Enhancing Smallholder Farmer Participation in Markets: **The IMOD Way**

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Science with a human face
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Dear Friends,

I am deeply honored to receive the Dr MS Swaminathan Award for Leadership in Agriculture for 2013. I consider this to be a major milestone in my professional life. I am humbled to be asked to join the list of outstanding awardees that have contributed so much to improving the human condition.

This Award is about leadership. I believe that the most important task of a successful leader is to rally his team around a compelling vision of the future, and to have an effective strategy to bring that vision into reality. Today I want to highlight the vision and strategy that our ICRISAT global team developed in 2010 and has been implementing ever since. We call it *Inclusive Market-Oriented Development*, or **IMOD** for short. We are very excited about it, and would like to state at the outset that all our research for development efforts are accomplished with strategic partners who also share our enthusiasm for IMOD.

Photo: L Vidyasagar, ICRISAT

[1] Presentation by Dr William D. Dar, recipient of the 2013 Dr MS Swaminathan Award for Leadership in Agriculture, bestowed on 24 June by the Trust for Advancement of Agricultural Sciences (TAAS) in New Delhi, India.

Agricultural development: the long view

To explain **IMOD**, I must first put it into context.

The CGIAR was established in the early 1970s at a time when mass famines were thought to be inevitable in the developing world. Food production was falling well short of the needs of rapidly increasing populations. So, increasing the production of staple food crops, particularly cereals, was the CGIAR's urgent first priority.

That effort helped to fulfill the promise of the Green Revolution in rice and wheat, which had begun a few years earlier. Production gains were so rapid that famine was averted. This was an enormous achievement!

Yet, while the yields of those crops more than doubled, hundreds of millions of people still remained hungry and malnourished, particularly those living in marginal farming areas such as the drylands. The Green Revolution varieties were not well suited to the dry areas, because irrigation and fertilizer were not easily available.

Then, the 1990s brought major economic upheaval to the developing world through 'structural adjustment' and economic liberalization. Agriculture slipped

Photo: ICRISAT

to a lower priority on national agendas. Industrial and urban development became higher priorities. Many agricultural support programs and institutions were downsized or dismantled.

Marketing was deregulated, so more opportunities were opened to the private sector. But the private sector in general was less interested in poor smallholders. The private sector preferred the simplicity of sourcing its raw materials from big commercial growers. It needed to deal at large scales to minimize costs and maximize profits.

All these changes hit the poor hard. Smallholder farming families lost many of their supporting institutions and services. Costs of inputs soared due to the removal of subsidies. Meanwhile, the prices that the poor received for their crops fluctuated wildly due to market deregulation and their lack of power in the marketplace.

As poor smallholders were increasingly "on their own", economists realized that they were hungry not only because they were not growing enough food, but because they couldn't afford to *buy* the food that they were unable to produce. To become food-secure, they needed options that ***both*** increased their production ***and*** increased their incomes.

At the same time, we in the CGIAR were struggling to adapt to these enormous changes. We did not have a solid framework for addressing the new world economic structure. In reviewing the science agenda in 2001, the CGIAR's highest science body, the Technical Advisory Committee (TAC), said:

In order to address the stubborn persistence of poverty, particularly in the rural areas amidst rising global food supplies, the CGIAR has explicitly redirected its mission toward sustainable poverty reduction… However… not enough [is] known about the processes and conditions under which agricultural technology can be an effective instrument for poverty reduction… TAC considers that it is important to rigorously establish causal linkages…
CGIAR Research and Poverty Reduction - TAC Commentary, 2001

During the first decade of this century the CGIAR and many other institutions carried out studies to better understand how agriculture could reduce poverty. But the next big step forward came from outside the CGIAR.

In 2008, the World Bank produced a comprehensive 386-page analysis of new trends in agriculture, probably the most authoritative study ever developed on this subject. The study was the 2008 World Development Report on 'Agriculture for Development.' I would like to quote from the summary:

"The world of agriculture has dramatically changed since the 1982 World Development Report on agriculture. An emerging vision of agriculture for development redefines the roles of producers, the private sector and the state. Production is mainly by smallholders, who often remain the most efficient producers, in particular when supported by their organizations. The private sector drives the organization of value chains that bring the market to smallholders… The state… corrects market failures, regulates competition… and supports the greater inclusion of smallholders and rural workers. In this emerging vision, agriculture assumes a prominent role in the development agenda."
World Development Report 2008: Agriculture for Development (Overview)

Implementing this vision, the World Bank's Policy Objective number one in agriculture-for-development became, *"Improve access to markets and establish efficient value chains."*

Of course, this idea is not new. In fact, one of its biggest successes had already taken place, right here in India. Over the period 1965-1996 Dr Verghese Kurien led India's White Revolution, organizing more than ten million smallholder dairy farmers across 81,000 cooperatives into a modern, efficient "national milk grid". The grid reached 250 million consumers and transformed India into the world's largest dairy producer. India's per capita milk production more than doubled, and cooperative members' incomes and milk consumption rose significantly. Dr Kurien's outstanding contribution earned him the World Food Prize in 1989. He became fondly known as the Milkman of India.

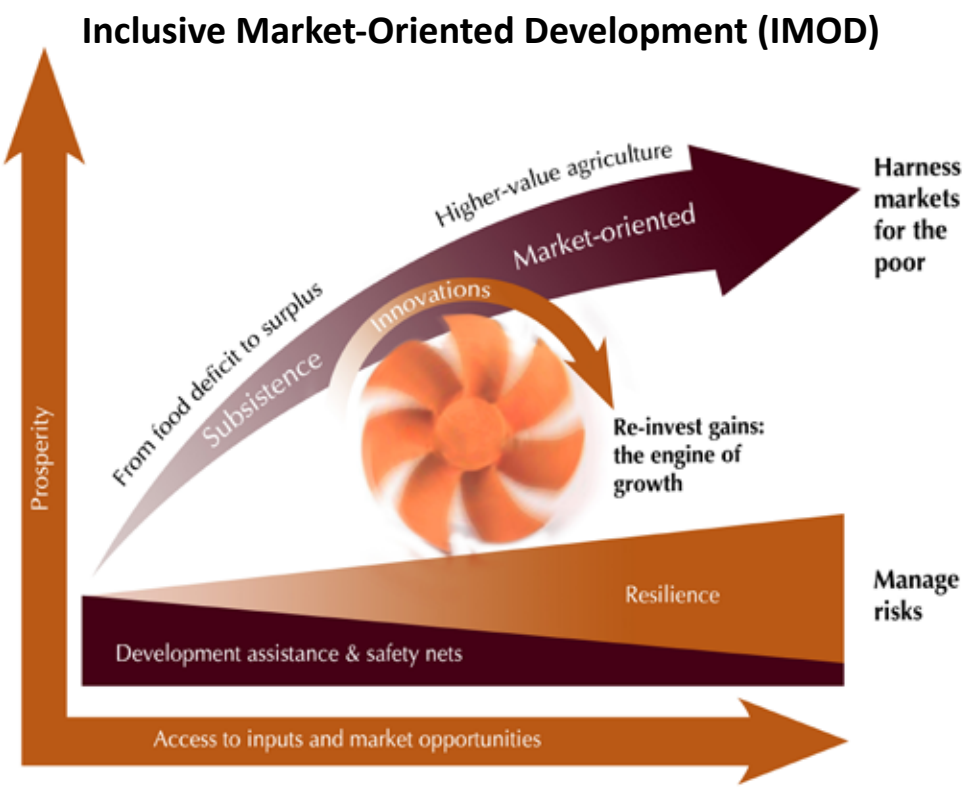
But such lessons had been largely overshadowed by the Green Revolution during the same time period. The World Bank study helped to refocus global attention on market-oriented development. It articulated the "causal linkages" between agriculture and poverty reduction that the CGIAR's TAC had called for eight years earlier. It was now time to act on this knowledge.

In this context of change, we at ICRISAT were seeking a new strategy for the decade 2011-2020. During 2010 we organized major brainstorming sessions in each global region where we work. We consulted both staff and a wide range of partners and stakeholders.

In all these consultations, an insistent theme arose – that to escape hunger and poverty in the drylands, smallholder farmers needed to have better connections to markets. Since this theme seemed to be globally important, we decided to make it the centerpiece of our new strategy. We called it IMOD, for Inclusive Market-Oriented Development.

What is IMOD?

I want to begin with our diagram of IMOD to give the big picture.



The first element I'd like to point out in this diagram is the big bold curve leading to the right. This curve represents **harnessing markets specifically to benefit the poor**, carrying them from impoverished subsistence farming to prosperous market orientation. Conventional value chains don't have this focus on the poor. Without this focus, larger-scale farmers and wealthy middlemen tend to capture most of the market opportunities.

Underneath the big curve in the diagram is the rotating wheel. This is the "**engine of growth**" that increases the incomes of the poor. The "fuel" of this engine is **innovations designed for the poor**. These are quite different kinds of innovations from those found in conventional value chains, which favor the large farmer and the wealthy. Including the poor also requires new kinds of partnerships.

The third major element of IMOD is **managing the risks that poor people face.** This is at the bottom of the diagram. Risks are especially high for smallholders, because they have few resources to fall back on if something goes wrong. Diversification is essential for risk management. For the very poorest, risk management requires outside help through development assistance such as subsidies, emergency food reserves, NGO aid and other safety nets. As their incomes increase through IMOD, smallholders become more and more able to stand on their own; that is, they become more **resilient**.

IMOD versus Value Chain

I am sometimes asked, "How is IMOD different from a value chain approach?" My short answer is, the "I". **IMOD's explicit goal is to *include* the poor** in value chains. This requires major innovation and needs to be highlighted. Conventional value chain innovations tend to deliver more benefits to the non-poor.

IMOD is a Dynamic Development Pathway

Before IMOD, we segmented farmers into different categories, such as very poor subsistence farmers, versus progressive farmers. We didn't pay much attention to helping farmers **move** from the subsistence category to the progressive category. Instead, we just developed specific technologies for each category. The system was 'static.' Poor farmers remained poor.

IMOD changed this static thinking. IMOD is a process of ***movement along a development pathway*** from impoverished subsistence farming, to prosperous market-oriented farming. This movement is what we mean by the word 'dynamic'. The dynamic nature of IMOD changed our thinking in fundamental ways. It compelled us to put priority on innovations that would ***move*** farmers from poverty to prosperity, instead of innovations that would leave them only a little less poor.

These are a lot of concepts. To make them more concrete, I'll describe some important cases of IMOD success by ICRISAT and its partners.

Escaping subsistence farming: Microdosing and small seed packs
Before IMOD, the CGIAR's focus was on achieving maximum yields of staple grain crops. We knew that if farmers used high rates of fertilizer, irrigation and improved varieties their yields could increase three to five times. We bred for higher and higher yield potential, even though Norman Borlaug pointed out many years ago that *"farmers can't eat potential."*

The problem that Dr Borlaug alluded to was that poor farmers couldn't afford high rates of fertilizer and irrigation, especially in Africa. Fertilizer prices rose sharply following structural adjustment in the early 1990s. Irrigation infrastructure was scarce in the drylands, and seed systems needed improvement. Without these inputs, the improved varieties could not express their high yield potential on-farm.

Before IMOD changed our thinking, we simply accepted that the poorest farmers were not going to benefit from fertilizer and irrigation – because they couldn't afford it. So we focused on other objectives like stress resistance that gave much smaller gains.

These farmers would be a little better off, but still poor. This is the static development model. Now, IMOD gives us a way to get past this poverty roadblock.

Photo: A Bürkert, Univ. Hohenheim

Photo: A Bationo, ICRISAT-IFDC

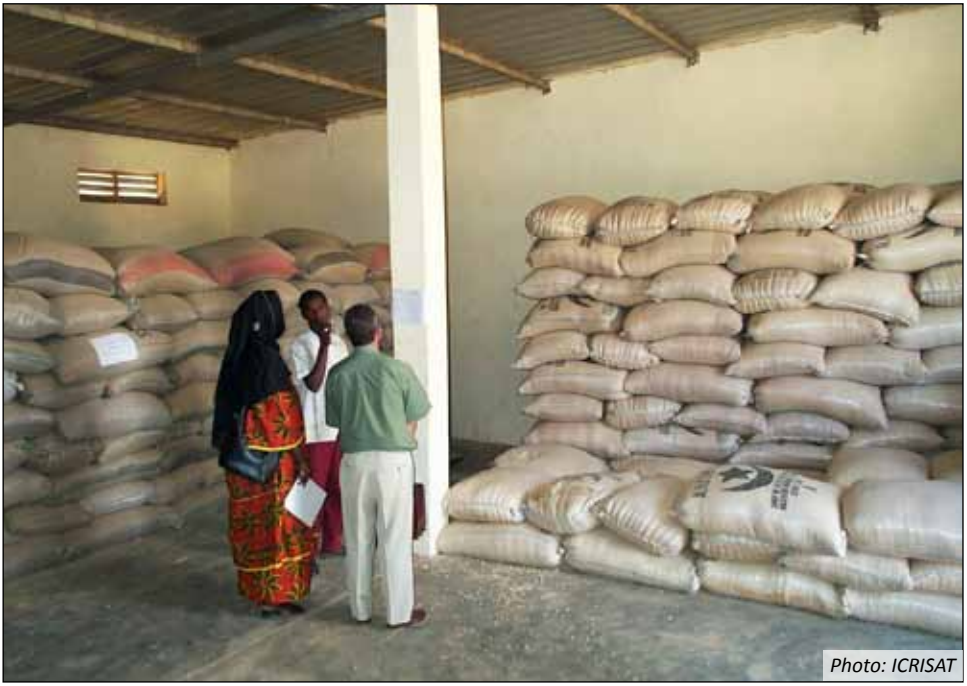
Microdosing (left) multiplies millet yields (right rear) on sandy Sahelian soils.

Our research had informed us that smallholder fields are usually nutrient-deficient, so that even a small amount of fertilizer would generate a large and profitable response from the crop. Research found that even applying just one-sixth of the recommended rate of fertilizer resulted in 50-100% yield increases. We studied the physiology and economics of this microdosing system using crop models and they indicated that, contrary to conventional wisdom, low rates of fertilizer are not overly risky. With low rates, crops don't become too leafy and run out of water before maturity. On the contrary, these low rates of fertilizer cause plant roots to grow faster and more extensively, and make the plants more drought-hardy.

We realized that if farmers started off with low fertilizer rates, and if they were supported by effective technologies and institutions, the profits could propel them ahead the following year. Year after year they could use increasing profits to improve their family's living conditions, increase their fertilizer rates, buy improved seed, and improve other management practices.

This virtuous cycle of increasing investment and increasing rewards, is what we mean by **dynamic development that progresses along the IMOD curve from a state of poverty, to a state of prosperity.**

How do we help farmers re-invest their profits to drive this virtuous IMOD cycle? In West Africa we work with FAO to develop a loan system called 'inventory credit' (in French: warrantage). Farmers put part of their harvest in community storage and sell it just before the next planting season, when prices are high. The warrantage associations buy fertilizer and other inputs at good prices for their member-farmers. In Eastern and Southern Africa, other organizations such as the National Association of Smallholder Farmers of Malawi (NASFAM) play a similar role. In India, the government plays a major role by subsidizing fertilizer, supporting crop prices, and by providing strong research-for-development services.



Seeds are stored and sold when the price is good.

The uptake of microdosing has been strong. We estimate that 400,000 farmers on both sides of the African continent are currently testing or adopting it. What they often tell us is that **they would like to buy more fertilizer if they could**. That is a vital sign of progress along the IMOD development pathway! Microdosing is motivating farmers to increase their investments and adopt more innovations from one year to the next.

As fertilizer use increases, so does the yield response by improved varieties. This is a strong IMOD dynamic. So, with strengthened donor support in recent years we've been encouraging both microdosing and improved seed across Africa. Just as micro quantities of fertilizer are more accessible to the poor, so are small-sized packets of improved seed; these are much in demand by the poor wherever we've tested them, especially by women for their home gardens and field crops, which in turn impact the nutrition of their families.

State powers up its agricultural engine

Government can ignite the IMOD engine, too. An initiative called *Bhoochetana* (Land Rejuvenation) is helping four million dryland farm families in Karnataka state, India, to boost yields by 30% on 3.7 million ha. A major method is by overcoming micronutrient deficiencies through targeted fertilizer dissemination and other soil and water management interventions. The economic benefits during the 2011 rainy season alone were US$ 130 million, returning 14 dollars for every dollar invested by the state.

A watershed achievement

Insufficient water is the defining constraint of the drylands. Yet much water is either wasted or allowed to flow by without being used. Improved water control is IMOD-strategic, because it reduces drought risk for the poor and it enables the cultivation of more diverse, higher-value, nutritious crops such as vegetables and fruits.

Effective partnerships with national and local agencies have improved watershed productivity and diversity through smallholder community action, benefiting 2.4 million farmers (12 million people in farming households) in India, China, Thailand, Vietnam and in several West African countries. In Asia. net crop income doubled on average, and cow milk yield has risen from 1.5 to 4.0 liters/day. Returns to investment in Andhra Pradesh state, India, alone have been US$608 million over the past decade.

Watershed management for high-value crop diversity and resilience in Vietnam.

Revitalizing the value chain for rainy season sorghum in India

Rainy-season sorghum is a US$690 million smallholder crop in India. It is used for cattle and poultry feed, processed foods and alcohol. We and our partners assessed the sorghum IMOD chain and found major weaknesses in grain grading, linkages to input and credit agencies, and marketing outlets. To overcome these constraints we:

- Facilitated their grouping into farmer associations so they could link more effectively to input and credit suppliers and become more empowered in market negotiations;
- Bred and disseminated better-quality cultivars;
- Trained farmers in integrated crop management; and
- Helped farmers improve their on-farm storage of grain.

As a result of these combined interventions, sorghum grain and fodder yields rose by 25-50% for the participating farmers. Income per hectare from the improved sorghum crop has nearly doubled, from $162/ha to $365/ha.

Besides providing food and feed, the tall sorghum plants are also a good source of fodder.

The chickpea IMOD engine

IMOD dynamics have sparked chickpea revolutions in India and in Myanmar, as well as in Ethiopia.

Originally a crop of the cooler, more moist latitudes of northern India, chickpea has, by virtue of the last twelve years research-for-development, adapted to hot, dry tropical conditions. Early-maturing, heat-tolerant kabuli grain varieties, mechanization of field operations through hourly contracting of tractor services, strengthening of formal and informal seed production, awareness and training programs, growing markets (domestic and export), and cold storage (achieving better prices and seeds for next season) have all played a major role. These innovations have sparked 50% increases in yield (from 600 to 900 kg/ha), a threefold increase in chickpea area (from 0.47 to 1.5 million ha) and a 4.8-fold increase in production (0.28 to 1.35 million t).

The kabuli chickpea IMOD revolution in Myanmar has been no less dramatic. Myanmar re-initiated exports of chickpea in 2001 following two decades of

Chickpea boom in Ethiopia provides both food and cash.

almost no export earnings from the crop. During the 2001-10 decade, Myanmar exported an average of 50,000 tons annually, worth $22 million. Chickpea production increased four-fold (117,000 to 467,000 tons) due to a doubling of sown area (164,000 ha to 332,000 ha) and a doubling of grain yields (712 kg to 1.40 tons per ha).

Africa is also benefiting from the chickpea boom. Germplasm-sharing and capacity-building assistance from ICRISAT to Ethiopia-EIAR contributed to major chickpea production gains in the East Shewa Zone of Oromia and Amhara regions, benefiting nearly one million farm households. Yields increased by 75% to 1.4 tons/ha from 2003-05 to 2010, and national production increased by 136% to 402,000 tons from 2003-05 to 2012. About a quarter of the crop is exported; export earnings increased 21-fold, to $21 million per annum from 2005 to 2010. Models predict that these gains will lift at least 0.7 million people out of poverty during 2001-2030.

Groundnut gains through IMOD

India

The world's largest groundnut producing district is in Anantapur, a drought-prone district of Andhra Pradesh state, India. More than 70% of the cultivated area in the district (about one million hectares) is sown to this crop because of its ability to survive long dry spells, and for its cash value. The crop is in demand both for oil and food uses. It is also valued as a source of fodder for livestock during dry years when other crops fail.

The variety ICGV 91114 created a new beginning in 2006. Bred and developed at ICRISAT, it features higher yields, earlier maturity, drought tolerance, high shelling turnover, high oil and protein content, and good palatability and digestibility of haulms by livestock. It increases pod yield by 23% on average. Net income to adopting smallholders has increased by 35%, worth $110 extra US dollars per household. Cows fed with the haulms (vegetative biomass) of this variety produce 11% more milk. Its drought tolerance has reduced yield variability by 30% compared to TMV 2 (an earlier variety).

Farmer associations were formed to produce seed of ICGV 91114, enabling it to spread. ICGV 91114 occupied about 3% of the Anantapur groundnut area by 2010, annually contributing an additional 42,000 tons of groundnut worth US$3.7 million to 30,000 farm households (150,000 people). Assuming 35% adoption by 2020, these benefits will rise to $500 million annually.

Groundnut fields covering the landscape in Anantapur.

Malawi

The 100,000 member-strong National Smallholder Farmers' Association of Malawi (NASFAM) called on ICRISAT's help in rekindling its groundnut export industry. The high-yielding ICRISAT-bred variety CG-7 now accounts for half of the national groundnut production. ICRISAT assistance in training and technology transfer for aflatoxin management, testing and certification has reduced contamination by this cancer-causing toxin sufficiently toallow groundnut exports to the UK. Stimulated by these successes, groundnut production grew at an annual rate of 7.5% per annum during 2002-2011.

Pigeonpea's quickening pulse in Africa

Pigeonpea is in high demand in India and worldwide. Pigeonpea has long been grown in Africa, but mostly on a household garden level or as a subsistence intercrop with maize. A concerted IMOD effort in Tanzania has invigorated pigeonpea production for cash export from Tanzania. Fusarium wilt-resistant, seasonally-adapted, export grain quality varieties have been adopted on 45% of the crop's area (double from five years ago) in northern Tanzania, producing

Director General Dar and Director ICRISAT Eastern and Southern Africa, Said Silim, admire a good pigeonpea crop in Babati District, Tanzania.

an additional 1.3 tons per hectare or 33,000 total extra tons – delivering approximately US$33 million in extra value to impoverished farmers while improving soil fertility and farming system resilience.

Goat platforms

Innovation platforms provide a channel for pro-smallholder innovation in value chains. They have doubled the prices received by smallholder goat keepers, particularly women, in southwestern Zimbabwe. The platforms established smallholder-friendly auctions offering fairer market prices to the poor. They also improve dry-season feed and fodder supplies, greatly reducing goat mortality.

Traders bid for goats in Zimbabwe. Auctions attract higher prices, raising incomes of smallholder goatkeepers.

Hybrid fuel for the IMOD highway

Access to improved seed is a major speed bump along the IMOD pathway. Developing hybrid varieties of crops is important in overcoming this obstacle, because it provides an incentive for seed companies to invest in crop improvement and seed dissemination. To foster hybrids, ICRISAT catalyzed the formation of the Hybrid Parents Research Consortium (HPRC) in India. HPRC currently consists of 36 private seed companies that provide nearly a million US dollars in research and knowledge-sharing funding annually. HPRC enhances the availability of hybrid seed to smallholder dryland farmers across the country. Nearly 60% of the hybrid sorghum and 80% of the hybrid pearl millet sold by seed companies in India today derives from ICRISAT germplasm.

Incubating IMOD

The Agribusiness and Innovation Platform (AIP) of ICRISAT is a public-private partnership model that fosters innovative agri-enterprise to bring R4D innovations of ICRISAT and partners to the marketplace for IMOD impact. It has attracted US$5.5 million over the past four years including support for 108 joint ventures. For example through its NutriPlus initiative, AIP incubates partners that develop, test and market innovative processed food products from staple grains that can increase incomes for smallholders.

The AIP team at the AIP-ICRISAT exhibit stall, Hyderabad 2011.

Conclusions

I hope this brief global tour has impressed upon you the fresh excitement and wide range of innovation that IMOD is bringing to the work of ICRISAT and partners.

A strategic framework is like a lantern in the night, providing vision in the darkness. It guides our work along the path that leads to our most cherished goals. It prevents us from going astray, and helps us to better help the poor to fulfill their deepest aspiration – not just to be less poor, but to escape poverty altogether. That is the purpose of IMOD.

IMOD gives us many gifts. It causes us to look at old problems in new ways, and to look for new and innovative solutions. It leads us to renew and enlarge our partnerships. It broadens our awareness, causing us to consider how farming fits into the larger framework of society. It gives us a clear logic for uniting socio-economic and biophysical research. It reminds us that smallholder farmers need markets, and markets need smallholder farmers. It insists that we must consider risks as well as rewards. It makes clear that development is a dynamic process, not a static event.

IMOD prompts us to go far beyond just increasing yield potential. It requires that we measure the actual *value* that our innovations bring to the lives of the poor. At the end of the day, that value is what matters most to us.

Thank you!

About **ICRISAT**

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Science with a human face

International Crops Research Institute for the Semi-Arid Tropics

CGIAR

ICRISAT is a member of the CGIAR Consortium

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, of whom 644 million are the poorest of the poor. ICRISAT innovations help the dryland poor move from poverty to prosperity by harnessing markets while managing risks – a strategy called Inclusive Market-Oriented Development (IMOD).

ICRISAT is headquartered in Patancheru near Hyderabad, Andhra Pradesh, India, with two regional hubs and five country offices in sub-Saharan Africa. It is a member of the CGIAR Consortium. CGIAR is a global research partnership for a food secure future.

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