Many of you may have attended meetings with us, some of which have blossomed into fruitful collaborations and partnerships.

The Agri-Science Park is ICRISAT's joint initiative with the private sector to develop and commercialize technologies that can raise productivity and incomes and help link poor and marginal dryland farmers to markets. Poor farmers have a slim chance of improving their incomes and livelihoods without science innovations. ASP provides the dual service of developing technologies that provide value addition and commercial activities that provide market access to poor farmers.

Creating public-private partnerships through the Agri-Science Park at ICRISAT is a central part of our strategy to be the premier agricultural science innovation center for the dry tropics of the world. The integrated public-private partnership initiatives under ASP are the Agri-Business Incubator (ABI), the Ag-Biotech Innovation Center (AIC), the Hybrids Parents Research



Consortium (HPRC), the Bioproducts Research Consortium (BRC) and the SAT Eco-Venture, our eco-tourism venture.

The role of and relationship between the public and private sectors are changing globally, due to the re-evaluation of the public and private sectors' roles in providing science innovations and the need to improve their effectiveness in disseminating these technology innovations to farmers. It is also a response to the expanding R&D capability of the private sector, emerging intellectual property regimes and a more liberal trade and economic environment.

ASP provides the dual service of developing technologies that provide value addition and commercial activities that provide market access to poor farmers.

Today in general, the private sector is leading in new sciences like biotechnology and information technology, but the public sector continues to play a critical role, especially in developing science innovations for the poor. The private sector has become more interested in helping to reach and lift poor farmers out of poverty; so there is a strong basis for public-private partnerships to help poor farmers through joint development of science innovations and marketing them to poor farmers.

Through ICRISAT's Agri-Science Park we are trying to implement the means to enhance agricultural biotechnology research to serve poor farmers. We are embarking on two new public-partner ventures to accomplish this. One is the Platform for Translation of Transgenic Crops (PTTC) that will create a working environment conducive to the use of transgenic and other biotech tools to create new crops that are more resistant to biotic and abiotic stresses, making them much more profitable for poor farmers. This initiative is being funded by the Government of India's Department of Biotechnology. The second is a platform to carry out innovative R&D for the food processing sector through the Bio Food Knowledge Center (BFKC), financed by the Government of Andhra Pradesh, where ICRISAT is linking up with both international and state partners. The proposed center will work towards high-value addition through science innovation, new technologies and commercialization of crops that can increase the incomes of poor farmers. A delegation



of officials from ICRISAT and the Government of Andhra Pradesh recently visited New Zealand to bring in the best global practices and knowledge to this proposed center. I thank the Government of Andhra Pradesh for its support.

I take this opportunity to congratulate the young scientists who won the BioAsia Innovation Award. As Charles Darwin said, it is not the strongest of the species that survive, nor the most intelligent, but the ones most responsive to change. Innovations are the lifeline of any changing nation. I would beseech you that we all, in both the public and private sectors, work together on innovations that can improve the lives of the poorest of the poor farmers of the world. They need to benefit from science innovation!

I would like to assure you that ICRISAT, as part of Genome Valley and BioAsia, is ready to work together to make this event the best platform for global knowledge exchange. We are open to all partnerships to improve the application of cutting-edge biotechnological tools to enhance agricultural productivity and the incomes of poor farmers in the developing countries of Asia and Africa.

Together, let us make it happen. Thank you! Good day!

Developing a Pro-poor Biodiesel Industry



*Message, Roundtable on Biodiesel
Development in India: The Way Ahead,
11 February 2008, ICRISAT-Patancheru,
Andhra Pradesh, India.*

Delegates of the German Advisory Council on Global Change, participants from GTZ, the private sector, the Government of Andhra Pradesh, research organizations and ICRISAT, good morning and welcome to the Roundtable on Biodiesel Development in India: The Way Ahead.



As concerns about climate change and energy security increase, new opportunities for developing and using bioenergy technologies that can contribute to a wider range of economic, social, and environmental objectives are cropping up. For instance, nations that develop domestic biofuel industries will be able to purchase

fuel from their own farmers rather than spending scarce foreign exchange on imported oil. Cellulose conversion technologies have opened up the potential for broadening the kind of feedstocks that can be used for biodiesel, like pongamia and jatropha. Compared to fossil fuel-derived diesel, biodiesel reduces unburnt hydrocarbons by 30%, carbon monoxide by 20% and particulate matter by 25%.

The Government of India has ambitious plans to increase biodiesel production from non-edible oilseed plants like jatropha and pongamia, though constraints exist in the form of lack of good quality planting material, ownership issues of community or government wastelands, etc. The National Biofuels Mission intends to bring 40 million hectares of land under biodiesel activity.

To overcome concerns that the bioenergy revolution could marginalize the poor, reduce the availability of grains and edible oils for human consumption, raise food prices and degrade the environment, ICRISAT's BioPower Strategy finds ways to empower the dryland poor to benefit rather than be marginalized by the bioenergy revolution.

ICRISAT's initiative to produce biofuels is not limited to bioethanol from sweet sorghum alone. Through its watershed development project, it is promoting the cultivation of pongamia and jatropha, from which biodiesel can be extracted. It is being used to supplement traditional, highly polluting fuels and provide livelihood to landless and marginal people.

Our partnership with the Andhra Pradesh Government entails permitting poor villagers, especially women's groups, to grow these two plants on wastelands. Once the trees mature, the women collect the seeds and press out the oil in their villages or sell them to large-scale processors to earn hard cash.

In partnership with the Andhra Pradesh Government and the Indian Government, ICRISAT has developed a model to rehabilitate 300 hectares of common property degraded land in Velchal and Kothlapur villages of Ranga Reddy district. The landless villagers have the right over the usufructs from the biodiesel plantations.

We also need to work out suitable institutions and policy guidelines to benefit the landless poor, marginal farmers and women to improve their livelihoods.

For the poor tribal community of Powerguda village in Adilabad district, ICRISAT and the Andhra Pradesh Government helped raise biodiesel plantations and set up an oil extraction machine. The biodiesel from this unit is used locally or sold in the market. Pongamia oil is used to generate electricity, run diesel engines and pumpsets. The press cake is used as fertilizer in fields.

In partnership with Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), ICRISAT is working with Southern Online Biotechnologies, which has already established a 40 kiloliter per day (KLPD) biodiesel plant in Nalgonda district of Andhra Pradesh. Producing this renewable source of energy qualifies it to earn carbon credits for offsetting global warming.

ICRISAT has also established a jatropha nursery at its research station at Niamey, Niger, in West Africa, where seeds collected from 18 different ecological conditions around the world are being grown to breed the best plants with the most appropriate traits.

The economics of biodiesel are still emerging. Productivity of the production sector is a big question. Much less is known about jatropha and pongamia, and their potential for increased yields, pests/diseases that may affect them when grown on a large scale, etc. Essentially they are still undomesticated species.

There is an urgent need to develop suitable models to rehabilitate Common Property Resources (CPRs), forest lands, and low-

quality private lands using biodiesel plantations. We also need to work out suitable institutions and policy guidelines to benefit the landless poor, marginal farmers and women to improve their livelihoods.

Although technology, policy support and demand for biodiesel are building up, the main constraint is the supply of raw material. Validated and good quality data on agronomic practices, yield potential, disease and pest occurrences, water requirement and management for block plantations are not available. There is an urgent need to undertake research on all aspects of biodiesel plantations. Biorefinery issues must also be handled.

We should be developing smart crops for biofuels. Smart crops are those that ensure food, energy and environmental security.

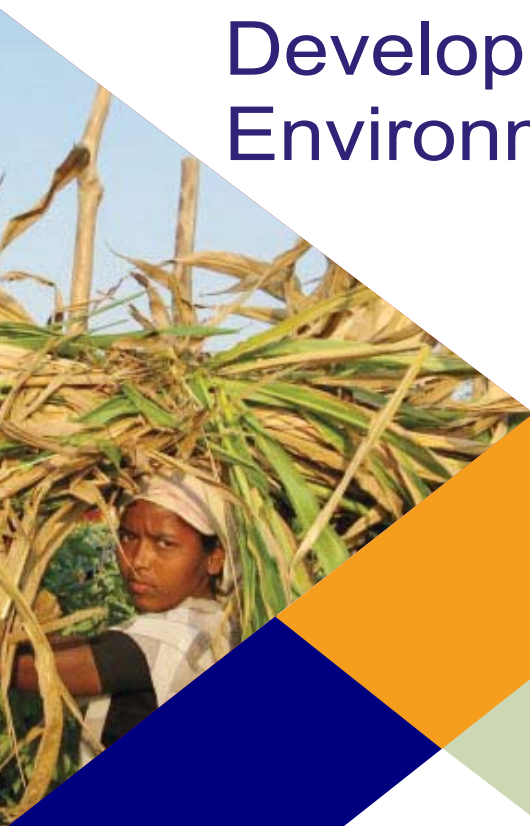
And to make all this viable for poor farmers, small-scale farmers need to be grouped and linked with the end user, ie, industry, for better bargaining capacity. Backward linkage of farmers' associations with seed and input suppliers should be set up for bulk purchases and appropriate models of vertical coordination or contract farming are crucial to save on transaction costs.

With these policies in place and a world where renewable energy sources contribute to a reduction in greenhouse gases, I am sure the poor and others too will lead better lives. The key strategy is the development of a pro-poor and a science-based biodiesel industry. We can work together to make this a reality.

Thank you.



Biofuels for Rural Development and Environmental Protection



Panelist, IFAD 31st session of the Governing Council Meeting, 13-14 February 2008, Rome, Italy.

Policymakers the world over are gravitating towards renewable bioenergy options to tackle the rising cost of fossil fuels, to address environmental concerns, provide new employment and generate income opportunities for the rural poor. It is an inescapable reality that energy consumption and development go hand in hand. This is evidenced by the fact that ethanol production surged from 12.6 million tons in 1991 to 40.3 million tons by 2006! Biodiesel production too rose significantly.

However, there are concerns that biofuels could marginalize the poor, reduce the availability of grains and edible oils for human

consumption, raise food prices and degrade the environment. ICRISAT's BioPower Strategy finds ways to empower the dryland poor to benefit from smart biofuel crops rather than be marginalized by the bioenergy revolution.

What are smart crops? Those that ensure food security, contribute to energy security, provide environmental sustainability, tolerate the impacts of climate change (water stress and high temperatures) and increase livelihood options, meaning multipurpose crops. ICRISAT conducts research to develop such smart crops. ICRISAT's BioPower Strategy involves developing sweet sorghum hybrids, high-biomass brown midrib (bmr) hybrids, and ligno-cellulosic technology with high biomass brown midrib hybrids, crop management practices and enhancing public-private-people partnerships.

ICRISAT focuses on sweet sorghum hybrids to fulfill both food and fuel needs; for which it has technology in place. Our studies have shown that rainy-season hybrids give higher sugar yield (20% = 0.8 t/ha) and higher grain yield (16% = 0.9 t/ha) compared to ordinary sorghum hybrids and that rainy-season sweet sorghum varieties showed 18% (0.8 t/ha) loss in grain yield and 42% (1.7 t/ha) gain in sugar yield.

Sweet sorghum has a strong pro-poor advantage since it has a triple product potential – grain, juice for ethanol, and stillage or bagasse for livestock feed or power generation. In addition, it is a cost-effective and competitive feedstock, is tolerant to water stress and high temperatures, and has high water-use efficiency. It is a CO₂ neutral crop, which is a positive characteristic. It is grown by seed propagation and has a shorter crop cycle compared to sugarcane. Therefore, sweet sorghum is an ideal and competitive feedstock for bioethanol.



ICRISAT is partnering with innovative private sector entrepreneurs/companies who share the concern and vision to devise models for collective action that are win-win for both the smallholder and the entrepreneur. It has partnered with an entrepreneurial bioethanol facility called Rusni Distilleries Ltd. in a pioneering venture. The model is a tripartite relationship between the private sector (Rusni), poor farmers, and input/services suppliers. With this, we have now the proof of concept that bioethanol from sweet sorghum is a reality.

ICRISAT was instrumental in catalyzing the Alliance Bioenergy Platform (ABP) comprising nine centers of the CGIAR, to analyze, research and advice on likely bioenergy impacts, technical options, and environmental and sustainability impacts.

In addition, it is a cost-effective and competitive feedstock, is tolerant to water stress and high temperatures, and has high water-use efficiency.

ICRISAT's initiative to produce biofuels is not limited to bioethanol from sweet sorghum. Through its watershed development project, it is promoting the cultivation of pongamia and jatropha, from which biodiesel can be extracted. Marginalized tribal groups, especially women in India, are cultivating biodiesel tree seedlings, selling them or planting them on wastelands, harvesting and crushing the seeds, selling the oil, and selling the seedcake (the residue after crushing) to farmers as an organic fertilizer. Some of the oil is used to power village diesel engines such as generators and irrigation pumps. The issues of food versus fuel, climate change and environment, land use, and impact on poverty alleviation vis-a-vis biofuels call for stimulating and informed science-based policy-making. That means a framework to promote biofuels should be linked to national and regional poverty reduction, food security strategies with cross-sectoral linkages, with sustainability issues (economic, environmental, social) integrated. Equity and benefit sharing are key to this effort; so are inclusion and the participation of key stakeholders.

Coming to the choice of feedstocks, we need to determine land-use patterns and potential food-fuel-feed tradeoffs, conduct science-based feasibility studies for alternative feedstocks, favor existing crops beneficial to the poor and generate higher growth benefits, and more importantly favor feedstocks such as sweet

sorghum that reduce conflicts among different social objectives (food security, environment, energy, etc) and establish important safeguards for food security.

Policies are needed to favor local processing rather than export feedstocks; distributed processing systems rather than a heavy concentration. Benefit sharing schemes between farmers and processors must be encouraged, and barriers to private investment (land policy, import/export tariffs, etc) removed. More importantly, science and technology support are crucial for innovation and commercialization.

How do we make biofuels competitive? This can be done by encouraging mandatory blending to promote private investment, by providing targeted incentives for farmers and processors, harmonizing policies across regions and economic groupings to allow inter-regional trade, facilitating vertical and horizontal market coordination (farmer organization, contract farming, etc,) and exploiting economies of scale and scope.

The economics of biodiesel are still emerging. Productivity is a big question. Much less is known about jatropha and pongamia, and their potential for increased yields, their susceptibility to pests/diseases when grown on a wide scale, etc. There is an urgent need to develop suitable models to rehabilitate CPRs, forest lands, and low-quality private lands using biodiesel plantations. We also need to work out suitable institutions and policy guidelines to benefit the landless poor.

Coming to strategic research, as limited information exists about biodiesel plantations, there is a need to undertake detailed research activities. Although technology, policy support and demand for biodiesel are building up, supply of raw material remains a main constraint. Validated data on agronomic practices, yield potential, diseases and pests, water needs and management for block plantations are not available.

The negative aspects of biofuels notwithstanding, it is indisputable that as a renewable energy source, they can help mitigate climate change and reduce dependence on fossil fuels, cut down the outflow of precious foreign exchange from developing countries, in addition to providing new markets for higher price products for agricultural producers to stimulate rural growth and farm incomes.

In summary, we need to ensure that food security and environmental security are not sacrificed in pursuit of inclusive biofuels development using a science-based approach.

Thank you.

Biofuel Crops for Sustainable Global Energy Production



Panelist, Washington International Renewable Energy Conference (WIREC), session on Sustainability, technology and development, 5 March 2008, Washington, USA.

US Secretary of Agriculture Ed Schafer, Secretary of the Interior Dirk Kempthorne, Secretary of Energy Samuel Bodman, Administrator of the Environmental Protection Agency Stephen Johnson, Under Secretary for Democracy and Global Affairs, US Department of State, Paula Dobriansky and world leaders, good morning.

Dear friends, it is a great privilege to be here today speaking to this august gathering on a topic that has drawn worldwide attention.

The emerging revolution in biofuels has opened up new prospects for developing countries – stronger energy security, new sources of wealth and reduced greenhouse gas emissions and pollution from fossil fuels. A few years ago, this seemed almost impossible.

Indeed, modern biofuels can help meet the needs of the 1.6 billion people who lack home electricity and 2.4 billion who rely on traditional sources for their energy needs. Moreover, biofuels can help mitigate climate change, reduce dependence on fossil fuels, cut down precious foreign exchange outflow, provide new markets for agricultural producers and stimulate rural growth and farm incomes. However, the biofuels boom may backfire on the poor. One of the principal concerns at present is that biofuels may increase prices of basic cereals and compromise food security.

There is also widespread concern on a high environmental price to pay for the biofuel boom which may impact on climate change. The food-energy security-climate change nexus has provoked worldwide concern and poses a big challenge to public international agricultural research.

The International Crops Research Institute for the Semi-Arid Tropics is a CGIAR-supported Center which works in the drylands of Asia and Sub-Saharan Africa. It is actively conducting research on biofuel crops and production systems that are pro-poor. We develop systems that increase the incomes of the poor, but do not trade off biofuels against food and feed security or the environment. We call these “smart crops” because they avoid the pitfalls that so many are concerned about today.



Along with this, ICRISAT has developed sweet sorghum, a smart crop that has shown good promise for bioethanol production. ICRISAT has been working on this for the last 15 years.

Sweet sorghum is similar to normal sorghum and is grown widely by poor farmers in Asia and Sub-Saharan Africa. Sweet sorghum stores large quantities of sugar in its stalks, in addition to producing high grain yields. It therefore addresses the world's biofuel needs without compromising food and feed security.

Likewise, sweet sorghum uses half as much water per liter of ethanol produced from stalk compared to sugarcane. It is carbon dioxide neutral: one hectare of sweet sorghum absorbs and emits 45 tons of carbon during its growth cycle.

Moreover, sweet sorghum has good energy balance: it generates 8 units of energy for every unit of fossil-fuel energy invested.

New technologies such as hybrid sorghum, combined with increased fertilizer usage, can double or triple the current low yields of grain in the dry tropics.

What about the land tradeoff? New technologies such as hybrid sorghum, combined with increased fertilizer usage, can double or triple the current low yields of grain in the dry tropics.

This is like doubling or tripling available land area. Hence, more biofuel and more crops can both be produced by this smart crop without clearing more land.

To commercialize sweet sorghum, ICRISAT has devised an innovative model for private-public-farmer partnerships. Through our Agri-Business Incubator in Hyderabad, India, ICRISAT works with several young biofuel companies as well as government agencies and civil society organizations.

Through our private-public-farmer partnerships, ICRISAT develops sweet sorghum hybrids and tests new sweet sorghum varieties with thousands of small farmers. The distilleries provide them with improved seed and technical advice, offer them a guaranteed price for their crops and transport the harvested stalks for processing. A significant feature of our private-public-farmer partnerships is that the rural poor are chief actors in biofuels development. The active participation of poor farmers through their producer organizations

is the best guarantee that biofuels is a boon rather than a bane for the world's poor. ICRISAT has also been instrumental in catalyzing the Alliance Bioenergy Platform (ABP) comprising nine CGIAR centers. I would like to emphasize that sweet sorghum will not replace sugarcane in the developing world; sugarcane systems are well established. However, it is difficult for sugarcane systems to expand because of their high requirement for irrigation water and rainfall. This tends to expand sugarcane systems into ecologically-sensitive areas like rainforests.

At this juncture, I would like to turn very briefly to biodiesel. ICRISAT is working on the well-known jatropha crop but also on a lesser-known tree called pongamia. Along our pro-poor biofuel strategy, we are promoting these crops mainly as part of rehabilitating degraded lands. Our host, the Government of India, is willing to allocate some of its vast wasteland areas so that the landless poor can grow these tree crops to increase their incomes.

Jatropha can produce about 30 gallons per acre of biodiesel, depending on the quality of land and crop management. This new opportunity is significant for the poorest of the poor, and at the same time helps rehabilitate wastelands. By using wastelands, we avoid clearing rainforests for palm-based biodiesel that has worried people in Southeast Asia.

A private-public-farmer partnership has also been formed to provide the landless poor, especially women, in tribal areas of India with access to wastelands for planting jatropha and pongamia. Once the trees mature, women collect the seeds and press out the oil in their villages for local use. They also sell the seeds to large-scale processors for much-needed cash.

As I close, let me emphasize three points to support sustainable global bioenergy production:

1. Greater investments in international agricultural research must be made to fully harness science and technology for biofuels development;
2. Biofuels development must be linked to the broader goals of food and feed security, poverty reduction and environmental sustainability; and
3. Biofuels innovations must be developed as an instrument of empowering the world's rural poor.

I will end my opening comments here and be glad to elaborate on any of these points during our discussion.

Thank you and good morning.

Working Hand in Hand for Energy Security*



Message of support, First National Sweet Sorghum RDE Review and Planning Conference, 12-14 March, PhilRice Complex, City of Batac, Ilocos Norte, Philippines.

It is an inescapable reality that energy consumption and development go hand in hand. With rising fossil fuel costs, the biofuel market is expanding as an economically viable and competitive substitute. This is evidenced by the fact that ethanol production surged from 12.6 million tons in 1991 to 40.3 million tons by 2006! Hence there is a compelling rationale

* Delivered by Dr Belum Reddy, Principal scientist (sorghum breeding), on behalf of the Director General.



for looking more deeply into biofuels as potential contributor to not just climate change mitigation, but also to environmental sustainability, and new employment and income opportunities for the rural poor.

However, there are fears that biofuels could marginalize the poor, reduce the availability of grains and edible oils for human consumption, raise food prices and degrade the environment. ICRISAT's BioPower Strategy finds ways to empower the dryland poor to benefit from smart biofuel crops rather than be marginalized by the bioenergy revolution.

What are smart crops? Those that ensure food security, contribute to energy security, provide environmental sustainability, tolerate the impacts of climate change (water stress and high temperatures) and increase livelihood options, meaning multipurpose crops. ICRISAT conducts research to develop such smart crops.

ICRISAT's BioPower Strategy involves developing sweet sorghum hybrids, high-biomass brown midrib (bmr) hybrids, and ligno-cellulosic technology with high biomass brown midrib hybrids, crop management practices and enhancing public-private-people partnerships, to fulfill both food and fuel needs. Our studies have shown that rainy-season hybrids give higher sugar yield (20% = 0.8 t/ha) and higher grain yield (16% = 0.9 t/ha) compared to ordinary sorghum hybrids and that rainy-season sweet sorghum

varieties showed 18% (0.8 t/ha) loss in grain yield and 42% (1.7 t/ha) gain in sugar yield. ICRISAT estimates that by planting sweet sorghum instead of grain sorghum, dryland farmers can earn an additional US\$ 40 to US\$ 97 per hectare per crop. Thus, sweet sorghum has immense global potential in alleviating poverty.

The Philippines biofuels policy enshrined in RA 9367 mandates the development and use of indigenous renewable energy sources; mitigating toxic and greenhouse gas emissions; increasing rural employment and income; and ensuring the availability of alternative and renewable energy. The target of the Philippine Energy Plan (2005-2014) is to reach an energy self sufficiency level of 60% by 2010 and beyond.

Bioethanol demand in the Philippines is projected to be 581 million liters by 2016.

Benefit sharing schemes between farmers and processors must be encouraged, and barriers to private investment removed.

Ties between ICRISAT and the Philippine NARS have evolved since the ICRISAT-Bureau of Agricultural Research (BAR) MoU in 2005 on commercialization of sweet sorghum. The Department of Agriculture-BAR, Mariano Marcos State University (MMSU), and ICRISAT embarked on a program aimed to develop and commercially utilize sweet sorghum as a potential source of ethanol and decrease the country's dependence on imported fossil fuels.

With funding from DA-BAR and the Commission on Higher Education (CHED), MMSU field-tested eight sweet sorghum varieties, five of which have been found adapted locally. The average yield was 110 tons/ha of sweet sorghum cane stalk for two cropping seasons in eight months (one main crop followed by one ratoon crop).

DA-BAR, ICRISAT, and the University of the Philippines Los Baños (UPLB) have also signed a tripartite agreement on the production and development of hybrid varieties of sweet sorghum for biofuel purposes.

ICRISAT has been providing research support in testing improved sweet sorghum germplasm lines, including bulk quantities of

seed; providing procedures for evaluating sweet sorghum trials; introducing sweet sorghum hybrid parents and hybrids for testing; facilitating visits by Philippines scientists and entrepreneurs to our research and ethanol incubation facilities; sharing knowledge on biofuels research and commercialization, cropping systems of sweet sorghum with pigeonpea in watershed mode; developing joint proposals on sweet sorghum research and linking farmers to biofuels markets; capacity building; and helping shape biofuel policies with interactions with government officials.

In the long run, these will apart from diminishing the country's dependence on fossil fuels and reducing its CO₂ emissions, be instrumental in contributing to the crucial national development goal of reducing poverty and increasing rural employment.

Sweet sorghum has a strong pro-poor advantage since it has a triple product potential – grain, juice for ethanol, and stillage or bagasse for livestock feed or power generation. A cost-effective and competitive feedstock, it has a shorter crop cycle of 4 months compared to the 12 months of sugarcane. It takes 4,000 cubic meters of water to produce a kiloliter of bioethanol, compared to 36,000 cubic meters required for sugarcane. Put together, the feedstock cost of producing one kiloliter of ethanol from sweet sorghum is US\$ 81.6, compared to US\$ 111.5 for sugarcane and US\$ 89.2 for maize.

Sweet sorghum is tolerant to water scarcity and high temperatures, two qualities which will keep the crop in good stead when the climate changes with global warming. It also has high water use efficiency, requiring 310 kg of water per kg of dry matter compared to maize's 370 kg.

Sweet sorghum is a carbon dioxide neutral crop; during its growth cycle, a hectare of the crop cultivated absorbs and emits 45 tons of carbon, making it environment friendly. It also has a good energy balance, meaning it generates 8 units of energy per unit of fossil-fuel energy invested in its cultivation, comparing favorably with sugarcane's 8.3 units and corn's 1.8 units. Also, it has been studied that gasoline blended with ethanol has lower emissions when run through an automobile engine than pure gasoline. E85, the fuel with 85% ethanol, emits only 1 part per million (ppm) concentration of nitrogen oxide whereas gasoline emits 9 ppm.

ICRISAT is partnering with innovative private sector entrepreneurs/companies who share the concern and vision to devise models for collective action that are win-win for both

the smallholder and the entrepreneur. It has partnered with a bioethanol facility called Rusni Distilleries Ltd. in a pioneering venture. The model is a tripartite relationship between the private sector (Rusni), poor farmers, and input/services suppliers. With this, we have now the proof of concept that bioethanol from sweet sorghum is a reality. Extending the learning gained through the ICRISAT-Rusni partnership, ICRISAT has engaged the Philippines in a Sweet Sorghum for Ethanol Consortium.

ICRISAT was also instrumental in catalyzing the Alliance Bioenergy Platform comprising nine centers of the CGIAR, to analyze, research and advice on likely bioenergy impacts, technical options, and environmental and sustainability impacts.

The issues surrounding biofuels call for stimulating and informed science-based policy making. A framework to promote biofuels should be linked to national and regional poverty reduction, food security strategies must have cross-sectoral linkages, with sustainability issues (economic, environmental, social) integrated. Equity and benefit sharing are key to this effort; so are inclusion and the participation of key stakeholders.

Coming to the choice of feedstocks, we need to determine land-use patterns and potential food-fuel-feed tradeoffs, conduct science-based feasibility studies for alternative feedstocks, favor existing crops beneficial to the poor and generate higher growth benefits, and more importantly favor feedstocks such as sweet sorghum that reduce conflicts among different social objectives (food security, environment, energy, etc) and establish important safeguards for food security.

Policies should favor local processing and distributed processing systems. Benefit sharing schemes between farmers and processors must be encouraged, and barriers to private investment eradicated. Science and technology support are crucial for innovation.

Biofuels can be made more competitive by encouraging mandatory blending to promote private investment, by providing targeted incentives for farmers and processors, harmonizing policies across regions and economic groupings to allow inter-regional trade, facilitating vertical and horizontal market coordination (farmer organization, contract farming, etc,) and exploiting economies of scale and scope.

It is indisputable that as a renewable energy source, biofuels can help mitigate climate change and reduce dependence on fossil fuels,



cut down the outflow of precious foreign exchange, in addition to providing new markets for higher priced products for agricultural producers to stimulate rural growth and farm incomes.

In short, the new energy options will require technology and policy solutions to ensure efficient, healthy, and environmentally sustainable outcomes so that food security and environmental security are not sacrificed. With greater cooperation between ICRISAT and the Philippines, this will be a reality.

Thank you.

The Youth as Agents of Change



Guest speaker, Annual commencement exercises, Isabela State University, 3 April 2008, Echgue, Isabela, Philippines.

To the graduating students and their parents, the faculty, staff and guests of the Isabela State University, good morning.

I am extremely grateful to President Romeo Quilang for inviting me as guest speaker of ISU's commencement exercises this year. First of all, I would like to congratulate Dr Quilang on his second term as President of ISU. With his dynamic leadership, he has significantly strengthened the various programs of the university, and I am confident that ISU will further advance itself as a premier institution of higher learning in the North.



As a son of the North, I feel reinvigorated every time I come home to this region. As I come back, I am very happy to note that ISU has gone a long, long way since its inception thirty years ago. I notice that at present, ISU has eleven campuses and is extending academic programs even in remote places like Palanan.

Let me begin by emphasizing the noble mandate of ISU which is to provide advanced instruction in agriculture, natural and applied sciences and technology. Along with this, ISU envisions to be a highly recognized institution of higher learning for people empowerment and sustainable development, propelled by the core values of excellence, effectiveness, accountability and integrity.

Due to these, ISU is a strong partner of my organization, the International Crops Research Institute for the Semi-Arid Tropics. ICRISAT is a nonprofit, non-political international agricultural research organization based in South India. It is one of 15 allied Centers supported by the Consultative Group on International Agricultural Research or CGIAR. ICRISAT's mission is to help empower 800 million poor people to overcome hunger, poverty and a degraded environment in the dry tropics of the developing world.

To move our partnership with ISU forward, we are right now conducting a workshop to develop an integrated research,

development and extension plan for dryland and biofuel crops in Northern Luzon. With these, I am indeed honored to speak before you, the new graduates of ISU, the premier educational institution of Cagayan Valley.

Since you are at the center of today's activity, allow me to share words of wisdom to guide and inspire you on your journey to success. You belong to the youth which comprises almost one-third of the population and nearly half of the country's labor force. Due to your numbers, you can indeed make a big difference in Philippine society. The Filipino youth is usually viewed as the future of our nation, the agent of change. We of the older generation count on you to help save our country and become the beacon of hope of our long suffering people.

*Be
the
agents of
change and
serve the poor.*

*Our country today
faces gigantic challenges in
fighting poverty, soaring oil
and food prices, hunger,
crime, corruption,
and social
conflict.*

The vital role of the youth in nation building is enshrined in Section 13 of the Constitution. It declares that the State shall promote and protect your physical, moral, spiritual, intellectual, and social well-being. It shall also inculcate patriotism and nationalism, and encourage your involvement in public and civic affairs.

As new graduates, you are about to begin this long journey and enter the real world of the 21st century. We now live in a global village – a world of free markets, and a wired society of competing economies. Relentless forces, such as huge capital flows, advances in information and communication technology, nanotechnology, and the gene revolution are creating rapid changes in the way we live. These changes are happening amidst soaring oil and food prices throughout the world, further aggravating the suffering of about a billion people in poverty.

You belong to a high-tech generation, adept at computers and cell phones, and communicate well with a keypad or a clicking computer mouse. Your relationships are established and sustained by text messages and electronic mail.

You sit before computers to surf the Internet — visiting websites, playing online games, creating blogs, chatting with friends and



looking for a community you want to belong to. For many of you, your iphones and computers are indispensable gadgets where your daily lives are conducted — if not created and re-created.

Your adeptness on computers and cell phones is not only an indication of your aptitude for high-tech tasks and processes. Because of this technology, you enjoy being incomprehensible to your elders, and you love it.

Please note though, that while this is noble, it is a tough challenge for you. Cheap labor and globalization have brought many of our youth to call centers where half of you are now employed. This trend has altered biological clocks, destroyed interpersonal relationships, and created a demand for 24-hour food chains in the strangest parts of town.

Moreover, so many of you have left for greener pastures abroad, or are set to leave. The hope of our country's future is not secure knowing of the constant exodus. Just like most of our countrymen, many of you are uncertain about the present, much more the future. But beyond all of these uncertainties, you must fulfill a patriotic duty of helping lift our rural poor from the quagmire of hopelessness and poverty.

Being graduates of a state university, you are duty-bound to pay back the public support you enjoyed during your studies at ISU. Be the agents of change and serve the poor. Our country today faces gigantic challenges in fighting poverty, soaring oil and food prices, hunger, crime, corruption, and social conflict.

During the last 30 years, the Philippines has lagged behind its Asian neighbors. One third of our population lives in poverty. Somebody has compared our country to a sick person in an intensive care unit. Hopelessness and despair stalk the land. Many of our countrymen want to leave the land in search of greener pastures.

But with you – the youth, as Jose Rizal has exhorted centuries ago, there is indeed hope in our motherland. It is therefore time to help our country and lift our poor countrymen from poverty, despair and hopelessness. How will you succeed in your chosen profession to help the poor?

As I always do on such occasions, allow me to share my own journey in helping the poor. Not so many years ago, I also sat and listened to a commencement speaker at the Benguet State University, my alma mater. I patiently listened throughout the speech, wondering what was in store for me. But deep inside, I felt I had an ambition to succeed and a mission to pursue. I wanted to be an agent of change to serve the rural poor, and I was determined to succeed.

I then set my sights on a career in public service, starting as a government farm management technician. Inspired by my goal to succeed, I worked harder and harder to reach the top. Hard work and patience paid off as I eventually became Vice President for Research and Development at the Benguet State University. I then moved to the Department of Agriculture as the first Director of the Bureau of Agricultural Research.

From BAR, I became the fifth Executive Director of the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD). Later on, I became the Secretary of Agriculture and then Presidential Adviser on Food Security and Rural Development. During this period, I aimed higher and directed my energies to go global. I traveled and interacted with eminent scientists, government leaders, and policy makers from all over the world. More than what you get in reading, meeting people from other cultures is very enlightening.

Through these experiences, I began to develop a deeper commitment to pursuing my dream of helping the poor. I further strengthened my resolve to be a leader serving the poor not only in our country but in other developing countries of the world. I am now an international public servant championing the poor.

I am humbled to be the first Filipino ever to be appointed as Director General of ICRISAT. ICRISAT serves 48 countries of the dry tropics of the world—the home of about 300 million people who are the poorest of the poor. Our core business is to improve agriculture in the dry tropics through research, guided by Science with a Human Face, which means that we harness science as a means to serve the rural poor, not as an end in itself.

When I came to ICRISAT eight years ago, staff morale was low and uncertainty pervaded the organization. But we restored confidence and optimism at ICRISAT. We turned financial performance around from a deficit to a surplus situation. Through sound leadership and management, your humble son transformed ICRISAT into a strong, robust and stable organization. ICRISAT today is top among 15 CGIAR Centers all over the world.

What your son has humbly done at ICRISAT, being its servant leader, can also be done in our country. But we need your commitment, dedication and selflessness to help make this happen. With these words, I wish you well and good luck. As you go out of the portals of ISU, I am very confident that you will join the ranks of dedicated professionals who will serve our poor people and help turn the Philippines around.

We should give the poor the gift of respect and love. We should give them the gift of dreams; real hope that they can see, aspirations that they can reach, homes that they can build, and food that they can produce with our help. We should share with the poor the gift of excellence, generously share our talents and resources. We must be the change agents of the poor.

When this happens, you, the youth, will have fulfilled ISU's vision of becoming a highly recognized and well respected institution of higher learning in the North for people empowerment and sustainable development.

The youth is indeed the hope and pride of our beloved Philippines.

With God's help, I am sure that you will all succeed.

Thank you and good day!

Conserving Nutritious Small Millets for a Healthier Population*



Inaugural speech, BMZ/GTZ-ICRISAT Project launching meeting on Sustainable conservation and utilization of genetic resources of finger millet and foxtail millet, 7 April 2008, ICRISAT-Patancheru, Andhra Pradesh, India.

Good morning to our NARS collaborators from the National Agricultural Research Organisation (NARO), Uganda; Kenya Agricultural Research Institute (KARI), Kenya; and Division of Research and Development (DRD), Tanzania; and in India –

* Delivered on behalf of the Director General.

Acharya NG Ranga
Agricultural University
(ANGRAU); University
of Agricultural
Sciences (UAS),
Karnataka; and
Rajendra Agricultural
University (RAU),
Bihar and scientists
in ICRISAT, and
welcome to the BMZ/
GTZ-ICRISAT Project
launching meeting
on Sustainable
conservation and
utilization of genetic
resources of finger
millet and foxtail
millet.



Malnutrition due to lack of essential minerals, proteins and/or vitamins is a primary health concern affecting nearly half the world's population, more so developing countries of Africa and Asia. The victims are pregnant women and children under three, leading to decreased work capacity in adults, reduced growth and slow cognitive development in children, disorder of the reproductive system, general weakness of the immune system, and ultimately death.

Finger millet and foxtail millet are among the hardiest crops, adapted to varied agroclimatic conditions in Sub-Saharan Africa and Asia. Their grains are richer in calcium, iron, zinc, beta-carotene and high-quality protein than many cereals, and can significantly contribute to reducing malnutrition in rural poor areas.

However, the average productivity of these two crops is low ($<1 \text{ t ha}^{-1}$) because of cultivation on marginal land, genetic erosion, limited crop improvement efforts and scanty use of genetic resources due to the non-availability of information on germplasm diversity for yield, nutritional and other agronomic traits, resistance to biotic and abiotic stresses, and grain quality traits.

A better understanding of the diversity patterns and exploitation of available genetic resources of these two small millets will lead

to more effective and sustained use of these underutilized species in crop improvement programs and farmers' fields.

Greater access of farmers and NARS to genetic resources of finger and foxtail millets during characterization will allow identification of materials and traits hitherto unavailable to these stakeholders and also contribute to reduced malnutrition and increased income of farmers in Africa and South Asia. This will also open doors for diversification of the uses of these two crops.

Characterization and understanding the diversity pattern for nutritional traits and stress resistance, and identification of genetically distinct accessions in finger and foxtail millets will serve as a sound base for more efficient and sustainable development of superior high yielding and nutritious cultivars by NARS. Farmers' cultivation of such cultivars will not only improve household nutrition but also enhance food security, income stability and marketing opportunities, with positive effects on health, work and thus national income.

The increased cultivation of genetically diverse but adapted finger millet and foxtail millet genetic resources by farmers will contribute to *in situ* conservation of the most valuable materials, and have a profound impact on overall research and development through continuous availability of the genetic resources and their continued evolution. It is the key to future impact of these crops' breeding programs in Africa and South Asia.

ICRISAT's genebank holds 5,949 accessions of finger millet from 24 countries and 1,535 accessions of foxtail millet from 26 countries. Preliminary characterization indicates the availability of a large diversity for morphological and agronomic traits in the germplasm. ICRISAT scientists have developed core collections of these crops consisting of 622 and 155 accessions, respectively, which serve as an ideal starting point for research projects. In fact, our scientists are working on developing mini core collections of these crops.

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It is against this background that the project on “Sustainable conservation and utilization of genetic resources of two underutilized crops – finger millet and foxtail millet – to enhance productivity, nutrition and income in Africa and Asia” is being launched with funding from BMZ/GTZ, Germany. The project is in consonance with the CGIAR’s System Priority Areas 1 of sustaining biodiversity for current and future generations and 2 of producing more and better food at lower cost through genetic improvements. By strengthening the targeted use of genetic resources of finger millet and foxtail millet, this project will increase their cultivation area, productivity, nutritional values, resistance to important diseases, and tolerance to drought and salinity.

I would like to take this opportunity to thank BMZ/GTZ for supporting this project and sharing our vision of a hunger-free world. The project’s activities span the research-development continuum, from identifying germplasm with good agronomic and nutritional characteristics that can be directly grown by farmers to molecular characterization of core/mini core collections to determine population structure and to identify the genetically diverse sources for different traits for use by breeders in NARS. This knowledge would contribute to more efficient improvement of finger and foxtail millets in Africa and Asia. The project increases stakeholders’ access to genetic resources and their abilities to conserve them *ex situ* and *in situ*.

I wish you a good and productive meeting.

Thank you.

Upholding NVSU's Culture of Scaling Greater Heights



*Guest of Honor and Speaker, 85th
Commencement exercises, Nueva
Vizcaya State University, 14 April 2008,
Bayombong, Nueva Vizcaya, Philippines.*

President Marilou Abon, other officials of the university, faculty and dear students and parents, good morning.

I would like to take this opportunity to thank President Abon for inviting me to speak to you today on the occasion of the University's 85th Commencement exercises.

The last few years have seen the Nueva Vizcaya State University which began as a Bayombong Farm Settlement School in 1916, responding to the challenges of our times with its vision for



excellence and peace, new policies and guidelines, empowered students and inspired faculty, and a host of other measures. Your President has been successful in opening global opportunities for NVSU. That is the trend in successful organizations worldwide.

Notwithstanding the gigantic challenges our country is facing today, I firmly believe that there is hope for the Philippines. I had to grapple with ICRISAT's sad state of finances when I took over as its Director General in 2000. Eight years later and with budget surpluses in the last five years and more research impacts created, I can confidently say that it was all possible with hard work (persistence), a clear focus on big issues (perspective), and the desire for transformation (personal commitment) to achieve new heights in terms of both excellence and relevance.

3 P's: Persistence, perspective, personal commitment. Armed with the power of these mental tools, I challenge you to help turn the country's situation around and empower the people, especially the poor, with tools and opportunities to improve their livelihoods and incomes. Higher education cannot ignore the economic realities of our country.

As a university you need to offer quality educational programs comparable to international standards; become a regional center of excellence and relevance; generate, adapt and share knowledge that equip our youth with competencies, values and

skills in a rapidly changing domestic and international job market; and utilize state-of-the-art ICT and other emerging innovations in higher education.

Allow your students and staff to work in an atmosphere of debates and challenges, with rewards for the most creative ideas and innovations.

The last few months have seen a sharp rise in the price of food commodities in general and rice in particular, hitting consumers in many parts of Asia. Rice prices in world markets have jumped 50% in the past two months and at least doubled since 2004. In the Philippines, the largest importer of rice, prices have soared to as high as a dollar from as low as 50 cents a kilo. The government is criticized strongly for lack of a long term strategy to be food secure.

You must not only have a clear personal vision and mission but you must exercise your right to participate in the transformation of a better Philippine society.

Inextricably connected to these food price hikes is the issue of climate change – in the form of higher temperature, more droughts and floods – that has been rearing its ugly head in all parts of the globe, leaving a trail of destruction and devastation. We need adaptation and mitigation strategies to cope with climate change.

History has shown that youths are the hope for meaningful change and with the right opportunities and positive attitude, there is nothing they cannot achieve. Youngsters like you just need the right atmosphere to do wonders for the country. You need to be in the driver's seat. It was only because I focused on opportunities, not dangers and adversities, that I was able to achieve success.

Young people's contributions to their communities and nations are not entirely understood. Youth are making a difference as activists and as leaders in community development. In many places they are apathetic or disengaged. Worldwide, youth are bypassing traditional forms of political participation through their activism and volunteering.

In short, you are the key agents of socio-economic development and technological innovations and change. You must not only have a clear personal vision and mission but you must exercise your

right to participate in the transformation of a better Philippine society. How else can you live up to Jose Rizal's belief that "the youth is the hope of our motherland"? So the challenge lies in reinventing yourself continuously and opening your mind to what's happening around you.

In the blood of every Filipino is an incredible legacy of sacrifice and survival that began when the Philippines cast off the shackles of its European ruler. These qualities have in fact come to define Filipinos globally. I urge you to be the torch bearers, the future leaders of the country.

Thank you.

Giving the Poor a Chance with Biofuels



Inaugural address, ICRISAT–International Fund for Agricultural Development (IFAD) Biofuels project launch meeting, 1 May 2008, ICRISAT-Patancheru, Andhra Pradesh, India.

National program scientists from China, Colombia, India, Mali, Philippines, and Vietnam; Keith Fahrney and Bernardo Ospina from the International Center for Tropical Agriculture (CIAT); Dr Vineet Raswant from IFAD; NGO partners from Colombia and India and my colleagues from ICRISAT, good morning and welcome to the ICRISAT-IFAD Biofuels project launch and work plan development meeting.



Food security, energy security and climate change are three of the greatest challenges we face today. Rising food prices coupled with reported uncertainties in food grain production and supply have led to panic buying and even rationing of food products in some countries. This has led to hot and passionate food vs fuel debates! Although price increases are blamed on increased biofuel production, factors such as high energy prices, cereal production not keeping pace with demand from the year 2000, stock levels, exchange movements and weather vagaries, as well as speculation affect price increase in commodities.

Fossil fuel prices are rising and the supplies are volatile owing to geopolitical reasons. Modern biofuels can help meet the needs of the 1.6 billion people who lack home electricity and 2.4 billion who rely on traditional sources for their energy needs. Biofuels offer hope to complement energy requirements while at the same time providing environmental benefits. Climate change impacts are further aggravating the scenario.

ICRISAT's BioPower Strategy focuses on feedstock sources and approaches that do not compete with food production but rather produce food as well as fuel, and may even enhance food production by stimulating increased input use and crop management intensity. ICRISAT develops systems that increase the incomes of the poor, but that do not tradeoff biofuels against food and feed security or the environment.

There has been much hue and cry about biofuels. Serious environmental damage can result from clearing rainforests for

sugarcane and for biodiesel from palm oil. We need smarter alternatives. Our focus revolves around “smart crops” such as sweet sorghum, pongamia and jatropha. Grain crops like corn, rice and wheat must not be utilized for biofuels in developing countries because of food security considerations. We have to be selective in developing, promoting, and commercializing biofuel crops, hence the need for smart biofuel crops.

Sweet sorghum is a smart feedstock for ethanol production. It gives food, feed, fodder and fuel, without significant trade-offs in any of these uses in a production cycle. ICRISAT pioneered the sweet sorghum ethanol technology, by genetic enhancement of cultivars, development of crop management options and commercialization of ethanol production technology with Rusni Distilleries through its Agri-Business Incubator. Similarly, more than 100 jatropha collections are under evaluation in ICRISAT.

Modern biofuels can help meet the needs of the 1.6 billion people who lack home electricity and 2.4 billion who rely on traditional sources for their energy needs.

The wind is behind our back with respect to sweet sorghum.

Benefits will increase as oil prices rise. This in turn will provide stronger and stronger profit incentives to raise productivity, raising incomes even further. It is a positive development pathway for the poor and the hungry. We believe we can find win-win solutions for the poor and the environment through smart research-for-development.

Greater investments in international agricultural research must be made to fully harness science and technology for biofuels development. This development must be linked to the broader goals of food and feed security, poverty reduction and environmental sustainability. Our biofuels innovations serve as instruments of empowering the world’s rural poor. The interest of small farmers is sacrosanct.

At ICRISAT, biodiesel plantations are used for rehabilitating degraded private and common property lands by adopting collective action to benefit landless women and vulnerable groups in the community. However, standardization of agronomic and productivity enhancement options for jatropha needs to be strengthened.

ICRISAT is also working through public-private partnership with Southern Online Biotechnologies and other partners for the promotion of jatropha. There is an urgent need to apply science for jatropha to be harnessed as a source of biodiesel. Cassava is another important feedstock with vast potential for bioethanol production. The beauty of the crop lies in the fact that in addition to its high productivity, it is possible to supply cassava chips year round to the distillery. The productivity is higher in Asia than in Africa and Latin America.

The current ICRISAT-IFAD Biofuel Project on three feedstocks (sweet sorghum, jatropha and cassava) involves six countries (Philippines, China, Vietnam, India, Mali and Columbia). The project will develop and evaluate sweet sorghum hybrids and bmr sorghum hybrids; develop and identify high-yielding and/or sugary cassava cultivars; evaluate and identify promising sweet sorghum cultivars in different eco-regions; evaluate nurseries of promising jatropha clones (and/or local species in Mali) and multiply the best clones; organize self-help groups (SHGs) to undertake biodiesel activities in villages; evaluate the decentralized extraction of oil and use of straight vegetable oil as an energy source; and standardize crop management practices to maximize the productivity of sweet sorghum yields and of cassava root yield, among others.

In the long run, this will facilitate small-scale farmers and landless poor to take advantage of the market demand for their crops for biofuel production and/or utilize the biofuels for local use (eg, running motor pumps), which in turn, will help them improve their livelihoods and rehabilitate degraded lands. The negative aspects of biofuels notwithstanding, it is indisputable that as a renewable energy source, they can help mitigate climate change and reduce dependence on fossil fuels, cut down the outflow of precious foreign exchange from developing countries, in addition to providing new markets for higher prices products for agricultural producers to stimulate rural growth and farm incomes.

I would like to take this opportunity to thank IFAD for their support to this project and their faith in us. In summary, we need to ensure that food security and environmental security are not sacrificed in pursuit of inclusive biofuels development using a science-based approach. Let us work together towards this objective.

I wish the project launching meeting a great success.

Thank you.

Creating a Critical Information Repository for Better Rural Livelihoods



Keynote address, Scoping meeting on Village Level Studies, 3 May 2008, ICRISAT-Patancheru, Andhra Pradesh, India.

Dr Prabhu Pingali from the Bill and Melinda Gates Foundation (BMGF); Dr Tom Walker from the Michigan State University (MSU), Dr N S Jodha from the International Centre for Integrated Mountain Development (ICIMOD), Dr P K Joshi from the National Centre for Agricultural Economics and Policy Research (NCAP), Gero Carletto from the World Bank, Thelma Paris from the International Rice Research Institute (IRRI), and my colleagues from ICRISAT, good morning and welcome to the scoping meeting on Village Level Studies.



Recent dramatic increases in food prices, particularly basic cereals, are threatening to push the poor in developing countries off the precipice and causing concern about world agriculture. In 2007, the international food price index rose by nearly 40%, compared with 9% the year before, and in the first three months of 2008, prices increased further, by about 50%!

The price of rice, after rising steadily through 2007, jumped sharply in the first quarter of 2008, up 75% from the previous year. That means that for a family of five living on just US\$ 1 per person per day, a doubling of food prices effectively cuts \$ 1.50 out of their \$5 daily budget! The problem has been festering, caused primarily by burgeoning demand and slower growth in yields.

At the household level, volatile food prices affect the poor and food insecure the most. While the few poor households that are net sellers of food will benefit from higher prices, the households that are net buyers of food that comprise a large majority of the world's poor, will be hit very hard. Adjustments in wages, employment, and in capital flows to the rural economy, which can create new income opportunities, will take time to reach the poor, but opportunities do exist to transform the challenge into gains for the poor.

The first generation Village Level Studies of ICRISAT that began way back in 1975 in three dryland regions in India were designed to collect farm-level data to assist research in its task of generating new technologies suited to the needs of farmers living in the semi-arid tropics.

It provided empirical evidence about the vulnerability of the poor to various sources of risks and shocks as well as the capacity to access physical, financial and social resources and networks in risky environments. It went on till 1985, with a few surveys

carried out in 1989 and 1993, since demand for the data remained quite high.

The second generation Village Level Studies in 2002 accommodated emerging areas of interest such as livestock enterprise economics, investments in soil conservation and water exploration, migration access to and benefits from government programs, etc.

Such data proved vital in identifying and designing appropriate interventions to help the poor achieve preferred livelihoods, improving their access to productive natural resources and technology, evolving strategies from an investment angle and enhancing their standards of living.

ICRISAT's existing longitudinal data sets bring a long-term, multi-generational perspective to agricultural, social and economic change.

ICRISAT's existing longitudinal data sets bring a long-term, multi-generational perspective to agricultural, social and economic change. They also elucidate on farming activities and the household economy in marginalized regions.

Poverty rates in rural areas have declined over the past decade. However, 75% of the world's poor still live in rural areas.

And rural poverty rates remain frustratingly high and tenacious in South Asia.

Hence understanding village-level information and ground realities in this region will provide insights into the rural economy. This will help identify new sources of vulnerabilities, risk and coping mechanisms. Suitable agricultural technologies that could increase the profits of poor farmers and improve their livelihoods could be developed.

This scoping meeting involving all key partners and stakeholders working closely together is a first step towards establishing high quality, longitudinal micro-level data from carefully stratified geographical locations – India, Bangladesh and Nepal – in South Asia.

We have the added advantage of having global expertise drawn from the CGIAR, ARIs, think tanks, universities and NARS together with an inter-disciplinary focus to help in this endeavor.



A unique dimension of this coordinated approach will be the generation of local-level perspectives on global issues and its local manifestations (eg, global warming, climate change and globalization).

I would like to take this opportunity to thank the Bill and Melinda Gates Foundation for their generous support to our cause of improving the livelihoods of the poor through Village Level Studies. I would also like to thank Cynthia Bantilan for her efforts in rallying all the stakeholders towards this mission.

I am sure this meeting will be highly successful in addressing important methodological issues, analytical framework and approaches for generating longitudinal panel databases as well as operational issues relating to site selection, common data protocol, database management and dissemination, leading to a full project proposal and detailed research plan for the proposed project on Developing knowledge support systems in South Asia for evidence-based decision making.

I wish your meeting a great success.

Thank you.

Communities Coping against Climate Change: The C4 Initiative



*Keynote address, Project inception workshop
on Vulnerability to climate change: Adaptation
strategies and layers of resilience, 7 May 2008,
ICRISAT-Patancheru, Andhra Pradesh, India.*

Frederick Roche and Cindy Malvicini from the Asian Development Bank, NS Jodha from ICIMOD, NARS partners from India, Bangladesh, China, Sri Lanka, Pakistan, Vietnam and Thailand and my colleagues from ICRISAT, good morning and welcome to the Project inception workshop on Vulnerability to climate change: Adaptation strategies and layers of resilience.

One billion of the world's poorest are vulnerable to the impact of climate change on agriculture, which ranges from



high temperatures, water scarcity, extreme weather events, desertification and land degradation to loss of biodiversity. Asia and Sub-Saharan Africa will be amongst the most severely affected by climate change; for about 90% of the world's rice is grown and consumed in Asia (where 70% of the world's poor live), and Sub-Saharan Africa is the world's fastest growing rice consumer. The meteoric rise in the price of rice and other foodstuffs the world over are signs of the hard times to come.

As rural communities across the developing world feel the pressure of climate change, high food prices, and environmental and energy crises, new knowledge, technologies and policy insights have never been more critical.

In this context, the eloquent and emotive quotation of IISD (2003) is most relevant: "Adaptation to climate change is therefore no longer a secondary and long-term response option only to be considered as a last resort. It is now prevalent and imperative, and for those communities already vulnerable to the impacts of present day climatic hazards, an urgent imperative".

The rural poor and vulnerable farmers in the semi-arid regions of Asia, especially in Bangladesh, India, Pakistan, China and Sri Lanka, tend to live in disaster-prone and ecologically fragile areas that are unproductive. Their vulnerabilities are high because they are especially exposed to climate variability risks and face the resulting stresses with severely limited adaptive capacity.

How do we prevent climate change from becoming a catastrophe, with its widespread negative effect on extreme weather events, water resources, natural ecosystems, coastal communities and infrastructure, air and water quality, biodiversity, agriculture and food production, forestry, human health and other factors that support economic performance?

Rainfed farming is vital for current and future food security. Global warming and changes in rainfall patterns are predicted to make rainfed agriculture even more risk prone. Given the current vulnerability of the rural poor in the SAT and the uncertain nature of future climate change, there is an urgent need for science-based solutions and pro-poor approaches to build adaptive capacity.

Adaptation to climate change is therefore no longer a secondary and long-term response option only to be considered as a last resort.

The opportunities lie in accelerating our efforts on two fronts: mitigation measures to prevent the degree of climate change from becoming unmanageable and adaptation measures to reduce the unavoidable harm from climate change.

Over generations, farmers have developed coping strategies to buffer against the uncertainties induced by season-to-season variation in water supply coupled with the socio-economic drivers which impact on their lives. Though coping strategies enable them to survive, they are risk avoiding in nature and are designed to mitigate the negative impacts of the poorer seasons. But they fail to exploit the positive opportunities of the average and better than average seasons.

ICRISAT has in place an Operational Research Strategy on "Managing current climatic uncertainty and adapting to future climate change" that adopts a three-tiered approach to the problem:

- Short-term seasonal climate and agricultural forecasting for farmers to fine tune medium-term strategies;
- Decision-support frameworks that provide a medium-term strategic understanding of the temporal and spatial distribution of climatic variability and its impact on performance and



profitability of existing and innovative agricultural practices;
and

- Providing longer term information on the likely impact and implications of climate change for rainfed farming systems.

ICRISAT believes that in order to adapt to climate change, agricultural communities and stakeholders need to first enhance their ability to cope better with the rainfall variability associated with current climates. ICRISAT is currently partnering with meteorological services, CGIAR Centers and climate specialists on about 12 projects pertaining to climate risk management in Asia and Africa. We are helping farmers devise ways to manage landscapes, soils and crops so that more of the water and nutrient resources are stored and used more efficiently and over a longer time period.

ICRISAT recognizes that managing climatic uncertainty and adapting to change cannot be an end in itself. It must be seen as an integral part of all that we do; hence climate risk management is being integrated across our research agenda. Our Integrated Genetic and Natural Resource Management (IGNRM) approach to climate proofing involves better drought and heat-tolerant varieties grown in farming and land-use systems that conserve water both in the crop's root zone and in the wells and reservoirs of villages.

The bottomline is to ensure that we develop resilient communities, resilient ecosystems and resilient crops.

ICRISAT already has on hand crops that are adapted to heat, high soil temperatures, knowledge and understanding of photoperiod-sensitive flowering, information on genetic variation



for transpiration efficiency, short-duration varieties that escape terminal drought, and high-yielding and disease-resistant varieties.

For instance, we have developed more resilient crops such as short-duration chickpea cultivars ICCV 2 (Shweta), ICCV 37 (Kranti) and KAK 2 and short-duration groundnut cultivar ICGV 91114 that escapes terminal drought. We have also integrated trees into traditional annual cropping systems to help reduce the impacts of winds and to protect soils from fierce storms. We have developed plants that resist pests and pathogens, such as downy mildew-resistant improved pearl millet hybrid HHB 67 in India; wilt-resistant high-yielding pigeonpea ICEAP 00040 in Tanzania, Malawi and Mozambique and rosette-resistant groundnuts in Uganda, to name a few.

To help guide our crop adaptation work, we are using crop growth simulation models such as APSIM to examine the disaggregated impact of a range of climate change scenarios on our mandate crops across the SAT of the world.

ICRISAT has an evolutionary advantage since its mandate crops are adapted to heat and high soil temperatures. Our breeding strategy factors these harsh and dry conditions. What we need to better understand are the physiological mechanism underlying heat tolerance, identify wider gene pools to develop crops of wider

adaptability, and develop more effective screening techniques of germplasm for desired traits.

ICRISAT is also responding to the challenges by exploiting the potential of 'pro-poor' opportunities for biofuel production. Its BioPower initiative believes in more investments in bio-energy crops and systems to provide a major impetus for sustainable development; empowering the dryland poor to benefit from, rather than be marginalized and so that farmers can better cope with stresses, climate change or otherwise. The current activities include developing higher-yielding sweet sorghum varieties for food, fuel, feed and fodder; pilot-scale pro-poor commercial start-up partnerships in sweet sorghum bioethanol; and research-to-development alliances for pro-poor jatropha plantation development for biodiesel.

Though adaptation to climate change is necessary to address impacts resulting from the warming which is already unavoidable due to past emissions, the costs of adaptation will increase as global temperatures increase. Making development more sustainable can enhance both mitigative and adaptive capacities, and reduce emissions and vulnerability to climate change.

I would like to take this opportunity to thank the ADB for their continued support to ICRISAT. I am sure that over the next three days, you will collectively assess and review the current situation on vulnerability to climate change in Asia, finalize the methodological framework and approaches for the study, and develop detailed workplans to implement the project as well as information dissemination plans. This project can be popularly called "Communities Coping against Climate Change"- the C4 initiative. I wish the deliberations great success.

Let us remember that global warming tolerance thresholds are not too far; hence an adaptation + mitigation approach is crucial with countries showing the political will to implement steps. It is humanity's business and the time for collective action is now. We have no time to lose.

Thank you.

Exploiting Legumes for Greater Productivity



*Welcome address, Pigeonpea project
launching meet, 16 May 2008, ICRISAT-
Patancheru, Andhra Pradesh, India.*

Dr Anand Bose, Additional secretary (Ministry of Agriculture), Ms A Neeraja, Director, National Food Security Mission, Dr Prabhat Kumar, Director, Business & Country relations and my other colleagues from ICRISAT, good morning and welcome to the pigeonpea project launching meeting.

The dramatic increase in food prices over the last few years has raised serious concerns about the food and nutrition status of the poor. Nearly every agricultural commodity is part of this rising trend. Since at the household level the poor spend about 50-60%



of their budget on food, higher food prices will cause them to shift to even less-balanced diets, with adverse impacts on health in the short and long run. Changes in food availability, rising commodity prices, and new producer–consumer linkages have crucial implications for the livelihoods of poor and food-insecure people.

Besides being a rich source of dietary protein, legumes hold great potential for fighting hunger and improving soil fertility, thus playing a vital role in furthering sustainable agriculture. They enable smallholder farmers to get onto the first rung of the ladder leading out of poverty and nutritional insecurity.

Chickpea and pigeonpea are the two most important pulse crops in India. Though India produces about 64% of the chickpea and 90% of the pigeonpea globally, production is still not adequate to meet domestic demand. In the case of pigeonpea, breeding efforts to enhance production have led to significant increases in cropped area while productivity has remained unacceptably low (700 kg/ha).

The impact of high-yielding cultivars of chickpea and pigeonpea in increasing production will be limited unless emphasis is laid on identifying varieties with less susceptibility to *Helicoverpa* so that farmers don't resort to applying toxic pesticides. The losses due to *Helicoverpa* are also aggravated by frequent occurrence of drought.

Climate change threatens to make dryland agriculture even more risky. Unless farmers produce and adopt more resilient legumes that evade drought, floods, mid-season dry spells, etc, their empowerment will remain a mirage. In prioritizing ICRISAT's crop adaptation strategy for climate change, ICRISAT has been able to draw heavily on current research products and lessons learned.

For instance, our long-term watershed management experiments have shown that drylands can produce 5.1 t of grain per hectare a year supporting 21 persons as compared to 1.1 t of grain per hectare a year supporting 4.8 persons in the case of farmers' practices. Also, such practices sequestered 330 kg of carbon per hectare a year up to a depth of 120 cm by intercropping sorghum with pigeonpea.

This pigeonpea hybrid technology will serve as the springboard for a pulse revolution in India and the rest of Asia and Africa.

The project on "Taking pigeonpea hybrids to the doorsteps of farmers" aims to increase pigeonpea production through the adoption of hybrids under diverse environments, increase productivity by promoting high-yielding hybrids, demonstrate yield potential of hybrids in different cropping systems and most importantly, empower farmers in seed production of hybrids and their parents. This pigeonpea hybrid technology will serve as the springboard for a pulse revolution in India and the rest of Asia and Africa.

The project on "Exploiting host plant resistance for *Helicoverpa* management to increase production and productivity of chickpea and pigeonpea under rainfed conditions in India" aims to improve chickpea and pigeonpea productivity and farm incomes through *Helicoverpa*-resistant cultivars.

This will be done by identifying chickpea and pigeonpea genotypes with diverse mechanisms of resistance to *Helicoverpa*, studying the interaction of *Helicoverpa*-resistant cultivars with bio-control agents, and technology exchange and capacity building, among other things.

The project will boost the production of grain legumes to improve human nutrition, particularly that of women and children in rural



areas and also improve farm incomes, enhance soil fertility, and the quality of life of the rural poor.

ICRISAT believes in the power of partnerships. Hence it will be actively working with agricultural universities, advanced biotechnology laboratories, public seed laboratories as well as public and private institutions to ensure that technology and materials are shared so that they reach farmers. To make hybrid seed available to farmers at a reasonable cost, we also propose to develop hybrid pigeonpea seed villages with the involvement of young farmers.

I take this opportunity to thank the Government of India for reposing their trust in us and for their unstinted support. I am sure that the synergies between our organizations will culminate in the improvement of the socio-economic conditions of farmers in terms of sustainable increased productivity, food and nutritional security and improved family well being.

Thank you.

Using Genomics-assisted Breeding for Groundnut Improvement



Inaugural address, 1st Annual review meeting of the National fund project on Groundnut genomics, 19 May 2008, ICRISAT-Patancheru, Andhra Pradesh, India

Dr Muralidharan, Director, National Research Centre for Groundnut (NRCG), Dr Ramesh Aggarwal from the Centre for Cellular and Molecular Biology (CCMB), Dr KV Bhat from the National Bureau of Plant Genetic Resources (NBPGR), Dr T Radhakrishnan from NRCG, Dr MVC Gowda from the University of Agricultural Sciences, Dharwad, and colleagues from ICRISAT, good morning and welcome to the 1st Annual review meeting of the National



fund project on Gene-based genetic maps and molecular markers for biotic and abiotic stress tolerance in cultivated groundnut.

The past three years have seen a marked volatility in food prices. Reduced global stocks, climate change and natural shocks such as droughts, outbreaks of disease, high energy prices, and inappropriate responses to existing market signals are some of the reasons for the spiraling prices. Most of the poorest people in developing countries are feeling the pinch of rising food prices, causing serious hardship.

Increasing agricultural productivity and effective upscaling of research products are needed to help the most vulnerable populations cope with the drastic and immediate hikes in their food bills, and to help farmers meet the rising demand for agricultural products.



Groundnut or peanut is one of the most important oilseed crops in the world. India alone contributes about 20% to the total world production, where the crop is grown by smallholder farmers under very low input conditions.

Lack of farmer access to seed of improved varieties, poor agronomic practices and diseases and pests are the major factors limiting yield in India. Rust, late leaf spot and early leaf spot are serious diseases that can cause up to 70% yield loss. Besides adversely affecting pod yield and its quality, these foliar diseases also affect haulm (fodder) yield and quality.

These molecular markers will be useful to groundnut breeders for selection in breeding practices so that improved varieties with enhanced resistance to biotic stresses and tolerance to drought can be developed.

Drought is another severe stress affecting sustainable production of groundnut in India. The potential for increasing farmers' yields through crop improvement, particularly for key biotic and abiotic stresses, is very high, especially if aided by the application of modern science.

Although crop improvement programs in the past involved conventional breeding, no effective molecular breeding program was developed to facilitate genetic improvement in this crop. The genetic basis of the most important traits in groundnut is not fully understood, and so far no molecular genetic map has been developed for cultivated groundnut species.

The current project was started with the objective of generating micro-satellite-enriched libraries and identifying 500 micro-satellite or simple sequence repeat loci; generating groundnut unigene-derived SNP markers, constructing integrated genetic maps with SSR, SNP and DArT; and phenotyping mapping populations and identifying genes/QTLs associated with resistance to foliar diseases and tolerance to drought.

These molecular markers will prove very useful to groundnut breeders for selection procedures so that improved varieties with enhanced resistance to biotic stresses and tolerance to drought can be developed. This will have an economic impact in the country in the long run.



I would like to thank the National Fund for Basic and Strategic Research for its support to this endeavor and our partners for believing in the power of partnerships.

A Peer Review Committee which was constituted to review the progress made, will give its suggestions in developing work plans. I wish you a productive meeting.

Thank you.

A Green Revolution in the Drylands of Africa: Israel-ICRISAT Ties



Guest lecture, Conference on Israel and the Green Revolution in Africa, 2 June 2008, Jerusalem, Israel.

Her Excellency Tzipi Livni, Honorable Vice Prime Minister and Minister of Foreign Affairs of Israel; Ambassador Haim Divon, Deputy Director General, and Head of MASHAV, Ministry of Foreign Affairs; Mr Gilbert Hounbo, Regional Bureau for Africa, UNDP; Prof Jeffrey Sachs, Director of the Earth Institute at Columbia University; Ms Federica Marso of the Organisation for Economic Co-operation and Development (OECD); distinguished guests, ladies and gentlemen, good afternoon.

I would like to thank Ambassador Haim Divon and the Government of Israel for inviting me to speak at this important conference about paving the way for a Green Revolution in Africa. I am certain that MASHAV and ICRISAT can provide critical leadership in this Revolution, particularly in the dry areas which are our bread and butter.

A dryland focus for Israel and ICRISAT

The drylands cover about 40% of the arable land mass of Africa. About 25% of Africa's population lives in drylands. Many of the poorest nations on earth, as measured by the United Nations' Human Development Index, are found in these drylands. Very few of these countries are on track to meet the Millennium Development Goals (MDGs) for reducing poverty and hunger.

Most of the 30 million smallholder farming households in these drylands of Africa are trapped in poverty and most farmers earn less than one dollar a day, with far too many living on just half a dollar a day.

External challenges are growing

Rising food prices hurt the rural poor because they often have to buy even more food than they are able to grow on their small farms. A double blow is the rising cost of fertilizer which is essential for increasing their food production. Rising oil prices and increased demand have caused global nitrogen fertilizer prices to triple in recent years. Rising oil prices also hit farmers in many other ways.

African farmers currently use very little or no fertilizer on their dryland grain crops, sorghum and millet. To increase yields though, they need to start using fertilizer and good seeds.



The low profitability and productivity of grain crop farming need to be simultaneously enhanced through the use of improved cultivars and more efficient use of fertilizer. With methods like microdosing and planting basin cultivation that we have advanced in dryland Africa, fertilizer rates one-tenth of those used in the developed world can give big yield increases, doubling or tripling yields across much of the West African Sahel.

Even at today's high fertilizer prices, which are much higher in Africa than in the developed world, each dollar's worth of extra fertilizer still delivers three dollars worth of extra grain. A

Green Revolution is really possible in this way, but we need the support of donors and the leadership of the countries themselves to roll this out on a large scale to benefit millions of families.

The 'gloom and doom' conventional wisdom is that the irrigation potential in dryland Africa is very limited and too expensive to develop.

Thinking out of the box, we also see great opportunity in helping African farmers identify horticultural crops that can diversify their production system and increase their incomes to combat rising food prices. Israel is already playing a leading role in this work. An Israeli scientist working with us, Prof Dov Pasternak, is screening over a hundred tree and vegetable crops and varieties for adaptation to the Sahel.

Climate variability and change

Droughts and heat waves will increase with climate change in the coming decades. Rain will come down in deluges interspersed by crushing droughts, so farmers need to prepare now to be able to save water when there is too much, and use it sparingly to get past droughts.

Irrigation potential and strategy

The 'gloom and doom' conventional wisdom is that the irrigation potential in dryland Africa is very limited and too expensive to develop. However, hydrological surveys show that underground water resources are extensive, even in the Sahel, but are relatively untapped. More and more governments in Africa today are making irrigation development a national priority.

In the Sahel of West Africa, for instance, some 30 billion m³ of water flows annually in the Niger River, about half the annual discharge of the Nile River. Shallow aquifers or 'dallols' could add an additional 3 billion m³ of water. Deeper aquifers hold trillions of m³. Rainwater can also be captured and stored in artificial dams. There is an urgent need for a systematic hydrological survey to assess the feasibility of more effectively using these precious resources in sustainable ways.

Drip irrigation, a scientific and technological innovation of Israel, greatly increases the efficiency of water use. It also makes more efficient use of costly fertilizers. Diversification of a portion of a smallholder's farm into higher-value horticulture crops under drip irrigation can very sharply raise incomes and improve diets.

What African governments and donors can do

There has been a neglect of agriculture as an engine of economic growth in Africa over the last two decades, as evidenced by low public and international investment. Foreign subsidies as well as local policies favor urban consumers, but punish African farmers.

African governments need to be more supportive of their rural poor, providing basic infrastructure like roads, communication systems, and health and education facilities. They need to adopt policies that encourage, rather than penalize agriculture. Developed countries need to break with their past habits of huge subsidies to domestic farmers that create unfair competition with the poor in the developing world.



What Israel can do

Given Israel's historic expertise, we suggest five priorities for the Israeli research and development community:

- Develop and disseminate diverse high-value horticulture crops;
- Build the entrepreneurial capacity of African farmers, and the institutional capacity to support 'value-chain' led, market-oriented agricultural development;

- Hydrological surveys and irrigation feasibility studies, with attention to sustainability;
- Develop new irrigation facilities based on drip irrigation where appropriate and sustainable; and
- Develop or rehabilitate seasonal dams to capture surface rainwater to raise water tables in dry areas, opening additional irrigation and late-season cropping possibilities.

Let me mention at this point that for every \$1 invested in international agricultural research, \$9 worth of additional food is produced in developing countries where it is needed most, and the investment continues to pay off, year after year.

Development investment models

Israel continues to be a good donor to ICRISAT and we appreciate this very much. We are already contributing together through the following development investment models to help realize a Green Revolution in dryland Africa.

African Market Gardens

Presently 2,500 successful demonstration small-scale drip irrigation market gardens now exist in four countries and consistently raise household incomes by 5 to 7 times. Lack of sufficient high quality, well-adapted vegetable seeds and tree seedlings, as well as credit for equipment investment are the major constraints to up-scaling. Immediate funding to gear up ongoing seed multiplication and the expansion of tree nurseries is required, as well as the need to bring in more partners like MASHAV and NGOs who can provide training to farmers.

Dryland Ecofarms

For farmers where there is no irrigation potential and with limited market access, we have been developing Dryland Ecofarm systems. Dryland Ecofarms are integrated multi-product crop-tree-vegetable-livestock systems that focus on rainwater harvesting. With variations including biodiversity gardens with medicinal and other high-value plants, fruit tree plantations, and bio-reclamation of degraded lands, these integrated systems double to triple household incomes and reduce climatic and market risks by half.



Conclusion – A Grey to Green Revolution!

A science-based market-oriented agricultural development needs to remain the focus for dryland Africa. What we need for Africa is a “Grey to Green Revolution”. We at ICRISAT recognize the valuable contributions Israel can make to African agricultural development. We have been partnering with Israel, both with MASHAV and the Israeli research system, primarily the Volcani Institute and Israeli universities.

We look forward to continuing to build our partnership to raise the poor farmers of Africa permanently out of poverty, using our “Science with a Human Face” approach. We have a choice to make today: To partner and pave the way for a “Grey to Green Revolution” in Africa.

It is within our reach, and it is our choice to go for it, and we will be judged on that choice by those we serve, the poor and the hungry of Africa.

Thank you and good day.

Technology-mediated Open Learning: Advances in ICRISAT and the CGIAR*



Inaugural address, launch of the BSU organic farming certificate course, 13 June 2008, Benguet State University, Philippines.

President of the Benguet State University Dr Rogelio Colting, faculty members and dear students, good morning.

I would first like to thank Dr Colting for inviting me on the occasion of the launch of the organic farming certificate course here today.

The course on organic farming is the outcome of a joint effort and collaboration between BSU and ICRISAT. President Colting has

* See the corresponding PPT in the CD attached.

actively supported the course development including delivery, and Dr Danilo Padua spent a semester's time in ICRISAT absorbing the practices of contemporary open and distance learning (ODL). I am happy to see that this collaboration has culminated in the launch of the new certificate course in organic farming.

We in ICRISAT have a platform for experimenting with practices of ODL, particularly by mediating it with the use of modern ICT tools and techniques. Our project, called the Virtual Academy for the Semi Arid Tropics or VASAT, was conceived of as a blend of ODL and ICT methods. These operate on a platform of good quality agricultural education and communication materials. It was and continues to be aimed at extension processes in support of drought preparedness and resource conservation practices. It is now also focusing on climate change adaptation at a popular level.

The VASAT experience has led us to develop an approach to lifelong learning to cover a wide range of learners. This range now includes those who seek higher education in agricultural sciences. Clearly, there are many topics that are important for self-employment or improved employment today. A number of these can be derived from learning core practices and concepts in agricultural sciences. On a very broad plane, you can accommodate them in agro-ecology, using the term holistically, to mean not just production, but conservation and services as well.

We have been partnering with the CGIAR initiative in open learning in higher education since 2004. It was earlier called the Global Open Food and Agricultural University or GOFAU. It is now called Open Source Agricultural Curriculum and Learning Initiative or AGROCURI.

We have helped in transforming it from a purely degree-oriented program. It is today a well-organized learning support initiative in agricultural sciences and technologies. It is being developed to support learning at all levels: study certificate, a graduate diploma or to offer a set of courses inside an academic curriculum which may lead to an MS degree. Our vision is to support learners in a university at any level that the academic administration decides. We hope that this set of new learners will include self-employed people, eco-entrepreneurs, farmers, activists and officials as well.

To achieve this, we are invoking an advanced practice in contemporary open learning. It is the practice of re-usable learning objects or RLOs. The RLO practice is intuitively simple:

you create a small unit of learning material once, and you can re-use it in different teaching contexts and in different places and times.

Firstly, this leads to economy in production. We have estimated that one hour of multimedia learning material requires nearly 300 hours of expert time. Through re-use, another teacher or a group saves so much development effort. Re-usability is a way to confer major cost advantages.

Secondly, this approach allows for faster creation; experts find it easier to write shorter pieces than whole courses or modules.

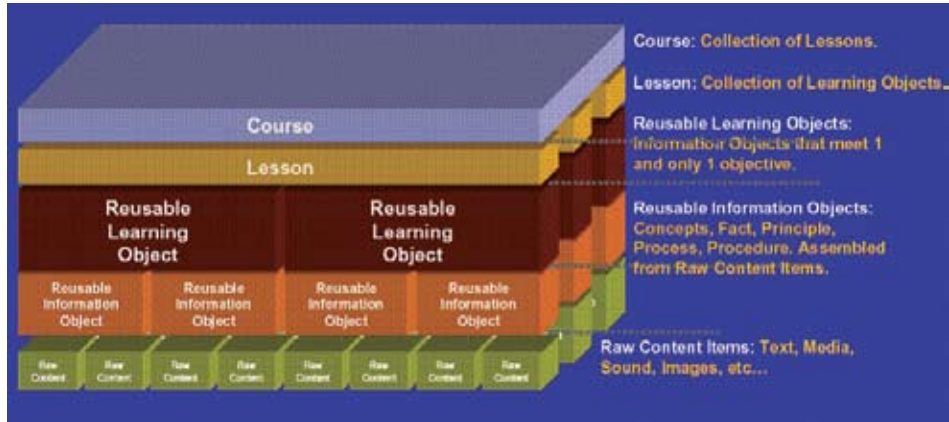
Thirdly, it also enables us to draw upon wider bases of experts and not only accredited teachers and researchers.

We hope that this set of new learners will include self-employed people, eco-entrepreneurs, farmers, activists and officials as well.

Based on this practice, we have proposed a curriculum framework for a masters program in agro-ecology. This is designed uniquely. From the course, a university can generate a certificate as easily as it can create a graduate diploma. The curriculum is designed as an aggregation of RLOs. They are assembled to create sub-units and units of a module and modules can be assembled to create a course. In a rough sense, it is like using Lego pieces to assemble a complex structure. The AGROCURI program and operations now include collaborative RLO authoring, review and publishing; capacity building is a key component.

You will find that it is easy for any expert to enroll as a contributor. The participating universities can enroll their faculty as contributors. Some seniors among them can serve as reviewers of any contribution.

The process is easy to conduct and takes place in password-protected sites. This will prevent unauthorized access and edits. Once reviewed and approved, an RLO is available to the public for view. The public can also rate the RLO using stars.



I am happy to say that the present course is itself composed of RLOs and they can be available in the RLO repository in a protected area first. We thank President Dr Colting and Dr Padua for their support and participation. The BSU is now a global pioneer. And ICRISAT is a proud partner of your organization. Thank you.

Knowledge in the Service of the Poor



Opening remarks, Planning and review meeting of the project proposal on Longitudinal data for evidence-based decision making, 9 July 2008, ICRISAT-Patancheru, Andhra Pradesh, India.

Ellen McCollough of the Bill and Melinda Gates Foundation, Thelma Paris from the International Rice Research Institute (IRRI), PK Joshi from NCAP, Tom Walker from Michigan State University, Hans Binswanger, Professor Extraordinaire, and colleagues from ICRISAT, good morning and welcome to the planning and review meeting of the project proposal on Longitudinal data for evidence-based decision making.

Poverty is staring us in the face of rural Asia. Never has it been more compelling than now to work towards decreasing its intensity and severity. Rural poverty rates are stubbornly high and tenacious. In addition, recent dramatic increases in food prices are causing concern worldwide. This is where technological as well as knowledge-based interventions can play a critical role. However, policy-level decision making on this critical issue will be flawed unless backed by ground realities and solid evidence.

ICRISAT has been the repository of longitudinal district-, household-, individual- and field-level data collected over 30 years, that provides working knowledge of the rural economy. Over 150 papers, 36 doctoral citations and 10,000 citations gleaned from GoogleScholar go to show the importance of our Village Level Studies.

The proposed project aims to substantially improve the quantity and quality of time series meso- and micro-data so that decision-making is based on evidence of impacts on the poor. The project is driven by three initiatives in India, Bangladesh, and Nepal:

- Compilation of longitudinal household, individual and field data over four years in 60 villages;
- Canvassing of survey on about 500 panel villages and 10,000 panel households; and
- Assembly of secondary meso-level agricultural data into integrated databases for distribution.

In addition, the project will improve the capacity of interested regional scientists in the analysis and in the generation of longitudinal household data and strengthen the environment for policy change via advocacy. In total, the project will produce six annual data sets, four from the VLS and two from the large-scale household panel survey. The design of VLS combines methods that have worked well in the past with desirable improvements.

I take this opportunity to thank the Bill and Melinda Gates Foundation for their support and our numerous partners for their painstaking efforts towards our goal of alleviating poverty in South Asia.

I'm sure that over the next two days, your deliberations and detailed discussions on expanding the geographic reach of ICRISAT's VLS will allow the voice of the poor to be heard above the din of our daily existence. I wish the review meeting success.

Thank you.

Let's go for the Hat Trick!



Address to Team ICRISAT, Celebration to mark ICRISAT's Outstanding ranking, 10 July 2009, ICRISAT-Patancheru, Andhra Pradesh, India.

Good afternoon Team ICRISAT! Good afternoon Outstanding ICRISAT!

Steve Jobs of Apple once said, "It's not enough to make your offer or performance great, it should be **insanely** great. Incremental improvements over your competition's offers, or even your own previous offers, don't cut it. You should shoot for ten times better." Can we do it?



We are gathered here today to celebrate ICRISAT once again being ranked Outstanding by the CGIAR and World Bank for 2007, and I thank Team ICRISAT for making this happen. ICRISAT is really great! ICRISAT is really Outstanding!

Based on the CGIAR Performance Measurement System, for 2007 we have performed greatly in all fronts: science, impacts, governance, management, and finance.

As a result of this outstanding performance, we will receive this year an additional \$1.10 million from the World Bank over their base allocation of \$0.98 million, bringing the total to \$2.08 million. This goes to show that as an innovation and impact-driven organization, ICRISAT has been in tune with the changing institutional context and task environment in its mission of helping bring about pro-poor growth and sustainable development in the semi-arid tropics of Asia and Sub-Saharan Africa. We would like to dedicate this success of ours to the small farmers and poor people in the dry tropics of the world.

At this point, I would like to request all scientists to stand. Let's give these men and women our utmost congratulations, recognition and applause for their continuous outstanding contributions! Global food shortages, rising fuel and commodity prices, and climate change seriously threaten to affect the livelihoods of the poor. Fertilizer and farmland are at a premium. Together, these have led to food riots and falling governments. I am proud to say that ICRISAT is in the forefront of research to tackle these issues.

Integrative thinking has been a way of life at ICRISAT. It has created a sense of limitless possibility and generated options and new solutions. This has led to a rise in aspirations over time. We have taken on the challenge of shaping the world of the poor for the better. We are the champions of the poor!

Creating a high functioning team with all of you has been challenging and rewarding. As your servant leader, I have consciously adopted a three-dimensional way of functioning – through the head, meaning by focusing on the skills that will enhance ICRISAT's strategy and future; through the heart, meaning by establishing transparency and open dialogues around; and through the guts, that is by taking calculated risks.

Persistence is the sandpaper that breaks down all resistance and sweeps away all obstacles. It is the ability to move mountains, one grain of sand at a time.

To be outstanding, we have had to together redefine existing standards of performance and challenge existing paradigms of world best practices. And that is what Team ICRISAT has succeeded in doing the second time around. Our commitment to delivering results that are profound and superior led to this reward.

As Abraham Lincoln said, "Character is like a tree and reputation like its shadow. The shadow is what we think of it, the tree is the real thing." Our future will depend on how we maintain our comparative advantage of having a unique core competence and strong institutional capacity in the science of semi-arid agriculture; our pro-poor research focus; our strategic partnerships and alliances, and global presence to serve the interests of the poor in the semi-arid tropics. ICRISAT has over the years proved it has a renewable capacity for resilience – a built-in power to heal, regenerate and grow beyond its known limits. We have never deflected challenges; instead, we have absorbed them and rebound stronger than before.

The last eight years have seen a demonstration of this resilience. The power to shape the future is earned through persistence. No other quality is essential to success. Persistence is the sandpaper that breaks down all resistance and sweeps away all obstacles. It is the ability to move mountains, one grain of sand at a time.



Savor the glow of our success, by all means, but resist the temptation to rest on your laurels. As Ralph Waldo Emerson said, "The reward of a thing well done is to have done it. Any recognition is just the icing on the cake, not to be expected but definitely to be enjoyed." With our second Outstanding accolade come a new set of expectations, requiring a new set of competencies. And I seek your support for this.

The EPMR is upon us. This will be our opportunity to show the panel our successes and our healthy practices; to show them how we have reinforced the can-do-it thinking everyday. On top of this is the CGIAR Change Management Process with the objectives of increasing the system's efficiency, effectiveness, and accountability.

With all these, ICRISAT must be ready for more reforms in the future. We will renew our allegiance to the poor, and we will refocus our research agenda. We will continue to create an environment to draw out the best from the spirit of human enterprise and creativity, because we believe that there is no limit to what the human mind can do and discover to meet the needs of the poor people living in the semi-arid tropics. We have you as our best diamonds to make things possible. Let us not follow where the path may lead; instead, let us go where there is no path and leave a trail.

Let us then pledge collectively to double if not triple our efforts which will lead us to the next level and beyond. Let us go for the hat trick!

God bless Team ICRISAT! God bless ICRISAT!

Thank you!

ICPH 2671: First Pigeonpea Hybrid to be Commercialized by the Private Sector



Launch meeting of hybrid pigeonpea seed ICPH 2671, 15 July 2008, Taj Deccan, Hyderabad, India.

Mr Murahari Rao, Managing Director, Pravardhan Seeds, Dr JM Rao, Principal pigeonpea breeder, senior management staff of Pravardhan Seeds, and colleagues from ICRISAT, welcome to the launch meet of the world's first hybrid pigeonpea seeds.

The world is witnessing marked volatility in food and energy prices. Reduced global stocks, climate change, rising human population, natural calamities, outbreak of diseases coupled with speculative response to the existing market signals are a few reasons for the spiraling price of foodstuffs and other essential



commodities. Nearly every agricultural commodity is part of the rising price trend.

This has led to serious concerns about the food and nutritional security of the poor. The bulk of food proteins in India are derived from pulses that are generally grown under low input and risk-prone marginal environments with low and unstable yields. At present, protein availability in India is less than one-third of the recommended dietary allowance.

Since options like increasing the area grown to pulses, intensive cropping and enhanced inputs have limited scope in India, harvesting



additional protein-hybrid legumes are the most prudent alternative.

ICRISAT along with its partners developed the world's first Cytoplasmic Male Sterility (CMS) based commercially viable pigeonpea hybrid ICPH 2671, which is high yielding and disease (wilt and sterility mosaic) resistant. It has now been named 'Pushkal' by Pravardhan Seeds. Incidentally, the word Pushkal means "abundance", which this hybrid promises.

The hybrid promises to break the 700 kg yield barrier, which has been persisting in Indian agriculture for the last five decades. Our experimental hybrids have recorded 20-150% yield advantage, ideal for bringing the next quantum jump in yield. Some hybrids have yielded more than 7 tons ha⁻¹, heralding a new era of heterosis breeding in pigeonpea and demonstrating yield levels hitherto never seen in this crop.

Since pigeonpea is predominantly cultivated by small and resource-poor farmers, it is important to keep seed cost within the reach of farmers.

To quote eminent agricultural scientist Dr MS Swaminathan, "Hybrid pigeonpea technology is like dwarfing genes in wheat and rice, and this will create a second green revolution".

Multilocal tests over three years lead us to believe that hybrid technology in pigeonpea has been a great success. The CMS-based hybrid seed technology appears to be ready for take-off.

Our major responsibility is to take this new research product to the clients – the farmers of rainfed agriculture. And we are happy to initiate this process through Pravardhan Seeds. ICRISAT in association with its consortium partners like Pravardhan Seeds will disseminate the hybrid technology which will serve as a springboard for a pulse revolution in the Indian subcontinent and Africa.

Considering the technology's high yield potential, both small and medium farmers are expected to adopt the hybrids. Since



pigeonpea is predominantly cultivated by small and resource-poor farmers, it is important to keep seed cost within the reach of farmers. I am sure that together we will succeed in improving the livelihoods of resource-poor farmers in the drylands.

Thank you.

Let's Rise from the Ashes like a Phoenix



Guest of Honor and Speaker, Oath taking ceremony of the Board of Agriculture of the Professional Regulation Commission (BOA-PRC), 1 September 2008, Manila Hotel, Philippines.

Dr Fortunato Battad, Chairman, Board of Agriculture of the Professional Regulation Commission, members of the Board, agriculture professionals, ladies and gentlemen, good afternoon. I would like to thank Dr Battad and the Board for inviting me to speak before you today.

The Philippines is passing through rough times, besieged as it is by a flood of problems – the rice imports bill threatens to touch \$2 billion this year; inflation has touched double digits; and the petroleum price spike is fuelling fertilizer price, and that of other commodities.



According to the Food and Agriculture Organization (FAO), food prices will not return to their original low levels, more so because of the high cost of farm inputs which is a result of high petroleum prices; and also because food surplus nations are using up their own production with less for export and net food producers need more food. The days of cheap food and fuel are over. The road from basket case to First world status will require a long haul exercise calling for a strategy that focuses on enhancing the competitiveness of our human capital; developing a critical mass of scientists and R&D personnel; speeding up knowledge creation and dissemination to push productivity; and improving the mechanisms that promote technology-based entrepreneurship. We need good governance, competence and honesty to move towards that goal of a First world status.

I as a Filipino yearn to contribute towards the realization of the dream of our people to rise out of poverty. My contribution has been through the research collaborations that ICRISAT has had with PCARRD, BAR, CHED and universities. Though people also look to big business and government for answers, the government alone cannot solve all the problems when we ourselves don't show the will to meet it halfway.

I believe we have the power to collectively change this country. The problems are huge; so are the solutions. Let us not lose hope. Never let yesterday's disappointments overshadow tomorrow's dreams. Instead, let us ignite hope. The poor must be shown the way out of their misery. Our people are our only wealth.

There is a need for the country to move from political commitment to action. Policies need to be reformed to create an

enabling environment so that the agricultural productivity of food-insecure farmers increases, thereby improving nutrition. Reducing the vulnerability of the poor through productive safety nets and making markets work will yield results.

At the same time, the government must also promote the use of genetically superior crops, vegetables, trees and animals that will help increase the productivity of small farms. Farmers can improve their food security by diversifying into high-value crops and products. Livestock, farm trees, aquaculture and vegetables provide small-scale farmers with sources of income while also enhancing the stability and sustainability of the farming enterprise. The improvement and expansion of community-based watershed management can also help.

Providing the humanware that will make a science-based progressive Philippine economy a reality is a challenge that the higher education institutions must take up.

The emphasis should be on holistic, multisectoral and multistakeholder approaches that tackle these problems simultaneously, comprehensively and in an integrated manner. I would like to emphasize that the Board of Agriculture can play a leading role in setting high standards of professionalism in agriculture and its related fields. This is the challenge before your organization; now is the time to act.

The agriculture sector is seriously sick and it needs a real cure. Continuous investment in science and technology can in the long run put food on the table. So why not isolate the farm sector from the world fuel crisis since we depend on agriculture and instead use viable alternatives like ethanol from sweet sorghum? We need a well planned and well funded long term agricultural strategy. A crisis program to deal with global crises affecting us will help us extricate ourselves from the economic mess we are in.

You may ask, but where is the capacity to fulfill our aspirations to transform the Philippines? Providing the humanware that will make a science-based progressive Philippine economy a reality is a challenge that the higher education institutions must take up. There is no lack of talented Filipino scientists but they have mostly all gone overseas; hence providing such talent the right environment to bloom is imperative. It is sad to note the falling enrolment in the BSA program as well as the low passing rate in

the National Licensure Exam for Agriculture, caused mainly by lack of expertise among higher educational institutions. Better teachers, current teaching materials and upgrading equipment can attract more students.

Unless agricultural education is modernized to meet the changing social and economic needs of our time, no progress is possible. In this context, a CHED Memorandum Order released in April that sets new Policies and Standards for the Bachelor of Science in Agriculture Program in order to meet the challenges of development and to be more responsive to current and future needs, particularly on food security and sustainability, is welcome. The academe can do much to resolve the food crisis. All of you who will take oath today are professionals in your fields. You have all the talent and resources. Your main challenge is to inspire and serve as good examples that others can emulate. Your vision must touch the heart of every Filipino, in turn inspiring him to tread the same path. I am sure that with a little bit of determination and innovation and going that extra mile, you can become the country's highest achievers. I wish you all the best in your endeavors and I believe you will all succeed.

It is time we shed our lackadaisical attitude. Business as usual will only drag us deeper into the quagmire of rising food prices, fuel price spike and climate change, the three issues that will not go away. We need to tackle these on a war footing, now. ICRISAT is in the forefront of research on emerging global issues to ensure resilient communities, systems and crops in the semi-arid tropics of Asia and Sub-Saharan Africa. It is already in collaboration with agricultural bodies in the country and will continue to offer its services for the betterment of the livelihoods of the poor.

Also, the youth of today are the architects of a flourishing Philippines of the future. I urge the BOA and the higher education institutions to mould our talent to transform our country from a basket case to a giving nation. Ours has been a case of 'up-and-coming' but never quite 'there'. Higher sustained growth rates are needed. Our country must reduce endemic poverty levels and start to live up to its potential. Let us all be a part of this endeavor.

I urge all those taking oath today to pledge their loyalty to the cause of agriculture in the country. We only have the Philippines as our country and we should all be one in transforming it into a vibrant and prosperous one.

Thank you.

Fueling a Green Revolution in Nueva Ecija



Guest speaker, 112th Nueva Ecija Day and groundbreaking of the 40 kLPD sweet sorghum bioethanol distillery and 5 MWe cogen plant, 2 September 2008, Cabiao, Nueva Ecija, Philippines.

Her Excellency Gloria Macapagal-Arroyo, President of the Republic of the Philippines; Abundia Garcia, Municipal Mayor, Cabiao; dignitaries, distinguished guests and friends, good morning.

I would like to thank the authorities for inviting me on the occasion of Nueva Ecija Day that is being celebrated here today



and also on the groundbreaking ceremony of the 40 KLPD sweet sorghum bioethanol distillery and 5 MWe cogen plant.

Nueva Ecija was one of the first provinces where the revolution of 1896 broke out. Today, the province is home to another kind of revolution – that of a green alternative fuel and with a new battle-cry – *unang sigaw ng kaunlaran*.



High fuel price and climate change are forcing nations to explore cheaper and environmentally friendly fuel options. Today's groundbreaking of the sweet sorghum bioethanol distillery is a step in that direction. It is the Cabiaoños response to the government's call to ensure energy independence and sustainable development.

The seeds of Philippines' association with ICRISAT's sweet sorghum for ethanol initiative were sown when in early 2006, Indian President APJ Abdul Kalam symbolically presented Her Excellency with foundation seeds of sweet sorghum and peanut developed by ICRISAT.

Today, the province is home to another kind of revolution – that of a green alternative fuel and with a new battle cry – unang sigaw ng kaunlaran.

ICRISAT's ties with the Philippines that date back to 1975, now encompass ties with PCARRD, BAR, CHED and universities. The Philippines has been keen to bridge the energy gap using green fuel and there have been initiatives to identify varieties and hybrid parents with high sweet-stalk yield. Varieties have been shared through MMSU and seed samples have been supplied to MMSU, UPLB, DA research stations, and other universities including the private sector.

I recall that ICRISAT promoted its ethanol from sweet sorghum technology for the Philippines at the Technology Investment Forum organized at Quezon City in January 2007 that was well attended by prospective investors and officials of the Philippine NARS and business sector. This came two days after Her Excellency formally signed into law the Biofuels Act of 2006 or Republic Act 9637.

More recently in October 2007 at the Philippine-India Business Forum at New Delhi, her Excellency was very encouraging and she invited investors to the Philippines to use the technology package developed by ICRISAT and Rusni Distilleries. Thank you madam for encouraging ICRISAT and its multipurpose smart crop sweet sorghum.

In the past three years, ICRISAT has been adapting and testing sweet sorghum varieties in the Philippines with the Mariano Marcos State University in Batac, Ilocos Norte, and network

institutions. In fact, five varieties of sweet sorghum bred by ICRISAT are thriving in the Philippines. In Bicol, through a joint undertaking of DA-BAR, MMSU and the Bicol Integrated Agricultural Research Center, the regionwide commercialization of sweet sorghum includes development of village-level technologies and products such as pops from its kernels, macaroons and production of molasses and organic fertilizer.

I am sure that there will be more of such initiatives in the future and ICRISAT looks forward to being part of them.

Thank you.

Adding Value and Creating Alternatives by Working for and with Farmers



Inaugural speech, inauguration of the decentralized sweet sorghum crushing-cum-syrup making unit, 18 September 2008, Ibrahimbad, Medak district, Andhra Pradesh, India.

Good morning friends!

At the outset I welcome all the farmers, partners and my colleagues from ICRISAT on this important occasion which is critical for the effective implementation of the National Agricultural Innovation Project-funded sub-project on Sweet sorghum value chain development.



It is an inescapable reality that energy consumption and development go hand in hand. With rising fossil fuel costs, the biofuel market is expanding at an economically viable pace and is seen as a competitive substitute/additive to fossil fuels. This is evidenced by the fact that global ethanol production surged from 12.6 million tons in 1991 to 40.3 million tons by 2006! Hence there is a compelling rationale for further exploring bioethanol as a contributor to not just climate change mitigation, but also to environmental sustainability and new employment and income opportunities for poor rural farmers.

However, there are fears that biofuels could marginalize the poor, reduce the availability of grains and edible oils for human consumption, raise food prices and degrade the environment. ICRISAT's BioPower Strategy finds ways to empower the dryland poor to benefit from smart biofuel crops (such as sweet sorghum) rather than be marginalized by the bioenergy revolution.



What are smart crops? Those that ensure food security, contribute to energy security, provide environmental sustainability, tolerate the impacts of climate change (high temperatures and water stress) and increase livelihood options, meaning multipurpose crops. ICRISAT conducts research to develop smart crops like sweet sorghum.

ICRISAT is developing sweet sorghum varieties, hybrids, appropriate crop management practices and enhancing public-private-people partnerships, to fulfill both food and fuel needs in partnership with national programs in both Asia and Africa.

Studies by ICRISAT, the Indian NARS, and the ICRISAT-Agri-Business Incubator show that ethanol is economically viable both for the farmer and industry in India.

During the 2007 rainy season, the distillery helped about 800 farmers by providing them new market opportunities.

By planting sweet sorghum instead of grain sorghum, dryland farmers can earn an additional Rs 2000 to Rs 4000 per hectare per crop. Thus, sweet sorghum has immense potential to alleviate poverty. Our results also indicate that the food-fuel tradeoffs are very marginal unlike in other biofuel crops like maize.

ICRISAT incubated the sweet sorghum ethanol production technology with Rusni distilleries through ABI. During the 2007 rainy season, the distillery helped about 800 farmers by providing them new market opportunities.

In the light of the Government of India's decision permitting 5% blending of ethanol with gasoline and an increase up to 10% on the cards this year, and a further increase of up to 20% by 2017 (as per the latest Biofuel policy announced by the Government of India), the demand for ethanol is shooting up. This creates new market opportunities for farmers.

However, there are constraints being faced by farmers and industry that need to be addressed to make sweet sorghum ethanol technology more viable. Among these are the limited availability of feedstock, high transportation costs with handling of bulk stalk volumes, reduction in stalk weight and extractable juice yield with delay in crushing, non-availability of bagasse for use by



farmers, difficulty in harvesting and leaf stripping, the poor shelf life of juice, and low on-farm productivity. The innovative 'Sweet sorghum value chain development' project will address these issues.

The decentralized crushing-cum-syrup making unit was set up in record time, thanks to the efforts of NAIP National Director Dr Mruthyunjaya and Component 2 coordinator Dr JP Mittal, and support from our partners and all of you.

The project is based on the principle of "working with you, for you, at your place". Hence you are the beneficiary in this. This unit will help you in crushing the stalks in your village, so that you can quickly derive returns. The unit is yours. The farmers' association will operate and maintain it. Of course, our staff will always be there to assist you throughout crop production, harvest scheduling and eventually crushing and syrup making. We have taken up crop planting on 120 acres this year but will increase the area in subsequent years. The syrup produced here will be sent to Rusni Distilleries for ethanol production.

This first of its kind unit in the world will be the cynosure of all eyes and your experiences will revolutionize sweet sorghum ethanol technology all over the world. I request you all to nurture it like your own so that prosperity comes your way.

Thank you and have a good day!

Emerging Concepts in Global Agriculture



*Speaker, Agriculture Leadership Summit
2008, 19 September, Taj Palace, New
Delhi, India.*

Distinguished guests, good afternoon.

The last six months have seen the world witness an economic turmoil of frightening proportions. It has clearly exposed our vulnerability to escalating food and fuel prices, with devastating impacts on the poor. Climate change with its freaky weather has further strained the capacity of agricultural land, leading to depressed agricultural productivity. With the increased risk of droughts and floods due to rising temperatures, crop-yield losses are imminent. This makes us wonder, will the poorest and



hungriest today still be poor and hungry in 2015, the target year of the Millennium Development Goals!

This vicious circle has thrown up a humungous challenge to the agricultural sector, bringing it to the forefront. Hunger stunts the lives of people and the prosperity of nations. German playwright Bertolt Brecht's *The Threepenny Opera* reminds us that morality and food run together: "First we eat and then comes morality". Can these feelings be translated into ensuring that the hungry world is transformed into a well-fed one?

In the light of these problems, the most vulnerable are the staggering 2.1 billion people who live on less than \$2 a day, of which three-fourths live in rural areas and depend directly or indirectly on agriculture for their livelihoods. About 880 million live on less than \$1 a day. They are food insecure due to issues of affordability, availability, access and use. Higher food and energy prices threaten to force them to make tradeoffs in their spending, drastically reducing the possibility of their improved well being. So future global food security cannot be taken for granted. How do we prevent and mitigate a worsening of the situation?

The FAO's 2006 State of Food Insecurity Report cites agricultural growth as being critical for reducing hunger. Agriculture matters because the continuation of poverty is in no one's interest. Agriculture matters because it is the driving force of economies.

Allow me then to extract from the experience of ICRISAT and present some emerging concepts in global agriculture. First, let

me focus on three strategic areas. One is food for people, two is environment for people, and three is innovation for people.

Food for people means creating and accelerating sustainable productivity and healthy food, which translates into improved productivity, reducing vulnerability to abiotic and biotic stresses, improved nutritional value, and transformation of livestock productivity through improved feeds.

Environment for the people means conserving, enhancing and sustainably using natural resources and biodiversity for better livelihoods, which includes climate change, and involves climate change mitigation and adaptation, increasing the resilience of the agro-ecosystem, and high water-use efficiency.

And innovation for people means new institutional relationships and enabling policies for pro-poor agricultural growth and gender equality. These are the emerging strategic objectives of the CGIAR.

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Other emerging concepts that I wish to dwell on briefly today are public spending for R&D in agriculture, new knowledge, adopting innovative strategies, conserving water, feedstocks and food security, benefit-sharing, private investment, adaptive R&D, public-private-people partnerships, and the Agri-Science Park.

For every \$1 invested in international agricultural research, \$9 worth of additional food is produced in developing countries where it is needed most. Less than 10% of public spending in developing countries goes to agriculture even though this sector commonly accounts for about half of their Gross Domestic Product. And less than 1% of public spending goes to agricultural research, which is vital to the innovation that opens up new livelihood opportunities.

As rural communities across the developing world feel the pressure of a coalition of new forces – rising food prices, global climate change, the energy crisis and a new interest in biofuels, apart from ongoing forces such as population growth, globalization and urbanization – new knowledge, technologies and policy insights have never been more critical to build a more



resilient system and to alleviate the food and agriculture crisis that is threatening the livelihoods of the poor.

As a top global research institute for dryland agriculture, the International Crops Research Institute for the Semi-Arid Tropics is working at different levels and adopting innovative strategies in pursuing its vision of improving the well being of the poor of the semi-arid tropics in Asia and Sub-Saharan Africa. Its mission is to reduce poverty, enhance food and nutritional security and protect the environment of the semi-arid tropics.

Our Integrated Genetic and Natural Resource Management approach to climate proofing focusses on better drought and heat-tolerant varieties grown in farming and land-use systems that conserve water both in the crop's root zone and in the wells and reservoirs of villages.

On biofuels, coming to the choice of feedstocks, we need to determine land-use patterns, potential food-fuel-feed tradeoffs, and conduct science-based feasibility studies for alternative feedstocks. We need to favor existing crops beneficial to the poor and generate higher growth benefits, and more importantly, favor feedstocks such as sweet sorghum that reduce conflicts among different social objectives and establish important safeguards for food security.

Policies are needed to favor local processing rather than export feedstocks. Benefit-sharing schemes between farmers

and processors must be encouraged, and barriers to private investment removed.

More importantly, science and technology support are crucial for innovation and commercialization. Biofuels can be made competitive by encouraging mandatory blending to promote private investment and by providing targeted incentives for farmers and processors.

Research at ICRISAT has been instrumental in opening doors by integrating discoveries in soil, water, climate, ecology, biodiversity, remote sensing, spatial information systems, other scientific data with policy, new markets and institutional research into smallholder farming systems through an adaptive research and extension process.

Public-private-people partnerships in agricultural R&D too are increasingly viewed as an effective means of conducting advanced research, commercializing new technologies, and deploying new products. Multi-level strategic partnerships in mobilizing science and technology for the poor lie at the heart of ICRISAT's research.

This ICRISAT achieves through its Agri-Science Park (ASP) started in 2003 as part of the Genome Valley Initiative of the Government of Andhra Pradesh. ASP is the 'hub' for public-private partnerships that enhance the development and commercialization of science-generated technologies and knowledge through market mechanisms that will ultimately benefit the poor. Among its components is the Agri Business Incubator (ABI) which is incubating 36 enterprises, the Ag-biotech Innovation Center (AIC) with 14 biotech companies as partners, and the Hybrid Parents Research Consortia (HPRC) with 48 private sector seed companies. Further, we have a Bioproducts Research Consortium (BRC) with 10 private companies as members, the Sweet Sorghum for Ethanol Research Consortium (SSERC) with 4 partners, the NutriPlus Knowledge Center and SAT Eco-Venture.

The current food and agriculture crisis is a complex one. And it calls for a comprehensive and multifaceted response. A new global governance system for agriculture, food and nutrition is needed to effectively and efficiently implement these initiatives. We need the support of developed countries and donors to help us in our task of improving the lives of the poor. Developing countries need to accord high priority to agriculture and rural development, including investments in science and technology.



One of the songs in *The Threepenny Opera* is entitled "Certain things make our life impossible." The second Green Revolution must now be put in place and have everyone's support to make certain many things possible.

Thank you.

Innovative Knowledge Sharing for Greater Food Security



*Inaugural remarks, Think tank meeting
on Knowledge Info-Mediaries,
22 September 2008, ICRISAT-
Patancheru, Andhra Pradesh, India.*

Dr Alluri, Dr Alam, colleagues from our NARS partners in India,
good morning.

I am happy to welcome you to ICRISAT, and to this meeting organized by the Commonwealth of Learning (COL) and ICRISAT. I would like to start by thanking you and your organizations for accepting our invitation. I learn that we have with us today senior experts like Dr Alam, and that six universities and two national research centers from India are represented in this event. I am glad we in ICRISAT are able to offer you a platform on thinking



about innovation. This bridge-building role is our strength. We thank COL for their support.

There is a need for new generation practices in knowledge sharing for food and livelihood security. This is all the more urgent in today's context of massive fluxes in food prices; also because weather extremes affect resource-poor farmers and extreme events have increased in frequency.

Almost six years ago, I had endorsed a novel program for knowledge sharing called the Virtual University for Climate



Management. It was designed to bring together the benefits of modern ODL, ICT4D and agricultural research. It was eventually transformed into the Virtual Academy for the SAT.

It is an institutional project of ICRISAT now and recognized in our long-term vision and strategy. We are committed thus to pursuing innovations in this sector, and our goal is to reach millions of farmers with you and through you.

Our work during the last six years has revealed the need for new techniques for large-scale capacity building. We have successfully conducted trials in bringing e-learning, ODL and ICT4D projects together. The ICAR in India has recognized our strengths and contributions. We now lead the Consortium for Agricultural Knowledge Management in India, with the support of NAIP.

Our work during the last six years has revealed the need for new techniques for large-scale capacity building.

We have always emphasized the human interface in knowledge flows, and accept that we need to turn our gains in the pilot into new, large projects. We play the role of co-convenor in the AGROCURI project which has over 20 partners from all over the world. It is built on the VASAT effort we have sustained for over five years and combines advanced practices of content management with ODL approaches.

I thus look forward to learning about your recommendations on the way forward. We should have a novel, holistic paradigm for extension and education for food security. We as a research institution are committed to working with you in evolving such a paradigm.

While concluding, I would like to recognize the contributions that Krishna Alluri has made to this endeavor. He has reposed trust and confidence in us since the early stages of our effort. He has been a consistent supporter, and his advice and networks have been highly valuable to us. His graduate research in the Philippines and almost three decades of work in the CGIAR have been helpful in fostering networks of people in Asia and Africa.

I am aware that he will retire from his official position in a few months. Yet, I am confident that he will continue to share his experiences and guide and support us in our continuing effort.

I wish you good deliberations. Have a good day.

Soil is Precious, Water is Life



*Inaugural speech, National workshop on
Impact assessment of watershed projects,
29 September 2008, National Institute of
Rural Development (NIRD), Rajendranagar,
Hyderabad, Andhra Pradesh.*

A fifth of the world's people live in areas of physical water scarcity. About 1.6 billion people live in water-scarce basins, where human capacity or financial resources are not enough to develop adequate water resources.

These are the unfortunate victims of the symptoms of physical water scarcity, such as severe environmental degradation, declining groundwater tables, and water allocation disputes.



The symptoms of economic water scarcity manifest themselves in inadequate infrastructure development, high vulnerability to seasonal water fluctuations like floods and drought, and inequitable distribution of water.

These coupled with a lack of commitment to water and poverty, inadequate investments, insufficient human capacity, ineffective institutions, and poor governance make managing water resources one of the most pressing challenges of our times. Water management is fundamental to how we feed 2 billion more people in coming decades, eliminate poverty, and reverse ecosystem degradation.

Current global food stocks are at their lowest and food prices have skyrocketed beyond the reach of the poor. Food and feed crop demand will nearly double in the coming 50 years. Population growth, rising incomes, continuing urbanization and changing food habits together will drive how much more food we will need. And climate change presents another big challenge.

By 2030, 8.3 billion will walk the earth and 30% more grain will have to be produced. Water, the blood of the biosphere, is the only answer to these issues. Only if we act to improve efficiency of water use in agriculture will we be able to meet the serious future challenges facing humankind.

Intrinsically linked to water scarcity and water use in agriculture are the growing shortage of quality topsoil and rapid land degradation. According to the UN, on a global basis, the rate of topsoil loss is 10-100 times faster than that of its replacement. We lose topsoil to development, deforestation, erosion and desertification.

The future of mankind depends on soil but we are destroying it faster than ever before. Today, more than 6 billion people are living on food that is coming from 11% of the global land surface.

As former US President Theodore Roosevelt once said, "The history of a nation lies in the way in which it cares for its soil. The nation that destroys its soil destroys itself". By implication I say, those who care less for their soils care less about the existence of human kind. Let us not forget that soil erosion and land degradation can transform productive soils into wastelands with tragic speed. As the nation's soil goes, so goes the nation. Hence fertile land with access to water is a strategic asset we can't afford to lose.

As the nation's soil goes, so goes the nation. Hence fertile land with access to water is a strategic asset we can't afford to lose.

Climate change studies indicate that agriculture accounts for 1/8th of greenhouse gases emitted leading to global warming. In addition, other global challenges such as energy crisis, food safety, health and nutrition, and destruction of forests have reared their ugly heads, making the practice of clean and sustainable agriculture inevitable.

The International Crops Research Institute for the Semi-Arid Tropics believes that water scarcity can be managed with a combination of soil and water management, and institutional innovations. It has been working on watershed management since 1976 and has developed a range of technologies to manage rainwater more efficiently in order to sustainably improve crop productivity.

In 1999, with ADB support, ICRISAT and its partners developed an innovative, holistic, farmer-participatory consortium model for integrated watershed management. Watersheds have since been used as an entry point for increasing productivity, enhancing livelihoods, protecting the environment, empowering the poor and building social capital, using an Integrated Genetic and Natural Resource Management approach.

ICRISAT's model Adarsha watershed at Kothapally employed a multi-disciplinary and multi-institutional approach that began with the management of soil and water. It encompassed individual

and community-based interventions, a consortium for technical backstopping, continuous monitoring and evaluation, community and stakeholder empowerment, the use of new science tools and on-station and off-station linkages. Access to productive resources, empowerment of women, building on local knowledge and traditions, and the involvement of local farmers contributed to the success of Adarsha watershed.

The convergence approach took place at several levels. The activities included setting up of village seed banks through self-help groups, making available to farmers quality seeds, processing for value addition, poultry rearing, vermi-composting, etc, all of which generated income. The holistic, collective and knowledge-driven approach to community watershed management has succeeded in improving the lives of 450,000 people in five countries in South and Southeast Asia in 375 villages. It has improved water level by 6 meters, reduced soil loss by 66% leading to a two to fourfold increase in productivity, enhanced employment generation, and increased incomes twofold.

At this point, let me emphasize that the solution lies in tackling the problem of water and land degradation at the local level as well as at regional and global levels. While measures need to be implemented at the local level for its impacts to be felt locally, at the regional and global levels a system of water governance is crucial. A comprehensive assessment of watershed programs by the ICRISAT-led consortium has revealed that only 1% of watershed programs are not economically beneficial and that 35% of them are performing above average. Big changes are needed in the policy agenda for water management. Adopting a holistic approach, new investments in reforestation and irrigation, and agricultural water management can spur economic growth within agriculture and other sectors. Rainfed agriculture needs to be upgraded. Agricultural research and development will have to show the way. Reforms will require negotiation and coalition building in which civil society and the private sector are important partners of the public sector. Equally important is continuous capacity building of all stakeholders, and transparent sharing of information through ICT.

Samuel Coleridge's quote, "water, water everywhere but not a drop to drink" is more relevant to the 21st century, than when it was proclaimed by the poet almost two centuries ago. So the time to act is NOW!

Thank you.

Forging Partnerships for Greater Pearl Millet Adaptation in New Areas



*Inaugural address, Pearl millet scientists
field day, 30 October 2008, ICRISAT-
Patancheru, Andhra Pradesh, India.*

Ladies and gentlemen, good morning!

Welcome to the Pearl Millet Scientists Field Day. Many of you from the national program have been our long time research partners. And this partnership has grown increasingly stronger, especially under the leadership of Dr IS Khairwal, Coordinator of the All India Pearl Millet Improvement Project (AIPMIP).

Agriculture is facing new challenges. As the effects of food price hikes hit more and more poor people and the number of those



suffering hunger swell, the contribution of food security to economic and political stability has gained importance as never before. Climate change is going to strike crop geography around the world, calling for urgent efforts to introduce and improve hardy crops which are tolerant to drought, high temperatures, and soil salinity.

Pearl millet is unique in that it is adapted to all these stress factors as well as to both acid and saline soils. Countries need to be vigilant to such challenges and opportunities to ensure food, feed and fodder security. ICRISAT strongly believes that broad-based partnerships will open up new opportunities and increase our effectiveness and efficiency in addressing these problems.

In 2004, we pioneered the formation of a new kind of partnership with the private sector in a consortium framework to strengthen our hybrid research program in pearl millet, which now has 40 members. We have similar private sector consortia for sorghum and pigeonpea, bringing the collective strength of the consortium to 48 seed companies and 80 members.

Adriana seed company from Brazil is the latest addition to the pearl millet and pigeonpea consortia. Brazil today cultivates pearl millet on 4 million ha, marking a rapid growth from about 2 million ha just 4-5 years ago. I believe ICRISAT's International Public Goods will be instrumental in making rapid strides in pearl millet research and development in Brazil, thus taking this crop beyond its traditional boundaries.

Our experiments in the Middle East and Central Asia through joint research with the International Center for Biosaline Agriculture (ICBA) and the International Center for Agricultural Research in the Dry Areas (ICARDA) has led to the identification of a few parental lines and populations with excellent adaptation to

saline lands, producing high grain and fodder yield. I appreciate Dr Abdullah Dakheel's continued efforts in strengthening this partnership.

While genetic improvement of pearl millet grain yield is ICRISAT's high priority area as is the case in your own research programs, we are also involved in low-key anticipatory research for forage production as per the feedback received from you in the past.

This has led to the development of some very productive populations which can be used to develop parental lines of forage hybrids. As forage requirement increases in India and elsewhere, use of pearl millet is likely to gain increasing importance.

Climate change is going to strike crop geography around the world, calling for urgent efforts to introduce and improve hardy crops tolerant to drought, high temperatures, and soil salinity.

We recently initiated genetic improvement of grain iron and zinc content in pearl millet and sorghum.

Some of the breeding lines and populations (including commercial varieties) showed twice the iron and zinc content found in improved genotypes of wheat and maize! Such results will contribute significantly to reducing micronutrient deficiencies in populations heavily dependent on pearl millet-based food.

Pearl millet cultivation as an irrigated summer season crop has been on the rise in parts of India, where air temperatures during flowering can exceed 42°C leading to most hybrids becoming sterile. However, few have been found to set good seed and give grain yields as high as 4-5 t/ha in 85 days of the crop. We have now initiated research to build heat tolerance in our materials.

Pearl millet is the most drought-tolerant cereal. We have achieved initial success using molecular marker technology, to further improve this trait and incorporate it in parental lines of some of the hybrids. A very popular and early-maturing hybrid (HHB 67) in India that was on the verge of collapse due to its susceptibility to downy mildew was rescued by developing its resistant version called HHB 67-Improved using marker technology, in partnership with AICPMIP and Haryana Agricultural University. I look forward



to similar successes of partnership-based research in the years to come.

Assessing the impact of our research products and the information we generate is an integral part of our research activities. We seek your support on this. I would urge that you be kind and prompt in providing the non-confidential information required for this, so that it would help us sharpen our research focus and enable us to develop products and generate scientific information more relevant to your programs.

I wish you all a comfortable stay and productive interactions while selecting materials and exchanging information.

Thank you.

Science in Service to the UNCCD Global Commitment to Combat Desertification and Land Degradation



*Introductory Statement, Joint opening of
the First Special Session of the Committee
on Science and Technology (CST S-1) and
the Seventh Session of the Committee for
the Review of the Implementation of the
Convention (CRIC) of the United Nations
Convention to Combat Desertification
(UNCCD), 3 November 2008, Istanbul, Turkey.*

The President of the Conference of Parties, UNCCD Executive Secretary, Mr Luc Gnacadja; the Chair of CRIC, Mr Israel Torres; delegations from the Parties; representatives of national,



international, non-governmental and other agencies; partners, friends, ladies and gentlemen, good morning!

We stand at a crossroads in the history of the UNCCD. The Parties have decided that business as usual has to change, so all of its bodies are embarking on fundamental reform. The new 10-Year Strategic

Plan and Framework to Enhance the Implementation of the Convention is our roadmap for change. The world is watching us, and will judge us by the decisions and actions that we take here in Istanbul.

The Committee on Science and Technology has a key role to play in that reform. The Conference of Parties places high expectations on the CST to improve its effectiveness in providing the COP and its bodies with scientific and technical knowledge that is valuable and actionable for improving the implementation of the Convention.

Operational Objective 3 commits the Convention with CST “to become a global authority on scientific and technical knowledge pertaining to desertification/land degradation and mitigation of the effects of drought.” Strategic Objectives 1, 2 and 3 likewise require strong input from science, and COP requested that CST should provide advice to the CRIC on how best to measure progress towards these Objectives. To achieve this strengthening, COP 8 stated that our CST meetings must “produce sound scientific outputs and policy-oriented recommendations”.

In order to achieve such outputs, COP 8 guided CST to reform our meeting style. They instructed us that each future ordinary session of the CST should be organized in a predominantly



scientific and technical conference-style format, focused on a thematic topic determined in advance by the COP. The topic given for CST for COP-9 is "Bio-physical and socio-economic monitoring and assessment of desertification and land degradation, to support decision-making in land and water management".

Already, much initial progress has been achieved on the CST reform objectives. The CST Bureau has held three meetings since COP-8. As guided by COP and assisted by the UNCCD Secretariat, we cast a wide net in search for assistance in organizing the first Scientific Conference. We have identified and commissioned an expert consortium of five leading institutions. The consortium is called Dryland Science for Development, or DSD.

The critical challenge before us today is to improve the interface between science and policy so that the right steps and innovations are taken that will bring us back from the edge of the abyss.

CST is looking forward to close and intensive partnership with DSD over the course of the next 12 months as we plan the Conference, which will take place in association with COP-9.

The DSD institutions are all represented here in Istanbul, and we will discuss the Conference plans further with them. Please stop by the European DesertNet booth to learn more about DSD and the scientific conference. But at COP-9, we should be able to make a decision to institutionalize the scientific advice from experts looking at the IPCC as a model.

Friends and colleagues, science has a critical role to play in the sustainability of the world we live in, and the quality of life that we enjoy. Life on earth is only possible because of the biochemical interactions that occur on the incredibly thin interface between atmosphere and land and water. The world is only now waking up to a realization of how it is seriously imperiling its own existence through its actions that degrade land, water and the climate.

Had science not identified these threats, humankind would likely have continued and intensified actions that would have ultimately led to its own destruction. In fact, we are still on that very course. The critical challenge before us today is to improve the interface between science and policy so that the right steps and innovations are taken that will bring us back from the edge of the abyss. In



addition, we need all Parties and the donor community to increase significantly R&D investments in support of the convention.

The UNCCD focuses on the degradation of land, which is the basis of our food chain and our climate, and of the livelihoods of our poorest peoples. Without healthy lands, people cannot thrive. Without a healthy atmosphere, our land and biological systems cannot be sustained. Our relationships to our sister Environmental Conventions need to be strengthened because science tells us that the dynamics of land, climate and biodiversity are intimately connected. And we know that the lives of the poor hang in the balance, because they depend directly on these ecosystem services.

We should have as a high priority in spite of the economic crisis combating desertification and land degradation. A rescue plan must be put in place for this purpose if we have to ensure global food security.

The CST appreciates the support shown by the COP and CRIC as together we face the daunting challenge of fundamental reform. We look forward to close interaction with CRIC for mutual benefit and increased effectiveness of science in support of a sustainable planet. We must continually remind ourselves of how important our task is. We live on a precious planet that hosts abundant, diverse and intelligent life that is unique in the universe. If we fail, the consequences are disastrous. We must use science and innovation to become better stewards of our precious inheritance.

Our planet is not ours to destroy. We hold it in trust for future generations. Will we live up to that trust? Your Committee on Science and Technology recognizes the critical role that you have entrusted to us. We will do our best to meet your expectations and to better serve the compelling needs of our human civilization and our time.

Thank you.

Tailoring Proposals to Maximize Success



Inaugural speech, Proposal writing workshop, 17 November 2008, ICRISAT-Patancheru, Andhra Pradesh, India.

Marian Fuchs-Carsch, Barry Shapiro, other resource persons, and budding scientists of ICRISAT, good morning!

It gives me great pleasure to be here for the proposal writing workshop being organized by PDMO. I take this opportunity to thank Marian Fuchs-Carsch for agreeing to conduct this learning session on proposal writing, an increasingly important aspect of fundraising which we often take for granted.



The recent CCER had advised us to develop a proactive strategy for working with staff in need of assistance with the larger purpose of making them more effective fundraisers. This is an institute policy to encourage all scientists to package proposals and generate funding for their activities.

This workshop is part of PDMO's mentoring program which is meant to develop and realise opportunities that increase core and special project funding.

The global credit crunch will make funds hard to come by this time. There is increasing competition for funds and donors want to make every cent count. At the same time, there is call for greater accountability, stringent bookkeeping, and evaluation practices are strict. But I always believe that good ideas and good proposals will always get funding.

Writing a proposal that captures and holds the attention of a donor is critical to its culminating in securing funds. Being a document that will be read and judged by astute reviewers who are experts in your specialty, it is essential that you make their reading easier by organizing ideas clearly, avoiding inflated rhetoric, impossible promises and unsupported arguments.

What makes a proposal coherent and fundable? A combination of factors I would say, which Marian will be elucidating on during the workshop.

Traditional core funding has been maintained with great effort, but needs to increase, despite countervailing donor trends. Today our level of core funding is only 35%.

ICRISAT must adapt to the changing external environment rather than the other way around. Innovative approaches are needed to mobilize resources from non-traditional sources for emerging new priorities such as climate change, biofuels, etc. ICRISAT has in place an Integrated Resource Mobilization and Communication Plan for this purpose.

I'm proud to say that the success rate of ICRISAT's proposals has been quite good at the level of 60% and up for the last eight years. This year about 65% of the 135 proposals submitted have been accepted for funding.

I'm proud to say that the success rate of ICRISAT's proposals has been quite good at the level of 60% and up for the last eight years.

This has been achieved by focusing on donor intelligence, assiduously building donor relationships and stewardship, and good proposal development and project reporting, as well as by carrying out social marketing targeted at donors. With a bit of help in learning how to package your proposal, you should be able to sustain if not raise this figure.

A noteworthy trend being witnessed is that of large foundations such as the Bill and Melinda Gates Foundation funding agricultural research for development. We need to capture these opportunities to improve the well-being of the poor in the semi-arid tropics of Asia and Sub-Saharan Africa.

We should also consider new developments at the global level to include the reform process of the CGIAR system. There are three emerging overarching goals of the CGIAR to include: food for people, environment for people, and policies for people.

I am sure that this workshop will equip you with skills to hone your proposal writing, thereby enabling a gradual and steady increase in our proposal success rates. Yes, we can achieve higher success rate if we put our minds and hearts together in this endeavor. I wish you all fruitful deliberations.

Thank you.



The Farmer Must Come First



Address, Guest of honor, Farmers' meet and felicitation of Dr William D Dar, ICRISAT & CFC project team by the Ministry of Rural Development & Farmers Association (Udityal), 24 November 2008, Udityal, Mahbubnagar district, Andhra Pradesh, India.

Dr Chinna Reddy, Honorable Minister for Rural Development, Government of Andhra Pradesh; Dr Manda Jagannadham, Member of Parliament; Dr P Shankar Rao, Member of Legislative Assembly; Dr Mallu Ravi, Member of Legislative Assembly; Dr DVG Krishna Mohan, Vice Chancellor, Sri Venkateswara Veterinary University, Tirupati; Dr SD Shikhamani, Vice Chancellor, Andhra



Pradesh Horticulture University; representatives from the district administration, members from the banking, private sector seed and poultry feed companies, distinguished farmers, partners, members of the press and colleagues from ICRISAT, good afternoon!

I am indeed happy to see all of you here today. The key players from the partner organizations who worked in the project in Andhra Pradesh, such as the Farmers' federation, Venkateswara Veterinary University, Janaki feeds, JK Seeds, and ANGRAU-EEI are here too. They have worked hand in hand during the last 3-4 years to bring the CFC-ICRISAT-FAO project on enhancing alternative uses of sorghum and pearl millet to a successful conclusion.

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.

Sorghum and pearl millet are two important crops of ICRISAT. Apart from their food uses, they have great potential as ingredients in poultry feed and other industrial uses. They can also be produced at lower cost. Of late, the cultivated area under these crops, particularly that of sorghum, has been falling as has their use as food.

To help sorghum and pearl millet farmers increase their income and enhance the productivity and marketability of the crops, ICRISAT and partners developed and implemented a project engaging farmers from 25 villages in Udityal and Palvai clusters in

Mahbubnagar district in Andhra Pradesh, and linking them with the poultry feed industry.

The emphasis of the CFC-FAO-ICRISAT project was on enhancing production of these two crops using superior cultivars and advanced technological options. This has led to farmers doubling their production and ensuring greater quality of produce.

The project believed that farmers would benefit from information on recommended package of practices, supply of seeds of improved cultivars, improved input supply, information on grain harvesting, processing, storage, bulking and market linkages between the grower/farmer and poultry feed manufacturer.

This farmer-centered, farmer-owned and farmer-managed participatory approach has paid rich dividends.

Farmers have been trained in bulking, grading and bulk marketing of grains. The bulk marketing of sorghum and pearl millet has helped farmers as well as industry.

The last 3-4 years saw ICRISAT and its partners assiduously helping farmers overcome difficulties associated with rainy season sorghum, such as rains at grain maturity and harvest leading to grain mold and storage difficulties.

Farmers were advised to harvest the crop at physiological maturity and dry the harvested earheads using earhead driers to overcome the deleterious effect of grain mold. The storage structures built under the project facilitated the safe and scientific storage of grains. Farmers are no longer resorting to distress sale of produce; they can now defer sales to get a handsome price for their produce. It has also led to farmers honing their bargaining skills.

Another important achievement of this project has been the formation of Farmers' associations in these two clusters. The efforts in modifying the conventional supply chain to avoid middlemen and to link producers directly with end users have proved successful. Farmers have been trained in bulking, grading and bulk marketing of grains. The bulk marketing of sorghum and pearl millet has helped farmers as well as industry. Let me emphasize here that ICRISAT has always believed that partnerships are the way out in these times when synergies can be exploited for the greater good of the farming community. Apart



from partners from research, private, NGO and banking sectors, farmers have been linked with formal credit institutions such as the State Bank of India. This has released them from the grip of private moneylenders.

Farmers have been the major stakeholders in this project and they have benefited immensely from this venture. I request the Honorable Minister to explore the possibility of supporting these two associations so that they can grow and evolve as model associations in the semi-arid tropics of Andhra Pradesh. I would like to again thank the Common Fund for Commodities and the FAO for their generous support and guidance, without which this project would not have been possible. I also take this opportunity to thank the Honorable Minister and his team and the office bearers and members of farmers associations in Udityal and Palvai for the honor bestowed on me and my team.

Thank you!



Riding the Wave of Success



*Address, Loyalty Day,
15 December 2008, ICRISAT-Patancheru,
Andhra Pradesh, India.*

Colleagues, Loyalty Day awardees, good morning and welcome!

We are gathered here today to honor the 100 loyalty awardees for serving ICRISAT selflessly in the cause of the poor of the semi-arid tropics. You are among those who are helping build a new foundation for a hunger-free and prosperous world and who have conscientiously given your energy and skills to ICRISAT.



I want each of you to have the sense that you can find a place in the organization to realize your own values as well as creating value for ICRISAT.

With attrition rates zooming, one would think loyalty is as quaint as the typewriter, for we find that lifelong loyalties that once developed around teams now develop around favored superstars who jump from team to team! But I believe that loyalty is imperative for that feeling of satisfaction with your work.

The winds of change are blowing and ICRISAT is riding the wave of success with its impressive array of scientific innovations. This has been possible thanks to your commitment and hard work.

Let us not be lulled by the momentary calm of the sea or the somewhat clearer skies above. The turbulence lies below and the storms are not all that far away.

Nine years ago, ICRISAT was in an unenviable situation, financially in the doldrums. But we made a pledge to bring change in the way we do business; we strove to think out of the box. Your active involvement in this process has been instrumental in our successes.

ICRISAT has a culture that values loyalty to the employer, wherein a kind of a reciprocal family relationship develops between the employer and the employee, in which the employer is concerned with developing the full potential of the employee and the employee is concerned about optimizing the welfare of the organization.

But we cannot be satisfied to rest here. This is the side of the hill, not the top. Now the time has come to make the most of our gains – to translate the renewal of our strength into the achievement of our purpose.

I close on a note of hope. Let us not be lulled by the momentary calm of the sea or the somewhat clearer skies above. The turbulence lies below and the storms are not all that far away. Poverty, hunger, climate change, skyrocketing prices are all made worse by the fuel and financial crises surreptitiously engulfing the globe.

Today we are surging ahead to meet these challenges and to fulfill the role of providers of scientific solutions. In the process,



we must constantly reexamine and revise our arsenal of scientific tools.

I have pledged myself to a continuous encouragement of initiative, responsibility and energy in serving the interest of the poor farmer of the semi-arid tropics. And I seek your continued support on this.

Let us together do this work!

Thank you.

Surging Ahead with Innovations and Impacts for the Poor



*Annual Day speech, 16 December 2008,
ICRISAT-Patancheru, Andhra Pradesh,
India.*

Mr Cornelis M Keur, Consul General, American Consulate General, Hyderabad; distinguished guests, and Team ICRISAT, good afternoon!

As we celebrate ICRISAT's 36th year with pride, we are witnessing unprecedented global challenges affecting international agricultural research. Soaring food and fuel prices from 2007 through mid-2008 seriously threatened the world's food, energy and political security and economic stability.



Due to this, the World Bank estimates that 100 million people have been pushed back into poverty, reducing our success during the last seven years. With this, almost a billion people around the world are suffering from hunger today, and 9,000 children under five years die everyday due to malnutrition.

Likewise, climate change and desertification pose serious challenges to agricultural productivity, especially to the poor of the dry tropics.

Drastic changes are also emerging in the global horizon. By 2025, experts predict that Asia, particularly China and India, will emerge on top of a multi-polar international system. Among others, it also foresees that:

- The international system will be revolutionized by the current financial crisis marking the beginning of a global economic rebalancing.
- The international system will be almost unrecognizable by 2025, owing to the rise of emerging powers, a globalized economy and the historic transfer of wealth from West to East.
- Unprecedented economic and population growth will put more pressure on scarce energy, food, and water resources. Due to this, the world will experience conflict over such resources.
- Strategic rivalries will likely revolve around trade, investments and technological innovations.

Nevertheless, due to the food crisis, agriculture is receiving the attention it deserves after two decades of neglect.

The recent external evaluation panel of the CGIAR emphasizes the urgent need for us to provide a long term approach towards global food security. It also urges clear goals for sustainable food production in sub-Saharan Africa and the promotion of investments in agricultural research directed to small farmers and the poor.

The findings of the foregoing external evaluation paved the way for the change management process now going on in the CGIAR.

In this context, we must capture opportunities to showcase our work and its impacts to the poor of the dry tropics.

By doing this, we assert ICRISAT's scientific excellence and relevance. We also position its role as the apex global organization for research in semi-arid agriculture.

Towards this, we have put in place Operational Research Strategies on the global development challenges of water scarcity, climate change, desertification, food and nutrition, high-value crops, and biofuels.

This year, ICRISAT released *Pushkal* for commercialization. *Pushkal* is the world's first CMS-based pigeonpea hybrid. We also inaugurated the world's first decentralized crushing-cum-syrup making unit in Ibrahimbad supported by NAIP.

We have initiated operations of the NutriPlus Knowledge Center in the Agri-Science Park at ICRISAT by signing agreements with two partners. Together with the Department of Biotechnology of India, we will establish a Platform for Translational Research on Transgenic Crops. PTTC will facilitate a coordinated approach in translating genetic engineering technologies for crop varieties towards product development and commercialization.

To address the availability of quality seeds to poor farmers, we scaled up activities in sub-Saharan Africa through the West Africa Seed Alliance (WASA) and Southern Africa Seed Alliance (ESASA).

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We are also waging a global media campaign to promote our flagship products and innovations.

At the System level, the CGIAR change management process is now in full gear after the CGIAR Annual General Meeting at Maputo. Guided by three strategic objectives, “food for people, environment for people and policies for people”, a new CGIAR architecture was approved. At the core of this set up is a Consortium of Centers supported by a Fund. This set up was conceived to delineate the doers from the funders of international agricultural research.

The new revitalized CGIAR is expected to be up by 2010 with the organization of a Consortium Board. Amidst the CGIAR change management process, we are currently in the midst of our External Program and Management Review (EPMR). This exercise will culminate in a report by the panel in late January next year.

As Chair of the Committee on Science and Technology of the UNCCD, we have set in motion a process to improve the committee’s effectiveness in providing cutting edge scientific knowledge and policy advice to implement the UN Convention to Combat Desertification.

Indeed, this year yielded more feathers in ICRISAT’s cap. Just like in 2006, we were again rated Outstanding by the CGIAR in 2007.

ICRISAT's Agri-Business Incubator also bagged Asia's Best Incubator Award given by the Asian Association of Business Incubators.

Our financial health continues to grow robust with an estimated expenditure of US\$42 million this year. Aiming even higher, we are targeting an annual expenditure of at least US\$ 58 million by 2015. We are grateful for the consistent support we are getting, especially from our donors and partners like the Bill and Melinda Gates Foundation and the Government of India.

At the CGIAR AGM in Maputo, ICRISAT along with eight other Centers won the prestigious King Baudouin Award. This was made possible through our involvement in the Collaborative Research Program for Sustainable Agricultural Production in Central Asia and Caucasus.

This is the fifth time ICRISAT is a proud recipient of the King Baudouin Award. I congratulate all scientists and partners who made this possible. Team ICRISAT has really made a difference in the lives of the small farmers and the poor people of the dry tropics of the world.

Let me end by quoting US President-elect Barack Obama when he said "it's only when you hitch your wagon to something larger than yourself that you realize your true potential." Along with this, we need to further elevate our work amidst our successes.

We must constantly re-grow and re-invent ICRISAT to create cutting edge scientific innovations to empower the small farmers and the poor. ICRISAT's future is in our hands.

Thank you and good day.

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 644 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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