

CIMMYT- BISA Aiming at Food, Nutrition and Environmental Security in South Asia

Raj Paroda
Former Director General, ICAR and Secretary, DARE
Government of India



Green Revolution



Dr. Norman E. Borlaug
Dr. M.S. Swaminathan
(Main Architects)

- ▣ **Early 1960s: Introduction of dwarf Mexican wheats from CIMMYT, and dwarf rices from IRRI.**
- **1963-64: Wide scale testing and selection of 4 wheat varieties.**
- **1965-66: Import of 18,000 tons from Mexico – A major policy decision.**
- **1966-67: Wheat production went up from 11 mt – 16 mt.**

Green Revolution in South Asia

Cradles of Success:

Policy

**Partnership
(ICAR with
CIMMYT)**

Technology

Farmers



Unprecedented Growth

- Five fold increase in food grains
(50 - 259.0 mt in 2015)

As against four fold increase in population
(0.3 - 1.2 billion)

- Reduced poverty (From 70% - 21%)
- Life expectancy almost doubled
(From 32 - 68 years)

Buffer stock : > 50 mt ; Export : 20 mt



Second Generation Problems of Green Revolution

- Factor Productivity Decline
- Deterioration in Soil Health (low organic matter)
- Water Table Decline, Water Logging and Poor Water Quality
- Macro-nutrient (N,P,K) Imbalances & Micro-nutrient Deficiency
- Increased Incidence of Diseases and Pests
- Increased Dependence on Costly inputs
- Reduced Farm Profitability



Economic Survey of India Report (February, 2016)

- **Agriculture is a victim of its past success –especially the Green Revolution**
- **It has become cereal centric, regionally biased and input intensive (land, water & fertilizer)**
- **It now requires:**
 - **increasing productivity by getting “more from less”**
 - **growing of less water requiring crops – pulses & oilseeds**
 - **emphasis on micro-irrigation**
 - **reinvigorating the agricultural research and extension system**
 - **Ensure marketing reforms (e-marketing)**
 - **Increase investments in Ag R&D**



Warning Against Complacency

The Green Revolution has won a temporary success in man's war against hunger and deprivation; it has given man a breathing space. If fully implemented, the revolution can provide sufficient food for sustenance during the next three decades. But the frightening power of human reproduction must also be curbed; otherwise the success of the green revolution will be ephemeral only.



Borlaug, 10 December, 1970

New SDGs

25 September, 2015

Goal 1: End Poverty in all its Forms, everywhere

Goal 2: End hunger, achieve Food security and improve nutrition, and promote sustainable agriculture

Goal 3: Good health and well being

Goal 5: achieve gender equality and empower all women

Goal 13: Urgent action to combat climate change

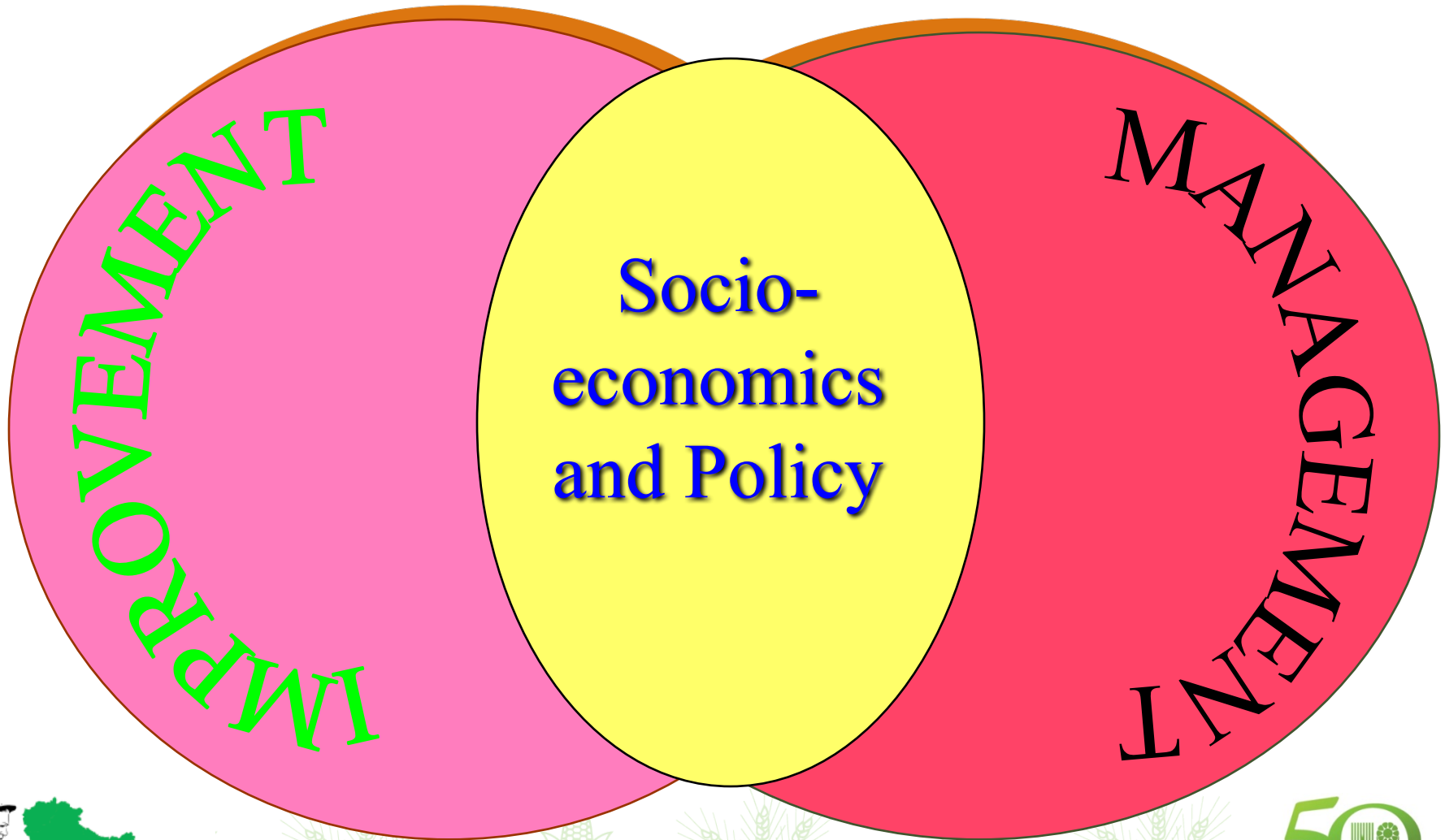
Goal 15: protect, restore and promote sustainable use of terrestrial ecosystems, combat desertification, halt and reverse land degradation and halt biodiversity loss

Goal 17: Building Partnerships

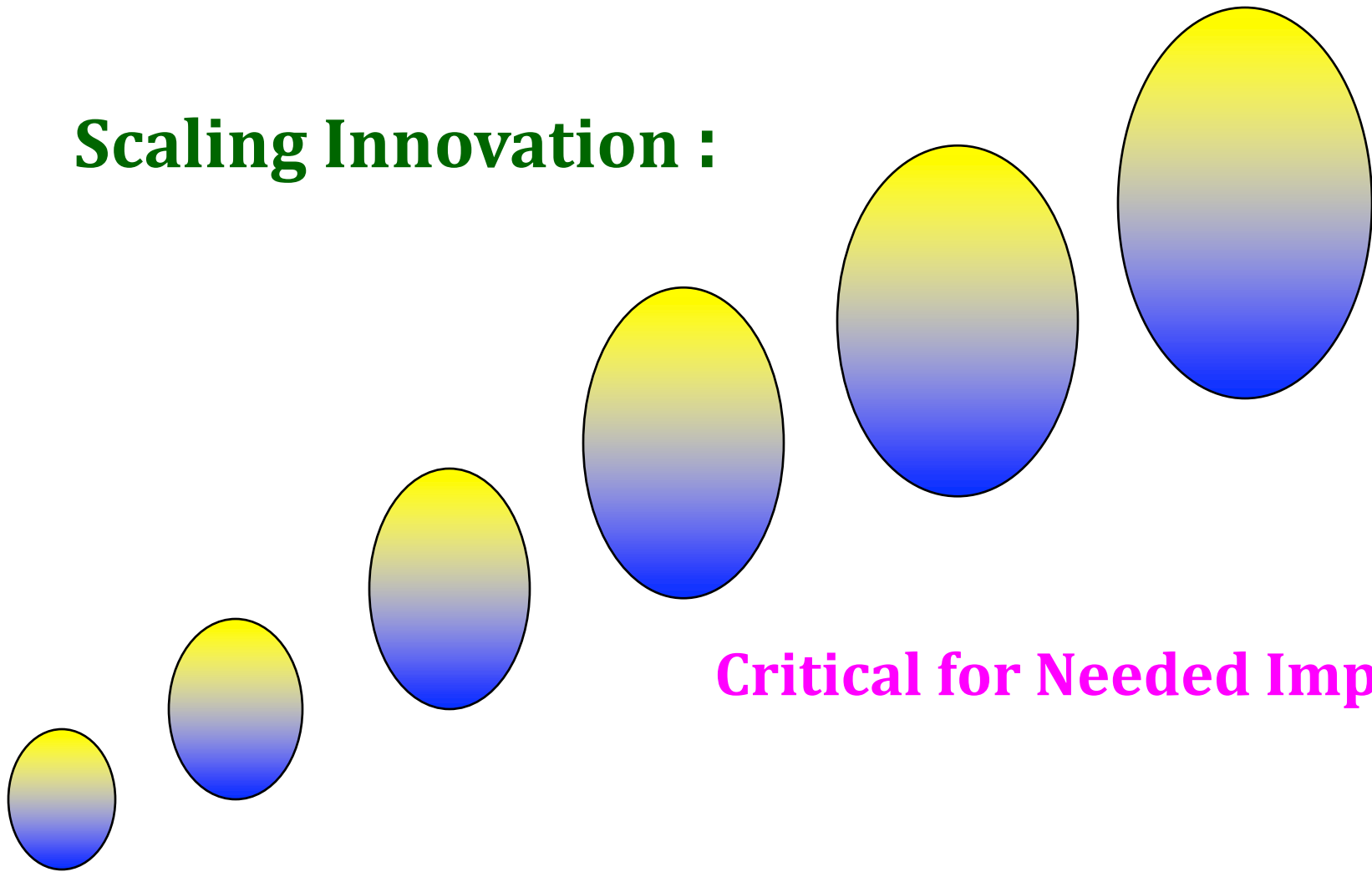
THE WAY FORWARD



Needed Paradigm Shift



Scaling Innovation :



Critical for Needed Impact



BISA - A Borlaug Legacy

5 October, 2011



Why Borlaug Institute for South Asia?

Scenario 2050:

- **South Asia will be home of about 1/4th of the world population**
- **We would need 70% more food grains**
- **Already having major pressure on natural resources**
- **Projected to be worst hit by climate change**
- **Threat for nutritional security is a major concern.**

South Asian food and nutrition security is a high-impact investment opportunity and central to attaining Sustainable Development Goals (SDGs)

Hence, a neutral platform for partnership to develop innovative technologies for sustainable agriculture is indeed an important need.

BISA, created in October 2011, offers an opportunity for strategic research to address emerging regional challenges.



BISA : Vision, Mission and Mandate

Vision

Food, nutrition, livelihood and environmentally secured South Asia

Mission

- To act as a centre of excellence that attracts talents, brings new science and promotes ARI4D for sustainable food production and nutrition security in South Asia

Mandate

- To conduct research on sustainable cereal based farming systems for food, nutrition and environmental security and thereby improving livelihoods of smallholder farmers
- To collaborate with national, regional and international institutions for innovations aiming at sustainable agriculture
- To promote translational research for wider adoption
- To ensure capacity development of stakeholders



BISA : A Unique Platform

NICHE

- **Can be an excellent eco-regional platform for research**
- **To provide pre-breeding support to NARS for resistance to emerging abiotic/biotic stresses**
- **Technologies for sustainable intensification of cereal based cropping systems**
- **Strategic research on climate smart agriculture and good agronomic practices**
- **socio-economic development through inclusive market oriented development (IMOD)**
- **Scaling innovations through public-private partnership**
- **Capacity development-women and youth**



Strengthening Pre-Breeding

- Breeding for initial and terminal heat tolerance
- Breeding for yellow rust and wheat blast
- Research on hybrids in wheat and maize (rainy, winter and spring season) and QPM
- More efficient use of winter-spring wheat germplasm
- Double haploid breeding in maize



Use of Drones for Phenotyping



Revival of Rice-Wheat Consortium (RWC)

- A success story of NARS-CG partnership in SA



• CGIAR Impact Review :

Indian CA program has saved USD 164 million with an investment of only USD 3.5 million with 66% internal rate of return - highest amongst all CG programs

Food Policy Brief, 35 (2010)

- **Received King Baudouin Award**
- **RWC led to initiation of eco-regional Programs and later CPs and CRPs**



Conservation Agriculture

Potential area : 10 m ha



Sustainable Intensification of Rice-Wheat System

Relay planting of Mungbean



Benefits :

- Increased profits
- Nutritional security
- Improved soil health
- Avoids wheat stubble burning



Conventional to Precision Farming



22/08/2015



New Innovation for R-W System : CA through Precision Water and Nutrient Application



Source: HS Sidhu and ML Jat, BISA-CIMMYT (2016)

- **CA in rice-wheat system saves on cost, energy and labor**
- **Sub Surface drip (SSD) irrigation system in CA based rice-wheat produced:**
 - **0.74 t/ha/year higher yield**
 - **With ~70 cm less water (almost double irrigation water productivity)**
 - **With 20% less fertilizer (higher NUE)**



Challenges before BISA

- **Building credibility as a center of excellence and to emerge truly a regional research institute**
- **Need for sustainability (staff, infrastructure and funding support).**
- **Regional research farms – asset or liability ?**
- **Functional autonomy and reforms in its management structure**
- **Have a Technical Advisory Committee**



Ensuring Success of BISA

- **An opportunity for revival of RWC - an eco-regional program in South Asia**
- **A strategic research platform for emerging transboundary problems (like heat tolerance, wheat blast, yellow rust)**
- **CIMMYT in South Asia truly as CIMMYT-BISA program –Ownership by CIMMYT**
- **Increased ARI4D investments by NARS and Donor Community – to address SDGs**
- **Support for operational/management autonomy**
- **Exploring options for South-South collaboration with Africa**



Thanks

