

Tackling the Dryland Challenge through Innovative Science

A Compendium of Speeches by
William D Dar
January-December 2010

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**International Crops Research Institute
for the Semi-Arid Tropics**

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Biographical Sketch



William Dollente 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 Consortium of CGIAR Centers.

Dr Dar holds the distinction of being the first Filipino and Asian to be Director General of ICRISAT. With his outstanding leadership as Chair of the Alliance Executive (2005), the Alliance of Centers was made the third pillar of the CGIAR system. He was Chair of the Committee on Science and Technology (CST) of the United Nations Convention to Combat Desertification (UNCCD) from 2007 to 2009. Dr Dar was also a 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.

Dr Dar has been the recipient of several honorary doctorates – Doctor in International Agricultural Development from Central Mindanao University in 2010; Doctor of Technology from Isabela State University (ISU) in 2008; Doctor of Resource Management from Benguet State University in 2007; and Doctor of Science from Mariano Marcos State University (MMSU), Philippines, in 2003.

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, 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 2002, PCARRD honored him with its highest and most prestigious award, the Symbol of Excellence in R&D Management.

In 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 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 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.

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.

In February 2009, he was conferred the Father Jose Burgos Award, Ilocos Sur's most prestigious award, for his outstanding achievement in the field of agriculture. In recognition of his excellent and outstanding contribution to pulses research and development, he was honored with the Indian Society of Pulses Research and Development (ISPRD) Lifetime Achievement Award. In October 2009, the University of the Philippines Los Baños honored him with the Outstanding Alumnus Award. In November 2010, he was conferred the Lifetime Achievement Award by the PCARRD Scholars Association, Inc. (PSAI).

Since leading ICRISAT, Dr Dar has intensively advocated a Grey to Green Revolution in the dry tropics of Asia and sub-Saharan Africa through Science with a Human Face. In pursuing the Institute's mission, 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 April 2010, ICRISAT led by Dr Dar won the CGIAR's Science Award for Outstanding Partnership together with the World Vegetable Center (AVRDC), for improving the lives of women and children in West Africa. In 2008, it had won for the fifth time the King Baudouin Award (the most prestigious in the CGIAR) along with eight other Centers. This was made possible through its involvement in the Collaborative Research Program for Sustainable Agricultural Production in Central Asia and Caucasus. Earlier in 2004, it had won the award together with CIMMYT, IRRI, IWMI and other national systems in the CIMMYT-led Rice-Wheat Consortium for the Indo-Gangetic Plains. In 2002, the Institute together with ICARDA had bagged the award for developing new chickpea varieties with higher tolerance to drought and heat, 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.

Dr Dar's astute and decisive leadership was repeatedly manifest in the Institute's surplus budgets in the year 2000 and from 2003 to 2009. In 2009, a very positive Sixth External Program and Management Review (EPMR) pronounced that "ICRISAT today is a thriving research institute with a unique capacity to address poverty alleviation, food security, and natural resource protection in the semi-arid tropics".

There were more research outputs and impacts created by the Institute during the last ten years as well, both in Asia and sub-Saharan Africa. The turnaround for the Institute was possible because of Dr Dar's effective and human-oriented management, big-picture decisions and innovations and the positive attitude and high morale he infused in the staff. He led the Institute in mapping out a new Strategic Plan to 2020, a road map to empowering the poor in the drylands.

As a demonstration of the strong faith in his outstanding leadership, the Governing Board awarded Dr Dar a third five-year term in office, starting 2010.

Dr Dar's transformational leadership has turned ICRISAT into a forward looking institution, which has been 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 conditions of the poor people living in the drylands of Asia and sub-Saharan Africa.

Foreword



I feel honoured to write this foreword in what has been a momentous year for ICRISAT. The year 2010 was when the Institute paused to take stock of its position. It looked back at what it had achieved. And then it looked forward to what lies ahead -- a perfect storm of converging conflicts, ready to punish poor smallholder farmers living in the dryland tropics of Asia and Africa.

Aware that pushing forwards the frontiers of knowledge, doing science with a human face, and expanding food production would help the poor grow their way out of poverty, the Institute embarked on a journey of change. For not doing so would imperil the livelihoods of the poor.

The year saw the formulation of the new Strategic Plan to 2020, with inclusive-market-oriented development or IMOD as its unifying conceptual framework. I would like to mention that as this exercise was in progress, a shared understanding of the goal is what I saw at the Institute, driven by an effective and committed team and a dynamic leader in William D Dar. While the understanding assures that staff know the direction in which they should work; commitment is that visceral quality that motivates them to do the work and to keep working when the going gets tough. Team ICRISAT has a clear understanding of the humungous task ahead of ending pessimism in the drylands.

The Institute is all geared up in its relentless pursuit of a prosperous, food secure and resilient dryland tropics and to meet its four aspirational targets of halving poverty, hunger, malnutrition and increasing the resilience of dryland farming.

A wind of change is blowing through ICRISAT. A renewed fervor and vigor has taken over. And this spirit is reflected in the speeches in this book. Under a dynamic leadership, the Institute is fuelling the engine of growth with its innovations. I wish it all the best in its endeavours!

Dr S Ayyappan
Vice-Chairman, ICRISAT Governing Board
Secretary to the Government of India
Department of Agricultural Research and Education (DARE) and
Director General, Indian Council of Agricultural Research (ICAR)

Investments, Incentives and Information Critical to Philippine Agriculture



Keynote Speaker, 29th Foundation Anniversary, Don Mariano Marcos Memorial State University (DMMMSU), 15 January 2010, DMMMSU South La Union Campus, Agoo, La Union, Philippines.

Pres Florentina Dumlao, ladies and gentlemen and students, good morning!

I wish to thank the organizers for inviting me to the 29th Foundation Anniversary of the Don Mariano Marcos Memorial State University today. I am happy to note the theme of your anniversary – “Towards a Sustainable Environment: DMMMSU’s Initiative to Climate Change”.

Climate change is a silent crisis that is creeping over us. The devastation wrought on thousands of people who bore the brunt of Typhoon Ondoy in our country and similar extreme climate events around the globe are causing significant economic losses. Such events in recent times have tested and tried our tough nature. No doubt we are a resilient people; but we need more than the will to bounce back while dealing with such crises, whether they are typhoons, water shortage or food shortage.

A PNAS study estimating least-developed countries’ vulnerability to climate-related extreme events over the next 50 years suggests that the effects of socio-economic development trends may begin to offset rising climate exposure in the second quarter of the century, and that it is in the period between now and then that vulnerability will rise most quickly. This implies an urgency for international assistance to finance adaptation.

Hence the race between climate change dynamics and climate policy is a close one. While we have credible scientific evidence to determine the effects of climate change, we need to understand that delays and underestimation of its impact is risky.



During the next few years, universities will be challenged to transform their role in higher education and their relationship to the evolving global scenario. They need to provide the logical focus for preparing youngsters in taking on this responsibility. What is needed is a dynamic approach to the curriculum and teaching. Academic institutions offering teaching and learning opportunities in food and agriculture should enhance connections with each other to support and develop new opportunities and technologies.

There is a need to increase the permeability between academe and the private and public sectors. The silo effect must be avoided at all costs. Agriculture departments, colleges and universities need to lead and play a key role in shaping the future of agriculture and insulating it from the adverse impacts of climate change.

I note that your institution has many achievements to its credit – it has the most number of accredited academic programs among state higher education institutions in the country. The Commission on Higher Education identified it as one of only three “Centers of Development in Information Technology” in Region I. The Professional Regulation Commission adjudged DMMMSU in 2008 among the top 5 performing Schools in Mechanical Engineering and top 6 Performing Schools in Veterinary Medicine.

In terms of research, the University has produced 11 patented technologies, among which figure the Tiger grass flower pollen remover, honey extractor machine, and calcium-enriched polvoron. The Sericulture Research and Development Institute has developed eight F₁ silkworm hybrids, three 3-way cross silkworm hybrids and three double-cross silkworm hybrids which are currently commercialized.

The University’s flagship R&D commodities – apiculture, sericulture, ubi, agroforestry, livestock and poultry have helped generate livelihood opportunities among rural clientele in all parts of the country. Coming to global linkages, it has established functional linkages with at least 20 international institutions in areas ranging from R&D and distance education to training and technical support.

Today, there are three I’s that are the overarching needs of Philippine agriculture: Investments, Incentives and Information. The government must invest more in infrastructure. Arable farmland comprises roughly a quarter of our country’s total land area. Although the country is rich in agricultural potential, inadequate infrastructure has limited growth in the countryside.

The government must provide more incentives to higher productivity and efficiency. This calls for more support to agriculture in terms of government policies backstopped by adequate financing schemes.

The government must manage knowledge better. The Philippine National Science and Technology Plan (NSTP) 2002-20 with its 12 priority areas, stipulates that the country should be a world-class knowledge provider and user in selected S&T areas by 2020 and that it should develop a wide range of globally competitive products with high technology content. It was not long ago that the Philippines had one of the largest agricultural research systems in Asia.

A few days ago ICRISAT celebrated its 37th anniversary with a renewed resolve to make things better for the impoverished farmer living in the semi-arid tropics. I am sure that under the able leadership of Pres Florentina Dumlao, DMMMSU too will re-examine its role in the changing global scenario and be prepared to address the critical demands on our agricultural systems. This is the only way that we can sustain educational institutions that will prepare the leaders of tomorrow.

Thank you and good day!

Gearing up for a Paradigm Shift in Bioinnovations



Special Address, Valedictory Ceremony, BioAsia 2010, 6 February 2010, Hyderabad International Convention Centre (HICC), Hyderabad, Andhra Pradesh, India.

Dr Vishwa Mohan Katoch, Director General, ICMR & Secretary, Department of Health Research, Government of India; Mr Ashok Kumar, Secretary to Government of India, Department of Pharmaceuticals; Dr Manel Barcelles, President, Biocat, Barcelona; Prof Seyed E Hasnain, Chairman, BioAsia 2010 Advisory Board; Mr Sam Bob, BioAsia 2010 Organizing Committee and distinguished guests, delegates, and ladies and gentlemen, good afternoon!

I would first like to thank the organizing committee of BioAsia 2010 for inviting me to be here with you during this valedictory session.

It has never been more compelling to prepare ourselves for a rising perfect storm which is the biggest threat to mankind. This perfect storm is the confluence of the adverse effects of climate change, desertification, food crisis, energy crisis and population crisis and including the financial meltdown. To succeed in this, science's innovation potential to boost economic and social development must be exploited, for which we need new ways of working, new non-traditional partnerships and truly integrated approaches.

Biotechnology has already delivered improved crops, and there is greater promise in harnessing genetic and molecular processes for humanity, much more the poor. In addition, advances in information and communication technology are facilitating countries' participation in science innovation. The biotechnology industry has contributed a lot over these years and the world is still looking forward to new initiatives from all public and private institutions to combat these current challenges.



Given biotechnology's diverse applications in areas such as nanomedicine, biopharmaceuticals, agri-biotechnology, medical biotechnology, stem cell therapy, the seed industry, food processing and molecular diagnostics, there is a critical need to share this knowledge and resources. This can be possible only by forging new business partnerships, academic and industrial collaborations and public-private partnerships which this forum facilitates.

However, five priority actions are critical for improving the chances of science innovations in biotechnology for securing new opportunities and driving effective development.

First, globally scientists need to be empowered to work on science innovation for development, which involves imparting science training in schools, supporting universities, and development institutions funding national research grant systems that allow local institutions to drive longer term research programmes.

Secondly, science innovation systems need to be strengthened in developing countries through north-south and south-south research collaboration.

Thirdly, new technologies should be accessible to science for development via continuous research into international public goods, government and donor support and by forging imaginative partnerships with the private sector.

Fourthly, research must be designed and delivered for impact by building research and development frameworks based on results which ensure that scientific research outputs effectively lead to economic growth and social development.

Lastly, by helping policymakers understand how science innovations can help reduce poverty, the profile of science within developing country governments should be raised.

Knowledge can inform action only with engagement and communication. Strong partnerships combined with knowledge exchange networks that link stakeholders; innovation systems and above all, if I may repeat, greater investments in research and development are critical if we have to achieve economic growth.

Started in 2004, BioAsia has proven to be an effective and efficient platform for new business ties, academic and industrial collaborations and for exploring and sharing resources. Keeping up with the changing times, the organizers have been injecting new perspectives of addressing global challenges through biotechnological interventions.

The Agri-biotechnology and animal biotechnology tracks began with delegates visiting ICRISAT and Indian Immunologicals Ltd and other institutions. The plenary sessions included their scope and challenges, biotech crops (their

development, commercialization, IPR and biosafety regulations and food processing sector opportunities) and food safety issues.

The animal biotechnology track had discussions on enhancing animal health, their productivity and biomedical applications with a focus on global challenges and future opportunities. Together, both tracks had 12 sessions, 37 speakers and eminent panelists from across the world.

I am sure BioAsia 2010 has benefited all the participants and stakeholders in terms of the B2B meetings, partnerships and collaborations. I thank the organizing committee for successfully conducting this event.

Congratulations to all!

Thank you!

Innovative Multi-partner Platforms for a Hunger-free World



Opening Remarks, CGIAR Generation Challenge Programme (GCP) Molecular Breeding Platform (MBP) Startup Meeting, 17 February 2010, Hyderabad, Andhra Pradesh, India.

Dr Jean-Marcel Ribaut, dignitaries from the CGIAR Generation Challenge Programme, Dr David Bergvinson of the Bill & Melinda Gates Foundation, Dr RR Sinha, Department of Biotechnology of India, partners from the Indian Council for Agricultural Research (ICAR) and ladies and gentlemen, good morning!

Let me first thank the organizers of the Generation Challenge Programme for inviting me to speak at this launch meeting of its Molecular Breeding Platform (MBP).

The food price crisis of 2008 and already discernable signs of global warming have brought food security and climate change to the apex of the international agenda. There are already one billion hungry people in the world; and farmers will need to feed a projected population of 9.1 billion by 2050!!

Global agricultural production will need to grow by 70% by this time! This can happen in three ways – by bringing new land into agricultural production, increasing cropping intensity on existing agricultural lands, and by increasing yields on existing agricultural lands.

Meeting this demand, together with facing the challenges from climate change, water scarcity, bioenergy and land degradation, puts enormous pressure on the agricultural sector. Food, feed and fibre as well as income, employment and other essential ecosystem services are all important outcomes of this sector.

The development of molecular genetics and associated technologies offers hope, especially marker-assisted breeding. In fact, in the past, ICRISAT's collaborative research has led to pearl millet hybrid HHB 67-2. The hybrid is resistant to downy mildew and is the first ever product of marker-assisted breeding in pearl millet to be released for cultivation in India.

Let me cite another example. ICRISAT has had a major role in the unraveling of the sorghum genome. This will help it combine the new knowledge with its expertise in molecular marker-assisted breeding to develop improved sorghum varieties and hybrids for desirable traits such as improved drought tolerance or improved disease resistance. Flood-tolerant rice Swarna-sub1 in India is another example of how accessing and adopting modern breeding technologies could enhance crop breeding.

The overall objective of the GCP's learning-by-doing web-based Molecular Breeding Platform will be to provide access to and facilitate the adoption of modern breeding technologies, breeding material and related information in a centralized and functional manner. The objective will be to improve plant breeding efficiency in developing countries.

The platform will serve as a one-stop-shop for information, analytical tools and related services to design and efficiently conduct molecular-assisted breeding

experiments. It will additionally bridge the gap between upstream and applied research in sub-Saharan Africa and South and Southeast Asia. MBP will have three components, the molecular breeding portal and helpdesk, information system and services component.

ICRISAT will be involved with identifying, deploying and supporting tools for management of genotypic characterization. It will also be concerned with establishing middleware infrastructure for networking database and applications and implementing a configurable workflow system for molecular breeding.

Contributing to genetic resource support service and trait and metabolite services, phenotyping sites and screening protocols will be another facet of its work. At this juncture, it is important to stress that such platforms will provide the critical tools for the future of agricultural research, especially under the new Consortium system. These will serve to enhance the CGIAR's ability to mobilize science for overcoming poverty and hunger and achieving ecosystem resilience in developing countries.

It will enhance collective action among Centers and with partners and also mobilize and expand further resources for agricultural research. This will culminate in the creation of global public goods that will contribute to agricultural development and improved livelihoods for the poor.

While ICRISAT fully supports the MBT and will do its utmost to provide the needed services and inputs for our mandated crops, I would like to emphasize that all other partners must chip in too.

I would like to take this opportunity to thank the Bill & Melinda Gates Foundation for supporting this venture which will have positive implications for global food security. The World Development Report 2008 stresses the importance of agriculture-led growth to increase incomes and reduce poverty and food insecurity in least developed and developing countries.

The world's farmlands can be the frontline for the fight against the impact of climate change and the battle to feed the mounting global population! This will be made possible through multi-partner platforms like MBT.

Welcome to Hyderabad. Welcome to ICRISAT!

Thank you!

Adapting to Climate Change in the Drylands



Message, Guest of Honor, National Symposium on Climate Change and Rainfed Agriculture, 18 February 2010, CRIDA, Hyderabad, Andhra Pradesh, India.

His Excellency Shri ESL Narasimhan, Governor of Andhra Pradesh; Dr B Venkateswarlu, Director, CRIDA; Dr J Katyal; other dignitaries, and ladies and gentlemen, good morning!

Agriculture is today confronted by a confluence of crises – warming temperatures, droughts, floods, increasing land degradation, rising food prices, zooming energy demand and population explosion – which if unabated, threatens to create a perfect storm.

The semi-arid or dry tropics is home to over 2 billion people and spans 750 million hectares in 55 developing countries. Here, 1.5 billion people depend on agriculture for a living. Of these, 670 million comprise the poorest of the poor. Farmers here are very vulnerable since they not only produce food under very harsh conditions but also have to make a living out of farming.

The importance of rainfed agriculture varies regionally but produces most food for poor communities in developing countries. Fifty-six percent of the net sown area in India is rainfed, contributing to 40% of foodgrains. Over 87% of coarse cereals and pulses, 55% of upland rice, 77% of oilseeds and 65% of cotton cultivated are under such farming.

ICRISAT works with strategic partners to meet the challenges of semi-arid agriculture in Asia and sub-Saharan Africa. The objective is to develop farming systems resilient to shocks, buffering crucial resources like water and nutrients and adapting crops to warmer temperatures and new pest patterns. And resilient farming systems must also be profitable for small farmers.



ICRISAT has a large repository of proven innovations in crop, soil and water management. We have pearl millet hybrids that can flower and produce seeds even under very hot temperatures. We also have improved sorghum lines that can produce good yields even under harsh conditions, to help farmers better adapt to climate change. Our repository of genes of dryland crops like sorghum, pearl millet, pigeonpea, chickpea and groundnut are well adapted to changes in climatic regimes.

Scientists predict an 11% expansion in drylands, with more frequent and severe droughts. Innovations such as ICRISAT's microdosing ensures that small, yet affordable, doses of fertilizer are applied at the right place at the right time. Microdosing has increased the productivity of 200,000 poor farm families in the nutrient-starved soils of sub-Saharan Africa by up to 120% and incomes by 50%!

Of the proven models to provide insights into the potential impact of climate change on crop productivity, ICRISAT has identified various yield gaps as crop management practices and adapted crop varieties are used under current climate and climate change scenarios. High yields are still possible under climate change if farmers combine improved practices with climate-adapted crop varieties.

There is no time to lose in transforming knowledge into action to help farmers weather the perfect storm. And unless this is accompanied by science advances towards new frontiers for more powerful adaptation and mitigation solutions, we cannot claim to have found a solution to the perfect storm.

Since current rainfed agriculture cannot sustain the economic growth and food security needed, its potential needs to be unlocked. Rainfed agriculture is struggling against a headwind of policies that are biased in favour of the "favoured lands". The bias is expressed in grain price support for heavily-traded commodities, export subsidies, preferential research and development investments. Correcting this bias can help solve the global food crisis and enhance the livelihoods of poor farmers.

In addition, higher investments in the area are critical. Finally, scientific innovations that can effectively produce food at lower cost can transform rainfed agriculture into a more paying proposition for the poor farmer. And we owe it to him.

The time to act individually and collectively is now!

Thank you!

Creating a Better Future for the Semi-Arid Tropics



Speech, Expert Consultancy Workshop, 23 February 2010, ICRISAT-Patancheru, Andhra Pradesh 502 324, India.

To our most esteemed partners and colleagues, good morning.

Let me sincerely thank all of you for being with us today in spite of your busy schedules. Your expert views will definitely enrich our pool of ideas in creating a better future for the semi-arid tropics.

Last year, ICRISAT's 6th External Program and Management Review (EPMR) panel recommended the Institute to "take ownership of and celebrate strategic planning and research prioritization process." Being a proactive organization, we heartily accepted this recommendation and embarked on an inclusive and broad-based strategic planning exercise. This expert consultancy is part of this process. Very recently, we also conducted facilitated in-house retreats here at the headquarters and in our regional hubs in sub-Saharan Africa.

The primary purpose of these exercises is to heighten inclusiveness in our planning process and get extensive buy-in from our staff, partners and stakeholders. Through our new strategic plan, we aim to help attain the global vision of a world free of poverty and hunger in a healthy and sustainable environment.

Along with this, ICRISAT envisions the improved well-being of the poor of the semi-arid tropics. Our mission is to reduce poverty, ensure food and nutritional security and protect the environment of the semi-arid tropics by helping empower the poor through science with a human face and partnership-based research.

To pursue the foregoing, ICRISAT mobilizes cutting edge science, leading to food security, poverty alleviation and environmental sustainability on behalf of poor rural families in semi-arid systems of Asia and sub-Saharan Africa.

Let me note that ICRISAT is doing its strategic planning exercise from a position of strength and good reputation as an offshoot of its institutional turnaround during the last ten years. From a very challenging situation in 2000, I am happy to report that ICRISAT, together with two other Centers, is now at the top of the CGIAR system and in the best of health.

From \$22 million in 2000, our budget has grown to about \$60 million this year. Among 15 CGIAR Centers, ICRISAT is now number two in terms of budget size. We have also achieved consistent budget surpluses since 2003. Today, we are number one in the CGIAR system in terms of cumulative budget surpluses and earned income.

Our reserves have consistently grown since 2000 to almost \$20 million. Today, we are number two in the CGIAR system in terms of reserves. ICRISAT is now on the top together with three Centers with the best financial performance. This is based on the two major CGIAR indicators of liquidity and reserves.

Aside from our financial health, we have had two external reviews since 2003 recognizing our high quality science, more research impacts, and sound governance and management.

Beyond the recommendation of our external review panel, ICRISAT recognizes the urgent impetus to undertake strategic planning since a range of issues have emerged in our task environment. Warming temperatures, droughts, floods, increasing land degradation, loss of biodiversity, rising food and energy prices, and population explosion are creating extreme challenges to feed the world. As these happen, the hardest hit will be the poor people of the drylands and rainfed areas. This is because they produce food and earn a living out of farming under very marginal conditions. If no global action is taken now, these will lead to a 'perfect storm' which will inflict more suffering on the poor and small farmers.

In this context, the CGIAR system is also undergoing change. During the CGIAR Business Meeting in December 2009, a new CGIAR architecture was approved, including new approaches of doing our work. The new CGIAR is a global research-for-development partnership consisting of a Consortium of international agricultural research centers and its funders working with various strategic partners. At the heart of the new CGIAR is a results-oriented strategy and an improved structure designed to enhance efficiency, impact and funding.

The pillars of the new CGIAR is a Consortium of 15 Centers and a new CGIAR Fund. The Consortium unites the 15 Centers under one legal entity. It serves as a single entry point for donors to contract Centers and partners for research programs. On the other hand, the new Fund, through a Fund Council, harmonizes donor contributions to improve the quality and quantity of funding. It will also usher in greater financial stability in the system, focus research investment to priority areas and harmonize reporting requirements.

The Strategy and Results Framework (SRF) links the two pillars of the new CGIAR through a collective research agenda. It also distinguishes the roles of 'doers' and 'funders.' The new CGIAR will cultivate new, stronger and more dynamic partnerships to generate cutting edge research outputs and strengthen national agricultural research systems.

It is against this backdrop that ICRISAT will align its research direction and reconfigure its research for development agenda to the changing times and the new CGIAR.

This is the major reason why we are here to listen to your views during the next three days, especially on:

- ICRISAT's contemporary task environment and corresponding opportunities, challenges and new directions;

- New innovations to enhance sustainable dryland crop productivity and resource conservation in a climate changing environment;
- Appropriate innovations to enhance farmer productivity and market access and linkages;
- Supportive policies and institutional arrangements to optimize agricultural productivity; and
- Access to information and support services by farmers and partners through innovative approaches and tools.

As we do this, we need your views on the major strategic issues identified during our in-house retreats and from other sources.

First, should we reconfigure ICRISAT's mandate from a crops-based research institute to that of a world dryland agricultural research center? Second, in doing the foregoing, how do we adopt a systems approach in integrating our crops with other concerns to holistically address challenges in the drylands? Third, how do we integrate climate change into our research agenda? How should we refine our overall climate change adaptation strategy? Fourth, how can we further refine and harness new science tools to enhance our work? How do we share them in a better way with national systems and other partners?



Fifth, how can we enhance value chains and value addition to our work? How do we add value to dryland crops to create more demand and enhance their nutrition? Sixth, how do we guide policy formulation and better influence their implementation? How do we strengthen our advocacy to increase public investments in dryland agriculture and eliminate policy biases against the drylands? Seventh, how do we further innovate, strengthen and expand partnerships and enhance capacity of partners? How do we optimize opportunities out of our existing partnerships? Eighth, how do we integrate gender and pro-poor issues in technology development and sharing? On related institutional issues, how can ICRISAT sharpen its investment focus and elevate its performance in research, management and support services?

How can ICRISAT best reposition itself in the new CGIAR ? How can ICRISAT further enhance its niche to maintain global leadership in research for the semi-arid tropics?

Before I close, let me mention that forty years ago, the Green Revolution was successfully waged in the farmlands of developing countries through high-yielding varieties and inputs.

However, this revolution bypassed the drylands, where more than two billion people live with 644 million being the poorest of the poor. The first Green Revolution therefore remains an unfinished business. With a 'perfect storm' looming above us and the specter of world hunger taking place, we need to wage a Second Green Revolution. But this time, it must be done in the drylands as well.

ICRISAT and the entire CGIAR system have a vast arsenal of successes – a testament that scientific innovations do make a difference to the lives of poor dryland farmers. But ICRISAT and the CGIAR cannot do this alone. With our sustained partnership, we will be able to wage a Second Green Revolution. This time, it will be won on behalf of all peoples of the developing world, most especially the poor.

We have done it before. With a new strategic direction and a new generation of scientific innovations, we can indeed do it better for the second time. As we do this, we will usher in a better future for the semi-arid tropics through a Grey to Green Revolution, driven by science with a human face.

Thank you and good day!

Linking Smallholder Sweet Sorghum Farmers with the Bio-ethanol Industry



Opening Address, CFC-FAO Project Planning Meeting, 3 March 2010, ICRISAT-Patancheru, Andhra Pradesh 502 324, India.

To our colleagues and partners, good morning!

On behalf of ICRISAT, I would like to welcome you to this planning meeting of our project on “Enhanced Livelihood Opportunities for Smallholders in Asia: Linking Smallholder Sweet Sorghum Farmers with the Bio-ethanol Industry” supported by CFC.

First of all, let me recognize and greatly appreciate the participation of our partners from India, China and Thailand. I also take this opportunity to congratulate all of you for successfully completing the previous project. I also thank all partners for joining this initiative. I am sure that our project will promote farmer-centered, farmer-owned, farmer-managed approaches, keeping farmers at the center of development.

With increasing global fuel prices in the past few years, there has been a growing interest in supplementing fossil fuel with biofuels. Working with national partners in the semi-arid tropics of Asia and sub-Saharan Africa, ICRISAT conducts research on biofuels aimed at providing additional income to poor farmers without compromising food and environmental security.

Along with this, ICRISAT launched a global BioPower initiative to empower poor dryland farmers to benefit from the biofuels bonanza. ICRISAT's BioPower research strategy focuses on feedstock sources and approaches with multiple advantages like sweet sorghum.

ICRISAT considers sweet sorghum a smart crop as it produces food, feed, fodder and fuel. Sweet sorghum also has a high net energy balance. It can be grown in the dry or semi-arid tropics across the globe as a rainfed crop in areas with more than 700 mm rainfall. A crop of sweet sorghum takes about four-and-a-half months to grow, and can be followed by a ratoon crop.

The main reason for the cultivation of sweet sorghum are the stalks. These produce large quantities of biomass with a high sugar content comparable with sugarcane. Sweet sorghum increases the incomes of smallholder farmers through the sale of stalks to the ethanol distillery while at the same time using the grain as food or feed. Thus, sweet sorghum for ethanol production contributes to energy security and provides additional incomes to farmers. Likewise, it does not compromise food or fodder needs and makes farmers part of the ongoing biofuel revolution. As we move further, I look forward to the products of our research on sweet sorghum.

Our project is very relevant as we aim to mobilize smallholder farmers to improve crop productivity and enhance the production and marketing of sweet sorghum for distilleries. We also forge partnerships with private seed companies, input suppliers and farmer groups for effective input delivery mechanisms. Moreover, our project also seeks to link remote farmer groups with commercial distilleries

by introducing decentralized processing of sweet sorghum juice into syrup. Our project will therefore establish and demonstrate successful models for up-scaling and out-scaling sweet sorghum cultivation for ethanol production. Ultimately, this will increase farmers' incomes and reduce environmental pollution.

Ethanol is a clean burning fuel, producing negligible amount of carbon dioxide on burning. This is very significant in the light of warming temperatures and erratic rainfall due to climate change. Sweet sorghum is capable of tolerating these vagaries much better than feed stocks like sugarcane, maize, sugar beet and others.

Through our project, we can help transform sweet sorghum into a profitable enterprise for bio-ethanol as well as for grains and stalks to feed humans and livestock. The benefits are multiple and significant: easing poverty, reducing air pollution and mitigating global warming. On a broader front, biofuels are a major emerging trend that can have a big impact on dryland agricultural development.

Raw materials are a key factor that we are helping to overcome in a pro-poor manner through smart crops and strategic partnerships. Hence, the biofuels revolution provides the greatest opportunity to empower poor smallholder farmers.

Before I close, I would like to thank the Common Fund for Commodities for its continued support to this project and the Food and Agriculture Organization for its advisory role. Most of all, I thank all of you and wish that you will actively participate in this project to reach our goals.

I am confident that in this workshop you will work hard and finalize the best plans for the implementation of our project. I am sure that your experiences and learnings from the previous project will be helpful in preparing and accomplishing our strategic project plans.

Many twists and turns are still ahead of us, but I am confident that with your support and partnership, we will be able to power a better future for the drylands.

Thank you good day!

Business Networking for a Prosperous and Greener Africa



Special Address, Business Networking Meeting with the African Economic Mission-India, 4 March 2010, Hotel Taj Krishna, Hyderabad, Andhra Pradesh India.

Mr Shakti Sagar, Vice Chairman, CII, Andhra Pradesh & Managing Director, ADP Pvt Ltd; Mrs Idit Miller, Vice President & Managing Director, EMRC; Mr Busi Sam Bob, Principal Secretary (Industries), Government of Andhra Pradesh; and participants of the 1st Africa-India Economic Mission on Agricultural Cooperation, representatives from agri-business companies; and the media, good morning, bon jour and bom dia to all of you. Welcome to this Business Networking Meeting!

Today, we are here with a purpose! We have with us 36 distinguished dignitaries from as many as 12 countries of Africa eager to share our knowledge and experience. Our dignitaries are from Angola, Congo, Tanzania, Lesotho, Cameroon, Chad, Mali, Uganda, Burkina Faso, Congo RDC, Senegal and Ivory Coast. There are also representatives from the areas of agri-business, agri-consulting, banking & micro finance, entrepreneurship development, farmer organizations, governments and agri-infrastructure.

Today I will dwell on three key words that are bound by the common thread of ensuring sustainable livelihoods: sub-Saharan Africa, food security and South-South cooperation. The African drylands are home to a high proportion of the deepest pockets of poverty. The economies are primarily agriculture-based, dominated by low reward-high risk subsistence farming.

Isolated from markets that could provide them the profits needed to invest in yield-enhancing inputs, they are often unable to grow enough food to feed their families. The transition to market-driven development needs to be fostered here.

ICRISAT's strategy for poverty reduction here includes the development of equitable, sustainable and resilient systems that connect African subsistence farmers to higher-value markets.

Economic reform in Africa has been very encouraging with the improved investment climate. Annual economic growth in the continent is greater than 5% with single digit inflation. According to the UN's MDG Report 2008, 51% of employed people in sub-Saharan Africa were living below \$1 a day in 2007, very similar to the 55.5% figure for 1997. After decades of decline, the sub-Saharan agricultural sector — 80% of which consists of smallholder farmers — grew more than 3.5% in 2008.

There are many other challenges that need to be overcome. They include slow progress in regional integration, governance and institutional shortcomings in some countries, conflicts and diseases, connecting smallholders to markets, creating employment opportunities in rural areas and adequate training for young people.

There is a particular need for programs and policies to increase the capacity of smallholder farmers to enter dynamic sectors of national, regional and international markets. There is reason to feel optimistic. African leaders made a historic pledge to commit 10% of their national budget to food security and agriculture-led growth.

South-South Cooperation is seen as an effective strategy by the United Nations to bridge the knowledge gap in sub-Saharan Africa, with the big players being India, China, Brazil and Russia. As aspiring economies, India and Africa have a lot in common – they are rich in natural resources, have a similar demography and a large domestic market. This provides a natural synergy for building partnerships.

Efforts are on at the government and private sector levels towards a comprehensive engagement to march together as partners in progress. South-South cooperation becomes extremely relevant given the turmoil in the global economy.

The age-old ties between India and Africa have today matured into a vibrant economic partnership. Bilateral trade is robust, having risen almost fivefold – from US\$ 7.1 billion in 2003-04 to US\$ 34.4 billion in 2007-08. Today, India's engagement with Africa engulfs a whole range of activities such as investment collaboration, technology transfer, skill development, among others.

I thank CII for bringing suitable Indian agri-companies to interact and do business with Africa. I also take this opportunity to appreciate EMRC for taking the lead in facilitating opportunities to bridge the gap between India and Africa. African agriculture today faces a context of general economic growth, and in the medium term a brighter outlook in international, regional and domestic markets than anytime in the last 40 to 50 years.

If Africa's farmers can be helped to overcome challenges and take advantage of new and improved market opportunities as the global economic crisis eases, the continent has enormous potential for growth in agriculture. The African Green Revolution need not be a mirage. It can happen if we work together! Let us make it happen!!

Thank you!

CMU: Blue Oceans and Green Harvests



Speech, 56th Annual Commencement Exercises, Central Mindanao University (CMU), 6 April 2010, Musuan, Bukidnon, Philippines.

The Board of Regents, President Victor Barroso, officials of the University, distinguished guests, graduating students and their parents, faculty and staff of CMU, friends, ladies and gentlemen, good morning!

First, let me thank Dr Victor Barroso for inviting me to address this very important event at CMU. As I received the Honorary Doctorate degree in International Agricultural Development from your university today, my heart was filled with pride.

Today's event is indeed a milestone for me as well as you, as it marks one hundred years of CMU's dedicated service to the underprivileged sections of our society. CMU is one of the top performing universities of the country today.

CMU has indeed come a long way since its days as the Mailag Industrial School in 1910. Its excellence in veterinary medicine, engineering, forestry education, agriculture, agricultural education, nutrition and dietetics and teacher education has been manifested by the 67.8% average performance of CMU graduates in the board examinations in these fields. This is a far cry from the 40% national passing percentage! Congratulations CMU for a job well done!

Likewise, your College of Agriculture and College of Forestry are recognized by the Commission on Higher Education as Centers of Excellence in these areas. CMU's excellence takes a deeper meaning as it provides education to students from the "depressed, deprived and disadvantaged sectors" in the region.

Today, the university faces tremendous challenges as well as opportunities for spearheading the growth and development of Mindanao. The economy of Region 10 is the largest in Mindanao. Agriculture is central to the regional economy.

But despite its booming growth in agri-based industries, competitive advantage and rich resources, Mindanao has the poorest regions and poorest provinces in the country. This is both a challenge and an opportunity for the university itself and you among the graduates.

Allow me then to offer some advice based on my experience with ICRISAT which is headquartered in India. We work in 55 developing countries of Asia and sub-Saharan Africa. I want you to note that with foresight and determination we were able to harness Team ICRISAT and partners to turn our adversities and challenges into opportunities.

I want to emphasize that, so I will repeat: "turn adversities and challenges into opportunities." Today, ICRISAT is fully transformed and is now a high performing global research institute. Let me elucidate on a seven-point formula to enable you to do so too. Let us begin with:

(1) Building teams

With its track record of excellence and leadership, CMU can exploit this opportunity to spearhead the sustainable growth and development of this region.

I believe it is time for CMU and its graduates to make a paradigm shift from business as usual and shift to a blue ocean strategy. A blue ocean is a marketplace of ideas where the water is clear and peaceful, where there is no bloody competition to make the waters red.

When I came to ICRISAT ten years ago, staff morale was low and uncertainty pervaded the organization. With me as Team Captain, we restored confidence and optimism at ICRISAT. We turned financial performance around from a deficit to a surplus situation. Through sound leadership and management, we transformed ICRISAT into a strong, robust and stable organization. ICRISAT today is top among 15 international agricultural research centers all over the world.

The first thing that you should do is build a University team – Team CMU, with the CMU President as its Team Captain. Your university officers should work as one group united in purpose. You can also build smaller teams based on your excellence in several areas, which can then work out their own R&D programs under the bigger, proactive and supportive University Team.

(2) Building partnerships

I know funding is a major concern for your projects, even though you may have the best ideas. So after having built a team, you should strengthen partnerships with the private sector, at least in Central Mindanao. You could talk to businessmen in your area of responsibility and explore what common projects you could undertake.

(3) Coordinating with governments

You have to maintain a working relationship with both the national government and local government units in Central Mindanao. Understand how they operate, their limitations, and work within those parameters. Then elevate and strengthen that partnership with teamwork.

Did you know that the Government of India is one of the biggest sources of funding for ICRISAT projects today? It is imperative that you cultivate good relationships with government. From then on the onus of delivering the goods is on you.

(4) Collaborating with outside agencies

Do not forget that there are donors outside the Philippines. In the Philippines, the World Bank and the Asian Development Bank are strong advocates of countryside development, especially for the poor and marginalized. You do not have to be as big as ICRISAT to come up with project proposals for funding. And that reminds me to urge you to invest in building a good think tank for packaging proposals.

(5) Advocating entrepreneurship

While education is your forte, remember that education is preparing people to look for jobs. That is why we are always running out of jobs. The blue ocean strategy here is to create jobs. Given that Region 10 is one of Mindanao's Super regions, with agri-business as its central theme, CMU can offer courses in entrepreneurship. If you have one, strengthen it and encourage its graduates to become entrepreneurs, thereby creating jobs for themselves and for others.

(6) Encouraging micro-credit

Another blue ocean approach concerns women. Grameen Bank of Bangladesh and our local Ramon Magsaysay Award-winning CARD MRI (Center for Agriculture and Rural Development – Mutually Reinforcing Institutions) based in San Pablo City have shown that women make the best creditors. CMU itself and you graduates can get into micro-credit right away. What you need first are initiative and imagination.

(7) Greening your part of Mindanao

There are 'perfect storms' brewing throughout the world. The perfect storm that I have in mind is a confluence of global warming, loss of biodiversity, poverty and population that is threatening to wash away or dry out the little that we have. Right now, many parts of the country are suffering from a severe drought due to El Niño.

Mindanao today is experiencing an energy crisis because of lack of water to run our power plants. The whole of Mindanao is now in a state of calamity. PAG-ASA estimates 40 to 60% reduction in rainfall as an effect of El Niño phenomenon. We need to do something for the region.

I urge you to green your part of Mindanao. Plant more trees and more drought-resistant crops. More agro-forest farms may be needed. It is in your hands to transform Mindanao into the breadbasket of our country and the springboard for our self-sufficiency in food.

You, the CMU graduates, belong to the youth which comprises almost one-third of the country's population and nearly half of our labor force. The older generation counts on you to help transform our country and become the beacon of hope of our long-suffering people. As you go out of the portals of CMU, you must join the ranks of dedicated professionals who will serve our poor people and help turn the Philippines around.

For your family, for God and country, you must repose more faith and more hope in others, first of all in yourself. You should give the poor people of Mindanao the gift of respect and love. You should share with them the gift of dreams: hopes that they can fulfill, homes where they can stay, jobs to earn a living, food to nourish their bodies, and other things to make a life that they can enjoy. You should share your gift of excellence, dedication and service. You must become the change agents of Mindanao.

When this happens, you, the youth, will have moved CMU to the next level of excellence, leadership and service beyond its first century. With God's help, I am sure that you will all succeed.

Mabuhay po ang CMU! Mabuhay po kayong lahat!

Thank you and good day!

Enhancing Scientists' Toolkit to Battle Global Scourges



Inaugural Message, Seventh CEG Training Course on Molecular Tools for Crop Improvement, 10 May 2010, ICRISAT-Patancheru, Andhra Pradesh 502 324, India.

Participants from ICAR centers, State Agricultural Universities, the private sector and research foundations from India and abroad, good morning and welcome to the Seventh CEG Training Course on “Molecular Tools for Crop Improvement”.

Battling the scourges of poverty and malnutrition is going to become more difficult as increasing food prices, high population growth rates, land degradation, and climate change rage all around us to make up the perfect storm. Extraordinary scientific and technological advances are required to enhance humanity’s toolkit for confronting these challenges.

ICRISAT’s Global Theme on Biotechnology aims to reduce poverty, hunger, malnutrition and environmental degradation in the semi-arid tropics. It does this by applying promising genomic, genetic engineering, wide-hybridization, diagnostic and bioinformatics tools and approaches to the improvement of our mandate crops.

ICRISAT’s Center of Excellence in Genomics is an integral part of our biotechnology research, supported by the Government of India’s Department of Biotechnology. Its vision is to enable agricultural breeding and research programs, initially in India and ultimately globally, to fully utilize modern molecular genome analysis methods to actively pursue its activities on research, services and capacity building.



Molecular genomics can revolutionize breeding and research, for which scientists must be allowed to focus on the research problem. CEG is enabling this by making highly sophisticated equipment required for this research available to them. Most importantly, through high-throughput, the cost of data production is minimal. We believe that the CEG is a model for similar efforts in other regions.

Capacity building is critical for individuals, groups, organizations and societies to enhance their ability to identify and meet development challenges, involving the development and sharing of good practices.

CEG offers courses and workshops to provide scientists/researchers updated information on application of novel genomics technology in crop research and breeding. The focus is to ensure that participants can actually “use” molecular markers in their research or program by utilizing the marker services provided by CEG, without actually “doing” the marker technology. The other important aspect is data analysis and the use of genotyping data rather than generating it.

Since CEG’s establishment, 137 candidates, including 17 from overseas, have participated in six training courses. Our research involves developing DArT arrays for pearl millet, sorghum and groundnut and mapping DArT markers for sorghum and millet and for groundnut in the future. We have also set up weather station and sensors and are analyzing data on reference collections of sorghum with lysimeters and assessing contrasting pearl millet parental lines and QTL-NIL lines, among others.

Coming to services, we have provided marker services to NARS partners and external institutes, with over 1,000,000 SSR data points having been generated. We have also initiated portal development for two molecular LIMS and successfully carried out the maintenance of the CEG server, backup operations and access of data.

We also launched a Platform for Translational Research on Transgenic Crops (PTTC) with support from DBT, which serves to evaluate potential new genetic engineering options and then advances these, in a focused way, to meet specific objectives in agriculture.

I am sure the 24 participants here today – 10 from ICAR centers, 8 from State Agricultural Universities, 3 from the private sector and research foundations and 3 from abroad – will return to their institutes with greater knowledge and tools that will help their institutes and countries deal with the multifarious challenges agriculture faces today.

Thank you!

Be the Change You Want to See in the World



Speech, 28 May 2010, ISH Graduation Ceremony, Westin, Hyderabad, Andhra Pradesh, India.

Helge Gallinger, graduating students and staff of the International School of Hyderabad (ISH) and proud parents, good evening!

As I stand before the students of ISH who are about to embark on a new chapter of their student life, I am momentarily transported to the time I was leaving high school... with soaring aspirations, encouraged by my teachers and inspired by my peers and my parents.

As you venture out into your new world, you will discover that it is full of obstacles and compromises, where success is determined more by the ability to belong than by the ability to think, where it is much easier to do as everyone else does.

But then what is it that will make you different, is the question you must ask yourself. Would you rather tread the appealing walkable paths that get to their destination faster, and presumably, with less effort, or would you rather be the pioneers and trailblazers of the unbeaten tracks?

I'm sure the answer is the latter. For it is the defiant and curious few who refuse the familiar and comfortable; the out-of-the-box thinkers who solve problems instead of fretting about them; the brave who dare do things differently, who will succeed.

Do not just seek to do well, but strive to excel in everything that you are. Be driven by the compulsion to make a difference in this world.

The world today is in turmoil, with crisis upon crisis threatening to upset the delicate thread of life. The rising perfect storm of climate change, desertification, biodiversity loss, population growth, food, and energy crises is upon us. Another financial crisis is brewing.



The responsibility of making the earth a better and safer place to live for you and yours rests on your shoulders. You could contribute towards this objective as scientists, architects, environmentalists, policymakers or engineers.

Today, rapidly expanding domestic and global markets; institutional innovations in markets, finance, and collective action; and revolutions in biotechnology and information technology all offer exciting opportunities to use agriculture to promote growth and development.

At ICRISAT, these changes are presenting new opportunities for us to serve the smallholder of the semi-arid tropics better. We are in the process of mapping out a strategic plan to 2020.

At the same time, the CGIAR too is changing to meet these challenges, with the objective of ensuring food for the people, environment for the people and policies for people. The new model opens the system to stronger collaborations and partnerships with other research and development actors.

So there is change happening all around us. And I would like to reiterate to the youngsters here – take not the road less traveled. Rather, make new roads, blaze new trails, find new routes to your dreams.

Explore possibilities that others may get a similar chance. As Mahatma Gandhi said, “Be the change you want to see in the world.” I wish you all the best in your endeavors!

Thank you!

Exploring Hardier Chickpea Varieties for Greater Productivity



Inaugural Address, 3rd Annual Review Meeting, Project on Evaluating Candidate Genes Towards Enhancement of Drought Tolerance in Chickpea, 9 June 2010, ICRISAT-Patancheru, Andhra Pradesh 502 324, India.*

**Delivered by Rex Navarro, Director, Communication Office.*

Dr Srinivasan of NRCPB, Drs C Bhardwaj and J Kumar of IARI, R Kumar of SVBPUAT and ICRISAT scientists, good morning and welcome to the annual review meeting of the project on “Evaluating candidate genes towards enhancement of drought tolerance in chickpea” funded by the National Fund for Basic and Strategic Research (NFBSRA), ICAR, New Delhi .

We are pleased to host this meeting at ICRISAT. This will provide an opportunity to the Peer Review Committee and to national partners to appreciate ICRISAT’s efforts in chickpea improvement as well as in its four other mandate crops, ie, pigeonpea, groundnut, pearl millet and sorghum.

Environmental threats such as climate change and biodiversity loss as well as international food shortages and declining food stocks exacerbate the already present challenges of poverty, food insecurity, drought and increasing population pressure in the dry tropics. This convergence of threats constitutes a perfect storm that leaves the poor in a no-win situation. In short, the challenges faced by agriculture are mounting.

Chickpea is one of the most important cool-season grain legumes in the semi-arid regions of the world, and India is its largest producer and consumer. Its production is adversely affected by abiotic stresses such as drought, salinity and low temperature as well as biotic stresses such as insect, fungal and viral diseases. Among all these constraints, drought has the most severe impact.

Yet, technological advances in the sciences give us hope that all is not lost. Chickpea breeders throughout the world have been working tirelessly to develop improved varieties through traditional breeding.

Recent advances in genomics and biotechnology offer some solutions for enhancing crop productivity. In several crops, modern molecular genetic tools have increased the speed of breeding new varieties and permitted the application of newly available genome sequence information for crop improvement.

Molecular genomics can revolutionize breeding and research. ICRISAT’s Center of Excellence in Genomics, established through financial support from the Department of Biotechnology, Government of India, is enabling this by making highly sophisticated equipment required for this research available to scientists.

Most importantly, through high-throughput and continuous operation, the costs for data production is minimal. In the case of chickpea, successful application of marker-assisted selection was a question until the recent past, due to dearth of genomic resources. However, recent efforts at ICRISAT in collaboration with its partner institutions across the world have made it possible to develop such resources.

The project for which we have gathered here is part of those collaborative efforts of ICRISAT and partner institutes. I understand that the National Fund of ICAR sponsored this Chickpea Genomics project some time in 2007, with NRCPB, IARI, Patel University and ICRISAT as partner institutes.

Its objective to identify genes and QTL for drought-related traits is very relevant to the chickpea breeding programme of ICRISAT and others. I believe that the Peer Review Committee will be pleased with the rapid progress all the partner institutes are making, and will play a constructive role in planning work for 2010-2011.

ICRISAT is in the process of devising its strategy to 2020. It believes in enabling opportunities for smallholder farmers. It assumes that poor people will respond to improved infrastructure, to more productive technologies, to better resource access and to new knowledge. In short, it strongly believes that poor people will change their future for the better, given the opportunity.

I would like to congratulate all the partners for their hard work and sincerely thank the National Fund and ICAR for their generous support. I wish all the partners a successful and productive meeting.

Thank you!

Dryland Cereals Spell HOPE for the Poor in South Asia



HOPE – Sorghum in SA 2009, Annual Review and 2010 Workplan Development Meeting, 21 June 2010, ICRISAT-Patancheru, Andhra Pradesh 502 324, India.

Ladies and gentlemen!

Good morning and welcome to the HOPE-Dryland cereals project annual review and workplan development meeting pertaining to sorghum in South Asia.

The OECD-FAO Agricultural Outlook 2010-19 sees coarse grain prices over the next 10 years between 15-40% higher in real terms than their average levels during the 1997-2006 period. For smallholder farmers to be more productive and efficient in their farming operations and manage to make a profit, investment in appropriate research and ensuring farmers' access to new innovations is essential.

Sorghum is an important crop in India as well as to ICRISAT for its multipurpose uses. It is the dietary staple of more than 500 million people in more than 30 countries of the semi-arid tropics. Majority of subsistence farmers who cultivate it are unable to take advantage of its high yield potential. The situation can be rectified by growing varieties/hybrids with improved tolerance to drought and low soil fertility, and resistance to pests and diseases.

This is the first time that ICRISAT and its partners have got substantial funding support to pursue R&D on post-rainy season sorghum, crucial for food and fodder security in this part of the world. I take this opportunity to thank the Bill & Melinda Gates Foundation for its support to the cause of small and marginal farmers in SSA and SA. My thanks also go to all the partners for their support.

This project gives us an opportunity to push proven yield-enhancing technologies in farmers' fields while developing sound backup material, production intensification methods and markets for future use.

At this point, let me briefly mention some of the changes that are taking place around us. The CGIAR's reform process is on track to address global issues in a more focused manner to reduce poverty and hunger, improve human health and nutrition, and enhance ecosystem resilience through high-quality international agricultural research, augmented by partnerships.

ICRISAT is now a member of the Consortium of CGIAR Centers. We are developing Mega Programs to address food, nutrition security and environmental sustainability in partnership with NARS, ARIs, CSOs and the private sector.

ICRISAT strongly believes that poor people will change their future for the better given an opportunity. Hence we are in the process of mapping out a new Strategic Plan to 2020. To ensure the transition from subsistence farming to market-driven agriculture, which forms the conceptual framework of this plan, ICRISAT will apply a systems perspective to AR4D.

Keeping in view climate change impacts on agricultural production, ICRISAT's Governing Board has laid special emphasis on research on heat tolerance while strengthening its work on drought tolerance.

I am happy that this project is aligned with our own focus on yield improvement in postrainy sorghum in India, where terminal drought stress is a major constraint. In tune with ICRISAT's regional research focus, postrainy sorghum improvement will be a major area of the work that needs to be carried forward to ensure greater productivity, from the current 600 kg ha⁻¹ to about 850 kg ha⁻¹, an over 40% increase, as set out in the project target.

A year of the HOPE project's implementation has gone by. I learnt that scientists from all the disciplines from different partner organizations have been diligently involved in fulfilling various objectives of the project.

I was told that in all the 7000 fields we worked in under this project in Maharashtra, there has been a considerable increase in sorghum grain and fodder yields, giving farmers additional incomes.

It is time to take stock of the situation and move forward in our approach to consolidate and sustain these gains in the years ahead. I look forward to your inputs in shaping, sharpening and carrying out our current and future sorghum research agenda.

Let me reiterate that the science we do should have meaning for the poor in the SAT, and science and development should go hand in hand to win the war against hunger and poverty. I'm sure the outcomes of your deliberations will speed up this process.

Thank you!

Food vs Cash Crops – What Should the Balance be?



Paper by William Dar, Mark Winslow, Said Silim, Tsedeke Abate and Mary Mgonja (ICRISAT), based on the Presentation (in the CD) made at the Sasakawa Africa Association (SAA) Borlaug Symposium, 14 July 2010, Addis Ababa, Ethiopia.

Thank you very much for inviting us to contribute on a topic that is strategically important for all of us involved in agricultural development. Ethiopia is a country of special interest to us in this regard because of our remarkable partnership on chickpea. Chickpea is an example of a single crop being used for both food and cash. Ethiopia is Africa's largest producer; major international markets are in the Middle East and South Asia. Improved varieties and extension in East Shewa Zone in the Oromia region have resulted in a 90% yield increase (2003-05 average compared with 2008) and 40% increase nationwide. The total production of chickpea jumped from 168 thousand metric tons in 2003-05 to 312 thousand metric tons in 2008. This contributed to skyrocketing export earnings, from \$1 million in 2004 to \$26 million in 2008.

EIAR scientists at Debre Zeit together with a range of partners should be congratulated for their gallant efforts in up-scaling this initiative, training over 5,000 farmers during the 2007-09 seasons. Similar impressive impact has been achieved with another leguminous grain crop, pigeonpea in Tanzania, also serving both food and export purposes (Shiferaw et al. 2008). ICRISAT and EIAR have also collaborated on sorghum improvement for decades, with significant impact. Our distinguished colleague Dr Gebisa Ejeta spent five years with ICRISAT (1979-84) working on introducing striga-resistant sorghum varieties into the region.

As these examples illustrate, in which a crop serves both food and cash purposes, the notion of a single, ideal balance point between food vs cash crops may be too simplistic. However, exploring this question can lead us to some powerful insights that can help us become more successful in reducing poverty and hunger in the developing world.

Inclusive market-oriented development

The World Bank's landmark 2008 World Development Report ('Agriculture for Development') identified a common thread underlying the development of agricultural economies worldwide and over modern history. That common thread was a transition from a rural subsistence enterprise, to an inclusive market-oriented enterprise responding to demand from urban centers. Importantly, they note that poverty and hunger decline as this transition proceeds. In a sense, rural areas use agriculture to capture a share of the growing wealth of cities.

Our own in-depth analyses at ICRISAT, carried out under our long-term Village Level Studies initiative, concur with the Bank's analysis (Walker 2010). We've studied the changes that have occurred over three decades in a number of villages in the drylands in Africa and Asia. Where poverty is declining, it is largely due to improving connections to urban markets that purchased agricultural produce and offered additional employment opportunities.

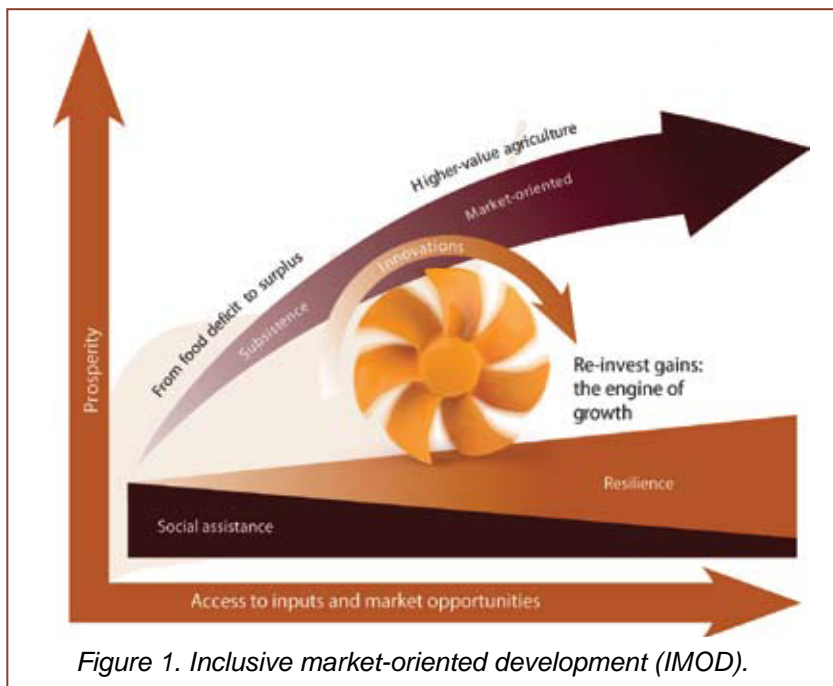


Figure 1. Inclusive market-oriented development (IMOD).

We have adapted this development dynamic to become a conceptual model for ICRISAT’s new Strategic Plan to 2020. This simple diagram (Fig. 1) illustrates the concept:

We refer to this strategy as inclusive market-oriented development (IMOD). It recognizes that any crops that are sold into urban markets become de facto cash crops (since urban areas pay for them with cash). The term ‘inclusive’ is meant to signal that we aim to include the poorest of the poor in our strategy, particularly through the basic food crops that they grow. ‘Orientation’ signals that we consider not only private-sector market drivers but also the social actions and policies that many nations adopt to help the poor to raise staple crop productivity and connect these staple crops to markets in order to reward increases in production. Thus, in the concept of inclusive, market-oriented development, the role of ‘markets’ is broadened and made inclusive of the poor.

In this inclusive market-oriented development context, the ideal balance between food vs cash crops might be stated as a strategy: “ensure food security first, then add income to the extent possible through cash crops.”

Food and (not vs) cash crops

If reductions in poverty and hunger correlate with increasing connections to markets, then rather than seeking a single ideal balance point between food vs cash crops, the important question for development agencies should be, “how

can we foster a sustainable, equitable transition for the poor along the inclusive market-oriented development pathway?” A change in the balance of food vs cash crops will be a logical outcome of this underlying transition. For each farmer the balance will be different, depending on their stage in the transition, particularly their food security status, their access to markets, and their capacities (assets, skills, capital).

At the subsistence end of the spectrum, a farmers’ overriding desire is to feed their families with basic levels of calories and protein. They are unlikely to begin cultivating high-value exotic vegetables and export crops as long as they feel insecure about their own sources of basic nutrition. Governments and donor agencies as well are anxious about ensuring basic food supplies for these extreme poor, because hunger and malnutrition are not conducive to social stability or economic growth. Therefore it lies in the interests of both poor rural farmers and of society as a whole to stimulate staple food crop production increases as the first trigger for inclusive market-oriented development.

Jointly, these groups need to take steps to grow and manage surpluses of staple foods, saving the surplus in emergency food reserves or exporting it, while taking action to moderate grain price fluctuations so that the poor no longer feel food-insecure. In essence, this converts the surplus portion of staple food crop production into a cash-crop commodity, because it involves farmers selling a surplus into markets. This is what we’ve been seeing happen with chickpea and pigeonpea in this region, and good organizations and initiatives are active in this area in addition to governments (eg, Purchase for Progress and Technoserve).

Additional reasons why staple foods such as the major grain crops make sense as the first step along the inclusive market-oriented development pathway are:

- Staple food grains are relatively hardy and productive crops even under sub-optimal growing conditions, and are cheaper and easier to grow than most cash crops, suiting them well to the poorest farmers in the most remote areas;
- Surplus production is readily generated by staple food grain cropping; the mere use of fertilizer plus improved seed can often double or triple yields in developing countries, as the Sasakawa Foundation has demonstrated here in Ethiopia and in other African countries and which also resonates with ICRISAT findings in West Africa and in Southern Africa using a fertilization technique called microdosing (Tabo et al. 2007; Twomlow et al. 2008); and
- Staple food grains are less perishable than most cash crops, so they are more easily stored as emergency food reserves and also more easily transported over bad roads from remote areas to distant markets and ports.

Once inclusive market-oriented development is triggered for staple food crops, the stage is set to expand it into additional high-value cash crops, because the basic experiences and channels for input supply and output marketing have been established. Farmer grain cooperatives, for example, can add new crops to the mix and provide training and inputs. These cooperatives can also leverage their market connections to additionally trade the new cash crops.

Research is an essential component of this strategy, as the chickpea, pigeonpea and sorghum cases illustrate. Research develops new technologies to increase returns-on-investment, ensure equity and sustainability, and remain competitive in the marketplace. At ICRISAT we develop research products intended for the whole range of stages along the inclusive market-oriented development pathway in order to ensure that farmers are enabled to progress each step of the way (ICRISAT 2010).

Awareness of the role of markets provides powerful insight to understand how the food vs cash crop balance will vary across farmers and locations. However, in order to use this concept for effective development, additional dimensions must be included.

A systems perspective

The great man whom we honor in this symposium, Dr Norman Borlaug famously said “working in Africa has been the most frustrating experience of my professional career. The yield potential is there, but you can’t eat potential. We need inputs, access to markets, infrastructure, and credit if African agriculture is to experience a Green Revolution.” (Ortiz et al. 2007).

Dr Borlaug recognized that attention was needed to the entire value chain system, not just improved varieties. We might also ask, how can we ensure that market-oriented development happens in an equitable way, rather than leaving the poorest behind? And how can farmers be protected against investment risks such as drought, which can wipe out their crop? How can farmers be protected against boom-bust cycles of wildly fluctuating market prices? And how can we ensure that the drive to sell to markets does not lead to unsustainable exploitation of the environment? These considerations prompted ICRISAT to qualify its strategic concept to include the notions of inclusiveness, and of market orientation that can include social actions that influence markets in a manner that promotes equity and security as well as income.

All of these considerations lead to the conclusion that a systems perspective is essential in guiding inclusive market-oriented development. We must look beyond single, simple ‘magic bullet’ solutions to understand how they will fit into and succeed in the entirety of the systems in which they function. All the critical components of these systems, ‘from plow to plate’ must be examined

and addressed appropriately so that the ultimate desired impacts — reduced poverty, hunger, malnutrition, and environmental degradation — are truly achieved.

Examples of food systems analysis and interventions have been ICRISAT's help to the National Smallholder Farmers' Association of Malawi (NASFAM) to screen groundnuts for dangerous aflatoxins to meet export safety standards, and to help catalyze a link to Fair Trade importers which resulted in higher prices received by Malawian farmers. This systems perspective-based, inclusive, market-oriented approach is now expanding into Mozambique, Tanzania and Kenya.

Research-for-development contributions

Finally, in addition to the impacts mentioned above we would like to mention some ways in which research institutions such as ICRISAT and its partners in the tropical drylands can further support development agencies in fostering inclusive market-oriented development. Inclusive market-oriented development can be made more effective by better understanding the market connection possibilities of particular target communities. Market access is largely influenced by distance, road condition and urban demand. Geospatial analysis and



modeling tools can reveal such patterns and can include layers of social data that help to understand where inclusive market-oriented development is likely to occur, and why (World Bank 2009). This would provide invaluable information for development institutions.

Market access raises additional questions such as access for whom? We need a better understanding of who the poor really are rather than blending them all together as an average statistic at country level. Different categories of poor have different degrees of entitlement and empowerment in relation to inclusive market-oriented farm activities, eg, women, children, youth, the landless, the elderly, and disadvantaged ethnic groups. This information is needed at local scales so that it can be related to market access and agro-ecological conditions. This kind of in-depth, geo-referenced understanding of rural society is particularly insufficient in Africa today.

Risk assessment is equally important, especially in drylands where climate risk is a major influence on farmer's decision-making. Climate change adds more uncertainty to the mix in the long run. Research is making good progress in understanding and evaluating risk and relating it to climate change and climate variability, and in turn to crop response and profits. Farmers must understand and feel able to handle the risks involved in growing cash crops if they are to successfully negotiate the transition towards inclusive market-oriented development.

As the chickpea, pigeonpea, sorghum, microdosing and aflatoxin cases demonstrate, research can also provide specific technology innovations to increase the value that is generated by inclusive market-oriented development. This higher value in turn creates a stronger incentive for farmers to take the next step along the development pathway through further investment. As described above, however care must be taken not to consider technology innovations in a vacuum, but rather in a systems context so that they serve farmer needs and conditions and therefore become adopted and generate benefits.

Conclusions

The question should not be food vs cash crops; it should be how to make food and cash crops work synergistically to propel farmers out of poverty. Ensure food security first, not in a way that creates aid dependency but rather in a way that makes it a springboard towards market-oriented development.

- In ending, let us remind ourselves of some things that we already know, but sometimes forget to apply in practice:
- If someone has no money, they cannot buy food no matter how cheap it is. We must end extreme poverty.

If farming is not profitable, farmers will not invest in it and improve it.

Let us therefore increase our understanding of the dynamics of poverty escape and inclusive market-oriented development, including their equity, risk and environmental consequences. Food crops and food security come first, but an end to poverty will bring an end to hunger.

Thank you!

References

ICRISAT 2010. (In press.) ICRISAT Strategic Plan to 2020. Hyderabad, India: International Crops Research Institute for the Semi-Arid Tropics. .

Ortiz R, Mowbray D, Dowsell C and Rajaram S. 2007. Dedication: Norman E. Borlaug - the humanitarian plant scientist who changed the world. *Plant Breeding Reviews* 28: 1-37.

Tabo R, Bationo A, Gerard B, Ndjeunga J, Marchal D, Amadou B, Annou MG, Sogodogo DI, Taonda JBS, Hassane O, Diallo MK and Koala S. 2007. Improving cereal productivity and farmers' income using a strategic application of fertilizers in West Africa. in: Bationo, A., Waswa, B., Kihara, J., and Kimetu, J. (eds.), *Advances in Integrated Soil Fertility Management in sub Saharan Africa: Challenges and Opportunities*. Springer. DOI 10.1007/s10705-007-9096-4

Twomlow S, Rohrbach R, Dimes J, Rusike J, Mupangwa W, Ncube B, Hove L, Moyo M, Mashingaidze N and Mahposa P. 2008. Micro-dosing as a pathway to Africa's Green Revolution: evidence from broad-scale on-farm trials. *Nutr. Cycl. Agroecosyst.* DOI 10.1007/s10705-008-9200-4

Shiferaw BA, Tewodros AK, and You L. 2008. Technology adoption under seed access constraints and the economic impacts of improved pigeonpea varieties in Tanzania. *Agricultural Economics* 39: 1–15.

Walker T. 2010. *Updating and Reviewing Future Challenges and Opportunities for Agricultural R&D in the Semi-Arid Tropics for ICRISAT Strategic Planning to 2020*. Hyderabad, India: International Crops Research Institute for the Semi-Arid Tropics.

World Bank 2008. *World Development Report. Agriculture for Development*. Washington DC: The World Bank.

World Bank 2009. *World Development Report. Reshaping Economic Geography*. Washington DC: The World Bank.

Let us Stoop to Conquer



Chief Guest, 28th Installation Ceremony of the Rotary Club of Hyderabad Midtown, 24 July 2010, Apollo Health Street, Jubilee Hills, Hyderabad, Andhra Pradesh, India.

Dr KN Unnikrishnan, President of the Rotary Club of Hyderabad Midtown, Mrs Lea Unnikrishnan, Board of Directors and members of the Rotary Club, Ms Sangita Reddy of the Apollo Group of Hospitals, ladies and gentlemen, good evening!

I would like to thank Rotary Club of Hyderabad Midtown, for inviting me here today for its 28th installation ceremony. I am always drawn by your motto “Building communities and bridging continents” as it echoes my own organization’s credo to serve across two continents; to do Science with a human face. Whether one is building communities or enhancing livelihoods like ICRISAT does, the need to transform lives for the better is what drives people and organizations.

As Rotarians Dr KN Unnikrishnan and Biswadeep Banerjee take over as President and Secretary, respectively today with other office-bearers, I am reminded of the time I took over at the helm at ICRISAT 10 years ago.

It was at a very difficult juncture when both funds and morale were low. I strongly believed that my mission was to serve others first in order to lead. I pledged to transform the Institute so that it could contribute to surmounting the challenges faced by the poorest of the poor in Asia and sub-Saharan Africa. Bringing about institutional change, facilitating an enabling environment, adopting a team-based culture, committed service, and a nurturing spirit were the recipe for the transformation. Hope was rekindled.

Today, I can proudly say that ICRISAT is ready to confront the global challenges faced by agriculture and its debilitating consequences for the poor. When we choose to broaden our ambit of concern and empathize with the plight of others, whether they are close friends or distant strangers, it becomes hard not to act; harder not to help.

For the new office-bearers who are taking over, I would say you need to be the servant-leaders who seek to draw out, inspire and develop the best and highest within people and communities. Hope and faith – great thinkers have always vouched for it. Great leaders have used it to inspire generations, to breathe life and to fill the mind with a lifting, positive attitude. The poor and less privileged deserve a chance and we must show them hope and faith!

As Rotarians, you can provide humanitarian service, encourage high ethical standards in all vocations, and help build goodwill and peace in the world by following 10 simple principles: Have a clear vision and foresight, conceptualize, provide stewardship, be self aware, be a keen listener, empathize, persuade, heal, build communities, and show commitment to people.

South Asia, much more India, is emerging as a new hotspot for malnutrition, disabling poor communities, especially women and children. Child malnutrition stalks 42% in dryland India!

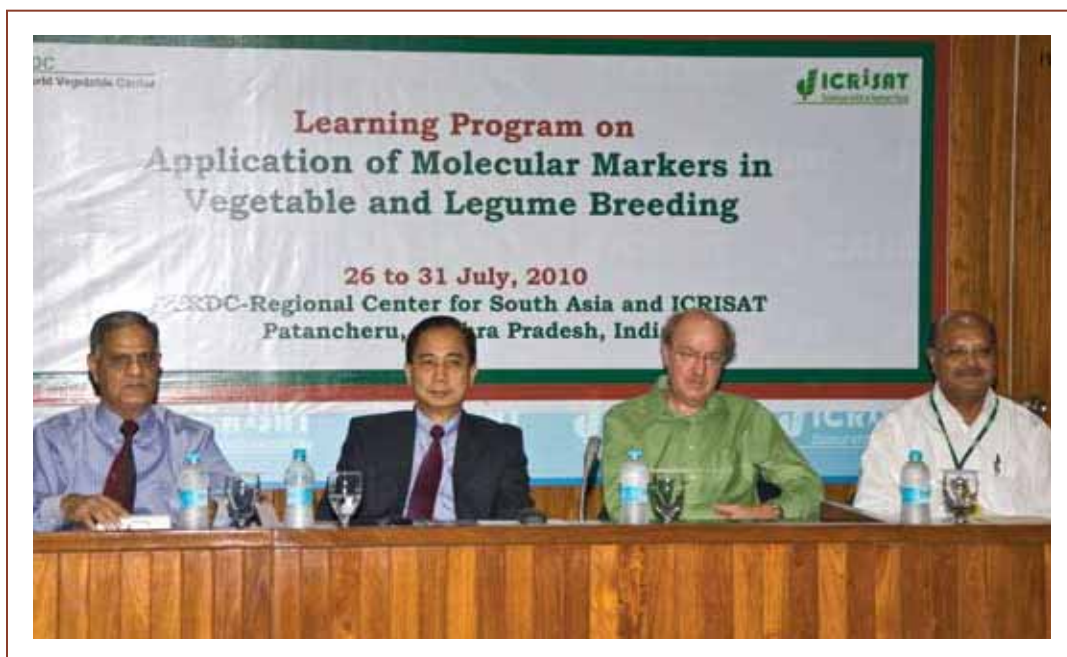
I'm pleased to know that your club is very actively involved in efforts to eradicate polio. This could mean so many more healthy children, leading to healthy communities and a healthy and prosperous economy. Equipped with a healthy population and the power of knowledge, India would be poised for superpower status!

ICRISAT's own research in this direction, aimed at improving nutrition through high-value crops, bio-fortified crops and by empowering women to manage their own enterprises, is paying rich rewards. Our enhanced knowledge-sharing systems are building the capacities of the poor by enabling them to adopt good agricultural practices or telling them about integrated pest management.

ICRISAT is always in the forefront of exploring innovative partnerships which will help bring frontier technological advances to empower communities. Let us together explore avenues for cooperation and commit to redouble our efforts to help rekindle hope in today's generation and aid them to lead a more wholesome and meaningful existence!

Thank you!

Breeding Better Vegetables and Legumes for the Subsistence Farmer



Guest of Honor, Learning Program on Application of Molecular Markers in Vegetable and Legume Breeding, 26 July 2010, ICRISAT-Patancheru, Andhra Pradesh 502 324, India.

Dr Chadha, scientists from AVRDC and ICRISAT, and partners from NARS, NGOs and the private sector in South Asia, good morning!

Welcome to the Fourth Learning program on “Application of molecular markers in vegetable and legume breeding”. This program is meant to share our repository of knowledge and skills in training with public and private sector personnel, participants from partner NARS, NGOs in South Asia as well as CLAN member countries.

A farmer’s greatest desire is to feed the family with basic levels of calories and protein. As long as he feels insecure about his own sources of basic nutrition, there is little scope of his ever moving up beyond subsistence farming. Hence ensuring basic food supplies for the extreme poor is critical, because hunger and malnutrition are not conducive to social stability or economic growth.

Increasing environmental threats of climate change, land degradation and biodiversity loss are adding new dimensions to the challenges of poverty, food insecurity, drought, increasing population pressure and rising costs of food. Together, they are converging to form a perfect storm that will further push the very poor into an abyss!

While the increased cultivation of legumes is essential for the regeneration of nutrient-deficient soils and for providing needed protein, minerals, and vitamins to humans and livestock, they are also a means of improving the livelihoods of smallholder farmers around the world. They stimulate growth in income to producers and earnings to labor through wage effects. Most importantly, vegetables are a rich source of nutrients, important for human health, especially that of women and children.

I would like to highlight our new framework, which is the inclusive market-oriented development (IMOD) pathway. At the subsistence end of the spectrum, a farmers’ overriding desire is to feed their families with basic levels of calories and protein. Farmers who lack access to markets, lack cash, which makes inputs unobtainable, leading to a spiral of low productivity, food insecurity and hunger.

Hence both poor rural farmers and society as a whole need to stimulate staple food crop production increases as the first trigger for inclusive market-oriented development. Once inclusive market-oriented development is triggered for staple food crops, the stage is set to expand it into additional high-value cash crops, because the basic experiences and channels for input supply and output marketing have been established. At ICRISAT, we develop research products intended for the whole range of stages along the inclusive market-oriented development pathway in order to ensure that farmers are enabled to progress each step of the way.

Molecular markers have been shown to be powerful tools for genetic dissections and manipulation of many traits of importance in agriculture. However, their full impact, especially in breeding, is yet to be realized. They have the potential to open up new avenues for vegetable and legume breeding research.

I'm sure the 6-day course that covers molecular marker systems in plant breeding, basic principles and theory of marker-assisted selection in modern vegetable breeding, application of molecular markers in commercial breeding programmes, mapping population, linkage map, QTL analysis and a host of very informative topics will prove very useful to you. Together with the demonstration and audio-visual sessions, the course will enable you to use these techniques and technologies in your respective countries.

Since January 2008, AVRDC and ICRISAT have been conducting research on "Genetic, physiological, and molecular approaches to improve heat and drought tolerance of tropical tomato". Identifying and developing tomato breeding lines with improved drought and heat tolerance through application of genomics, molecular genetics, and effective identification and utilization of genetic resources is an ongoing process.

A total of 160 germplasm lines/genotypes have been subjected to field screening trials and 22 genotypes/crosses will be screened under controlled conditions. Prominent drought-tolerant lines will be selected amongst these genotypes for future breeding programmes.

I would like to mention here that thanks to new techniques for growing vegetables in West and Central Africa, jointly developed by ICRISAT and AVRDC, we were jointly bestowed the prestigious "Science Award for Outstanding Partnership" by the CGIAR during its Global Conference on Agricultural Research for Development (GCARD) in France.

I am sure that together we can do much more to end poverty and hunger. Let us not forget that the poor need our expertise and our products more than ever now!

Thank you!

MS Swaminathan: Thinker and Doer Par Excellence



85th Birthday of Dr MS Swaminathan, 7 August 2010, Chennai, India.

As the face of the world changes and each time one feels an element of doom and despair, one's faith is rekindled to see that there are thinkers and doers who believe that ultimately persistence and a clear vision will prevail. And the picture of one man springs to my mind as I visualize such a thinker and doer – that of Dr MS Swaminathan.

My long and fruitful association with Dr Swaminathan dates back to when I was serving Philippine agriculture in various capacities and he was Director General of the International Rice Research Institute (IRRI) in the Philippines from 1982 to 1988.

As Director General of IRRI, he was among the most popular DGs that IRRI had. I recall that when he returned to Los Banos after almost seven years in 1996, the support staff of IRRI had put up special posters in the town calling him "Tatay" (father) because he had taken personal interest in their well-being, even paying for insurance premia for several of them!

Very few people would be aware that it was Dr Swaminathan who, in a direct meeting, persuaded the then President of the Philippines, Mrs Aquino, to proceed with the setting up of PhilRice, while there was a view circulating that its setting up could mean IRRI "leaving" the Philippines!

I would call Dr Swaminathan a visionary. His fervent plea in 1983 for developing reliable and low-cost *ex-situ* conservation techniques, such as storage under permafrost conditions and in cold desert regions, turned into reality in 2008, with the construction of a Global Seed Vault in the Norwegian village of Longyearbyen on Svalbard Island. He has always been actively involved in *ex-situ* and *in-situ* preservation and conservation of seeds of a variety of plants by professionals and rural and tribal communities in order to safeguard the food security of current and future generations.

His deep involvement and contribution to the conservation and sustainable use of natural resources for the livelihood security of dependent communities extend far beyond agrobiodiversity to playing a critical role in developing the draft Convention on Biological Diversity (CBD) during 1984-90.

He has an almost encyclopaedic knowledge of both the history and the operations of the very complicated CGIAR research system. I would be doing an injustice to him if I didn't admit that but for his intervention, ICRISAT would not have been located in Patancheru. Dr Swaminathan played a critical role in bringing ICRISAT to India, and to Hyderabad, scuttling a rather compelling offer from another State in Central India to locate ICRISAT campus. His intervention with then Indian Prime Minister Indira Gandhi cleared the decks for its location here. Dr Swaminathan has been a true friend to ICRISAT. We have often sought the wisdom of his experience in our consultations and he has been the most sagacious adviser.

Even more impressive to me are Dr Swaminathan's deep understanding and feelings for the billions of impoverished people whom the CGIAR, with its central aim of poverty alleviation through agricultural improvement, serves throughout the developing world. His many personal experiences, in India and elsewhere, have led him to develop a unique and powerful vision of how science can best be delivered to the world's poor.

To him must go the credit for first recognizing the potential value of the Mexican dwarfs. Had this not occurred, it is quite possible that there would not have been a green revolution in Asia. Truly, Dr Swaminathan, the Father of Green Revolution of India, is an icon in agricultural science for development.

An eminent policymaker and inspiring leader, Dr Swaminathan's advocacy of sustainable agriculture leading to an evergreen revolution makes him an acknowledged world leader in the field of sustainable food security. He will go into the annals of history as a world scientist of rare distinction.

Status of Progress Towards UN Millennium Development Goals



Presented at the International Conference on Eliminating Hunger and Poverty: Priorities in Global Agricultural Research and Development Agenda in an Era of Climate Change and Rising Food Prices, 7 August 2010, Chennai, India. (PPT in CD)

Ladies and gentlemen,

Thank you for this chance to share our thinking at ICRISAT on progress made towards the eight Millennium Development Goals. I also want to share our latest thinking on how we plan to accelerate that progress.

Reports suggest that efforts to meet the hunger target have swerved off track. The FAO estimates that the number of undernourished people as of 2009 was 1020 million. So this number needs to fall by 436 million between now and 2015, or by 73 million a year! The goal is achievable in the next 5 years if we shed our “business as usual” way of doing things. What is needed is a new approach to fight hunger.

You will notice that most of the world’s hungry and poor live in rural areas in Africa and Asia. Together China and India account for over 363 million hungry people, followed by 204 million in sub-Saharan Africa. Though Asia has a larger number of poor, it is SSA where the deep pockets of poverty and hunger lie.

The CGIAR with its 15 centers has been associated with some phenomenal successes in agricultural productivity growth and poverty reduction. Half of the land planted with improved crops is grown with varieties of CGIAR ancestry. This has been possible by working with partners. And for every \$1 invested in research by the CGIAR, \$9 worth of additional food is added in developing countries.

Poverty lies at the root of the MDG challenges. Poor people are hungry and malnourished because they cannot afford to buy enough food. Women and children are the last to eat at the table, and are the most affected by malnutrition. Surprisingly, childhood malnutrition is higher in dryland Asia than in Africa (42% vs 27%). The poor cannot afford to pay school fees and they need their children to do farm work. Women who are desperately poor are more likely to become exposed to HIV/AIDS in exchange for income. And the poor cannot afford to replace the soil nutrients that they extract, leading to environmental degradation.

Dryland poverty rates are declining in Asia, but not in sub-Saharan Africa. Why? Analyses by the World Bank and ICRISAT have found that access to markets is key to escaping poverty. Asia’s urban economies are growing strongly, while Africa’s are not. Farmers who learn to sell to urban markets, are able to capture a piece of that growing urban wealth for themselves. Farmers are great entrepreneurs, and given an incentive, will deliver what the market wants in order to escape poverty.

Yet there is the looming presence of the ‘perfect storms’ brewing throughout the world. The perfect storm that I have in mind is a confluence of global warming, loss of biodiversity, poverty and population that is threatening to wash away

or dry out the little that we have. At the center of this storm are the poor, who depend on the land for survival – yet, they are unable to fight off the massive storm clouds that are building.

Based on this understanding, ICRISAT's new Strategic Plan to 2020 focuses on harnessing markets to reduce poverty. We call this strategy IMOD for inclusive market-oriented development. We see it as a dynamic progression from subsistence towards market-oriented agriculture. It starts by increasing the production of staple food crops, converting deficits into surpluses that are sold into markets.

As food security is achieved, market connections are expanded to raise incomes further through high-value crops like fruits, vegetables, export crops, industrial raw materials and other income-boosting products. Farm families have to be assisted along this pathway. Security against risks, access to inputs, stable and profitable markets, capturing a high proportion of the value chain, and access to market knowledge are key. This is where MDG 8, global partnerships to help on all these needs, becomes crucial.

There is of course a risk that market benefits are mainly captured by men. But this does not have to be the case. We must be proactive to ensure that a large share of the benefits go to women and children. This is why the term "IMOD" includes "I", for inclusive. We must understand the roles and constraints of women and overcome those. For example, women have more limited access to land than men, but they are good farmers. Therefore we must give women options that deliver high value from small areas of land such as vegetables and fruits. We must help them form groups that gain access to land, such as this vegetable drip irrigation "Market Garden" cooperative in Ghana.

Through IMOD we can make progress on all eight Millennium Development Goals. This approach attacks the root of the problem in a systematic way that leads to lasting solutions, not band-aids. Instead of creating dependency, it empowers the poor to change their own futures for the better. We and our many partners are just enablers; it is the poor who take centerstage by growing their way out of poverty.

Business as usual will no longer yield results. A smarter, more innovative and better focused approach to reducing hunger is critical. Firstly, it involves investing in agriculture and social protection. Research has proven that investments in agricultural research and extension have large impacts on agricultural productivity and poverty. More moneys into social protection with focus on nutrition and health are also crucial for the poor.

Secondly, there is a need to bring in new players such as the private sector, philanthropic organizations and emerging economy development investors so

that they can provide effective and sustainable investment and innovation to help fight hunger.

Thirdly, adopting a country-led, bottom-up approach is crucial. Effective policies adapted to the local context can help countries maximize the local impact of the global agenda and tap external development assistance. Individual countries need to integrate global issues in developing their own strategies at the country level.

Fourthly, pilot projects and policy experiments can improve policymaking by giving decision-makers information about what works before policies are actually implemented.

Lastly, we need to come good on commitments made to policies and investments to enhance food security.

The numerous policies and agreements to end hunger and poverty will be ineffective in achieving the MDGs and curbing the rise in the number of hungry people, unless we do business as unusual!

Thank you!

Soil Health and Plant Nutrition: Critical Drivers for Food Security



Inaugural Address, International Conference on Plant Nutrition 2010, 11 August 2010, ICRISAT-Patancheru, Andhra Pradesh 502 324, India.

Sri KS Raju, CMD of Nagarjuna Fertilizers and Chemicals Ltd, & Chairman, Fertilizer Association of India, Prof Maarten Chrispeels, Dr Durga Prasad, Convenor of this Conference, distinguished delegates of the International Conference on Plant Nutrition, ladies and gentlemen, good morning!

Welcome to the International Conference on Plant Nutrition 2010 and to the ICRISAT campus. In this part of India, you will see first-hand the severity of the problems of plant nutrition and soil health in the tropics, and how we in the Institute strive to address them to ensure the food and nutritional security of the poor and hungry.

Being experts in the area of plant nutrition, you are well aware of its intricacies and importance in sustainable food production. Your work in plant nutrition is so critical and important because of the need to ensure food for the more than six billion people on earth today. But more important is the need to appreciate and internalize the urgency to help the one billion poor people who go hungry to bed every night.

Most of the world's hungry and poor live in rural areas in Asia and Africa. Together, China and India account for over 363 million hungry people, followed by 204 million in sub-Saharan Africa. The FAO estimates that the number of undernourished people as of 2009 was 1.02 billion. Childhood malnutrition is higher in dryland Asia than in Africa (42% vs 27%). And most of the hungry and malnourished people live where the soils as well as water resources are degraded.

The 21st century has thrown up more challenges at us – increasing land degradation and desertification, growing water scarcity and the need to produce more food to feed an ever-growing population. To compound matters, a perfect storm of warming temperatures, droughts, floods, loss of biodiversity, rising food prices, zooming energy demand and population explosion are creating extreme challenges to feed the world.

Unless we find a way of tackling these crises confronting agriculture today, there is little hope for the poor. But first, we must change our attitude towards the poor. Many of us fail because we only see the world from one perspective. You have the “the bird’s point-of-view” and “the worm’s point-of-view”. Like the eagle, we could fly high and quickly across great distances and from the air see many things that the worm on the ground cannot.

Yet, the worm’s perspective, its understanding of the actual conditions on the ground and mindset of the poor and the oppressed cannot be ignored. We need to strike a balance between these two perspectives to arrive at policies, plans and programs to support the poor and the hungry.

Sustainable and resilient agriculture involves the successful management of agricultural resources to satisfy human needs, while maintaining or enhancing the quality of the environment and conserving natural resources.

Soils in the dryland tropics are not only thirsty but hungry too and are under very high pressure as large number of people are dependent on it for their food, fibre and fuel needs. Plant nutrition is very tightly linked with soil organic matter content as it drives the complete cycle of plant nutrient release and availability. The challenge lies in improving soil organic matter content of tropical soils.

With global warming, the need to enhance our work on capturing more carbon into the soil is essential. There are indications that this strategy will contribute substantially to mitigating and adapting to climate change. Also, developing crops that can withstand high temperatures and drought conditions are necessary.

However, merely finding scientific solutions to problems of soil health and nutrition will not do! More important is the need to make this knowledge available to billions of small, marginal and illiterate farmers in Asia and Africa and elsewhere in a cost-effective manner. How else will they handle balanced plant nutrition on their farms? Unless scientists and change agents work with farmers, they will not be able to fully appreciate their problems.

Over the last 10 years, ICRISAT scientists with partners have been involved in farmer participatory work with 250-600 small farmholders in every micro-watershed in more than 300 micro-watersheds (500 to 1000 ha) in Asia and Africa, to develop cost-effective and scientifically proven soil sampling techniques which are stratified using the toposequence and socioeconomic status of the farmers.

For instance, you will be surprised to know that our on-farm participatory soil analytical research in different states of India revealed that farmers' fields in these states were not deficient in potash (in less than 10% of the fields). However, widespread deficiencies in zinc, boron and sulphur were recorded (in 50 to 100% of the fields) along with nitrogen and phosphorus.

In some districts even with subsistence agriculture and poverty, large number of farmers' fields were showing sufficient levels of phosphorus resulting in its buildup. Such information is crucial for farmers to be able to manage plant nutrition schedules. We have initiated the process of taking the science of soil analysis to the doorstep of farmers to equip them with timely and appropriate information they can use, the right inputs to be used at the right time and in appropriate quantities.

Another challenge lies in mapping nutrient deficiencies over vast areas. It is not enough to invest and establish laboratories, more importantly we need to

train human resources to collect samples, analyze them and communicate the results to millions of small landholders who also need capacity enhancement.

So the roadblocks are not at the level of scientific solutions but at the delivery and operational levels. Once we have evidence and solutions in place, convincing policymakers to come out with appropriate policies for sustainable development is critical. In spite of policies in place, there are situations where timely supply of plant nutrients to farmers becomes a bottleneck, calling for public-private-people partnerships (PPPP). Hence, to get the desired impact of our scientific technologies, we need to adopt end-to-end approaches and consider the value chain of the impact pathway.

Based on this understanding, ICRISAT's new Strategic Plan to 2020 focuses on harnessing markets to reduce poverty and hunger. We call this strategy IMOD, for inclusive market-oriented development. We see it as a dynamic progression from subsistence towards market-oriented agriculture.

It starts by increasing the production of staple food crops, converting deficits into surpluses that are sold into markets. As food security is achieved, market connections are expanded to raise incomes further through high-value crops (like fruits, vegetables, export crops, industrial raw materials) and other income-boosting products. Farm families have to be empowered and assisted along this development pathway.

During the course of this conference, I urge you to keep the small and marginal farmer at the center of your debates and to try to devise end-to-end solutions for the sustainable intensification of systems in the tropics and subtropics.

Ladies and gentlemen, the time to pull the small farmer out of the poverty trap has come. Concentrate your energies on developing sustainable nutrient management options. Let us together pledge to end poverty and hunger today!

Have a fruitful conference!

Thank you!



The Poor of the Drylands Beckon Us



Speech, ICPN 2010 Nutrition Award Function, 11 August 2010, ICRISAT-Patancheru, Andhra Pradesh 502 324, India.

Distinguished Professor Emeritus of Biology, University of California San Diego, Maarten Chrispeels, Dr Durga Prasad, distinguished guests, ladies and gentlemen, good evening!

It is indeed a great honour to have amidst us Prof Maarten Chrispeels, who is here to receive the ICPN Plant Nutrition Award today. Congratulations, Sir!

The threat of hunger looms large in the drylands of the developing world that is home to over 2 billion people, of which 1.5 billion depend on agriculture for a living. Farmers here are most vulnerable since they not only produce food under very harsh conditions but also make a living out of farming.

In addition, agriculture is threatened by a confluence of warming temperatures, droughts, floods, increasing land degradation, rising food prices, zooming energy demand and population explosion, that if unabated, will lead to a 'perfect storm,' creating extreme challenges for the poor and hungry.

ICRISAT has proven innovations in crop, soil and water management that can help farmers better adapt to these trying conditions. Its repository of genes of dryland crops like sorghum, pearl millet, pigeonpea, chickpea and groundnut are well adapted to changes in climatic regimes. ICRISAT has developed and released varieties of these crops that are all more drought tolerant than currently-grown varieties.

Pre-emptive action to replace vulnerable crops with more drought-tolerant ones and efficiently managing natural resources to arrest land degradation, conserve soil moisture and harvest water during the rainy season for supplemental irrigation are equally important for us to help the poor dryland farmer.

More importantly, empowering stakeholders by building capacity, enabling rural institutions and formulating policies that support dryland agriculture should make a big difference. What is needed in particular, is for policymakers to significantly increase public investment in dryland agriculture, research and rural infrastructure and enable collective action and rural institutions for agriculture and natural resource management.

Rehabilitating degraded lands, diversifying livelihood systems and including dryland crops in the minimum support price scheme are other measures that need to be seriously considered.

At the subsistence end of the spectrum, a farmer's overriding desire is to feed his family and to feel secure about his own sources of basic nutrition. Together we can achieve these objectives with quality science and innovations that can elevate the poor from their mediocre livelihoods.

Thank you!

Capacity Building: A Catalyst to Fuel Change



Inaugural Address, Course on Capacity Building for Participatory Monitoring, Evaluation and Impacts of Integrated Watershed Management Program, 16 August 2010, ICRISAT-Patancheru, Andhra Pradesh 502 324, India.

Participants from state-level nodal agencies, and ladies and gentlemen, good morning and welcome to the course on Capacity building for participatory monitoring, evaluation and impacts of integrated watershed management program.

Many centuries ago, Shakespeare wrote:

*“Learning is but an adjunct to ourself,
And where we are our learning likewise is.”*

Today, economic growth is as much a process of knowledge accumulation as of capital accumulation. Economic development is increasingly linked to a nation’s ability to acquire and apply technical and socio-economic knowledge, and the process of globalization is accelerating this trend.

Capacity building is key to promoting sustainable development; it could be building abilities, relationships or even values that will enable organizations, groups and individuals to improve their performance and achieve their objectives. Apart from stimulating economic growth through increased productivity resulting from innovation, knowledge contributes to poverty reduction. Hence capacity building acts as a catalyst that fuels change and involves a wide range of different groups in society.

Over the last 10 years, ICRISAT scientists with partners have been involved in farmer participatory work with 250-600 small farmholders in more than 300 micro-watersheds (500 to 1000 ha) in Asia and Africa. ICRISAT has seen that the pragmatic use of scientific knowledge and low-cost interventions have led to tangible economic benefits for the poor.

Some of the best-bet options that offer opportunities for widespread impact have included cost-efficient water harvesting structures, *in-situ* moisture conservation measures, increased availability and adoption of improved cultivars, efficient use of limited water for supplementary irrigation, rehabilitating wastelands through community participation and reduced use of pesticides with integrated disease and pest management.

However, we need to understand how best to remedy the weakest links in all watershed programs – the reach of technology and information. Farmer field schools for capacity building, computer information hubs in villages, and participatory technology development are there but need to be made accessible to the poor farmer. There is need to promote ICT-based knowledge sharing and agricultural extension to speed up transfer of agro-technologies to watershed villages and to link farmers to markets and to research and development agencies.

Current monitoring and evaluation systems in watershed programs are weak. There is lack of uniformity in what is being measured and lack of baseline data against which progress can be monitored. Some of these topics will be discussed in detail during this course.

In general, any capacity building program should make a clear contribution to achieving sustainable development, whether the focus is on water, climate, or trade. The strategy should be to build self-sufficiency within the community and this is best achieved by starting with knowledge-based activities that deliver tangible results.

Given the looming presence of the 'perfect storms' brewing throughout the world – a confluence of global warming, loss of biodiversity, poverty and population – that threaten to wipe out the poor who depend on the land for survival, the urgency to find remedial measures has never been greater.

As for the participants from the state nodal agencies who are here today, this course will equip you with greater knowledge and tools that will help your organizations deal with the multifarious challenges agriculture faces today.

I wish you fruitful deliberations.

Thank you!

Servant Leadership: A People-Centered Paradigm of Research Management



Speech, National Dialogue on Building Leadership in Agricultural Research Management: Concerns and Future Strategy, 27 August 2010, NAARM, Hyderabad, Andhra Pradesh, India.

Friends and colleagues, good morning!

First of all, let me thank the organizers of this dialogue for inviting me to share my ideas on this relevant topic on building leadership in agricultural research management.

In this age of globalization, genetic revolution, informatization and climate change, we really need to rethink and reshape our paradigm and strategies in managing research.

Ten years ago, I joined ICRISAT at a time when the Institute was facing daunting challenges. ICRISAT was then reeling from the past, marked by low staff morale, financial challenges, and unusual turnover in its governance and senior management. Today, ICRISAT is fully transformed and a high performing institution, a leading center of the CGIAR.

Servant leadership, the main ingredient of this transformation, is the core of my talk today. Robert Greenleaf was indeed right when he first said in 1970 that “servant leadership begins with the natural feeling that one wants to serve, first. Then conscious choice brings one to aspire to lead.”

At heart, the servant leader is a servant first, making a conscious decision to lead in order to better serve others, not to have dominion over them. This is the same feeling I had when I joined ICRISAT. Coming from a farming family, I firmly believed that my mission was to serve others first in order to lead. Servant leadership was my call to transform the Institute in surmounting its tremendous challenges to serve the poorest of the poor.

Together with this, ICRISAT needed a vehicle for institutional transformation. “Science with a human face” then came about. Science is a means that ICRISAT mobilizes in order to serve the poor, not an end in itself.

Servant leadership is the main engine for ICRISAT’s transformation, propelled by science with a human face. Related to servant leadership, let me now share the main drivers of ICRISAT’s transformation.

First is institutional change which made us embrace “science with a human face” as the vehicle for organizational transformation. It laid out the process of pursuing staff and institutional innovations, responsive to the rapid changes in our task environment. Business as usual was junked. Our governance and management team steered ICRISAT into new heights through a culture of scientific excellence, decentralization, transparency, innovative resource mobilization, knowledge sharing and communication.

Second is an enabling environment where we reconfigured the workplace so that our staff are empowered and fully developed to be productive in the organization. Towards this, we pursue innovative management policies and procedures to

enable our people to work in the best conditions across our locations in Asia and sub-Saharan Africa.

Third is a team-based culture where our people work under a collaborative and cooperative spirit. Along with this, we established 'Team ICRISAT' to serve as a social force for organizational change. Likewise, we team up with strategic partners from the public, private and civil society sectors to maintain the quality of ICRISAT's science to benefit the poor.

Fourth is committed service which is responsible for ICRISAT's allegiance to the poorest of the poor of the semi-arid tropics who are our main beneficiaries. ICRISAT is proud of its highly committed staff and partners, helping the Institute to move forward during challenging times.

Fifth is a nurturing spirit where we nourish and sustain the commitment of our staff and partners to serve the poor. In line with this, ICRISAT devotes substantial resources towards ensuring the well being of its staff.

Hence, servant leadership at ICRISAT is pursued on several fronts: proactive governance; decentralized research management; accessibility and visibility; inclusive and team-based work culture; innovative resource mobilization, communication and knowledge sharing and strategic public-private-civil society partnerships. We make these work by pursuing the ten principles of servant leadership espoused by its original advocates.

First is vision and foresight. Vision enables the servant leader to clearly see the future, way ahead of others in the organization. Foresight enables servant-leaders to understand lessons from the past, analyze realities of the present, and envision the likely consequences of a decision in the future. As visionaries, servant leaders always dream of greater heights for the organization.

Second is conceptualization. Servant leaders are good conceptualizers, seeing things at a higher level than others. They think beyond day-to-day realities and look at the organization from a broad and strategic perspective.

Third is stewardship. Servant leaders are stewards who manage and administer what has been entrusted by others. Due to this, stewardship comes with accountability. As stewards, servant leaders manage organizations based on the trust and confidence bestowed by their followers.

Therefore, servant leaders are not organizational proprietors but manage their institutions in trust for the greater good.

Fourth is self-awareness. General awareness, and especially self-awareness, strengthens servant leaders. By being highly aware of themselves, they are comfortable with their followers and clear about their likes and dislikes. At a

broader level, they are sensitive about events in the task environment and their impact on the organization.

Fifth is listening. Conventional leaders are esteemed for their good communication and decision making skills. Servant leaders further complement these skills by making a deep commitment to listen intently to their followers.

Servant leaders also continuously seek to identify and establish group consensus. Hence, they closely listen to what is being said (and not said).

Sixth is empathy. Servant leaders always seek to understand and empathize with others. They experience the same emotions that other people feel, blurring the line between self and others. This way, followers feel a sense of belongingness to the organization.

Seventh is persuasion. Servant leaders use persuasion rather than authority in managing organizations. Servant-leaders seek to convince rather than coerce followers. The servant leader is effective at building consensus within groups. This principle clearly distinguishes the servant leader from the traditional leader.

Eighth is healing. Healing is a powerful force for institutional transformation and integration. One of the great strengths of servant leadership is the ability to heal personal feelings and human relationships. In the organization, servant leaders use their influence to heal relationships among individual followers, groups and communities of practice.

Ninth is community building. Servant leaders are community builders and harness these to make organizations the primary molder of human lives. Towards this, servant leaders constantly seek to build coherent communities among those who work in the organization.

Tenth is commitment to people. Servant leaders believe that people have an intrinsic value beyond their tangible contributions as workers. As such, servant leaders are deeply committed to the personal, professional and spiritual growth of each individual within the organization.

In sum, let me paraphrase Robert Greenleaf on becoming a servant leader. Servant leadership is internalized only through personal experience.

In serving others first, we come to a conscious choice that creates our desire to lead. It is through the process of serving others, searching the unknown, exploring uncharted waters, growing oneself and others, listening deeply, confronting fear, healing conflicts and converting one's failures as great learning opportunities that we become true servant leaders.

As I close, let me mention that several crises confront global agriculture today, and their confluence, if unabated, will lead to a 'perfect storm.' Warming

temperatures, droughts, floods, increasing land degradation, loss of biodiversity, rising food and energy prices, and population explosion are creating extreme challenges to feed the world, especially the poor. Preventing this perfect storm is the biggest challenge we will face as servant leaders of the poor and the hungry.

Based on this understanding, ICRISAT's new Strategic Plan to 2020 focuses on harnessing markets to reduce poverty. We call this strategy IMOD, for inclusive market-oriented development. We see it as a dynamic progression from subsistence towards market-oriented agriculture. It starts by increasing the production of staple food crops, converting deficits into surpluses that are sold into markets.

As food security is achieved, market connections are expanded to raise incomes further through high-value crops like fruits, vegetables, export crops, industrial raw materials and other income-boosting products. Farm families have to be assisted along this pathway. Security against risks, access to inputs, stable, profitable markets, capturing a high proportion of the value chain, and access to market knowledge are key.

We must therefore team up and enhance our alliances with other servant leaders across the globe to help the poor and the hungry weather this perfect storm. United by the principles I earlier mentioned, I am confident that we will make this happen.

Thank you and good day!

Pulses for the Poor



Keynote Address, Pulses Conclave, 4 September 2010, ICRISAT-Patancheru, Andhra Pradesh 502 324, India.

Ladies and gentlemen, good morning!

First of all let me welcome you to the Pulses Conclave. I deeply thank you for coming even as we are holding this event on a weekend.

During the last several years, we have seen agricultural research and development focusing on staple cereals. Pulses like chickpea (*chana*) and pigeonpea (*arhar*), traditionally grown in rotation with cereals, were largely ignored. This constrains the poor from accessing a rich and cheaper source of protein.

Climate change and soaring prices will likely keep pulses away from the plates of the poor. This will aggravate malnutrition since per capita protein availability in India is very low at 10 grams per day. Pulses increase incomes, improve soil fertility, sustain cropping systems and help smallholder farmers get out of poverty. Hence, there is a strong imperative for us to increase the production of and income from pulses.

India is the world's biggest producer and consumer of pulses. But India still imports \$94 million worth of chickpea and \$117 million worth of pigeonpea every year. Therefore, it needs to mobilize innovations and delivery and support systems to ensure that these pulses are sufficiently produced locally. Our battlecry and our shared goal should be that India should be self-sufficient in pulses.

Science has developed available technology to increase the production and productivity of pulses. A strong delivery system and empowered farming communities are also necessary. Working together, federal and state agencies, agricultural research institutions, the private sector and civil society organizations including farmers organizations could help bring about self-sufficiency in pulses in India.

Although chickpea is a cool-season crop, its area has expanded to warmer short-season environments in Madhya Pradesh, Maharashtra, Andhra Pradesh and Karnataka. This has been largely due to the availability of short-duration, high-yielding varieties. This means that the crop can be successfully grown in Central and Southern India provided that improved technologies are practiced effectively by farmers with adequate support from government.

One of ICRISAT's biggest success stories is the chickpea revolution in Andhra Pradesh. The Government of Andhra Pradesh had and continues to have the political will to make this a reality. Due to improved technology, chickpea production increased 24-fold in the state from 36,900 to 884,000 t during the past 20 years. About 80% of the chickpea area in the State is cultivated with improved varieties like JG 11, JAKI 9218, ICC 37, KAK 2 and Vihar developed through collaboration with ICRISAT.

Coming to pigeonpea, ICRISAT has developed varieties that have elevated the crop to new niches. In the hilly terrain of Uttarakhand, traditional pulses yield

only 200 to 300 kg ha⁻¹, leading to a large protein gap among the population. Together with the Uttarakhand Government, ICRISAT demonstrated that its pigeonpea variety ICPL 88039 can produce over 1,000 kg ha⁻¹ with minimum inputs. The results proved us right. Moreover, pigeonpea has proven to be an ideal crop in rotation with wheat in the northwestern plains of India.

In China, ICRISAT works with the government on a large-scale soil conservation program in over 150,000 hectares. The pigeonpea produce is also used for food, feed and fodder. We are also proud to announce that ICRISAT has developed the world's first pigeonpea hybrid yielding 3 to 4 t ha⁻¹ in farmers' fields in Andhra Pradesh and Maharashtra. This new hybrid pigeonpea technology can serve as a springboard of the pulse revolution in India.

In Andhra Pradesh, a hybrid pigeonpea farmer yielded more than 10 tons seed from eight acres and received the most prestigious 'Best Farmer of Andhra Pradesh' award. This technology is now spreading rapidly with support from ICAR and public and private seed producers.

In pigeonpea, the availability of genetically pure seeds is a major constraint. Seed shortage is high and maintenance of genetic purity due to out-crossing is a major concern. ICRISAT and ICAR are jointly addressing this issue. We continue to generate and share appropriate technologies, strengthen crop improvement and develop climate change-ready cultivars of pulses. In addition, we are establishing efficient seed systems, providing market linkages, improving the conservation and efficient use of water and enabling policies to increase the competitiveness of pulses.

ICRISAT's New Strategy to 2020 emphasizes the importance of harnessing markets to bring about prosperity among farmers. This strategy is anchored on "inclusive, market-oriented development" which brings about prosperity through a dynamic progression from subsistence to market-oriented agriculture.

At this juncture, let me thank our partners, the Indian Society for Agri-business Professionals and Agriwatch for organizing this timely conclave. With the convergence of good ideas, I am confident that we will address the most pressing issues for pulses to ultimately benefit the poor. We hope that by the end of this Conclave we shall have formulated the roadmap of pulses self-sufficiency in India and will implement the same on a war footing.

We must do it! Together, we can do it!

Thank you!

Awaken your Entrepreneurial Spirit!



Keynote Address, Entrepreneurship Development Workshop on Establishing and Managing a Commercial Sweet Sorghum Syrup Enterprise for Food Application, 27 September 2010, ICRISAT-Patancheru, Andhra Pradesh 502 324, India.

Mr JC Sharma, Principal Secretary to the Government of Andhra Pradesh (Food Processing); Ms K Rama Devi, President, ALEAP; Dr Mohan Rao, Director, Khadi & Village Commission, Andhra Pradesh; ladies and gentlemen, good morning and welcome to the Entrepreneurship development workshop on Establishing and managing a commercial sweet sorghum syrup enterprise for food application.

We know that crop diversification minimizes the risk of crop failure that might result from the vagaries of climate and also helps farmers increase their incomes. Farmers in the moderate climate of the drylands can choose from a wide variety of crops for diversification. Many of these are high-value crops with tremendous market potential. ICRISAT's work on diversification hinges mainly on the objective of improving the livelihood options of the farmer.

Based on this understanding, ICRISAT's new Strategic Plan to 2020 focuses on inclusive market-oriented development or IMOD, which is a dynamic progression from subsistence towards market-oriented agriculture. It starts by increasing the production of staple food crops, converting deficits into surpluses that are sold into markets.

We aim to contribute to inclusive market-oriented development through four Strategic Thrusts, among which Thrust 2 on Markets, institutions and policies will focus on interventions that enable the poor to harness markets. It includes public-sector incentives that influence markets, such as government and development-agency policies and assistance that encourages farmers to invest in agricultural growth while managing risks and vulnerabilities. A particular objective is to capture as much of the value in the chain as possible for the very poorest groups.

Strategic Thrust 3 on Dryland cereals to increase productivity to help end hunger, aims to build on food-fodder-fuel sorghum types to capture income opportunities in bio-ethanol and livestock markets in India and Africa.

To go back to the origin of ICRISAT's research and development of sweet sorghum varieties, we can proudly say that R&D for forage and fodder started way back in 1980. Work on the crop for ethanol production took off in 2002.

Now we have moved further on. NutriPlus Knowledge Center (NutriPlus) at the Agri-Science Park@ICRISAT, supported by the Government of Andhra Pradesh, has developed a method to obtain clarified sweet sorghum juice for food applications. NutriPlus was set up to serve as a platform to develop and promote value-added products and food processing technologies, and conduct research to create knowledge in order to deliver high-value food products and processes. This is done with the objective of sharing knowledge in the area of food science and technology among entrepreneurs and the food industry.

NutriPlus' activities are geared towards providing world-class facilities and supporting new ventures to meet ICRISAT's mandate of ensuring nutritional security and poverty alleviation and improving the livelihoods of farmers in the semi-arid-tropics. It will also provide support to entrepreneurs in the food industry through innovative research and development and entrepreneurship development programs.

NutriPlus has successfully demonstrated the use of sweet sorghum syrup as an alternative sweetener in bakery items, energy bars, breakfast cereals, sugar confectionery and fruit-based products. Beverages can also be made by reconstituting sweet sorghum syrup. We have developed a refreshing sweet sorghum-based ready-to-serve (RTS) drink.

This workshop, the first of its kind, is being organized to create awareness about the potential of sweet sorghum in food applications among prospective entrepreneurs, to enable them to start their own, small and medium business enterprises. It will deal with harvesting sweet sorghum and processing of its juice to syrup, setting up of sweet sorghum processing units, the technology involved, quality control and also provide a business perspective.

The workshop will also cover in detail the business model for setting up processing units at micro/small and medium levels, including potential sources of funding. This will be followed by an Entrepreneurship Development Program wherein select entrepreneurs will be helped in business incubation jointly with our Agri-Business Incubator.

I would like to take this opportunity to thank the Government of Andhra Pradesh for their support till now for Phase I of the NutriPlus project. We are currently awaiting the release of funds for the critical Phase II of the project. These funds will be used to establish an extrusion pilot plant and to upgrade the product development laboratory with a state-of-art sensory science facility, to evaluate products developed in the pilot plant.

I'm sure this workshop will lead to a sharing of new ideas and also awaken the entrepreneurial spirit in you. I wish the workshop success.

Good day!

Honing Agri-businesses, Maximizing Agricultural Impacts



Special Address, Orientation Program for Mentors and a Seminar on Best Practices in Agri-Business, 28 September 2010, ICRISAT-Patancheru, Andhra Pradesh 502 324, India.

Mr VR Muthu, CEO, Idhayam Group of Companies, mentors from across the nation, BPD managers and team ICRISAT, good morning and welcome to the NIABI Mentor's Orientation Program-cum-Seminar on Opportunities and Challenges in Agri-Business.

Modernizing the agro-food system can be a strong engine for direct and indirect growth and poverty reduction in developing economies. This can be achieved by reducing food costs and supply uncertainties and improving the diets of the rural and urban poor; generating growth, increasing and diversifying incomes, and providing employment and entrepreneurial opportunities in both rural and urban areas; and inducing productivity gains by smallholder farmers to increase their opportunity for income generation and better integrating them into markets.

Agro-enterprise activity furnishes crucial inputs and services to the farm sector, thus improving the latter's cost competitiveness and the quality and safety of its products. It also provides inputs and services to manufacturing and downstream activities (processing and commerce), both of which influence the profitability of farming itself. These help poor farmers integrate their activities with consumers.

It was the need for innovation, entrepreneurship and technology commercialization felt by stakeholders in agricultural R&D that led to the innovative institutional system of agri-business incubators. Done properly, agri-business incubators can help local communities to raise agricultural productivity, link farmers to markets, reduce crop risks and vulnerabilities and enhance environmental sustainability.

ICRISAT's new strategy to 2020 is strongly anchored on harnessing markets to reduce poverty and hunger. We call this strategy IMOD, for inclusive market-oriented development. We see it as a dynamic progression from subsistence towards market-oriented agriculture.

ICRISAT will strive to do so by employing a systems perspective to set priorities and purposeful partnerships, through four research for development strategic thrusts on Resilient dryland systems, Markets, institutions and policies, Dryland cereals and Grain legumes.

The emergence from subsistence to market-oriented agriculture reduces poverty since markets create demand for a wider diversity of higher-value foodstuffs and agro-industrial products stimulating agro-enterprises that raise rural incomes and create opportunities beyond agriculture. Farm families have to be empowered and assisted along this development pathway.

ICRISAT's Agri-Business Incubator (ABI) facilitates the creation of competitive agri-business enterprises through technology development and commercialization to benefit farmers in the semi-arid tropics.

ICRISAT, through ABI has established a Network of Indian Agri-Business Incubators (NIABI), with the support of the National Agriculture Innovation Program (NAIP) of the Indian Council of Agricultural Research (ICAR). NAIP is funding Business Planning & Development (BPDs) units or business incubators to support entrepreneurs in agri-business through commercialization of technologies.

ABI-ICRISAT has established a co-business incubation platform with these BPDs which is unique in building synergies nationally and creating momentum for entrepreneurship development in agri-business.

These new initiatives call for the effective management of incubators and the involvement of professional organizations to give an impetus to agricultural development and to benefit entrepreneurs and farmers. Incubators are important for agricultural and industrial agri-business sectors, where technology has to be a precursor for improving the economic, social and environmental conditions of rural communities.

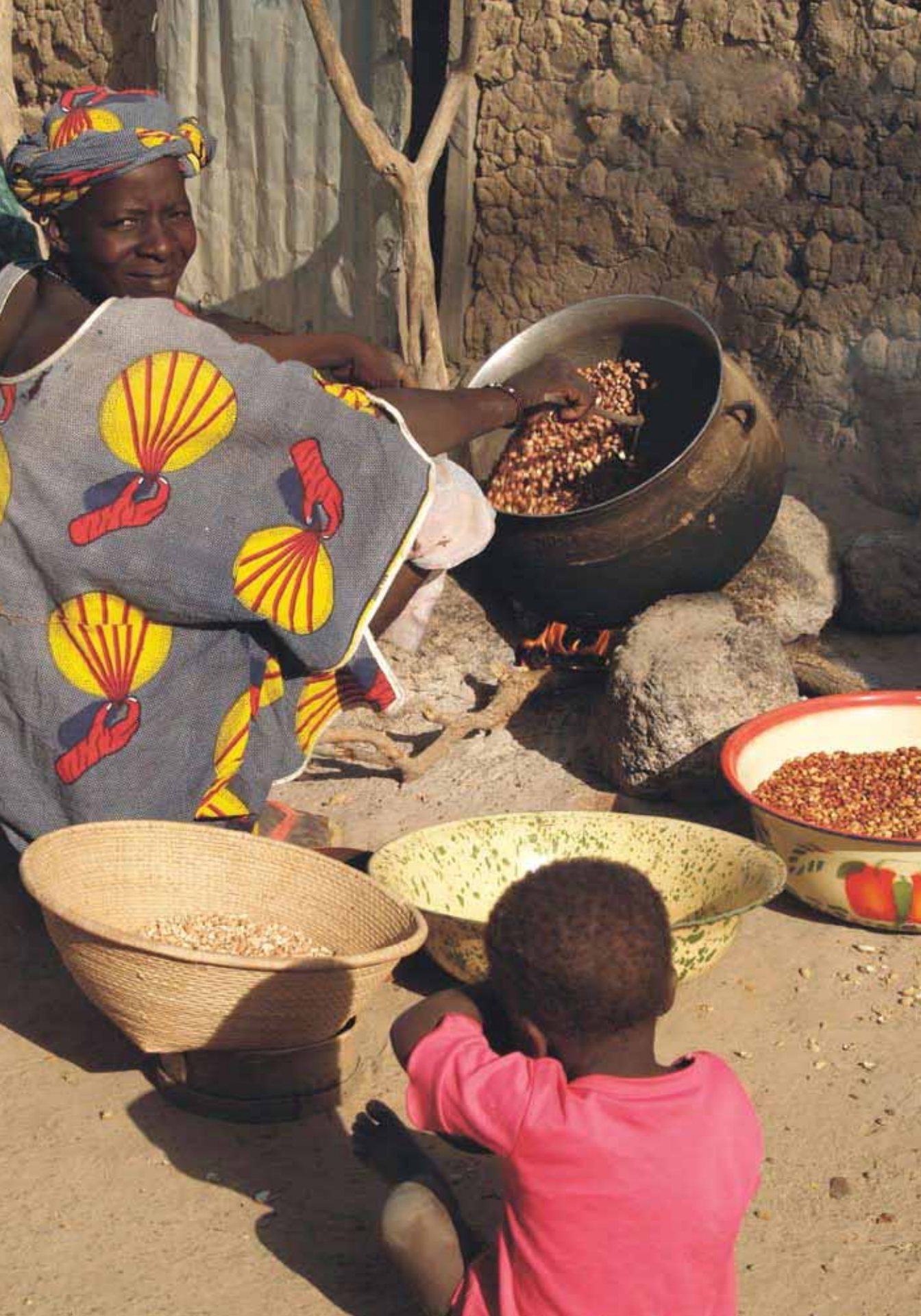
ABI has identified and selected around 60 mentors from across the nation for its NIABI platform. The mentor orientation program will involve networking of agri-business incubators across the country to maximize agricultural impacts by encouraging innovators, mobilizing a pool of commercial technologies, and thereby maximizing benefits to farmers.

ABI's network will provide an excellent platform for the exchange of ideas, share successful experiences, identify R&D areas, and develop future partnerships. We have identified from across the nation experienced professionals in agri-business and allied sectors with domain expertise who would be mentoring these ventures successfully.

By helping nurture innovations and entrepreneurship in agriculture, ABI fulfills ICRISAT's mission of eliminating poverty and improving livelihoods.

I would like to thank Mr Muthu for sharing his thoughts on and experiences in agri-businesses which will greatly benefit the mentors and BPD managers in their endeavors. I wish this program great success.

Good day!



Agricultural R4D: A Catalyst for Food and Nutritional Security



Panelist, 3rd Agriculture Leadership Summit on Food Security Challenges and Road Ahead (Foreign Representatives Section), 29 September 2010, PUSA Campus, New Delhi, India.

Dignitaries on the dais, ladies and gentlemen, good evening!

The International Crops Research Institute for the Semi-Arid tropics envisions the improved well-being of the poor of the semi-arid tropics. Its mission is to reduce poverty, enhance food and nutritional security and protect the environment of the semi-arid tropics by helping empower the poor through Science with a human face.

We believe that the world's farmlands can be the frontline for the battle to feed the one billion hungry people in the world and a projected population of 9.1 billion by 2050! This will mean that global agricultural production will need to grow by 70% by then!

In India, small farmers constitute about 80% of the farming community and hold approximately 39% of total agricultural land, feeding its population of 1.15 billion. The average agricultural sector growth over the last three years has remained at around 4.7%.

The key challenges facing Indian agriculture today are ensuring household food and nutritional security, increasing farm income, alleviating poverty and minimizing production risks due to climate change, in addition to ensuring overall natural resource management and environmental security.

Innovative policies, appropriate institutional arrangements and market-driven technologies can harness untapped opportunities to provide benefits to the farming community.



Greater emphasis on the seed sector, input use efficiency, financial and insurance institutions and a paradigm shift in technology transfer mechanisms can bring India closer to food security.

Increasing agricultural productivity is critical to ensure food security. This can happen by bringing new land into agricultural production, increasing the cropping intensity on existing agricultural lands, and by increasing yields on existing agricultural lands. Rainfed areas have potential to raise production. Yields from rainfed agriculture may fall by as much as 50% by 2020 if production practices remain unchanged.

India is home to 40% of the world's malnourished children, 35% of the developing world's low-birth-weight infants and 2.5 million child deaths each year. India's future will be in weak hands unless we tackle poverty and malnutrition hand in hand. There has been a skewed preference for cereals in agricultural research and development, with pulses and other nutrients being sidelined. It is shocking but true: per capita protein availability in India is a mere 10 grams per day!

Nutritional security will be possible by ensuring a judicious macronutrient-micronutrient mix in diets, growing hardy nutritious and quick crops and indigenous vegetables. There is also need to encourage the production of value-added foodstuffs and diverse food groups. India needs to mobilize innovations and delivery and support systems to ensure pulses are sufficiently produced locally. Science and technology are at our disposal to do so.

Meeting this demand, together with the daunting challenges being faced from climate change, water scarcity, bioenergy and land degradation, puts enormous pressure on the agricultural sector. Several crises confront the world today, and their confluence makes up a rising 'perfect storm.'

Building on assessments of six climate models and two crop modelling approaches, Cline (2007) concludes that global agricultural output could decrease between 6-16% by 2080, assuming a 4.4 degree increase in temperature and 2.9% decrease in precipitation, depending on the effects of CO₂ fertilization.

ICRISAT's climate change 'Hypothesis of Hope' for the semi-arid tropics states that how farming systems cope with current rainfall variation is likely to yield important clues for adapting to future climate change. High yields are still possible under climate change if farmers combine improved practices with climate-adapted crop varieties.

On the whole, food security calls for a dynamic agriculture for development agenda that harnesses the power of science and technology to double food production. For inclusive growth to occur, ensuring women and child nutrition is very important. Policy initiatives will have to help develop skills and knowledge of resource-poor farmers, increase their income levels and help empower them.

More importantly, policy changes need to be transforming in nature, which calls for inspirational leadership.

In addition, linking farmers to markets is critical to boost farm production and farmers' income. This will check the widening rural-urban disparity, and diversify rural livelihood options covering crop, livestock, fisheries and horticultural activities.

ICRISAT's new strategy to 2020 hinges on inclusive market-oriented development, to help the dryland poor attain a whole new level of resource access, stability, security and productivity, so that he can grow out of poverty.

Therefore, by increasing the resilience of agricultural production systems and formulating the right policies, the farmer of today can hope for greater empowerment for the future. Together, we can empower him!

Thank you!

Use it or Lose it: Agrobiodiversity for Market-oriented Smallholder Prosperity



Chief Guest, Inaugural Session, International Symposium on Agrobiodiversity in the Asia and Pacific Region, 13 October 2010, Suwon, Republic of Korea.

Ladies and gentlemen, good morning!

I would like to first thank our distinguished APAARI Executive Secretary Dr Paroda for inviting me to share with you ICRISAT's views on agrobiodiversity. In fact, ICRISAT's gene bank is named in honor of Dr Paroda, because he was a passionate advocate for preserving agrobiodiversity when he served on our Governing Board.

Our gene bank is helping to conserve five important dryland crops: sorghum, millets, groundnut, pigeonpea and chickpea. It holds more than 119,000 diverse landraces and wild relatives collected in 144 countries. It is held in trust for all of humanity and is now being duplicated in Svalbard, Norway for backup security.

My friends and colleagues, the agricultural research-for-development community has made an astounding contribution to human welfare over the past half century. In the 1960s, many feared that a catastrophic famine in South Asia was inevitable. Yet, through science our leaders, scientists and development workers created a Green Revolution and famine was avoided. It has been one of humanity's greatest success stories.

While we celebrate the Green Revolution, we cannot rest on our laurels. Our work is not finished. We see that farmers have been provided with fantastic technology for raising cereal grain yields, yet hundreds of millions of people continue to go to bed hungry and malnourished each night. Did you know that even in this day and age of glittering high-tech cities and booming economies, nearly half of our children in the dryland areas of South Asia are malnourished?

The root problem is poverty. They are simply too poor to buy even the very cheap grain that is available today. And even if they could, grain alone will not provide them the well-balanced diet that they need to cure their malnutrition.

Most of these poor live in rural areas and depend on agriculture for a living, so we must look for agricultural solutions. Over the past year at ICRISAT, we have been intensively consulting with staff and partners to create a new Strategic Plan to 2020 that aims to help these poor to escape poverty for good.

The central concept in this new Strategy is what we call inclusive market-oriented development. The key idea here is to harness markets to work for the smallholder farmers, increasing their incomes greatly. To do this, we need to provide these farmers with higher-value crop options that they can sell to urban consumers. And this brings us directly to the issue of agrobiodiversity.

Many of us who grew up on small farms remember that our elders ate a very diverse range of foods, including foods collected from the wild. Today, with wild lands shrunken and degraded and much higher human populations, the rural poor have very limited diets based on just a few of the cheapest foods. Even

when their bellies are filled with starch, they often lack the protein, vitamins and minerals needed for good health. Women and children, who are the future of Asia, are especially debilitated by malnutrition. Our future is being compromised right before our eyes.

We also remember how our elders valued certain landrace varieties of crops for their special taste or appearance or easy cooking or storage ability or other traits. These advantages attracted higher market prices for these varieties. Sadly, many of these landraces have vanished, and with them their nutritional benefits and their adaptation traits that could have helped a world facing climate change.

ICRISAT's inclusive market-oriented development strategy stands up to these challenges. It views agrobiodiversity as a crucial tool for raising farm incomes while diversifying diets to end malnutrition. And by adding value to farming, farmers will have an incentive to preserve and sustain this agrobiodiversity for future generations, leading to environmental security.

A huge range of options is available. Many successes worldwide are documented for vegetables, fruits, grains, herbs, spices, condiments, medicinal crops, energy crops, and industrial specialty crops. The answers are all around us; we can still find important pockets of diversity that have improved human well-being substantially. The spices and teas grown in the hills of Kerala in India, in Sri Lanka and in the Himalayan foothills for global export; vegetable gardens in rice rotations in East Asia; the rich and unique fruit tree resources grown across Asia's tropical latitudes; high-value, hardy small goats, chickens and pigs raised by women and children in the homestead, and wild fish that provide essential protein for the family diet; and many more examples could be cited. These agrobiodiversity resources are a treasure trove of potential value for smallholders and humanity in general.

Sometimes we underestimate what smallholders can achieve. We focus on their constraints and overlook their strengths. On a small farm, human knowledge and hand labor can provide the special care that is required for growing high-value crops and animals. Grain crops, on the other hand, have been mechanized in many parts of the world; so it is difficult for smallholder farmers to compete with these crops. In a globalizing world, we all have to capitalize on our comparative advantages. Agrobiodiversity is a huge comparative advantage for smallholder farmers that we must help them to exploit.

The title of my talk begins with "use it or lose it". This is a key message. While gene banks provide a crucial strategic backup against losses of agrobiodiversity, it is impossible to collect and preserve every landrace. And in storage, these landraces do not continue to evolve, to adapt to a changing world. Even more significantly, the knowledge that farmers accumulated over generations about

the special traits of each landrace, is lost. Genetic erosion is also accompanied by knowledge erosion.

Gene banks must be complemented by greater *in-situ* use and conservation of agrobiodiversity. By helping farmers to access markets and earn money from this diversity, we can create a sustainable mechanism for preserving it for posterity.

As an outcome of our new Strategic Plan, we are accelerating this type of research. For example, leaves of the “miracle tree” Moringa and the “Pomme du Sahel” *Ziziphus Mauritania* fruit are very rich in vitamins and in strong demand in the parched Sahel zone of Africa. Small-scale drip irrigation there is expanding rapidly as it enables a much wider range of species to be cultivated year-round.

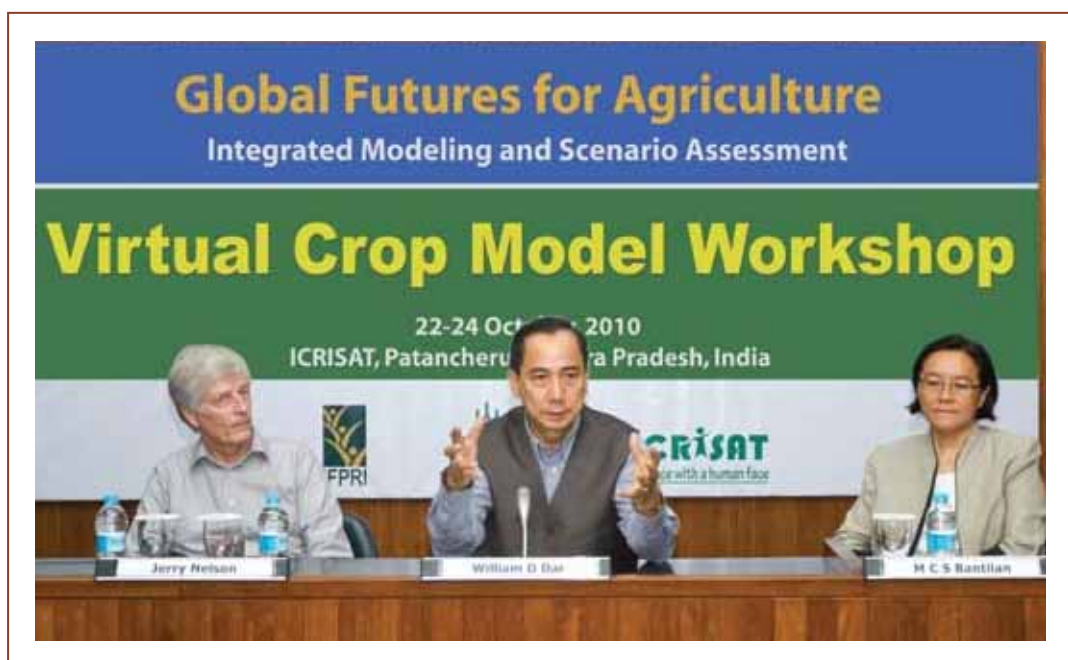
These small “market gardens” can be tended by women’s groups to both increase their incomes and diversify their family’s diet, multiplying their incomes by severalfold, to \$1500 on only 500 square meters – more than ten times higher income than they can get by growing millet. Even without irrigation, rainwater harvesting can help the poor cultivate seasonal fruit trees and high-value vegetables such as okra and *Senna obtusifolia*, a local traditional leafy green. Diversification builds on the Sahel tradition of integrating trees with annual crops. It would be tragic if this diversity and knowledge resource is lost. The same is true here in Asia and the Pacific.

Our vegetable research-for-development is strongly reinforced by partnership with AVRDC, the World Vegetable Center. We also work on forage feed resources that help to sustain diversified smallholder livestock enterprises both in Africa and Asia. Feed shortages are often the limiting constraint for animal-raising for rural poor households.

My friends and colleagues, I hope these comments convey our excitement about the opportunity for using it - so that we do not lose it. There is much to be done to bring this vision to reality. We are rolling up our sleeves and getting the job done. It is a partnership-based strategy, so we need you on board. Together, let us help to end poverty, hunger and malnutrition in Asia and the Pacific through inclusive market-oriented development with a systems perspective that harnesses agrobiodiversity for the benefit of the smallholder farmers and the poor.

Thank you!

Virtual Crop Modeling Key to Critical Smallholder Farmer Decisions



Welcome Address, Joint Biophysical Scientist-Social Scientists Virtual Crop Modeling on High Performance Cluster Training, 25 October 2010, ICRISAT-Patancheru, Andhra Pradesh 502 324, India.

Good morning!

I would like to welcome colleagues from our sister institutes CIMMYT, CIP, IRRI, ILRI, ICRAF, IFPRI and those from ICRISAT, who are here to attend the Technical working group meeting and the Virtual Crop Modeling on High Performance Cluster Training program.

The world is facing enormous challenges which are likely to intensify in the coming decades. The confluence of a growing population, climate change, food and energy crises and several other critical environmental and social uncertainties make food security harder to achieve.

Reports suggest that efforts to meet the hunger target have swerved off track. The FAO estimates that the number of undernourished people as of 2009 was a staggering 1020 million! At the center of this maelstrom are the poor, who depend on the land for survival. The major challenge will be how to feed 9.6 billion people by 2050! The need to explore pathways to sustainability is imperative for a positive transformation.

Interactions among co-evolving human and environmental systems are highly complex and inherently uncertain. Scenarios serve as renderings of plausible possibilities, designed to stretch the imagination, stimulate debate, and, by warning of pitfalls ahead, prompt corrective action.

What is needed is a new approach to fight hunger. For instance, we need to understand the biophysical impact of climate change on crops and the impacts of changes in both the mean and extremes of climate, which could have implications in terms of time to maturity of a crop, drought and heat stress and are likely to be increasingly important.

The importance of getting right planting dates, geographies and crops is critical as the need for good, timely decisions and a decision making process has greatly increased. Use of crop simulation models incorporating local climatic conditions with management operations may increase the farmer's ability to make more timely and educated decisions.

You are all key potential players in the "Global Futures for agriculture: Integrated Modeling and Scenario Assessment" project, to develop an improved version of IFPRI's International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT). It will assess how changes in global trading regimes, mandates for biofuels and energy prices, land degradation and climate change affect human well-being and consider how these trends affect developing countries' progress towards achieving Millennium Development Goals.

During this training program, you will be actively involved in evaluating the potential of promising technologies using a systems perspective and an

integrated modeling framework which include different models like crop growth, hydrology and IMPACT. Improvements to the IMPACT model will make it possible to more effectively evaluate potential research expenditures and their impact on the world's most important crops, forests and livestock.

The research will focus on regions most vulnerable to global changes in the next 30 to 50 years, with special attention on the rural poor and smallholder farmers. The analysis will improve upon previous research by incorporating detailed location-specific data; climate, soil type, crop variety and other critical variables; improved measurement of effects on human welfare; and the impact of potential agricultural investments on economic growth, incomes and poverty alleviation.

The interaction of biophysical and social scientists from various CGIAR centers during the Virtual crop model workshop and Crop model training will focus on developing virtual crops using crop growth models for the identified promising technologies/varieties developed at CGIAR centers. It will also delve into validation of technologies using DSSAT model; identifying suitable regions/country for adoption of promising technologies; and validation of adoption rates, time lag and the possibility of the technologies succeeding.

The sessions you will be attending will be an amalgam of biophysical and socio-economic approaches that are inherently linked to these issues. In addition, linking farmers to markets is critical to boost farm production and farmers' income. This will check the widening rural-urban disparity and diversify rural livelihood options.

ICRISAT's new strategy to 2020 hinges on inclusive market-oriented development or IMOD to help the dryland poor attain a whole new level of resource access, stability, security and productivity, so that he can grow out of poverty.

I am sure that at the end of this exercise, CGIAR centers will be better equipped to evaluate and prioritize research investments, and to support the decision-making of international development partners and national policymakers.

Thank you!

Modern Chickpea Breeding for Greater Food Security



Opening Remarks, Training Course on Modern Breeding Methodologies for Chickpea Improvement, 25 October 2010, ICRISAT-Patancheru, Andhra Pradesh 502 324, India.

Good morning and welcome to participants from Algeria, Bangladesh, Ethiopia, India, Kenya, Malawi, Myanmar, Nepal and Tanzania who are here for the training course on Modern breeding methodologies for chickpea improvement.

Chickpea is an important source of energy, protein, minerals, vitamins and fibres that can play a vital role in overcoming problems of nutritional insecurity. We can't afford to gloss over the fact that childhood malnutrition in dryland Asia stands at 42% and in Africa at 27%.

Global chickpea area increased from 9.8 million ha in 1981-83 to 11 million ha in 2005-07. Expansion in area was more pronounced in Africa (1.1% per annum during this period) compared to 0.2% in Asia. In South Asia which accounts for the bulk of chickpea area and production, chickpea has remained stagnant during the last two and a half decades. Area has declined in India and almost collapsed in Bangladesh and Nepal.

Chickpea's utilization pattern varies across regions and countries as well. In Asia about 78% of total supply is used as food and in Africa 84% of total supply was used as food in 2001-03.

Expanding food and feed demand suggest considerable opportunities to expand the sector by generation and diffusion of appropriate technologies for different production environments and appropriate market and trade policies. Developing traits for drought resistance, breeding for shorter duration and other crop management practices need to be emphasized.

There is considerable potential to grow chickpea in rice-fallows in the post-rainy season in many part of South Asia provided we can overcome constraints like lack of availability of short-duration varieties, lack of protective irrigation facilities, etc. Widespread sulphur and zinc deficiencies in growing areas, botrytis grey mold, *helicoverpa armigera*, and lack of supply of quality seeds too are major production constraints.

At ICRISAT, we have tried to tackle these issues through our research. Our first landmark variety ICCV 2 is perhaps the world's first earliest maturing kabuli chickpea, released for cultivation in India, Myanmar and Sudan. We have made developments with our two super-early desi varieties, ICCV 96029 and ICCV 96030 which mature in 75-80 days in southern India. We have also succeeded in improving fusarium-wilt resistance and seed size of super-early lines.

Efforts have been on to identify new sources of earliness. Three major genes were identified for early flowering, which will improve precision and efficiency of chickpea breeding for desired maturity. In addition to all these steps, linking farmers to markets is critical to boost farm production and farmers' incomes to check widening rural-urban disparity and diversify rural livelihood options.

ICRISAT's new strategy to 2020 is based on inclusive market-oriented development to help the dryland poor attain new level of resource access, stability, security and productivity, so that he can grow out of poverty.

Let us not forget that most of the world's hungry and poor live in rural areas in Asia and Africa. High quality agricultural research is part of the solution of world food security problems. We need to aim at more comprehensive and holistic solutions and integrated approaches.

This workshop is part of the capacity building exercise under Tropical Legumes I (TL I), Phase II project titled "Improving chickpea productivity for marginal environments in South Asia and Sub-Saharan Africa" of the CGIAR Generation Challenge Programme (GCP).

During this workshop, you will have a wider exposure to ICRISAT's ongoing activities in chickpea breeding, physiology and entomology; and molecular markers and molecular breeding activities. You will also be introduced to experimental design and analysis of genomics data for breeding applications during the course on "Application of molecular markers for crop improvement" next month and in the 2nd National Workshop on "Marker-Assisted selection for crop improvement" commencing the day after tomorrow.

I would urge you to take this opportunity to interact with our plant breeders, molecular biologists, pathologists, entomologists, physiologists, biometrician and bioinformatics specialists here.

I'm sure that this training course will equip you with skills and knowledge that you can apply in your respective institutes. I wish you successful interactions.

Thank you!

Shaping Agri-business Practices, Empowering Smallholder Farmers



Inaugural Address, Agri-business Community of Practice (CoP) Kick-Off Meeting, 26 October 2010, Golconda Resorts, Hyderabad, Andhra Pradesh, India.

Mr Steve Giddings, Agri-business Technical Lead, infoDev; Mr Ram Koundania, CEO, Advanta; Mr NT Yaduraju, National Coordinator, National Agricultural Innovation Project (NAIP), New Delhi; Mr Paul Basil, CEO, Villgro, India; and Ms Valerie D'Costa, infoDev Program Manager who has not been able to come, ladies and gentlemen, good morning!

Welcome to the kick-off meeting for infoDev's Agri-business Community of Practice (CoP) organized jointly by ICRISAT and infoDev. This event aims to bring together practitioners who enable agri-business entrepreneurship in developing countries and to share their lessons and ideas with the purpose of shaping infoDev's Agri-business CoP work program for 2010–12.

The World Bank estimates that GDP growth originating in agriculture is about four times more effective in reducing poverty than GDP growth originating outside the sector. Hence agriculture's potential needs to be fully exploited. Moreover, how else can we feed the billion hungry people now and the projected 9.1 billion by 2050! Let us not forget that China's rapid growth in agriculture was initially responsible for the rapid decline in rural poverty from 53% in 1981 to 8% in 2001. Agriculture was also the key to India's slower but still substantial long-term decline of poverty.

Modernizing the agro-food system is a strong engine for direct and indirect growth and poverty reduction in developing economies. By increasing productivity, connecting smallholders to rapidly expanding markets and generating jobs in the rural non-farm economy, agriculture provides pathways out of poverty.

Managed efficiently, the innovative institutional system of agri-business incubators can help local communities raise agricultural productivity, link farmers to markets, reduce crop risks and vulnerabilities and enhance environmental sustainability.

ICRISAT's Agri-Business Incubator (ABI) facilitates the creation of competitive agri-business enterprises through technology development and commercialization to benefit farmers in the semi-arid tropics.

Our NAIP-BPD program has established 10 agri-incubators and we are now poised to lead the world through our CG centers in establishing many more such centers. For this, we seek InfoDev's cooperation in setting up the model center for Africa and seek respective government funding for the same.

I would like to mention here that ICRISAT's new strategy to 2020 is strongly anchored on harnessing markets to reduce poverty and hunger. We call this strategy IMOD, for inclusive market-oriented development. We see it as a dynamic progression from subsistence towards market-oriented agriculture that is achieved by employing a systems perspective to set priorities and partnerships.

The emergence from subsistence to market-oriented agriculture reduces poverty since markets create demand for a wider diversity of higher-value foodstuffs and agro-industrial products stimulating agro-enterprises. These in turn raise rural incomes and create opportunities beyond agriculture. Farm families have to be empowered and assisted along this development pathway.

Though agri-businesses are developing, there are several challenges as well as opportunities they present. We need to share successful incubator models that have supported and graduated to successful agri-business SMEs, showcase these examples, identify emerging markets and means to harness opportunities as well as provide visibility through various media.

This program, while producing a good practice assessment and training program on agri-business incubation, will also explore how lessons from incubation can be used to enable agri-business entrepreneurship elsewhere. It will additionally help complement and potentially collaborate on agri-business activities in developing countries by reaching out to agri-business programs of partners.

Highly promising areas like value chain development through technology interventions, academia-to-industry linkages and soft landing opportunities for start-up ventures are some other areas that will be discussed and will throw up interesting opportunities for those gathered here. By helping nurture innovations and entrepreneurship in the field of agriculture, we will together be fulfilling the mission of eliminating poverty and improving livelihoods. Now is the time to do it!!

Good day!

The MAS Pathway to Crop Improvement



Opening Remarks, 2nd National Workshop on Marker-Assisted Selection for Crop Improvement, 27 October 2010, ICRISAT-Patancheru, Andhra Pradesh 502 324, India.

Dr Swapan Datta, DDG-Crop Science, ICAR; Prof PK Gupta, Chair, Task Force, ACIP, DBT; Professor Roberto Tuberosa from Uni Bologna, Italy, ladies and gentlemen, good morning!

Welcome to the 2nd National Workshop on Marker-Assisted Selection for Crop Improvement being conducted by ICRISAT and the Department of Biotechnology, Government of India, in collaboration with the Generation Challenge Programme of the CGIAR.

CGIAR's agricultural research has made major contributions to agricultural development in general and world food security concerns in particular and contributes to improved livelihoods for the rural poor. But the question remains... How do we feed the already one billion hungry people in the world? And what about the projected 9.1 billion that will have to be fed by 2050!! Global agricultural production will need to grow by 70% by this time!

Meeting this demand, together with facing the challenges from climate change, water scarcity, bioenergy and land degradation, puts enormous pressure on the agricultural sector. High quality agricultural research is certainly part of the solution of world food security problems. There is an urgent need for more comprehensive and holistic solutions and integrated approaches that take changing needs and demands into account.

Capacity building acts as a catalyst that stimulates economic growth through increased productivity resulting from innovation and knowledge sharing. The objective of this workshop is to create awareness among the crop breeding community in India about the latest developments in marker-assisted selection and cutting-edge genomics science. The development and use of DNA (or molecular) markers has already made a major impact on the way we conduct research in plant genetics and also on the selection strategies we use in plant breeding.

During the last two decades, both linkage mapping and association mapping have been successfully used to identify marker-trait associations for a variety of traits in all major crops to facilitate the use of marker genotyping as a substitute for cumbersome phenotypic selection, particularly for traits that are difficult to score visually.

High-throughput genotyping approaches have also been developed to undertake 'background selection' to reconstitute the genome of recurrent parent after transfer of a desirable gene through backcrossing.

MAS is now becoming an integral component of conventional plant breeding, leading to the development of improved cultivars/hybrids in several crops being grown by farmers the world over.

MAS techniques are also becoming more cost-effective. For instance, in addition to the routine marker-assisted backcrossing (MABC), marker-assisted recurrent selection (MARS) and genome wide selection (GWS) are two new approaches that have potential to improve MAS efficiency and effectiveness. And I believe that the speakers will be talking about these approaches in this workshop. In this context, modern sequencing and genotyping technologies will accelerate the use of MAS in crop improvement.

I am happy to note that this workshop will have deliberations on recent advances in DNA sequencing, genotyping, bioinformatics and statistical genetics/genomics that offer immense opportunities for the use of modern genetics for gene/QTL discovery and allele mining, thereby transforming crop breeding approaches. The workshop comes at a time when plant breeders need to equip themselves with modern genomic tools in their breeding programs.

I would like to mention here that ICRISAT's new strategy to 2020 is strongly anchored on harnessing markets to reduce poverty and hunger. We call this strategy inclusive market-oriented development or IMOD, which is a progression from subsistence towards market-oriented agriculture.

This pathway to market-oriented agriculture reduces poverty since markets create demand for a wider diversity of higher-value foodstuffs and agro-industrial products stimulating agro-enterprises that raise rural incomes and create opportunities beyond agriculture. Farm families have to be empowered and assisted along this development pathway.

On this note, I would like to thank DBT for choosing ICRISAT to organize this workshop. My sincere thanks to ICAR and GCP for their collaboration with ICRISAT. Once again, we welcome and thank the PIs/Co-PIs/Collaborators of ongoing projects funded under the Accelerated Crop Improvement Programme (ACIP) of DBT, Members of the Task Force and Programme Monitoring Committee of DBT-ACIP and all the special invitees from India and abroad for coming here to deliberate on these important topics.

I'm sure that you will all find this workshop stimulating and have new ideas to contribute and share. The deliberations and brainstorming sessions will hopefully empower you in using modern genomics and breeding methodologies for crop improvement.

Thank you!

Opening a New Gateway in Farm Businesses



Chief Guest, TNAU-ABI Inaugural, 2 November 2010, Coimbatore, Tamil Nadu, India.

Dr NT Yaduraju, National Coordinator (NAIP component 1), Dr Murugesha Boopathy, Vice-Chancellor, TNAU, ladies and gentlemen, good morning. I would like to thank the authorities for inviting me to the inauguration of the renovated NAIP-BPD building and Business Planning and Development meet here today.

Agri-business incubators in India face great challenges of addressing the needs of small and marginal farmers who represent the greater part of the agricultural community. Turning them into entrepreneurs is a tough task. However, given the role business incubators play in providing the maximum services to farm entrepreneurs on different fronts, they are in a position to impart greater entrepreneurial zeal among farmers.

Today, agri-business incubators need to be the one-stop shop providing solutions for entrepreneurs. Needs of entrepreneurs can be met through integrated operations among incubators.

I would like to mention here that ICRISAT's Agri-Business Incubator is a pioneer in agri-business incubation in India and has successfully supported over 100 ventures of entrepreneurs. It facilitates direct interface between scientists and industry, clinches technology transfer deals, and strives to understand better expectations of the agro-industry.

ICRISAT's new strategy to 2020 too emphasizes the importance of harnessing markets to bring about prosperity among farmers. This strategy is anchored on "inclusive, market-oriented development" which brings about prosperity through a dynamic progression from subsistence to market-oriented agriculture.

I am proud to say that the Agri-Business Incubator @TNAU was launched on 7th August 2009 under co-business incubation partnership with ICRISAT. In fact, TNAU is the first State Agricultural University (SAU) in India to have started an agri-business incubator.

Within one year of its operation, the incubator can boast of several successes. More of such incubators need to be set up in all SAUs and agricultural research institutes all over the country. To date, the incubator has been able to mobilize ` 23.4 million from NAIP and ` 19.2 million from NSTEDB. It now has 16 incubatees, representing diverse areas such as horticulture, food processing, farm machinery, bio-inputs and seed ventures.

To date, two technologies have been commercialized and three are in the pipeline. Financial assistance to the tune of ` 1.05 million has been provided to incubatees.

This year, the incubator supported innovations such as the cardamom drier, Subha low-cost power tiller and India-specific sugarcane harvester. It has also introduced in the market products such as the SRI power weeder, TNAU-

banana pseudostem injector and TNAU herbal insect repellent. Among the crop variety introduced through its seed business incubation program has been Co6 black gram.

These achievements have been due to synergistic efforts under co-business incubation as well as because of effective networking. Co-business incubation partnerships have to be promoted among existing agri-business incubators in the country, breaching the borders for technology commercialization and agripreneurship promotion.

Global changes and food scarcity call for greater efforts from the business incubation community to promote farm ventures through agri-business incubators. Increased assistance to agri-business incubators in agrarian nations, especially in African and South Asian countries, can provide the fillip to farm business incubation to contribute to food grain production and nutritional security.

The numerous farm innovations in agricultural universities in India can be effectively commercialized only through agri-business incubators. Such commercialization can bring in a definite change in the farming system and will create opportunities and prosperity to the smallhold farming sector of India.

Let me reiterate that a thriving and competitive agri-business sector, particularly smallholder agriculture, relies on an inclusive and effective innovation and entrepreneurship ecosystem. Business incubation guided by an inclusive development pathway is key as it provides the essential support system to agri-businesses and agro-industries. Lets make it work!

Thank you!

Lasting Solutions to Crop Productivity Constraints



Inaugural Address, 8th CEG Course on Application of Molecular Markers in Crop Improvement, 8 November 2010, ICRISAT-Patancheru, Andhra Pradesh 502 324, India.

Ladies and gentlemen, good morning and welcome to the ICRISAT-CEG 8th training course on Application of molecular markers in crop improvement.

Forty participants, 20 from India from CEG-DBT and 20 from overseas, including 14 supported by the Generation Challenge Programme from Bangladesh, Ethiopia, Kenya, Ghana, Malawi, Nepal, Tanzania, and 6 self-supported from Algeria, Ghana, Nigeria, South Africa, Sri Lanka, and Sudan are here to attend this course.

Future food demand cannot be met merely from incremental gains from conventional plant breeding; a major change in yield improvement is needed, such as occurred during the Green Revolution. Finding solutions to major crop productivity constraints, developing new technologies that raise yields in low-potential areas and creating opportunities for diversification in agricultural value chains are some of the major agricultural challenges we face today.

Based on this understanding, ICRISAT's new Strategic Plan to 2020 focuses on harnessing markets to reduce poverty and hunger. We call this strategy IMOD, for inclusive market-oriented development. We see it as a dynamic progression from subsistence towards market-oriented agriculture.

ICRISAT firmly believes in the potential of biotechnology to enhance the speed, precision, efficiency and value addition of its crop improvement efforts, especially in addressing complex traits that have remained intransigent to conventional breeding. The Institute uses promising genomic tools and approaches for the genetic improvement of its mandate crops, with the larger goal of reducing poverty, hunger, malnutrition and environmental degradation in the SAT.

This training course is hosted by ICRISAT's Center of Excellence in Genomics supported by the Department of Biotechnology, Government of India. Our research involves developing DArT arrays for pearl millet, sorghum and groundnut and mapping DArT markers for sorghum and millet and for groundnut in the future. We have also set up weather station and sensors and are analyzing data on reference collections of sorghum with lysimeters and assessing contrasting pearl millet parental lines and QTL-NIL lines, among others.

We have provided marker services to NARS partners and external institutes and have also initiated portal development for two molecular LIMS. Our Platform for Translational Research on Transgenic Crops (PTTC) evaluates potential new genetic engineering options and then advances these, in a focused way, to meet specific objectives in agriculture.

In recent years, genomics has been providing breeders with new tools and novel approaches to perform their tasks with high precision and efficiency. For example, application of molecular markers in breeding through marker-assisted selection has already been demonstrated in several crop species to develop

improved varieties with better agronomic traits and enhanced resistance or tolerance to biotic or abiotic stresses. These new varieties could prove to be appropriate for resource-poor farmers and enhance their livelihood security. This is probably the most obvious way to demonstrate how genomics empowers poor farmers.

ICRISAT-CEG has already trained 160 scientists in its seven training courses. The major focus of this course will be on analysis and the use of marker genotyping data rather than on data generation. The course will provide hands-on training in sample preparation, experimental design and data analysis components of molecular markers, and application of bioinformatics for crop improvement. Construction of genetic linkage maps, marker-trait association based on linkage mapping procedures and the use of decision support systems in molecular breeding will be given major emphasis.

In addition, participants will be exposed to new advances in genomics, bioinformatics and modern breeding through lectures on association genetics, next generation sequencing, marker-assisted recurrent selection, genomic selection and novel bioinformatics approaches.

After attending this course, participants will develop the capacity to implement molecular marker technology in their crop improvement programs. I am sure this will benefit your countries immensely.

Thank you!

PSAI Scholars and Professionals Can Make a Big Difference



Acceptance Speech on being conferred the PSAI Lifetime Achievement Award,
9 November 2010, BSWM, Quezon City, Philippines*

** Delivered by Mrs Beatriz Dar.*

Secretary Mario Montejo of the Department of Science and Technology (DOST); Dr Pat Faylon, Executive Director of PCARRD; Commissioner William Medrano of CHED; Deputy Executive Director Richard Juanillo; Dr Joy Eusebio; President of PSAI, the Board of PSAI, distinguished members of PSAI, distinguished guests, friends, ladies and gentlemen, good morning!

I would like to thank the leadership and the general membership of PSAI for this recognition – the Lifetime Achievement Award that my wife received for me today. I would like to dedicate this Award to the smallholder farmers in the rainfed and upland areas of Africa and Asia and in particular Philippine farmers, and to the poor and hungry Filipinos.

PCARRD must be congratulated for its sustained investments in human resources development for the almost 40 years of its existence. I believe this is one of the high paying investments of PCARRD and DOST, as most of the men and women holding key positions in agriculture and natural resources both in public and private institutions including civil society were scholars of PCARRD. I was a beneficiary of this scholarship which has contributed significantly in my professional growth and development.

We conceived the institutionalization of PSAI as early as 16 years ago when I was Executive Director of PCARRD. We believed that an organized cadre of scholars and professionals can contribute very significantly in the inclusive economic growth and development of our country. We knew these cadre of scholars and professionals can make a big difference in the bureaucracy, in the academe, in the private sector, in the civil society and also in international



development. They are the pride of PCARRD and DOST in all these fields and institutions, here and abroad.

We have been proven right and we hope that DOST and PCARRD continue to sustain if not increase investments and to support human capital development and also increase investments in basic and strategic research, applied research and technology commercialization. The country needs everyone to tap the power of science and technology, particularly in the sectors of agriculture and natural resources because it is in these sectors that the poor and hungry, and the marginalized and vulnerable are living. It is the major responsibility of the government to empower these people, bring them out of the poverty trap, transform and mainstream them into an inclusive market-oriented development pathway. This is a tall order but it has to be done!

Almost a third of our country's population are poor and hungry. Added to this is the massive environmental degradation that is happening all over the archipelago. If today, we are not able to feed the burgeoning population of the country of more than 90 million, as we are still importing much of the food items that we need, how can we feed then the almost 150 million Filipino people by 2050?

We should encourage not only the government but also the private sector to invest significantly enough in science and technology and in agricultural research for development. I know that PSAI will champion this clarion call and work with Secretary Mario Montejo and others in putting up a roadmap for agriculture and natural resources R4D, one that brings into account global contemporary challenges to include climate change, loss of biodiversity, massive land degradation, energy concerns, population explosion and many more. I call this the brewing perfect storm. These are the same challenges that we have and will impact the country. This long-term strategy will be our shield, our mitigation, our adaptation and our coping mechanism in a world that is growing warmer with freak weather, and with a world growing poorer and hungrier.

As scholars and professionals, we need to roll up our sleeves, be a part of that change to make a big difference in our country, working with government, with the private sector, and with civil society or with our own businesses to enhance the development of a more resilient but prosperous agriculture and natural resources in the country.

Mabuhay kayong lahat and God bless!



Linking Farmers to Markets: Inclusive Agricultural Value Chains



Guest of Honor, 18th Annual Conference of the Agricultural Economics Research Association (AREA) on Value Chains of Agricultural Commodities and their Role in Food Security and Poverty Alleviation, 18 November 2010, NAARM, Hyderabad, Andhra Pradesh.

Sri D Sridhar Babu, Minister for Higher Education, Government of Andhra Pradesh; Dr PK Joshi, Director, NAARM; Dr Mruthyunjaya, President, AERA, ladies and gentlemen, good morning!

I would like to thank Dr PK Joshi for inviting me here today to speak on a topic that is close to my heart and one which we at ICRISAT have been innovating on.

Developing countries in Asia are witnessing a fundamental shift in agriculture from farming for household consumption to a more market-oriented production. Rising incomes, growing urbanization, and changes in tastes and preferences are driving demand for high value commodities; niche markets for specialty products; export markets and demand for coarse cereals in non-food alternate uses.

Markets and institutions are critical to leverage the potential of agricultural growth for the benefit of small-scale producers. We need to ask ourselves how market-based food supply systems can be developed that offer economically sustainable levels of financial reward to all participants in the food chain (ie, farmers, processors and retailers) while simultaneously providing safe, nutritious, natural resource-stewarding and affordable food to consumers.

This is where consumer-driven supply chains are likely to play a dominant role. Institutional innovations like contract farming, bulk marketing through producers' associations, direct marketing, marketing through cooperatives or specialized middlemen and ICT-enabled supply chains are directly linking the producer to the end user.

These innovations assure a market for small-scale producers and ensure that information on food safety and quality requirements of end users (processors and consumers) are transmitted back to the farmer. In short, they encompass the entire sequence of economic activities in an agricultural value chain.

The emergence from subsistence farming to market-oriented agriculture is a systemic change that will be the trend in the foreseeable future. Special care must be taken to ensure that the poorest are enabled to participate in this changing environment, rather than being left behind.

We at ICRISAT refer to this unifying conceptual framework as inclusive market-oriented development, the core of our new Strategic Plan to 2020. The framework describes the escape out of poverty as a dynamic process of emergence from poverty-plagued subsistence farming to inclusive, market-oriented prosperity, enabling the poor to change their lives for the better.

Smallholder farmers are constrained by a lack of capital, inputs, technology and services, and access to markets which may act as a barrier for their participation in emerging markets.

ICRISAT's numerous interventions for its mandate crops involve a holistic approach from production to marketing, involving improved crop technology and package of practices. I would like to mention here that ICRISAT's Agri-Business Incubator is a pioneer in agri-business incubation in India and has successfully supported over 100 ventures of entrepreneurs. It facilitates direct interface between scientists and industry, clinches technology transfer deals, and strives to understand better expectations of the agro-industry.

I shall briefly highlight the market linkages/value chains in a couple of projects ICRISAT leads. Besides providing the improved crop technology and package of practices, these projects identify existing weaknesses in the value chain and suggest strategies to strengthen links along the commodity value chain from farmer to consumer.

ICRISAT undertook a project where small-scale sorghum and pearl millet farmers were organized into Farmers' Associations who were then linked to industrial end users. The association was also linked to formal credit and input sources. The Farmers' Association representatives directly negotiated with end users and sold their produce in bulk at a higher price.

ICRISAT has also been promoting 'smart crop' sweet sorghum with multi-product potential as a viable crop for bio-ethanol production. Ethanol can be produced from the stalk, while the grain can be retained for food use and the stillage used as livestock feed or as fuel. Two value chains have been developed – the centralized value chain model applicable to farmers close to the distillery and who are able to get the stalk to the distillery shortly after harvest and the decentralized one for farmers further away from the distillery and where harvesting and crushing of stalk to juice and conversion to syrup happens at the decentralized crushing unit close to the village. The syrup is supplied to the distillery for conversion into ethanol.

As opportunities for further agricultural growth through technological breakthroughs continue, food security and productivity growth in agriculture in India in the coming decades will increasingly depend on improved utilization of natural, human, financial and material resources.

The evolution and popularization of value chain innovations is essential for harnessing the power of markets to accelerate productivity growth and ensure food security. Scaling-up and scaling-out these institutions and developing them are possible through appropriate policies and regulations. Though central and state governments have taken a number of policy initiatives in this direction, some issues that are generic in nature merit more attention.

Firstly, public-private partnership is necessary to improve physical infrastructure. A firm's decision to invest in agri-business (refrigerated transport, cold storages and food processing), is largely influenced by the availability of public infrastructure,

government policies and regulations. Since good public infrastructure in India is concentrated near urban and peri-urban centers, farmers in the hinterland are excluded from demand-led agriculture.

Secondly, competition must be promoted through private sector investments. By enacting the Model Act (The State Agricultural Produce Marketing Development & Regulation Act) in 2003, the Government of India created a level playing field for private investment in agricultural markets, agri-business and contract farming.

Thirdly, smallholders must be involved in contract farming. Encourage and facilitate them to organize into cooperatives, self-help groups or growers associations. Create scale economies in acquisition of inputs, technology, services and information.

Fourthly, effective grades and standards need to be developed and complied with given the rising demand for safe and quality foods in both domestic and international markets.

Lastly, institutional insurance mechanisms for agriculture remain under-developed and farmer's access to financial institutions needs to be enhanced.

I would like to conclude by saying that agricultural value chains can succeed and be sustainable with proper co-ordination and forward and backward linkages from the production sector to the processing sector, and finally the end user.

Creating strong public-private partnerships and involving a larger number of stakeholders creates a self-sustaining value chain with critical inputs such as technical backstopping and market information reaching the farmers in a timely manner and safe and preferred commodities reaching end users.

Let us not forget that the overall objective should be to ensure inclusive growth.

Thank you!

Reliable Data: The Answer to the Hunger-Poverty Nexus



*Inspirational Message**, Annual Review Meeting, Village Dynamics in South Asia (VDSA) Project, 22 November 2010, ICRISAT-Patancheru, Andhra Pradesh 502 324, India.

* Delivered by Deputy Director General-Research, Dr David Hoisington.

Partners from NCAP and IRRI, colleagues from ICRISAT, good morning and welcome to the Annual review meeting of the Village Dynamics in South Asia project.

An estimated 600 million people subsist on less than US\$ 1.25 a day in South Asia. By 2050, the region's population is likely to exceed 2.2 billion! Upheavals connected with food price, financial crises or climate change will push a large number of poor into destitution.

About 70% currently live in its rural areas and account for about 75% of the poor. They all depend on agriculture for their livelihoods, a sector that employs about 60% of the labour force, while contributing only 22% of regional GDP! Better informed decisions can enrich efforts to improve the plight of smallholder farmers in this region.

ICRISAT's Village Level Studies today serve as a valuable contribution of the CGIAR to the knowledge base on rural household economies. They provide important insights into changing household and village livelihoods. They have helped scientists identify and understand socio-economic, agro-biological and institutional constraints to agricultural development in the semi-arid tropics.

ICRISAT's high frequency village, household and field surveys data have been widely used in priority-setting exercises, in typology construction, in evaluating trade liberalization issues, etc. They have come in handy for policymakers, development functionaries, and extension staff in identifying principles and practices relating to technology options.

This project on Village Dynamics in South Asia aims to decrease the incidence and severity of absolute poverty in the South Asian SAT and the humid tropics by increasing the availability of time-series district, household, individual and field-level data. Its uniqueness is that it brings a long-term multi-generational perspective to agricultural, social and economic change, and also provides an extraordinary level of detailed and carefully collected information on farming activities and household economy.

The time-series meso and micro-data at state and district levels focus on core variables that include crop area, production, land use, irrigation, farm harvest, monthly rainfall, fertilizer consumption, agricultural wages, livestock numbers and products, mechanization, and infrastructure. Improving this data will enable better decision making based on evidence of impacts on the poor. We need to keep updating our efforts to identify the knowledge gaps and research needs in SAT India, Eastern India and Bangladesh. You will need to keep this in mind while discussing work plans for the second year of this 5-year project.

The largely transition-phase economies of Asia have a higher agglomeration index of 52 compared to Africa. Our village-level studies in India reveal that many of the village poor have found greater opportunities in cash crops.

In its new Strategic Plan to 2020, the Institute has adopted inclusive market-oriented development (IMOD) as its guiding principle to empower smallholder farmers to grow their way out of poverty. IMOD is a dynamic progression from subsistence towards market-oriented agriculture. Our aspirational targets are to halve poverty, hunger, child malnutrition and increase the resilience of tropical dryland farming. The pathway to prosperity will be mapped out using a systems perspective, aided by complementary and purposeful partnerships.

We will contribute to IMOD through four Strategic Thrusts on — Resilient dryland systems; Markets, institutions and policies, Grain legumes and Dryland cereals. Our Strategic Thrust on Markets, institutions and policies will focus on interventions that enable the poor to harness markets to generate higher productivity and income. It will address not only private sector but also public sector dynamics that influence markets.

This includes building on established activities such as village level studies of dryland rural economies and understanding the causes and consequences of poverty, and poverty escape pathways. The objectives of enhancing the availability of reliable household data, increasing the availability of updated meso-level agricultural data and nurturing policy analysis and strengthening capacity building must be met if we are to make a difference to the poor farmer. I would like to thank the Bill & Melinda Gates Foundation for aiding us in this task.

I am sure that your focused discussions on knowledge gaps and research needs as well as project management will enhance the efficacy of our efforts to decrease the incidence and severity of absolute poverty in the region.

We owe it to the smallholder farmer!

Thank you!

Boosting Rainfed Agriculture in Karnataka



Address, Bhoochetana Review and Planning Meeting, 27 November 2010, ICRISAT-Patancheru, Andhra Pradesh 502 324, India.

Shri Umesh Katti, Honorable Minister of Agriculture, Government of Karnataka, who has been the moving force behind improving the livelihood of small and marginal farmers in Karnataka; Dr KV Raju, Economic Adviser to the Chief Minister of Karnataka; Mr NC Muniyappa, Principal Secretary; Dr Mudbi Babu Rao, Commissioner; Dr K Sarvesh, Director; staff from the Department of Agriculture; Mr Raju Damle from the Confederation of Indian Industries; ladies and gentlemen, good morning and welcome to ICRISAT.

Going by the latest UN-FAO FAOSTAT data, the world's population is projected to reach more than nine billion in 2050. It is also projected by then that food production will need to increase by 70-100% to maintain the same dietary standards we have today.

An annual linear rate of population growth of 1.6% in the semi-arid tropics implies that there will be about 115 million more mouths to feed between now and 2020; 69 million in Asia's SAT alone. Achieving food security for this increase in population is a daunting challenge, but it also represents an opportunity.

Rainfed agriculture matters since it is practised on 85 million hectares in India and produces 44% of its food and fodder. In Karnataka, which is the second largest state after Rajasthan with area under dryland agriculture, the need to increase productivity gains greater urgency. Current rainwater use efficiency in dryland agriculture varies between 35-45%. Producing more food with less water is the way forward. In addition, growing land degradation due to depletion of nutrients, soil erosion and other factors is a big challenge.

ICRISAT's long-term experiments in heritage watersheds have clearly demonstrated that large gaps exist between current farmers' crop yields, which are two to five time less than the achievable yields. Soil sampling of over 46,000 farmers' fields in 15 districts of Karnataka reveals that these soils are hungry as well as thirsty.

Encouraged by lessons of the Sujala-ICRISAT initiative, the Bhoochetana project was started by the Government of Karnataka in 2009. Its goal is to bring about a change in the lives of farmers in Karnataka's 24 selected rainfed districts, increasing average crop productivity by 20% in four years.

Apart from implementing rainfed technologies like contour cultivation, conservation furrows, planting Gliricidia on field bunds, using biofertilizers and biocontrol agents, training was imparted to government staff in 68 talukas and team-building workshops were held for nearly 2500 stakeholders. Public awareness campaigns and field days were conducted.

When we talk of water scarcity, we generally mean scarcity of irrigation water which consists of only 1/3rd of the water used for food production. Rainfall stored in the soil (green water) which contributes 2/3rd worldwide has immense potential

to enhance water use efficiency to overcome water scarcity and increase food productivity.

Among the achievements made by Bhoochetana in 2009 was that key inputs were mobilized speedily in coordination with DoA staff; there was timely procurement of groundnut and pigeonpea cultivars, pearl millet hybrids and soybean cultivars. ICRISAT arranged seed distribution towards flood relief; more than 35,460 soil samples were collected from 1773 villages; and joint crop cutting exercises were conducted.

Soil sample analysis was done to map nutrient status in 24 districts using GIS techniques. Improved agricultural technologies and seeds and other inputs were made more accessible. Stakeholders' skills were enhanced. All these increased groundnut, finger millet, pearl millet and soybean productivity between 32% and 66% in different districts. Smallholder rainfed farmers gained additional income of ` 2.8 to ` 11 for every additional rupee invested on improved management.

The novel science-led approach taken at the doorstep of farmers in Bhoochetana is not just for Karnataka; it could become an exemplar for India as well as other developing countries in Asia and Africa. The learnings from Bhoochetana will help us share this knowledge in order to unlock the potential of rainfed agriculture.

Consortium, convergence, capacity building, and collective action were the strategies adopted to make the consortium work and to build capacity. The



main bottlenecks we face with small farmholders in Asia and Africa are in the areas of knowledge-sharing mechanisms, availability of the right inputs at the right time, and credit facilities for farmers.

I would like to draw your attention to the Institute's Strategic Plan to 2020 that adopts inclusive market-oriented development as its guiding principle to empower smallholder farmers to grow their way out of poverty. IMOD is a dynamic progression from subsistence towards market-oriented agriculture. It starts by increasing the production of staple food crops, converting deficits into surpluses that are sold into markets.

The emergence from subsistence to market-oriented agriculture reduces poverty, because markets create demand for a wider diversity of higher-value foodstuffs and agro-industrial products, stimulating agro-enterprises that raise rural incomes (as well as creating opportunities beyond agriculture). This creates greater resource access, stability, security and productivity. This pathway to prosperity employs a systems perspective founded on purposeful partnerships in setting priorities to ensure that all the important issues along the pathway are addressed holistically.

As we understand from our experience of the watershed consortium at ICRISAT, team building and trust among our consortium partners and ensuring timely availability of inputs is becoming critical. We look forward to the best solutions which can make this initiative successful. There will be hurdles and tough decisions. I am sure that with strong commitments from the Government of Karnataka, we will find the ways and means to address these issues to achieve our set goal of the mission. I wish you all very fruitful and enriching deliberations in your planning meeting.

Thank you!

Partnerships with Purpose



Opening Remarks, Symposium on Partnerships with Purpose for Inclusive Market-Oriented Development (IMOD), 6 December 2010, ICRISAT-Patancheru, Andhra Pradesh 502 324, India.

Dr Ganesan Balachander, distinguished guests and partners, colleagues, ladies, and gentlemen, good morning. I wish to extend a cordial and warm welcome to all of you for coming today and participating in this symposium on Partnerships with Purpose for inclusive market-oriented development (IMOD).

It is a great pleasure to open this symposium on the topic of partnerships. We chose this subject because we have reoriented and sharpened our partnership strategy in our new Strategic Plan to 2020. We see it as the foundation that is critical for success in our Mission. We want your advice on how we should implement this new strategy most effectively.

Our new Plan commits us to follow a systems perspective within a conceptual framework that we call inclusive market-oriented development, or IMOD. In a nutshell, we believe that by connecting poor farmers to markets, we will enable them to increase their incomes and their resilience. There is much more to this framework, which I encourage you all to read in the new Plan, but today I want to focus on the implications of IMOD for partnerships.

We summarize these implications as “Partnerships with Purpose”. Here we are highlighting a break-away from past thinking of “partnerships for partnership’s sake.” We want partnerships to be more than just a numbers game. We want partnerships to have a clear and valuable purpose.

What do we mean by ‘purpose’? At the highest level, the purpose is to progress towards the Mission goals that we all share – as stated in our Strategic Plan, to reduce poverty, hunger, malnutrition and environmental degradation across the dryland tropics. But we have to focus on concrete objectives towards those goals. These are the challenges that lie along the IMOD-related development pathways.

To make this more clear, I’d like to give an example that we cited in our Strategic Plan. It is one that I think you will all be familiar with. I’m talking about the Green Revolution itself. Dr Norman Borlaug was of course a central catalyst in the Green Revolution. Yet, when he tried to extend it to Africa, he found that he needed a different approach. He said,

“Working in Africa has been the most frustrating experience of my professional career. The yield potential is there, but you can’t eat potential. We need inputs, access to markets, infrastructure and credit if African agriculture is to experience a Green Revolution.”

Borlaug saw that a larger system needed to be addressed if impact was to be achieved, not just single interventions such as improved seed. At ICRISAT, we’ve had the same experience. We want to learn from this experience and become more effective in the future by taking a systems perspective in our work. And this is where partnerships come in.

No single institution can hold all the expertise needed to address all the challenges facing an IMOD-related system. These systems are just too complex. To succeed we need partnerships that address all the weak points in the system.

As Dr Borlaug noted, for crop commodity value chains in Africa we need partners who can solve issues of inputs, access to markets, infrastructure and credit, in addition to what we at ICRISAT and our partners contribute in the areas of crop improvement, natural resource management and policy research-for-development.

So I hope this gives you a sense, in a nutshell, of why we believe that Partnerships with Purpose are fundamental to our new Plan. Partnerships are essential to meet today's diverse, IMOD-related system challenges.

Diversity and focus

Since IMOD-related systems involve diverse challenges, so must our partnerships become more diverse. When we talk about system components like inputs, infrastructure, and credit — as Dr Borlaug highlighted — we are talking about partners needed from the manufacturing and industrial sectors that make fertilizer, to the state and private sectors that provide infrastructure, to the financial sector that provides credit, and so on.



We have to broaden our partnerships beyond simply the biophysical sciences sector. We have to bring in whoever is necessary to achieving the objectives of that crop commodity value chain.

So we are expecting to engage in more diverse partnerships over the coming decade, while at the same time being more focused on clear IMOD-related system challenges. Instead of twenty similar partners in a particular project, we might have ten but coming from a wider diversity of sectors.

Research-for-development partnerships in a project-driven world

Research-for-development is a long-term undertaking. It often takes a decade or more to reach a conclusion on a particular strategic objective. But development investments today are typically provided only for periods of a few years, in the form of projects. We have to adapt the long-term vision of effective research-for-development, to the short-term reality of project funding. We have to sustain and evolve our partnerships from one project cycle to the next until our objectives are met.

For this to work, we believe we must involve partners in the full project cycle, including identification of the project idea, persuading investors to fund the idea, workplanning, execution, impact assessment, and planning the next project.

But how do we operationalize this, especially when bridging funds for transitioning from one project to the next may not be available? We need your advice on this question.

I would also like you to give us more ideas on how to streamline the management of such projects. All partners certainly want the project resources to be used as efficiently as possible towards achieving the agreed objectives. But resources can quickly be eaten up in extensive consultations. What management strategies would be most effective in balancing the need for consultation, with the need for action?

And a related question: should those who head our partnership projects be expected to act as leaders, managers, or coordinators? Consultation is essential, but clear vision and quick decisive action is also essential for achieving objectives in short project time frames.

Capacity-strengthening with purpose

Another very important dimension of Partnerships with Purpose, is its implication for capacity-strengthening. We have said that purpose means that we will pursue clear objectives within a systems perspective. It is in our interest to strengthen

capacities related to meeting those objectives, so that impacts will be sustained after our joint projects come to an end.

Therefore, like Partnerships with Purpose, we also speak of Capacity-Strengthening with Purpose. We want to strongly underline the connection between our purposes, and our capacities. This does raise an issue, though. Sometimes we are asked to organize capacity-strengthening workshops and courses on topics that may not relate to our systems objectives. Such courses could become distractions. We do not want to compete with educational institutions like colleges and universities.

Our strategy for handling this problem will be to be pragmatic. We will look at each case on its own merits. Sometimes even when a topic is outside our focus area, we still may be able to help by convening other experts, and to host such courses at our locations and facilities.

Other times, we may be able to suggest more appropriate institutions. Meanwhile, our main focus will remain on capacity building in support of our Partnerships with Purpose.

Effective partnerships are key to our mutual success over the next decade. Now is the time to get the right approach in place. By committing to Partnerships with Purpose, we are forging a clearer direction for joint action. Our discussions at this Symposium and our conclusions will be extremely valuable to us in optimizing this new approach. I am sure that others who read the Symposium papers will feel the same way.

We are most grateful that you have taken the time to join us at this important Symposium, and hope that you will enjoy your time with us here. We wish you the best of success.

Thank you!

Let us Rededicate Ourselves to Change



Message, Loyalty Day, 6 December 2010, ICRISAT-Patancheru, Andhra Pradesh 502 324, India.

Ms Martha Stone, distinguished guests and partners, my most esteemed colleagues and loyalty awardees, good afternoon and welcome!

Today, we are here to honor 170 loyalty awardees as we do every year. This is part of ICRISAT's tradition of recognizing your commitment and dedication to the Institute. This is also our way of rewarding the years that you have devoted to ICRISAT. ICRISAT's stature and success as a premier global R4D institution depend on your loyalty, commitment, and productivity.

During the last 38 years, we were able to surmount formidable challenges because of your dedication and loyalty to the Institute. As a result, the fruits of your hard work are now being enjoyed by millions of smallholder farmers throughout the dryland tropics of the world.

As we move on, we will be entering a new era in the rich history of ICRISAT. Tomorrow, we will be launching our new Strategic Plan to 2020. This plan is our new roadmap to help end, not only alleviate, poverty and hunger in the dryland tropics. With our message of prosperity through inclusive market oriented development, ICRISAT and its partners will stop the cycle of gloom that has hounded dryland people for decades.

IMOD is the unifying conceptual framework of our new strategic plan. IMOD is a dynamic progression from subsistence to market-oriented agriculture. Propelled by scientific innovations and other support systems, IMOD brings about prosperity to the poor through the generation of surpluses that are sold



in markets for income. Hence, the inextricable concepts of inclusiveness and market-orientation are the propellants that make IMOD the engine of prosperity in the dryland tropics. Through IMOD, ICRISAT and partners aspire to help halve poverty, hunger, child malnutrition and increase the resilience of tropical dryland farming by 2020.

We will pursue these through partnership-based international agricultural research-for-development that embodies Science with a Human Face. Along with IMOD, we will employ a systems perspective in setting our research priorities and projects. A systems perspective allows us to study the holistic interaction of economic, social, political, physical and technological factors influencing dryland agriculture.

As we will pursue IMOD and a systems perspective, we will have to embrace change with a new mindset not only in what we do, but also in how we do it. Thus, we need to institutionalize cultural change. Cultural change will enable us to look and do things in a different way. As indicated in our new strategic plan, we aspire to become a learning organization that embraces and shares new ideas and innovations.

Our learning culture will become a powerful instrument in changing the Institute's strategic directions, operations and workplans on a continuing basis. Therefore,



we will now formally start today the process of cultural change guided by our motto of Science with a Human Face, and our shared values namely:

1. Strategic and systems thinking
2. Showing the way
3. Working for results
4. Respecting everyone, and
5. Communicating for understanding.

With our motto and these shared values, that we need to imbibe and live with, we have key cultural change areas that we will pursue relentlessly as follows:

1. Impact culture – A culture where everyone understands how the work that we do is vital for achieving the desired impacts of the institute.
2. Learning and knowledge sharing culture – A culture where everyone openly shares experiences and ideas.
3. Innovation culture – A culture where creativity is encouraged openly.
4. Partnership and networking culture – A culture where our partners feel they are equal.
5. Gender and diversity culture – A culture where gender and diversity is very high priority and considered crucial to the success of the institute.

TEAM ICRISAT, let me ask you these questions: Are we ready to embrace cultural change in the Institute? Can we enhance the growth and development of ICRISAT to a higher level? And lastly, can we rededicate ourselves to aggressively implement the new strategic plan of ICRISAT?

At this juncture and with your resounding positive response, we need then to rededicate ourselves to our beloved ICRISAT. I request all of you to rise and repeat after me this Pledge of Dedication:

I reaffirm my commitment and dedication to ICRISAT, especially to the pursuit of its vision, and mission, including its strategic thrusts and aspirations as enunciated in our Strategic Plan to 2020.

I believe that the changes and the directions articulated in the new strategic plan will be for the good of everyone, most especially the smallholder farmers and the poor of the semi-arid tropics of Asia and sub-Saharan Africa.

I pledge to work as a committed member of TEAM ICRISAT and will continuously contribute the best of my abilities for the betterment of the Institute.

I hereby reaffirm that I will actively support all endeavors and change initiatives that will ensure the continued success of ICRISAT.

So help me God!

Thank you!

Modern Science for the Poor



Message, Inauguration of the Platform for Translational Research on Transgenic Crops, 7 December 2010, PTTC Complex, ICRISAT-Patancheru, Andhra Pradesh 502 324, India.

Dr MK Bhan, distinguished guests, colleagues, friends, and ladies and gentlemen, good morning! Welcome to the inaugural of the PTTC, an edifice dedicated to the smallholder farmers and the poor people of the developing world!

Going by the latest FAOSTAT data, the world's population is projected to reach more than nine billion in 2050, which will require a 70-100% increase in food production to maintain the same dietary standard we have today. Without this production increase, more than one billion severely undernourished people and more than 100 million will be living near starvation, a scenario that should be taken as an alarm for us to wake up, and enhance our efforts to use modern science to feed the poor.

There is potential to increase world food production on existing agricultural lands. The most promising technological strategy at this time is to integrate the best of conventional crop improvement technologies and the best of crop biotechnology applications, just as it happened during the Green Revolution. This will amount to what Prof MS Swaminathan terms as the "ever green revolution".

International agricultural research in the CGIAR has contributed much to agricultural development in general and to world food security concerns in particular. Over the course of nearly 40 years of investment, a growing pipeline of research products, innovations and impacts has been changing lives on a large scale. Very high returns to social investment have been generated, in excess of 17 dollars for each dollar invested during just the first three decades of the system's existence.



Biotechnology in general and transgenics in particular offers a powerful tool for crop productivity enhancement, not only in terms of quantity but also in nutritional quality. This not only can save lives but also help farmers adapt to ensuing climate change, in the process generating social, economic and environmental benefits for resource-poor farmers. Plant biotechnology has the potential to move agriculture from a resource-based to a science-based industry.

We are here today for the formal launch of the ICRISAT-DBT Platform for Translational Research on Transgenic Crops (PTTC). The facility will enable a collaborative and coordinated approach for the translation of existing genetic engineering proof of concepts to the development of transgenic crops. Further product development cycle followed by their commercialization will ensure that the resource-poor farmers are not left out from the benefits from this technology.

PTTC will also serve as a facility of reference to strengthen national, regional and international linkages in transgenic R&D, exchange of materials and information, as well as support training, consultation and technology commercialization. It will also provide an opportunity for public sector research institutes and private sector biotechnology companies to work together and generate research products that are national and international public goods.

I would like to mention here that the Department of Biotechnology, Government of India, under the able leadership of Dr MK Bhan, has been instrumental in seeing this dream come true. It has been a steadfast partner, champion and friend of ICRISAT. And I must thank Dr MK Bhan for the trust and confidence he has reposed in us.

When I speak of partnership, I would like to mention that ICRISAT has a long history of strong partnerships. In 2010, we were involved in 190 active partnerships and distributed 20% of our budget to partners to execute joint research-for-development activities. ICRISAT's new Strategic Plan to 2020 strongly reiterates its commitment to harnessing complementary and purposeful partnerships. Inclusive market-oriented development or IMOD, is the unifying conceptual framework of our strategic plan. IMOD is a dynamic progression from subsistence towards market-oriented agriculture, which will achieve a new level of access to resources, stability and productivity for poor smallholder farmers.

ICRISAT has set four aspirational targets – of halving poverty, hunger, child malnutrition and increasing the resilience of tropical dryland farming. Its four Strategic Thrusts – Resilient dryland systems; Markets, institutions and policies; Grain legumes; and Dryland cereals – will generate products and innovations to help provide the poor with the goods and services they need to participate in IMOD.

Our systems perspective to agricultural research for development shall provide the rationale and framework for such purposeful partnerships. It will be more

diverse and will include a wider range of organizations from the government, non-governmental, community-based and private sectors, both within and beyond the realm of agricultural research-for-development.

We have already made significant innovations in this area. Our Agri-Science Park@ICRISAT has stimulated over 100 joint ventures with agri-business entrepreneurs in India over the past five years. Innovation systems such as the Hybrid Parents Research Consortium, the Agri-Business Incubator and the NutriPlus Knowledge Center are among some examples of successful and innovative partnerships.

Right now, inter-center partnerships are evolving dynamically under the CGIAR reform, creating a unified Strategy and Results Framework, which harmonizes collective center efforts through CGIAR Research Programs. All this is done with the purpose of achieving the mission to “reduce poverty, hunger, malnutrition and environmental degradation in the dryland tropics.”

I would like to conclude by saying that we aim to play a growing role in developing global public goods to benefit the poor. I am confident that PTTC has the potential to evolve into a leading edge technology translational facility and serve as a global model for the utilization of transgenic technologies and their products.

As Edmund Burke said, “Society is indeed a contract. It is a partnership in all science; a partnership in all art; a partnership in every virtue, and in all perfection. As the ends of such a partnership cannot be obtained in many generations, it becomes a partnership not only between those who are living, but between those who are living, those who have gone, and those who are to be born.”

Thank you!

Toward a Prosperous, Food-secure and Resilient Dryland Tropics



Report of the Director General, Annual Day, 7 December 2010, ICRISAT-Patancheru, Andhra Pradesh 502 324, India.

Prof MS Swaminathan, Chairman, MS Swaminathan Research Foundation; Special guests Shri YS Vivekananda Reddy, Honorable Minister for Agriculture, Government of Andhra Pradesh; and Ms Martha Stone, former Chair, ICRISAT Governing Board; special invitee Dr MK Bhan, Secretary, Department of Biotechnology, Government of India; Team ICRISAT, ladies and gentlemen, good afternoon.

On our 38th anniversary celebration, ICRISAT has a reason to rejoice. Change is in the air! As somebody once said and I quote “Change has a considerable psychological impact on the human mind. To the fearful it is threatening because it means that things may get worse. To the hopeful it is encouraging because things may get better. To the confident it is inspiring because the challenge exists to make things better.” To us at ICRISAT, change is an inspiration!

Our scientific successes in the last 38 years have significantly improved the livelihoods of poor farmers in the drylands of Asia and Africa. Yet, poverty continues to persist with 185 million poor in dryland Asia and 95 million poor in dryland Africa. Reduction of poverty has now become an overarching goal.

This past year has been one of introspection for us. In the process of crafting our strategic framework, we conducted in-house retreats, expert consultancy workshops, and obtained feedback from more than 650 stakeholders. It gave us an insight into the ways of addressing the various dimensions of combating poverty in the dryland tropics.

The result has been our new Strategic Plan to 2020 that serves as a blueprint to a more vibrant ICRISAT. The Plan’s mission statement is to: “reduce poverty, hunger, malnutrition and environmental degradation across the dryland tropics.”



It is anchored on the conceptual framework dubbed as inclusive market-oriented development, which is based on the premise that by connecting poor farmers to markets, we will enable them to increase their incomes and their resilience. The Plan was approved by our Governing Board in its 63rd meeting in Arusha in September.

A systems perspective to the plan shall allow us to view the fight against poverty in the dryland tropics as a complex system, to be addressed not just with a single intervention but in consideration of the interdependent components of the whole agriculture value chain. Toward this end, we have identified four strategic thrusts, namely: resilient dryland systems; markets, institutions and policies; grain legumes; and dryland cereals. We have also formulated a Business Plan (BP) that describes how we will fulfill our commitments during the first five years, from 2011 to 2015.

Likewise, we have been actively engaged in the reform process in the CGIAR. We strongly believe that effective partnership among international agricultural research centers is the key to mutual success. Today, ICRISAT leads the CGIAR Research Programs (CRPs) on Dryland cereals and Grain Legumes and is actively involved in five other CRPs.

Shedding the “business as usual” attitude, we have sought change not only in what we do, but also in how we do it. We seek to infuse cultural change through systems and strategic thinking, by showing the way, working for results, encouraging innovation and creativity, upholding professional respect, and promoting better and effective communication.

Our Gender and Diversity policy to increase research and management excellence has been overhauled. Gender equity has been embedded in all our



research activities, right from priority setting to impact assessment. Sustaining staff morale and productivity has always been a priority. We have now reinforced ICRISAT's culture of recognition through an informal, non-monetary recognition scheme.

Though our work speaks for itself, for our donors and partners to be informed of how our research benefits the poor, we have strengthened our communication and awareness program. We have intensified our global media outreach to Europe and to other major donors, and improved our global/net presence through social networking like Facebook, Twitter and YouTube sharing.

I must assure all of you that we are continuously growing in strength and impact. From \$22 million in 2000, our budget has grown to about \$60 million this year. We have also achieved consistent surpluses since 2003. Despite all these, we have not been complacent. During this year, ICRISAT has worked doubly on securing larger grants, ensuring full costing of proposals, providing for full overhead recovery, and inclusion of staff time and timely reporting to donors.

We have secured large project funding to the tune of US\$ 8 Million from the Challenge Program on Climate Change, Agriculture and Food Security, and US\$ 3.3 Million from GCP/BMGF for Phase 2 of the Tropical Legumes I project. The Government of India has been our strongest supporter by far.

That we are treading the right path was evident early this year, when the CGIAR awarded ICRISAT and the World Vegetable Center (AVRDC) the prestigious 'Science Award for Outstanding Partnership' for improving the lives of countless women and children in West Africa.

Among our major science achievements have been the promotion of hybrid pigeonpea and a super-early pigeonpea variety. We have developed climate-smart varieties of chickpea and pearl millet, drought-tolerant peanut varieties and new sorghum hybrids.

In the area of biotechnology, we have completed sequencing of mt- genomes of hybrid pigeonpea ICPH 2433 and its corresponding lines; developed large-scale molecular markers in pigeonpea and chickpea; and a molecular marker kit to test the purity of hybrids. Next generation sequence analysis is being used to sequence the transcriptome of chickpea, pigeonpea and pearl millet.

Our large-scale upscaling of community watershed interventions in 24 districts of Karnataka state in India are benefiting farmers. So are our time-tested soil and water conservation measures and research with gum Arabic in West and Central Africa. We have successfully used models to assess climate risk in Kenya.

We believe that harnessing purposeful partnerships and contributing complementary expertise and capacity is what will compel us to meet our

aspirational targets of halving poverty, hunger and child malnutrition and increasing the resilience of tropical dryland farming in Africa and Asia.

In this entire process of change, the Governing Board has been a strong pillar of support, actively involving themselves in the CGIAR reform process. Their commitment, guidance and wisdom were instrumental in the completion of the Strategic Plan. I am honored and pleased to take this opportunity to thank the Board and the staff in all our locations for their valuable contribution to this effort.

Together with our partners, we in ICRISAT stand ready and driven to create excellent prospects for a prosperous, food-secure and resilient dryland tropics.

We invite you to join us in this journey of hope and prosperity for the tropical dryland poor.

Thank you!



About ICRISAT



The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) is a non-profit, non-political organization that conducts agricultural research for development in Asia and sub-Saharan Africa with a wide array of partners throughout the world. Covering 6.5 million square kilometers of land in 55 countries, the semi-arid tropics have over 2 billion people, and 644 million of these are the poorest of the poor. ICRISAT and its partners help empower these poor people to overcome poverty, hunger, malnutrition and a degraded environment through better and more resilient agriculture.

ICRISAT is headquartered in Hyderabad, Andhra Pradesh, India, with two regional hubs and four country offices in sub-Saharan Africa. It belongs to the Consortium of Centers supported by the Consultative Group on International Agricultural Research (CGIAR).

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