

# Policies and Strategies for Scaling Conservation Agriculture in Asia

**Raj Paroda**

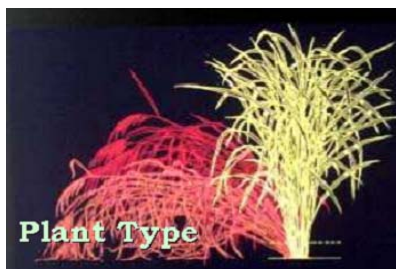
Former Chairman, GFAR,  
Executive Secretary, APAARI,  
Director General, ICAR and  
Secretary, DARE, Government of India

## The Context

Asia-Pacific is agriculturally a vibrant region and a major supplier of food, accounting for:

- ❑ Nearly 60% of the world's population from 1/3<sup>rd</sup> of geographical area
- ❑ 90% of the world's rice, 40% of its cereals and 40% of its meat
- ❑ 70% of the global food and vegetable market
- ❑ 80% of the aquaculture market
- ❑ Around 80% farmers are small holders (< 2 ha)

## Asia – The Region of Green Revolution



A Science Led Innovation



**The Genes that  
Made the  
Difference:**

**In wheat**

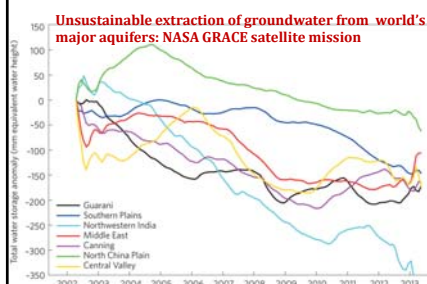
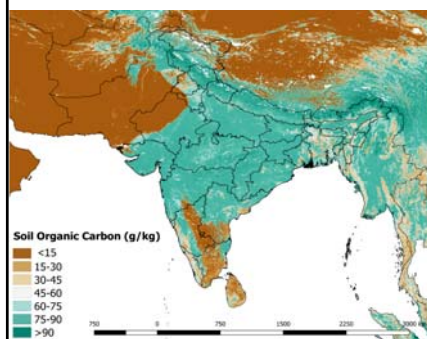
**Norin 10**

**In rice**

**Dee Geo Woo Gen**



## Second Generation Problems



Source: Famiglietti, J.S. (2014) Nature 4, 945-947.

- Factor productivity decline
- Deterioration in soil health (low OM)
- Macro-nutrient imbalance & Micro-nutrient deficiency
- Decline in water table
- Increased incidence of diseases and pests
- Dependence on costly inputs
- Reduced farm profitability

## Asia – Slow in Adoption of CA

Continent	Cropland under CA (m ha)	Per cent of global CA area
South America	66.4	42.3
North America	54.0	34.4
Australia & NZ	17.9	11.4
Asia	10.3	6.6
Russia & Ukraine	5.2	3.3
Europe	2.0	1.3
Africa	1.2	0.8
<b>Global total</b>	<b>157.0</b>	<b>100</b>

Kassam et al (2015)

Country	CA area '000ha 2008/09 update	CA area '000 ha 2013 update
China	1,330	6,670
Kazakhstan	1,300	2,000
India	-	1,500
Turkey	-	45
Syria	-	30
Korea, DPR	-	23
Iraq	-	15
Uzbekistan	-	2.45
Azerbaijan	-	1.30
Lebanon	-	1.20
Kyrgyzstan	-	0.70
<b>Total</b>	<b>2,630</b>	<b>10,30</b>

## Success of Rice-Wheat Consortium (RWC) A Regional Program Initiated in 1990



### • 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 Program involving Bangladesh, India, Nepal, Pakistan, CIMMYT & IRRI

## Innovation:

### Planting of Mungbean in Rice-Wheat System

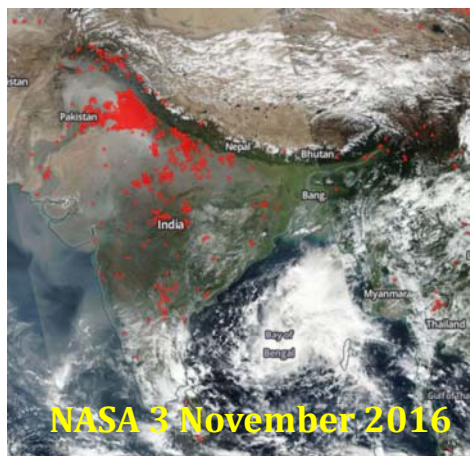


### Benefits :

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



## Emerging Challenge : Rice Residue Burning



Mainly in Rice - Wheat Production System

- Total residues : 680 mt/yr
- Rice residue burning in NW India: 23 mt
- Impact :
  - Loss of >9 mt C/year (34 mt CO<sub>2</sub>-eq)
  - Loss of ~0.15 mt N (US \$ 31 million)
  - Pollution and Health issues

## Innovation:

Avoidance of Residue Burning

- Use of Happy seeder

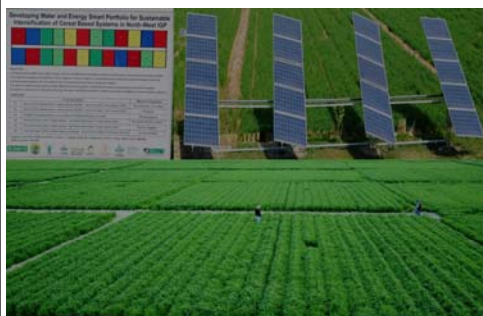


- ACIAR Project in the region (Bangladesh, India and Nepal)
- NARS-CIMMYT-BISA continued refinement & validation
- Prototypes also provided to Pakistan, Mexico, USA, African countries
- 2 Wheel Happy Seeder for small holders

## Major CA Initiatives in Asia

Initiatives	Country	Year
National Mission on Sustainable Agri (NMSA)	India	2008
National Food Security Mission	India	
National Innovation on Climate Resilient Agriculture (NICRA)	India	2011
ICAR Platform on CA	India	2013
National Mission on Soil Health	India	2015
Comprehensive research program on conservation agriculture	China	1992
Conservation tillage extension	China	2002
National plan for response to climate change	China	2014
Innovative Research, Technology Transfer and Capacity Development Program	Iran	2014

## Innovation : Water and Nutrient Use Efficiency



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

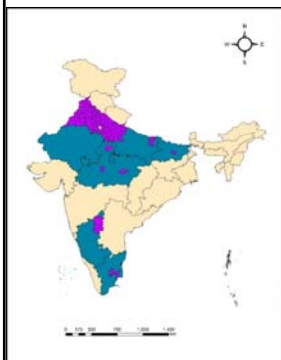
- CA in rice-wheat system saves cost, energy and labor
- CA through Sub Surface drip (SSD) irrigation system in rice-wheat produced:
  - ✓ 0.75 t/ha/year higher yield
  - ✓ With ~70 cm less water (almost double irrigation water productivity)
  - ✓ With 20% less fertilizer (higher NUE)
  - ✓ Lower carbon foot print

## Innovation: CA in Cotton-Wheat System



- Relay planting wheat using high clearance tractors
- Wheat productivity increased by 0.5 to 1.0 t/ha with additional gain of ~USD 300/ha
- Obviates seasonal labor shortage
- Potential Area : Almost 10 m ha in Asia (Around 4.5 m ha in SA)

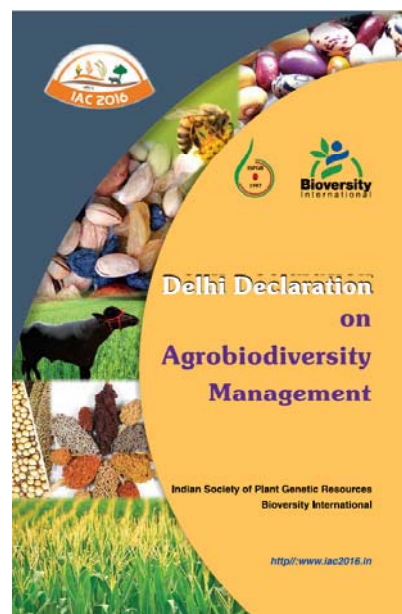
## Innovation Laser Land Leveling - A Silent Revolution



- Introduced in India during 2000-01 (*RWC/CIMMYT and ICAR-NATP*)
- Adoption: ~4.0 million ha in India
- Yield gains in RW system (3.5 mha, 0.5 t ha<sup>-1</sup> yr<sup>-1</sup>)- 1.75 mt yr<sup>-1</sup>; ~US\$ 20 million yr<sup>-1</sup>
- Water saving in RW system (4,0 mha, 18 ha-cm ha<sup>-1</sup> yr<sup>-1</sup>) = 6.5 km<sup>3</sup> yr<sup>-1</sup>
- Electricity saving for irrigation ~US\$ 70 million yr<sup>-1</sup>
- Employment generation : 11 million person days/yr

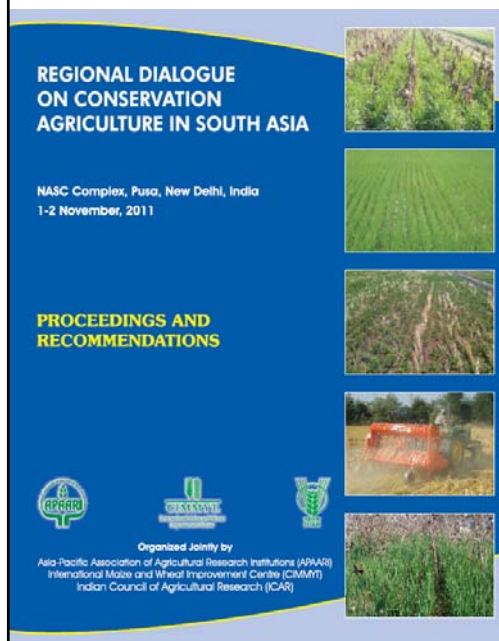
(Jat, et al, 2006; 2009a,b; 2011; 2015; Aryal et al, 2015)

## Use of Agrobiodiversity for CA



- Shared vision of agrobiodiversity conservation and sustainable use towards achieving Sustainable Development Goals (SDGs)
- There are large interactions of genotypes with environment and management (GxExM)
- Selecting/Tailoring genotypes which are better adapted to CA

## Networking and Regional Partnerships




### Recommendations:

1. Revival of RWC
2. Potential to out scale on 12 m ha
3. Regional partnership
4. Policy and funding support

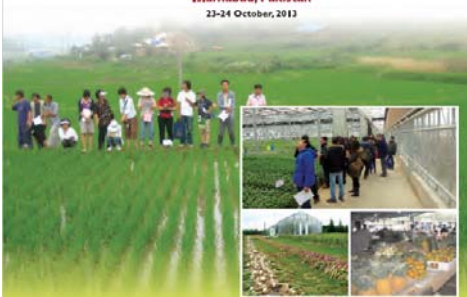


## Attracting Youth in Agriculture



**Regional Workshop on  
Youth and Agriculture:  
Challenges and Opportunities**


Islamabad, Pakistan  
23-24 October, 2013



**Proceedings and Recommendations**

Organizers  
Asia-Pacific Association of Agricultural Research Institutions (APAARI)  
Pakistan Agricultural Research Council (PARC)

Co-Sponsors



- Youth led reorientation of AR4D around farming systems
- CA being knowledge and skill intensive requires greater involvement of youth
- Knowledge sharing and linking science to society with human face is possible through involvement of youth.
- Higher investments on skill development of youth critical for entrepreneurship
- Youth to become Technology Providers and become 'Job Creators' and not 'Job Seekers'.

## Policy Advocacy – A Must

**Advanced Course - Asia  
CONSERVATION  
AGRICULTURE:**  
Gateway for Sustainable Intensification  
of Smallholder Systems

8 <sup>th</sup> Batch Commencing from 23 October 2017	Dates Oct 23-Nov 06 2017	Venue CIMMYT-BISA Ludhiana/Karnal India
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The Conservation Agriculture (CA) practices with increased acceptance across the globe are being considered as a challenge for sustainable intensification of smallholder production systems. Its positive impact on natural resources, and adaptation to and mitigation of climate change effects are widely acknowledged. In Asia, CA is a relatively new introduction and hence capacity development is vital for development, adaptation and scaling CA based technologies for impact at scale on smallholder farmers in the region. Therefore a course on conservation agriculture shall offer unique capacity development opportunity to the scientists currently associated with natural resource management research for development. The advanced course on CA in Asia was initiated during 2010 and the eighth session is being organized by CIMMYT and BISA under the aegis of CGIAR Research Program on WYSEAT, CGARR, WAZED and in close collaboration with Indian ICARs (ICAR, PAU etc). This course links the advanced and multidisciplinary approach for sustainable intensification of water and wheat based systems, introduction of natural resource degradation, and climate resilient production systems with vast expertise of CIMMYT researchers and partners across Asia, Africa and Americas. Emerging in view the high magnitude, the course has become a regular flagship activity wherein selected young men and women researchers from CGIAR as well as international organizations and NGOs across Asia involved in CA based sustainable intensification can be benefited.

- Awareness Among Policy Makers
- Promoting Role of Private Sector
- New Incentives and Subsidies
- Better Adoption by Farmers



## Roadmap for Scaling CA in Asia

- Establish long-term basic and strategic research platforms in different production systems / agro-ecologies
- Bridging the knowledge gaps by sharing successes across regions
- Strengthen extension systems through farmers participatory approach
- Mainstream CA with the Sustainable Development Goals (SDGs)
- Promoting Public-Private Partnership
- Enabling policies and doubling resources for AR4D

### CA for Better Future

