



# Scaling Conservation Agriculture for Sustainable Intensification in South Asia - A Regional Policy Dialogue

Dhaka, Bangladesh; 8-9 September, 2017

## Proceedings & Recommendations



### Organizers

Trust for Advancement of Agricultural Sciences (TAAS)  
Australian Centre for International Agricultural Research (ACIAR)  
Australian AID  
International Maize and Wheat Improvement Center (CIMMYT)



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## Preface

Conservation agriculture (CA) is not new to South Asia. In fact, its seeds were sown during 1970s. However, the concept got prominence after an eco-regional coalition known as Rice-Wheat Consortium (RWC) got initiated involving Bangladesh, India Nepal and Pakistan. It is estimated that CA presently spans over an area of 5 m ha in South Asia. Undoubtedly, this achievement looks impressive, but it barely covers 2% of the 210 m ha of arable land in South Asia. Hence, scaling of CA as an innovation is of considerable importance in the present context.

In order to bridge the gulf between actual achievement and potential for CA diffusion in South Asia, jointly TAAS and ACIAR convened and CIMMYT facilitated a Regional Policy Dialogue on Scaling Conservation Agriculture for Sustainable Intensification (CASI) on 8-9 September, 2017 in Dhaka, Bangladesh. The primary goal of this dialogue was to review the progress of CA and to explore avenues to move forward on scientific, institutional and policy related issues to catalyse translative and transformative actions for accelerating its coverage. Another goal of the deliberations was to put forth a 'Policy Brief on CASI in South Asia' that will define opportunities for scaling mechanisms or a platform for enabling regional partnership for knowledge sharing and learning from each other's experiences.

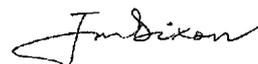
In all, 64 participants from South Asian countries, representing research institutions, universities, development departments, multilateral funding agencies, senior government officials, international organizations, private sector, civil society organizations and progressive farmers attended.

The general consensus was that scaling CA requires: application of farming system's related coherent interventions; adoption of a farmers' participatory approach; interdisciplinary and inter-institutional collaboration; more emphasis on translational research and transformational action; grant of monetary incentives to farmers adopting CA; political commitment and policy support; increase budgetary provisions; establishing South Asia Regional Platform for Conservation Agriculture for Sustainable Intensification on the lines of earlier successful Rice-Wheat Consortium (RWC). Details of these deliberations form part of these Proceedings.

Since many individuals and organizations supported this Policy Dialogue, the first after almost two decades, we on behalf of TAAS and ACIAR thank them all. We are thankful to the NARS leaders of SA for setting the tone of the Dialogue. Thank are also due to the speakers for delivering assigned talks and the participants for their active role in synthesising the recommendations. The logistic support extended by CIMMYT, Bangladesh is duly recognized. Untiring work and secretarial assistance of Ms Simmi Dogra is also acknowledged. Last but not the least, we place on record our appreciation for the technical expertise provided by Dr. JC Katyal, being a resource person.



**RS Paroda**  
Chairman, TAAS



**John Dixon**  
Principal Advisor, ACIAR



# Executive Summary

TAAS jointly with ACIAR convened a Regional Policy Dialogue on “Scaling Conservation Agriculture for Sustainable Intensification (CASI)” on 8-9 September, 2017 at Dhaka, Bangladesh. The CIMMYT, Bangladesh facilitated its organization. In all, 64 participants from South Asia (SA), representing research institutions, universities, development departments, multilateral funding organizations, senior government officials, international bodies, private sector, civil society organizations and progressive farmers were in attendance.

The primary goal of the Dhaka Dialogue was to review progress and state of CA-based sustainable intensification (CASI) in South Asia, and to explore avenues to move forward on scientific, institutional and policy fronts on the CASI and for catalysing translation research and transformative agenda on scaling its spread. Another goal of the Consultation was to put forth a ‘Policy Brief on the CASI in South Asia’ that would define opportunities and alternative scaling mechanisms, for example a platform for enabling regional partnerships on knowledge sharing and learning from one another’s experiences.

Based on the: (i) guiding principles relevant to CASI enunciated by science leaders, development authorities and policy makers, (ii) key scientific findings on the current state and the avenues of scaling, (iii) the central issues emerging from the deliberations of the Groups on Policy and Institution, Knowledge and Capacity Development, and Entrepreneurs and Business Models, (iv) outcome of Policy dialogue and (v) discussions on integrative way forward led to the following recommendations:

- i. **Apply farming system’s related holistic interventions:** CA in itself is not a single technology. It was valued as an innovation for sustainable farming, assimilating effective germplasm/crops management techniques, integrated nutrient/pest regulating schemes, minimal farm tillage, and efficient soil and water handling practices. In pursuance, CA thus requires application of **farming system’ related coherent interventions** that would increase both income and adaptive capacity of farmers for diversified as well as resilient agriculture.
- ii. **Adopt a farmers’ participatory approach to infuse CA:** Farmers in South Asia being small and marginal land-holders have limited risk taking ability. On outscaling of CA practices, their participation is considered critical for effective technology transfer, besides adaptive research, validation, refinement and adoption.
- iii. **Emphasize inter-disciplinary and inter-institutional collaboration:** Complexity of scaling CA related innovations necessitates research for development, fructified by consortia of multi-disciplinary teams working across diverse institutes and organizations - both public and private. Also, conduct of research has to move from components to systems and from short-term to long-term so that its results have replicable economic and environmental benefits.

- iv. **Focus on translational research and transformational agenda:** Given the intricacy of the processes on translating soil and crop management practices into curative action, imparting CA knowledge and know-how to farmers is a prerequisite for changeover. However, capacity building training has to be formatted as an interactive learning process and field-based adaptive research. Joint contribution of scientists, engineers and extension workers (public and private) in farmers' training would reinforce the efforts on scaling CA for sustainable farm intensification.
- v. Perceptibly, smallholder farmers adopting CA are contributing towards ecological services that are inherent to the land biosphere. In recognition furthering the cause of environmental services, the **resource poor farmers, be compensated/rewarded** suitably. Besides cash dividend, they be provided with tools and tackles facilitating application of CA technologies, Extending incentive for not burning straw, free custom-hiring of zero-till machinery and cheap credit are the three examples of this genre. Such bold policy decision would inspire farmers ensuring faster scaling of CA in South Asia.
- vi. **Political commitment and much needed policy support:** CA need to be made an integral part of: (i) country's development agenda aiming at resilient agriculture, land reforms such as: efficient crop, water, nutrient, energy use etc., and (ii) action plan to fulfil obligations under international treaties and conventions such as: climate change, desertification, CBD, SDGs etc. In pursuance, formulation of country-specific policy instruments, mainstreaming CA to be part of the development agenda would be essential.
- vii. **Increase in public funding for scaling CA:** Increased budgetary provision (almost four times), supporting CA application, is urgently needed. Primarily, a national funding promise such as launch of a "**National CA Mission**" is a need of the hour to scale CA practices both in rainfed and irrigated areas. Additional boost to CA is possible by making it an integral part of the on-going public funded schemes, like in India: Rashtriya Krishi Vikas Yojna; in Nepal: Prime Minister's Agricultural Development Program, and in Pakistan, aligning CA with commitment for Paris Agreement on Climate Change. Complementary international funding would help scaling-out innovations around CA. Organising a '**Funders Forum**' would ensure scaling of the CASI in South Asia.
- viii. **Establishing SA Regional Platform for CASI:** For maximizing on-site gains and minimizing off-site adverse outputs of methods on managing land ecosystem, establishment of "**South Asia Regional Platform for the Conservation Agriculture for Sustainable Intensification**" (SARP 4 CASI) is urgently needed. For successful launch of such an initiative, involvement and firm commitment of political leaders, respective Heads of NARS, donors and the CG Centres active in South Asia will be highly desirable.

The lessons learnt through sharing knowledge, success stories, technological innovations and technology transfer from the earlier successful Rice Wheat Consortium (RWC), convened by CIMMYT in partnership with NARS, for the Indo-Gangetic Plains, would be helpful is establishing the proposed SARP4CASI.

## **Acronyms and Abbreviations**

ACIAR	Australian Centre for International Agricultural Research
APARI	Asia Pacific Association of Agricultural Research Institutions
ARE4D	Agricultural Research and Education for Development
AR4D	Agricultural Research for Development
BARI	Bangladesh Agricultural Research Institute
BARC	Bangladesh Agricultural Research Council
BISA	Borlaug Institute for Sustainable Agriculture
CA	Conservation Agriculture
CASI	Conservation Agriculture for Sustainable Intensification
CBD	Convention on Biodiversity
CIMMYT	International Maize and Wheat improvement Centre
CSISA	Cereal System Initiative for South Asia
DFAT	Department of Foreign Affairs and Trade
DDG	Deputy Director General
DG	Director General
EC	Executive Chairperson
ED	Executive Director
EIGP	Eastern Indo Gangetic Plains
GDP	Gross Domestic Product
GOI	Government of India
ICAR	Indian Council of Agricultural Research
ICARDA	International Centre for Agricultural Research for Dryland Agriculture
IGP	Indo Gangetic Plains
IIIFSR	Indian Institute of Integrated Farming Systems Research
KGF	Krishi Gobeshona Foundation

KVK	Krishi Vigyan Kendra
NARC	Nepal Agricultural Research Council
NARES	National Agriculture Research and Extension System
NARS	National Agriculture Research System
NCAP	National Centre for Agricultural Policy
PARC	Pakistan Agricultural Research Council
PESTEL	Political Economic Social Technology Environmental Legal
RCER	Research Centre for Eastern Region
RCTs	Resource Conservation Technologies
ROI	Return Over Investment
RWC	Rice Wheat Consortium
SA	South Asia
SAARC	South Asian Association for Regional Cooperation
SAU	State Agricultural University
SDG	Sustainable Development Goals
SRFSI	Sustainable and Resilient Farming Systems Intensification
TAAS	Trust for Advancement of Agricultural Sciences

# **Proceedings and Recommendations**

## **BACKGROUND**

The Trust for Advancement of Agricultural Sciences (TAAS) supported by the Australian Centre for International Agricultural Research (ACIAR) and the SRFISI project of the Australian supported Sustainable Development Investment Portfolio organized a Regional Policy Dialogue on “Scaling Conservation Agriculture for Sustainable Intensification (CASI) in South Asia” at Dhaka, Bangladesh on 8-9 September, 2017. The International Maize and Wheat Improvement Centre (CIMMYT), Bangladesh facilitated organization of the Dialogue. Sixty-four participants covering 5 out of 8 countries from South Asia (SA), representing research institutions, universities, development departments, multilateral funding organizations, senior government officials, international organizations, private sector and civil society organizations, were in attendance. Dr Ramesh Chand, Member, NITI Aayog Government of India (GOI); Dr John Dixon, Principal Advisor, ACIAR; Dr RS Paroda, Chairman, TAAS, India; Dr Bhagya Rani Banik, EC, BARC, Bangladesh; Dr Baidya Nath Mahto, ED NARC, Nepal; Dr Yusuf Zafar, Chairman PARC, Pakistan; Mr Hamid Helmandi, Senior Advisor (Agriculture), President’s Office, Afghanistan and Dr AK Singh, Deputy Director General (Agricultural Extension), ICAR, India, steered the proceedings of this policy consultation.

Global agriculture and food production, primarily driven by technology-led enhanced productivity, doubled since the past 25 years. This enabled the developing world to reduce number of hungry people from 994 million in 1992 to 791 million in 2014, a decrease of 203 million in 22 years. South Asia, the home to about 1.75 billion people, over 30 per cent of whom are living in poverty, faces a major challenge of rapid economic growth for achieving Sustainable Development Goals (SDGs). The growing challenges of natural resource degradation, increasing labour and energy cost, volatile markets and emerging risks associated with the global climate change in this smallholder dominated region would further intensify these concerns. The future of farm income growth and national food security in South Asia has twin challenge of natural resource fatigue and decelerating productivity growth of food grains. These challenges are further exacerbated owing to sharp rise in the cost of inputs including energy, depleting water resources, spreading soil degradation, continuing indiscriminate and imbalanced use of chemical fertilizers, and above all owing to worsening effects of global climate change.

The natural resources in South Asia, especially in the Indo-Gangetic plains, are markedly stressed due to increased population, and uncalled for pressure of some economic and development policies compared to the rest of the world. Increasing climatic variability affects most of the biological, physical and chemical processes that underpin productivity of small-holder crop-livestock farming systems.

About 80 million of the India's farm- families, representing some 400 million men, women and children, own less than 2 hectares of land area, and these tiny holdings are often scattered. Due to demographic reasons and development demands, per capita availability of land, water and other natural resources, which are already stressed, would continue to decline, making economic viability of farming a big challenge. Integrated farming systems to substantially increase productivity, climate resilience and rural employment opportunities, especially of marginal and sub-marginal families, are thus required. In this context, pro-poor and pro-nature innovations in science and technology assume high priority.

In South Asia, more than 95 per cent of the agriculturally suitable land is already under cultivation. Hence, there is hardly any scope for horizontal expansion of farming. The region would need to produce 70 per cent more food by the year 2050 to meet the projected demand. Nonetheless, having high risks of climate change induced extreme weather events, crop yields in the region are predicted to decrease in the absence of increased resilience to cope with climate risk between 7 and 10 per cent in the near future. Therefore, development and deployment of tools, techniques, practices and strategies aiming at increasing agricultural production, while arresting degradation of soil, water and environment and ensuring their rational use, are essential to meet future food demands in the region.

At present, there is a need of paradigm shift in agronomic management practices to produce more and with higher efficient use of inputs. For this, conscious efforts are to be planned to swap unsustainable elements of the conventional-tillage-based monoculture production prototype with temporally and spatially high productive, profitable sustainable intensification, which is possible through large-scale adoption of Conservation Agriculture (CA) as a vehicle for change. It is well- established globally that CA aims to achieve sustainable and profitable agriculture and subsequently aims at improved livelihoods of farmers through three CA principles—minimal soil disturbance, permanent soil cover and crop rotation. The CA based management practices have also demonstrated to help adapting climatic risks and in lowering environmental foot prints.

In South Asia, CA technologies have been developed, adapted and promoted since the past two decades, primarily to conserve resources and increase farm income. The evidence from large number of studies on the CA-based management optimization in the cereal-based systems across the South Asia has shown tremendous

potential to increasing/sustaining crop productivity, input-use efficiency with economic profitability, improving soil health, increased adaptive capacity of production systems to climate risks, reducing emissions and enhancing soil-carbon sequestration.

In South Asia, no-till systems were introduced during mid-1990s to sow wheat in a timely fashion in the rice-wheat system. The CA program was later facilitated by the strong presence of Rice-Wheat Consortium (RWC) for the Indo-Gangetic plains, led by the regional NARS, facilitated by the World Bank and convened by the CGIAR Centres. It led to a steady rise in acreage under CA-based resource conserving technologies in India, Pakistan, and Nepal, and to some extent in Bangladesh also. The RWC reported a total coverage of nearly 3m ha under CA -based resource conserving technologies in South Asia in 2007 benefiting thousands of farmers directly to the extent of nearly US\$ 150 million. The RWC was adjudged as the best eco-regional program of the CGIAR and was awarded King Baudouin Prize. The success of the consortium was on account of regional collaboration, lessons learnt regionally and information sharing for development of scale-appropriate CA machinery and through capacity- development of all stakeholders.

During the past decade, a number of innovations on CA have been developed but their adoption has been somehow slow. It is fairly well understood that dissemination or extension of new technologies and innovations, in general, and of natural resource management technologies, especially CA-based practices, in particular, is indeed a challenge and would require innovative extension mechanisms and partnerships. Very often than not scientists, having developed and tested technologies are not able to transfer these far and wide to farmers. Why farmers are not ready to adopt CA technologies is a real concern of planners and scientists alike? Farmers currently need value-chain information (production, protection, inputs and services) on region-specific technologies which along with innovations are in advance stages of experimentation in farmers' fields. However, lack of a regional common platform for sharing the knowledge and capacity-development, besides needed policy support are the major deterrent in accelerating pace of CA adoption in the South Asia. Therefore, a policy dialogue on scaling conservation agriculture in South Asia was organized in Dhaka, Bangladesh on 8-9 September, 2017.

The primary goal of the dialogue was to review progress and state of CA-based sustainable intensification (CASI) in South Asia, and to explore avenues to move forward on scientific, institutional and policy fronts on the CASI and for catalysing translative research and transformative actions on scaling the CASI. This target was planned to be reached by organizing an open dialogue among policy-makers, NARS leaders, CGIAR centres, research institutions, development officials, private sector representatives, NGOs, donors and progressive farmers, to

exchange information, and to have an assessment of the regional priorities and a road map for out-scaling the CASI. Another goal of the deliberations was to put forth a 'Policy Brief on the CASI in South Asia' that would layout opportunities and alternative scaling mechanisms, for example a platform for enabling regional partnerships on knowledge sharing and learning from one another's programs on the CASI.

## **STRUCTURE OF THE DIALOGUE**

The Policy Dialogue was structured in 5 Technical Sessions, besides an Opening Session. The other Sessions mainly focused on: (i) Recent Advances in Conservation Agriculture in South Asia, (ii) Current Status on Scaling the CASI, (iii) Breakout Groups on the Policy and Institution, Knowledge and Capacity Development, and Entrepreneurs and Business Models, (iv) Policy Dialogue on Scaling the CA and (v) Plenary on Way Forward.

## **OPENING SESSION**

Dr RS Paroda chaired the Opening Session. Dr Ramesh Chand, Member, NITI Aayog, Government of India, was the Chief Guest. Dr John Dixon welcomed the dignitaries and the participants. He informed that the CA has expanded steadily and covered an area of 150 m ha globally. More satisfying is the fact that CA is spreading at a rate of ~1 m ha/year. In the recent times, 2 out of 3 hectares planted to cereals have been covered under the CA in Australia. Noticeably, farmers' innovations were at the back of this revolution. Compared to Australia, the spread of the CA in South Asia is quite modest. According to him, the out-scaling of the CASI - the combination of conservation agriculture and sustainable intensification - is slower because of some institutional weaknesses and policy inadequacies. He drew attention to 3 specific recommendations: (i) preferred linking of cultivators to input (typically machinery) and service provision markets along with output markets, (ii) identification and resolution of country-specific policy constraints to scaling CASI and (iii) forging regional partnerships and alliances and organizing CASI platforms for experience sharing and cross-learning.

Dr RS Paroda made a presentation for scaling CASI in South Asia. He traced the transformation of agriculture in South Asia following introduction of modern rice and wheat varieties, which led to the Green Revolution. He also highlighted emergence of second-generation problems leading to fall in the factor productivity, soil-health, water quality and farm income. Degradation in quality and health of natural resources was underlined as the main adversary of the recently observed productivity growth decline. While laying out the strategy for natural resources management, he suggested adoption of an eco-regional approach, conducting multi-disciplinary-team-work with specific involvement of stakeholders, mainly

farmers, and conducting research in a farming system mode, rather than individual crops and varieties. He re-emphasized that induction of CA is the way forward to support sustainable intensification. Given the past success of the RWC in strengthening spread of CA, Dr Paroda suggested to revive it in letter and spirit. On institutional functions, he specifically asked for reorientation of agricultural research for development (AR4D) portfolio suited to infusion of the CA. He also cautioned that appropriate policy support and adequate funding are extremely necessary, without which CA would remain a rhetoric than a reality.

Dr T Mohapatra, Secretary, DARE, and DG, ICAR, began his address through a video clipping. He stressed that in the context of adversaries like climate change and depleting natural resources, CA can offer a hope for resurgence of regional agriculture. He talked about the success of collaborative CA work done by the ICAR, BISA and CIMMYT and assured to make available the experience and the research findings with NARS of respective countries of South Asia. He said ICAR would cooperate in building human resource of the region through non-formal and formal capacity enhancing programs.

Dr A K Singh, DDG (Agricultural Extension), ICAR, briefed regarding CA scaling initiatives in India. He specifically mentioned about the launch of Climate Smart Villages and Diversification of Agriculture in support of building adaptive and resilient agriculture. He also talked on the Indian Government flagship programs on solar energy, more crops per drop, crop insurance and installation of meteorological observatories at each of the Krishi Vigyan Kendra (KVK). He said that individually these program provided leads to strengthen infusion of the CA. He shared his experience of Chandauli district of Uttar Pradesh (India), where 60, 000 ha could be covered under CA in the shortest possible time by the involvement of KVK scientists with the farmers. And technology of raised bed and furrow method of farming could be extended to ~3 m ha in heavy soils of Madhya Pradesh, India. He reiterated that changing farmers' mind set is necessary to create awareness, build knowledge and skills and to resolve machinery related constraints, including their availability.

Dr Bhagya Rani Banik, EC, BARC, Dhaka, was more than satisfied with the food self-sufficiency in Bangladesh. However, this is now being threatened by exploitative agriculture; coming in the wake of very high cropping intensity (192%) industrialized agriculture. That too is with a disturbing trend of wide man to land ratio, and almost 1 per cent of the farmland being diverted annually to other uses. Already severe stress on soil and water resources is being realized. Rising salinity, declining soil fertility, depleted water resources and climate change driven increase in frequency of erratic rainfalls are the kind of scenario Bangladesh agriculture is facing. Dr Banik specifically mentioned the relevance of CA in supporting sustainable intensification, and that's what the country needs utmost

to maintain its hard earned food self-sufficiency. According to her, Bangladesh has taken significant strides under the CA during the last one decade. She said, even though the progress was slow, but was quite encouraging, since this would act as a catalyst for further growth in the CA. She, however, cautioned that the success would only be assured, if efforts of extension functionaries, scientists and machinery manufacturers are forged as an alliance in the real-life field situations.

Dr Baidya Nath Mahto, ED, NARC, Nepal, mentioned that agriculture in Nepal is an uncertain and risky business as it is open to back to back vagaries of droughts and floods. Most farmers are small landholders and reside on hostile terrains that are difficult to be covered by the technology transfer agencies for real-time advice. Other challenges are non-availability of machinery suited to tiny Nepali farms. He specifically pointed out that the past success with the CA dictates that its spread is a must to sustain necessary growth in food grain production. The RWC, which helped in the initial stages of CA infusion, needs to be revived, as it seemed to have played a vital role.

Dr Yusuf Zafar, Chairman, PARC, Islamabad (Pakistan), informed that collectively rice and wheat meet around 70 per cent of the calorie needs of Pakistani population. Halting recently observed fall in productivity growth rates is a national priority. Dr Zafar apprised that revival of the RWC and adopting a holistic approach - balancing increase in economic yields and containment of the rise in the degradation of bio-physical resources and climate change – is the only option to move forward. Along with the application of CA concept, Pakistan as a policy has approved use of biotech approaches to enhance sustainability of agriculture. Pakistan also needs to significantly commit more funds for agriculture as it barely invests 0.18 per cent of the GDP; placing the country at the rock bottom rank among the SAARC countries as far as support to AR4D is concerned.

Dr Ramesh Chand, Member, NITI Aayog, GOI, made a very informative presentation on the CA in South Asia for balancing growth and sustainability. To market CA to farmers, it would be essential that farm profitability is sustained. He stressed that farmers should be given incentives, since they generate ecological benefits for the society at large. He also emphasized that besides rice and wheat, there is a need to undertake research on other crops and cropping systems. Instead of creating a separate program on CA, he suggested to mainstream CA in some of the existing programs linked to public initiatives on sustainable growth of agriculture. Above all, he suggested sensitizing planners and policy-makers regarding the crucial role of CA in balancing sustainable food production and containing adverse soil, water and environmental consequences. Further, he stressed that CA has to be considered as a 'national public good' by countries in South Asia.

The outcome of the presentations made during the Opening Session set the tone and tenor of the guiding principles around which the approaches and the

necessary elements of a doable future action plan ought to revolve and evolve. Based on this analysis, a brief **Synthesis of the Conclusions** of the Session is narrated below:

- There are institutional weaknesses and policy inadequacies in South Asia region
- The NARS leaders need to identify research initiatives that address systems and not necessarily components
- Identify country-specific policy instruments and to see that they are in place
- Forge regional partnerships and alliances and ensure building of a CA platform
- Adopt an ecoregional approach, and initiate a multi-disciplinary, multi-institutional activities through effective involvement of stakeholders
- Reorient research agenda to meet needs, specifically, of small-farm holders

## **SESSION I: RECENT ADVANCES ON CONSERVATION AGRICULTURE IN SOUTH ASIA**

**Co-Chair** : Yusuf Zafar, Chairman, PARC, Pakistan, and  
AK Singh, DDG (Agricultural Extension), ICAR

**Facilitator** : YS Saharawat, ICARDA, Afghanistan

Dr Andrew McDonald presented an overview and future strategies of Cereal System Initiative for South Asia (CSISA) project. Before launching programs on CA infusion, he emphasized the need for defining the goal, priorities and partner coordination assuring outcome and real returns over investment (ROI). He informed that agriculture in South Asia is complex due to dominating number of small farm-holders, high rural poverty, inflating population and growing influence of adversaries like climate change. Hence, CA, which is known to be pro-environment and pro-economics, needs to be spread for wider applicability and scope for adoption. He presented his viewpoint while citing several examples from the CSISA project-based research studies being run across Bangladesh, Nepal and India. The CSISA work from the North-western IGP pointed to enhanced productivity of the rice-wheat system by 11 per cent and profitability by 24 per cent, whereas there was reduction in energy usage by 25 per cent and irrigation water by 28 per cent. The CA gains were perceptibly higher with wheat-crop. In contrast, its negative influence on rice yields could mainly be attributed to incidence of iron deficiency. In the Eastern IGP, significant changes in weed flora were observed by replacing conventional practices with the CA system. Rural surveys demonstrated insufficient awareness on CA among the farmers of the Eastern IGP. The CSISA engagement in the region also indicated that service providers played a pivotal role in transfer of CA technology to farmers. Experience in the Eastern IGP further established that the CA-centred single-window service system was another viable option for

its diffusion and strengthening rural entrepreneurship development. Dr McDonald highlighted the specific role of neighbourhood single-window service providers and formulating sustainable business models suiting their specific needs. He also emphasized reorientation of government policies, specifically subsidy on machinery. The CSISA experience suggested that the extant policies are more obstructive and less supportive to sustenance of CA infusion. Some other key constraints are—non-availability of innovative machines i.e., light machines improvised with right seed dropping mechanisms; knowledge gap among different stakeholders, and lack of private sector investment.

The second presentation was on Sustainable and Resilient Farming Systems Intensification (SRFSI) by Dr Mahesh Gathala. He gave an overview of the project and highlighted that there are 20 implementing partners. This multi-partner consortium arrangement is complementary and mutually-rewarding for open cross-learning and pledging ownership by the NARES system as well. Dr Gathala, like Dr McDonald, pinpointed that in the Eastern IGP most farmers are smallholders, population growth is rather high, and the region supports 44 million agricultural labourers. The SRFSI experience showed that agricultural constraints varied between the North-western IGP and the Eastern IGP, and even within different districts of the Eastern IGP. Hence, for the Eastern IGP, zoning and prioritization are very important for developing sustainable agricultural production systems. In the context of wider adoption of the CA in the Eastern IGP, it is imperative looking beyond crop productivity. Special emphasis would need to be placed on small-scale mechanization, enhancing water and energy-use efficiency, besides crop intensification and diversification. The sustainable development strategy calls for a bottoms-up approach of learning through communities and better institutional arrangements for cutting short the adoption lag of CA technologies. Through multi-partner arrangement of the SRFSI, results of CA-based studies across diverse cropping systems have shown reduction in the cost of production by 21 per cent, irrigation water application by 12 per cent, energy use by 14 per cent, labour-use by 32 per cent as well as crop productivity increase by 3 per cent. One of the major highlights of the project is three times higher gender involvement in CA-based activities. The comparative studies involving gender have shown that CA adoption was higher by the women-farmers compared to the men-farmers. The lessons from the project suggest that CA-based technologies with farmers as the nucleus should be built on the existing infrastructure, must be evolved and implemented by engaging with the policy-makers and ought to have greater focus on wider adoption.

Dr ML Jat made a presentation entitled, 'How does conservation agriculture deliver to the climate smart agriculture portfolio? Learnings from South Asia'. He informed that CA-based technologies strengthen climate smart agriculture.

Through several examples, he shared that CA helps in building climate resilience; especially under adverse climatic conditions. He specifically underlined the value of a consortium of practices and policies that strengthen the stakeholders-specific practices and policies. He further highlighted the importance of technology targeting and introduction of legumes/pulses in the existing cereal-based systems. This infusion would assure productivity enhancement, said Dr Jat. According to him, the Turbo Happy Seeder is a climate smart machine, as it helps in improving soil health, building resilience to extreme weather events, and in minimizing the chemical load, water-use and the GHG emissions. For example, in the rice-wheat system, the adoption of CA reduces more than 250 T g CO<sub>2</sub>/ha/year, which translates into reduction of GHG emissions by 18 to 62 per cent. The CA technologies help in carbon sequestration as well. Dr Jat singled out the role of Laser Land Levelling and adoption of sub-surface drip irrigation as a kind of silent water revolutions. The climate smart agriculture in future would require layering of technologies as well as system perspective, and there is a need for innovative policies and practices to be put in place. He further shared that as 'one size does not fit all', different technologies would have to be evaluated for wider adoption.

The discussions that followed the three presentations led to the following key points.

- Identifying key drivers for the CA adoption by placing emphasis on issues like increase in vulnerability to soil erosion, decrease in availability of farm labour fuelling hike in daily wages, depleting water-table and rising energy prices.
- Cross learning and behaviour change would help in effective translation of the CA technologies at the farmers' fields, stimulating large-scale adoption.
- Widening infusion of the CA-based technologies would call for developing greater awareness, networking, capacity enhancement at different levels, besides knowledge sharing at the local, national and regional levels.
- Translating CA delivery programs into public policy and alternatively a public law would necessitate garnering wider public opinion in its favour.
- Partnering with the farming community is indispensable for scaling CASI, besides modernizing research and technology development initiatives.

## **SESSION II: CURRENT STATUS ON SCALING CASI**

**Co-Chairs** : Dila Ram Bhandari, Joint Secretary, Ministry of Agriculture, Nepal and Bhagya Rani Banik, EC, BARC, Bangladesh

**Facilitator** : RK Malik, CSISA, CIMMYT, India

The National Agriculture Research and Extension Systems (NARES) and the International Agriculture Research System (IARS) have jointly been in the forefront

on accelerating adoption of CA- based technologies. The goal is to intensify sustainability of existing cropping systems and to counter potential threat of impending climate change. In order to gain deeper understanding on the status of scaling CA in the region, the country status reports from Bangladesh, India, Nepal and Pakistan were presented during this Session.

Dr Wais Kabir, ED, KGF, presented Country Status Report of Bangladesh. He informed that due to less land and more dependent population, Bangladesh has no choice but to intensify its agriculture. However, delay in planting, difficulty in land preparation due to excess/shortage of soil moisture and lack of cultivars of right duration impede stretching cropping intensity further. He highlighted the positive role of making available pro-CA machinery and other inputs in the spread of CA practices. He typically informed on the use of strip-till planter and zero-till planter in increasing yield and crop intensification without adverse outputs. Presenting the results from a 7-year study, he reported that compared to the conventional farming methods, switch over to the CA practices (strip/zero till planting, legume intercropping and mulching) led up to 50 per cent increase in yield with 50 per cent less labor, 20-25 per cent savings in input costs, besides 44 per cent less expenditure on fuel. In spite of visible benefits, slow spread of the CA continues to be a matter of concern in Bangladesh, as elsewhere in South Asia. On this, he suggested enhancing access to the CA machinery and launch of capacity building and sensitization of programs for service providers, machinery manufacturers, extension workers and researchers. Dr Kabir drew attention to the specific need for training of farmers to build knowledge and skills related to all aspects of the CA concept.

Dr. B. N. Mahto, ED, NARC, presented 'Current Status and Scope of Conservation Agriculture in Nepal'. He informed that currently minimum tillage, zero-tillage, animal-drawn harrows and intercropped relay seeding are being promoted as resource conservation technologies (RCTs). Experimental evidence proved that minimum tillage produced one t/ha extra yield compared to the conventional method. Additionally, with bed planting there was a further saving of irrigation water to the tune of 28%. Despite impressive gains attributable to RCTs, Dr Mahto informed that until 2006-07, adoption of CA was limited to 16,622 ha only in Nepal. Continuing slow progress, therefore, suggested that there exists considerable scope to promote the CA in Nepal. For accelerating the spread of the CA principles and practices, he outlined the following steps.

- Increase awareness on the CA concept among the farming community
- Extend seed subsidies to include seed-cum-fertilizer drills and zero-till machinery
- Implement in letter and spirit the existing Agri-Mechanization Promotion Policy
- Evolve and introduce appropriate policy instruments supporting special grant for launching CA-specific research and development

- Mainstream CA initiatives with the ongoing Prime Minister Agri-Modernization Project for scaling CA technology in Nepal.
- Advocate establishment of Agri- Machinery Custom Hiring Service Centers overseen and backstopped by the present NARC Agri-Machinery Testing Centre.

Dr. BP Bhatt, Director, ICAR-RCER Patna (India), presented the 'Country Status Report on CASI in India'. He informed that efforts to promote CA technologies have largely been centered in the Indo-Gangetic Plains (IGP); jointly, the RWC and the NARS promoted CA for sustainable intensification. This initiative starting from a scratch in the 1990s has spread to approximately 3 m ha. He was of the view that despite increase in area, the expected economic and environmental benefits in response to application of RCTs are not commensurate to the effort and investment. Dr Bhatt explained reasons for this oddity; these included: non-availability of CA machinery, lack of appropriate seeders suited to small and marginal farmers, preferred use of straw for livestock feeding, component-based application of CA, conflicting subsidy policies on supporting rotavator plough excluding zero-till seed drills; high cost of CA machinery; limited access to custom-hiring, and poor entrepreneurship of service providers. In order to mitigate the consequences of these constraints, he suggested to: (i) create sub-regional and regional platforms for technology development, adaptation and knowledge-sharing; (ii) strengthen technology transfer services sensitive to situation and location-specific needs; (iii) develop database of network of service providers and help building their capacity and (iv) infuse and institutionalize a system of incentivizing and rewarding CA adopters including compensation for generated carbon credits in response to promotion of RCTs.

Dr Yusuf Zafar, Chairman, PARC, Islamabad (Pakistan), made a presentation entitled 'CA Initiatives: Sharing Pakistan Experiences'. In Pakistan, as anywhere else, the gains from the adoption of CA were astounding, explained Dr Zafar. For instance, without any yield penalty, compared to farmers' practice, there was a saving of Rs 2,000/ha on diesel for land preparation and irrigation water requirement by 1000 m<sup>3</sup>/ha; more timeliness in seeding, which reduced losses of 35 to 40 kg grain/day due to delay in seeding and above all improvement in soil-organic carbon status and useful soil biology. He stated that some progress has been made for rapid spread of the CA by establishing 10 partnerships among researchers, extension agents and service providers, on-farm demonstrations, organization of field days and training of farm men and women. In order to accelerate penetration of CA, Dr Zafar suggested to the following: (i) encourage private sector-led growth and entrepreneurship, (ii) initiate training programs for service providers, (iii) increase number of demonstrations show-casing CA technologies, (iv) establish a system for quality control of machines/system designers and (v) increase public investment for promotion of CA.

The following salient points emerged from the 4 Country Reports presented during the technical session.

- The scaling of the CA technologies in South Asia has happened because of cross fertilization of ideas and sharing of knowledge between Bangladesh, India, Nepal and Pakistan. RWC – a regional initiative – fuelled CA infusion by providing a common platform for convergence of ideas and sharing of experiences leading to the development of translational action and transformative research agenda. Hence, RWC need to be revived in consultation with the NARES for faster uptake of CA-related practices.
- The status reports of different countries gave a detailed view as to how the 3 key interventions like zero tillage (ZT), laser-land levelling (LLL), and the 2-wheel tractor-based strip till machines scaled out and what can be done further to expand CA in these countries.
- The sustainable intensification of cropping system has to happen in consonance with the saving in cost of inputs, increase in income of farm-holders and enhancement in quality of natural resources. The CA-based technologies were viewed as prerequisites of sustainable intensification.
- Competition and trade-offs for utilization of crop residue for animal feed and soil health has to be studied, and a holistic approach in the farming system mode needs to be evolved and applied.
- Happy Seeder having proven credentials need to be popularized where the burning of crop residue is a major problem.
- Direct-seeded rice and associated issues like season-long weed management must be resolved on priority.
- Induction of CA-based technologies is the most effective way to mitigate effect of imbalanced input use and over-exploitation of natural resources. Therefore, it is high time to include CA-based technologies in the package of practices and mainstream it in the ongoing national R&D programs and policy instruments pertaining to sustainable growth of a country's agriculture. .
- There is a need to address the researchable issues of today's and tomorrow's concerns like the emerging climate change scenario, including variable and uncertain episodes of monsoons and initial and terminal heat as well.
- Regional networking of databases, knowledge and experience sharing, capacity building should be taken up by the SAARC countries through a CA platform.
- In view of the fact that India, Pakistan, Nepal and Bangladesh have launched some mega programs, like solar pumps, National Innovation on Climate Resilient Agriculture (NICRA), introduction of high-efficiency precision irrigation systems

and diversification via high-value crops under the CASI, these interventions need to be further coordinated by encouraging a convergence approach.

- There is need to take a wider view of each of the CA-based technologies and emphasize on the determinants contributing to CA infusion. Road map on CA spread needs to be developed by creating a common platform for expertise and experience sharing.

### **SESSION III: BREAKOUT GROUPS**

Following the two technical sessions reported state of the CA spread and lessons learnt from the country-wide interventions on scaling CA in South Asia, the participants were divided into 3 groups: Group I. Policy and Institutions; Group II. Knowledge and Capacity Development, and Group III. Entrepreneurship and Business Models. Given the complexity of CA adoption and issues related to its out-scaling, the intent of these Breakout Groups was to arrive at specific integrative action points that bridge existing gulf among institutions, researchers, development departments, policy making bodies and all other stakeholders (most importantly farmers) and assemble them on one platform for scripting joint initiatives on the CA-based sustainable intensification. A brief account of the outcome arising from the deliberations of each Breakout Group is presented below.

#### **Group I. Policy and Institutions**

*Chair* : Lin Crase, University of South Australia

*Facilitator* : AS Panwar, IIFSR

Following is the gist of recommendations that emerged from the deliberations of this Group:

- There is no single CA-specific policy; rather CA touches many policy domains.
  - ◆ Access to country-specific policies covering general facets of agriculture are in place, but these need to be aligned explicitly to the local and regional requirements. Need is also for more comprehensive policies that include pre-defined indicators to qualitatively and quantitatively measure the outcome and impact on a time-scale.
  - ◆ The introduced policies need to be coherent and well-integrated to support spread of the CA concept.
- In the context of policies on Natural Resource Management and Utilization, following points need to be checked.
  - ◆ Property rights would need clarification (e.g., access, use, transfer rights, etc.).

- ◆ The value and cost of resource use is poorly signaled. Resource scarcity and degradation need hatching by prices.
- ◆ In the context of agricultural policies, the subsidies are poorly targeted and are numerous; a long-term target of zero subsidies should be in place, and in short and medium terms, subsidies would have to be structured to reinforce speedy scaling of CA.
- Policies need institutions for implementation, which must be community-centered and the demand-for-change driven. The capacity of community institutions also needs strengthening.
- State implementing agencies need to perform better; they ought to be made accountable to the communities, if CA is to be expanded.
- A regional 'INSTITUTION' is required for sharing experiences across countries. Such a platform could provide a 'WAREHOUSE' of technologies. In addition, it could serve the purpose of suggesting new policy options for required backstopping the CASI.

## **Group II: Knowledge and Capacity Development**

*Chair* : Ejaz Qureshi, ACIAR

*Facilitator* : Yash Saharawat, ICARDA

The Group made following recommendations:

- Synthesis/stock-taking/consolidation of knowledge as a product, i.e. specific knowledge packages of CA need to be developed suiting diverse needs of stakeholders.
- A knowledge repository is required for catalysing policy-makers on garnering support and mobilizing resources for the spread of CA.
- Extending right knowledge to the farmers and other stakeholders without dissemination losses is necessary. Encouraging and incentivizing rural youth to work as agri-service providers, and technology transfer agents. Launch of initiative of this genre was seen to minimize dissemination losses and develop rural entrepreneurship as well.
- In capacity development and technology transfer programs, besides focusing on researchers, extension workers and progressive farmers, including NGOs and private sector service providers was also considered essential.
- For developing a young CA expert group, the new course curriculum for teaching and learning around CASI need to be developed for adoption by the Ag Universities. Making agricultural education compulsory in all schools and

mandating Ph.D. and M.Sc. students to undertake CA-driven research programs were recommended for launch.

- Practical training modules on RCTs needed at different levels, i.e., serving the cause of farmers, extension workers, private service providers and other concerned.
- Innovations required for time, number and space-neutral knowledge sharing and transfer; greater use of ICTs and showing of appropriate videos were cited as examples.
- Institutionalization of continuous capacity development programs similar to L3 (life-long-learning) is necessary.
- Incentivize progressive farmers for their contribution towards knowledge and know-how sharing with other farmers, extension agents, researchers and other stakeholders.
- Establish regional platform/network for knowledge-sharing and capacity development.

### **Group III: Entrepreneurship and Business Models**

*Chair* : Erric Huttner, ACIAR

*Facilitator* : HS Sidhu, BISA

On the conclusion of intense discussions, the Group arrived at the following recommendations:

- Water, environment and natural resources' use must be costed: It was recommended to place an economic value attributable to loss in quality of natural resources with the conventional management practices vis-a-vis quality enhancement due to adoption of CA technologies. Economics favouring CA would convince scaling it out.
- Multiple business models need to be explored and promoted: Single-window service providers with CA machinery banks and trained operators would be more sustainable with the involvement of youth. However, individual service providers should not be ignored as they have low financial risk with deep reach in the rural areas. This was considered a preferred business option for the individual service providers having local repair and maintenance capabilities. The service providers' network for combine harvesters (rice and wheat) and laser land levellers already has proved successful in India.
- Capacity-building of service providers and business entrepreneurs: It was emphasized that capacity- building of service providers would be a key to success of business models on scaling CA. A well-trained service provider would act as

an extension agent to transfer CA technologies in the respective ecoregion of its operation.

- Capital/Credit (Soft Loan) Incentives for CA stakeholders: Initiatives are needed to provide incentives to farmers, service providers and to machinery manufacturers who give requisite assurance to produce quality machinery.
- Clear communication and awareness strategies: As CA is knowledge intensive, so clear communication and awareness strategies to address frequently asked questions about CA machinery and its impact would build a robust business model.
- Common Platform for Knowledge and Information sharing: Easy access to a common Platform for Knowledge and Information sharing would help scaling CA. It was projected to further attract entrepreneurs and private sector who view it as a viable business option.

#### **SESSION IV: POLICY DIALOGUE ON SCALING CA**

*Co-Chairs* : Raj Paroda, TAAS  
Ejaz Qureshi, ACIAR

*Facilitator* : Rishi Tyagi, APAARI, Thailand

Dr Raj Paroda welcomed delegates and panellists. He observed that CA is not zero-tillage only, rather in a broader sense, it is conservation of natural resources while maintaining reasonable level of productivity and profitability with minimum investments on inputs. He emphasized that innovations need to be scaled out keeping in view majority of the small farmers. He expressed that the panel discussion would come out with suggestions on Way Forward at the national and the regional levels.

Dr Ejaz Qureshi remarked that policies on scaling up CA on the one hand would be giving higher income on adoption and on the other, practitioners of CA would receive incentives for generating environmental benefits as public good. In that sense, equally important is to inspire new-look NARS; and have in place appropriate policy instruments.

Dr Yusuf Zafar from Pakistan, mentioned that CA is being practised by default, e.g., pine forestry, cold water fish culture and many horticultural crops. Government of Pakistan through its 2 Houses of Parliament (Senate and National Assembly) has passed a resolution aligned to the Paris Agreement on Climate Change, and six-monthly report is being submitted to the CBD Secretariat. He informed that by enactment of law, burning of straw is banned in Pakistan. As Chairman of APAARI, he assured that APAARI would take forward the agenda of CA in the Asia-Pacific region.

**Mr Suraj Pokhrel** from Nepal stated that CA is not a new concept. He made several suggestions on spreading CA in Nepal. Among these, he laid specific emphasis on subsidy policy on machines to be continued; to bring CA under the umbrella of Prime Minister Agricultural Program on rice and wheat; to develop machinery for small holder farmers and for launch of capacity-building programs both for men and women farmers. He accorded high importance to public-private partnership for infusing CA among Nepalese farmers.

**Mr Fazle Wahid** from Bangladesh mentioned that CA is being propagated in a big way in his country. In fact, CA has been made an integral part of the National Organic Agriculture Policy. Several development programs like promotion of bio-fertilizers, evolution of stress-tolerant varieties, IPM and incentives on shifting to solar energy are some on-going initiatives to promote diffusion of CA.

**Mr Hamid Helmandi** from Afghanistan made an elaborate presentation on the agricultural situation of his country. He stressed that given to the declining health of natural resources in Afghanistan; spread of CA is a must for sustainable growth of agriculture. He stated that the government is very supportive and keen to facilitate spread of CA, specifically among small- holder farmers. He emphasized the need for development of effective public-private business models at the national and regional levels.

**Mr Sudhir Kumar** from the State of Bihar (India) stressed that CA should be defined from the point of view of being a technology, process, method or concept. To promote CA, government has made compulsory to purchase zero-till machines along with tractor to avail subsidy. He espoused that as a matter of policy, CA should include both crop and livestock in a broader farming system concept.

**Dr Suresh Pal**, Director, NCAP, New Delhi, elaborated that policies need to support development of location-specific technologies for CA, and more investments are necessary for promoting CA. While developing policies, CA-driven generation of public goods ought to be the key factor for grant of pecuniary support to farmers. Scripting and introducing a pro-CA policy is important, but still more important is the genuine implementation, which invariably remains questionable. He observed that engagement with private sector is necessary for manufacturing machinery and providing after-sale services to the farmers. He placed specific emphasis on launch of awareness creating campaigns to educate all stakeholders in the art and science of the CASI.

**Dr Abdul Kalam Azad**, Director General, BARI, informed that though his country's agriculture is primarily rice-based, there are as many as 208 crops that are being cultivated in a small or in a big way. Because of dominance of lowland rice, he observed that zero-tillage as such may not be accepted in Bangladesh, unless some modern agricultural practices such as mechanical rice planters are

promoted. Accordingly, there is a need to evaluate efficacy of the introduced practices before promoting CA.

**Sh AK Padhee**, Director (Country Relations & Business Affairs), ICRISAT, reported that his institute is promoting infusion of CA in rainfed agriculture being developed around watershed management approach. He opined that since CA is a concept, it calls for integration of site-specific practices covering, crops, soils, rainwater and livestock. He cautioned that to minimize inadequacies afflicting institutional and organizational processes, there is a need assessing role of both internal (strengths and weaknesses) and external (political, economic, social, technical, environmental and legal) factors before out-scaling CA across diverse farming and farmers' situations. He specifically suggested bringing all stakeholders concerned with the agriculture R&D on board. The joint support of these players (e.g., research institutes, state departments of agriculture, NGOs, private sector, machinery manufacturers, credit institutions, and farmers interest groups) is fundamental to speed up the spread of CA.

**Dr C Chattopadhyaya**, Vice Chancellor, Uttar Banga Krishi Vishwavidyalya, Pundibari (West Bengal), emphasized CA infusion should be blended with watershed-based development of dryland agriculture. He went on to suggest that for holistic improvement of farmers' income, besides cereals, horticultural crops should also be part of technology transfer covering CA principles and practices. He stressed on the need for developing special course curricula around CA practices as part of the UG program and emphasis on CA research to be a part of the PG thesis program.

In the wake of above inputs by the Panellists, an open discussion was held. Resultant outcome is laid out below as recommendations.

- Provisions of incentives for farmers adopting CA practices e.g. subsidy on mechanization to promote CA or compensation for creation of environmental services. New financial system ought to be developed instead of credit system, as currently in practice.
- Institutional arrangements at the NARS level are to be developed in each country, so that farmers' participation is ensured for promotion of CA.
- Knowledge creation is important, but equally important is its transfer through regional platforms like APAARI, SAC, etc.
- Policy-outcome indicators need to be developed to assess impact of CA.
- Location-specific technologies be developed with increased investments on adoption of CA.
- Private sector is to be involved in extension of CA technologies and need be encouraged by the governments to manufacture efficient, practicable and small farm machinery.

- PESTEL (political, economic, social, technological, legal) analyses need to be undertaken for harnessing sustainable benefits of CA technology.
- Each NARS should develop a country status paper on CA and its impact on the livelihood enhancement and environmental security. Profitability need to be assessed not only in terms of cash income of farmers, but to accrued societal and environmental benefits also.
- Private sector need to be engaged while developing and inducting public supported new extension methods and mechanisms.

## **SESSION V: PLENARY ON WAY FORWARD**

The Session opened with some brief comments by Dr Raj S Paroda. He recounted the success of the organization and fruitful outcome of the deliberations. He reiterated that not only must the farmers' needs and aspirations drive transfer of CA practices, but the indigenous innovations and resources ought to form also the core object for ecoregion specific spread of the CA technologies. Additionally, research objectives must create space for accommodating farmers' outlook and constraints on various elements constituting CA. Dr Paroda observed that the task ahead, though difficult, can possibly be accomplished by modernizing agricultural education, strengthening stakeholder's capacity, developing partnerships and networking among public and private agencies, reorganizing institutional structures and governance methods, and re-scripting agricultural policy augmented by CA principles and practices. He laid specific emphasis on revival of a RWC like program and for having a discussion platform for sharing knowledge, experience and expertise. Before closing, Dr Paroda specifically thanked Dr John Dixon for ACIAR support, local CIMMYT staff for organizing logistics and also the inputs from Dr JC Katyal for finalization of draft proceedings and recommendations in a record time.

Dr JC Katyal then presented a synopsis of the deliberations and the action points emerging therefrom. He briefly narrated Session-wise outcomes. Dr Katyal also portrayed a snapshot of recommendations, synthesized from the conclusions drawn at the end of each Session.

Ms Julia Niblett, Australian High Commissioner in Bangladesh, regarded the holding of the regional policy dialogue on the CASI a big initiative for the sustainable growth and development of agriculture in Bangladesh. This event, in particular, is of topical relevance and of great practical utility, since Bangladesh agriculture at present is imperilled by rising degradation of natural resources, diminishing size of already miniature landholdings and onslaught of floods/cyclones; incidence of which is more frequent and less predictable now than ever before. She made a specific mention of the Australian (DFAT and ACIAR) public

funded project on “Sustainable and Resilient Farming Systems Intensification (SRFSI) for the EGP” project. The SRFSI is in operation in Bangladesh since 2014. The aim is to reduce poverty by improving productivity, profitability and sustainability of smallholder agriculture in the EGP. Having seen the success of this productivity enhancing, profitability increasing, input cost cutting, natural resources building and climate change containing CA initiative, Australian Government (through ACAIR) would be more than willing to consider supporting similar project in future also.

Md Fazle Wahid Khondeker, Additional Secretary, Government of Bangladesh, remarked that agriculture of his country is confronted with twin problems of falling quality of soil, water and environment and feeding the burgeoning population from diminishing cropland area. Given the circumstances, there is no alternative except to introduce smart agricultural practices that conserve and augment quality of natural resources and sustain necessary surge in productivity growth with adaptability and resilience. It would, therefore, be necessary for Bangladesh to make CA a cardinal point for its perspective plan on agricultural research and development.

Dr Ramesh Chand, in his special remarks, suggested that the action points emerging from the dialogue must set the goals and targets, which are relevant socially and environmentally, doable within a set time-frame and the outcomes ought to be measurable quantitatively, based on the predefined set of indicators. He emphasized that assuring rise in income, either directly or indirectly, would be an incentive for accelerating CA adoption in South Asia. While underlining the need for increased investment for transfer of CA concept and practice, he underlined grounding in of CA as part and parcel of the ongoing AER4D agenda.

Dr John Dixon proposed a Vote of Thanks. He appreciated leadership role of Dr Paroda for organizing the dialogue so meticulously; ensuring participation of key policy leadership from the region. In particular, he commended the speakers for their comprehensive presentations. Noteworthy were the comments made and the views expressed by the participants in enriching the ensuing discussions, and he thanked them for their interventions, which significantly improved the understanding and the appreciation for CA. He was pleased with the emphasis on knowledge-sharing such as on an RWC-like platform across the region to augment knowledge and accelerate scaling of the CASI. After such a successful policy dialogue, it would be logical for a volunteer group to encourage knowledge-exchange and leading projects to organize information-sharing and capacity-building activities. He also thanked Dr T.P. Tiwari, Dr Mahesh Gathala and the entire CIMMYT team as well as Ms Simmi Dogra of TAAS for all logistics.

## RECOMMENDATIONS

Based on the: (i) guiding principles relevant to CASI enunciated by the agri-science leaders, development authorities and policy makers during the Opening Session; (ii) key scientific findings on the current state of CASI and the key strategies on out-scaling it presented by the chief investigators of the ongoing CA projects across South Asia, (iii) the central issues emerging from the deliberations of the Groups on Policy and Institution, Knowledge and Capacity Development, and Entrepreneurs and Business Models, (iv) outcome of Policy on Scaling-up CA session and (v) follow up threadbare discussions involving all participants led to welding together of a transformative approach supporting an integrative way forward on spreading CASI in South Asia. Salient points synthesized from these events and engagements as recommendations of the 'Regional Policy Dialogue on Scaling Conservation Agriculture for Sustainable Intensification' were arrived at. These are presented below.

- i. Conceptually, CASI is not a single technology. It is an innovation for sustainable farming, assimilating effective germplasm/crops, integrated nutrient/pest management, minimal and efficient farm mechanization, and efficient soil and water management practices. Therefore, it requires application of **farming system' related coherent interventions** that would increase both income and adaptive capacity of farmers for diversified as well as resilient agriculture. Additionally, its infusion is seen to sustain ecological services and in providing greater environmental benefits to the countries of the region. Hence, CASI being a national/regional/international public good, it needs to be outscaled to reap multidimensional benefits.
- ii. Farmers in South Asia are predominantly small and marginal with a limited risk taking ability. Hence, outscaling of CASI principles has to adopt **farmers' participatory approach**, requiring on-farm research, validation, refinement and faster adoption methodology.
- iii. Noticeably, the complexity of scaling CASI related innovations calls for **inter-disciplinary and inter-institutional collaboration**. Thus, it necessitates combined action by the drivers of change - farmers, scientists, development officials, NGOs, entrepreneurs and the policy-makers. For this, a 'Mission Mode' program/ approach is warranted urgently for joint regional action to have the needed impact on scale.
- iv. Given the intricacy of the process to effect change in soil and crop management practices, scientists, engineers and extension workers (both public and private) would need to impart knowledge to practitioners (farmers) regarding CASI principles and practices without any dissemination losses. This calls

for greater emphasis on **translational research and transformational action** for scaling CASI in South Asia, which has so far lagged behind other regions (South America, USA, Canada and Australia).

- v. Convincing farmers, which goes beyond filling knowledge gap, would require linking science to society. In pursuance of this, a paradigm shift from routine component based short-term research to **innovative, result-oriented, system-wide long-term research** is warranted. From organization standpoint, forging alliance of innovators, social scientists, public development officials, policy-makers, NGOs and the private sector would ensure faster and desired impact of conservation agriculture for sustainable intensification (CASI). Perceptibly, smallholder farmers adopting CASI are contributing towards ecological services that are inherent to the land biosphere. In recognition furthering the cause of environmental services, the **resource poor farmers be compensated/rewarded** suitably. Besides cash dividend, they be provided with tools and tackles facilitating application of CASI technologies, Extending incentive for not burning straw, free custom-hiring of zerotill machinery and cheap credit are the three examples of this genre. Such bold policy decision would inspire farmers ensuring faster scaling of CASI in South Asia.
- vi. **Political commitment and much needed policy support** will be necessary to make CASI an integral part of: (i) country's development agenda aiming at resilient agriculture, adoption of improved technologies such as: efficient crop, water, nutrient, energy use, etc. and (ii) action plan to fulfil obligations under international treaties and conventions such as: climate change, desertification, Convention on Biological Diversity (CBD), SDGs, etc. Guided by the quality of native biophysical resources and socioeconomic situation of farmers, the policy instrument, hence, would have to be region/country-specific.
- vii. Irrefutably, increased budgetary provision (almost four times), supporting CASI application, is urgently needed for sustaining farm profitability and national food and nutritional security, conserving available natural resources and containing GHG emissions. Primarily, a **national funding** promise such as "**National CASI Mission**" would be the need of the hour to scale CASI practices both in rainfed and irrigated areas. CASI can also be made an integral part of the on-going public funded schemes of the Governments. Like in India: RKVY-Rashtriya Krishi Vikas Yojna (National Agriculture Development Scheme); in Nepal: Prime Minister's Agricultural Development Program; and in Pakistan, aligning CASI with commitment for Paris Agreement on Climate Change. Yet, complementary international funding would be essential to scale-out innovations around CASI. To catalyze donors and policy-makers, it would be desirable to organize a 'Funders' Forum' to ensure scaling of the CASI in South Asia.

- viii. Though the positive ecological outcomes of CASI are perceived to be local, these do spill far beyond the boundaries of a nation and even the region. Moreover, what a country does to its natural resources influences greatly environment of its neighbours as well. Although local legal measures are necessary to nip the on-site generation of adverse outputs (like smog from burning of straw), yet to contain the off-site spread, application of CASI principles and practices would essentially require a **“South Asia Regional Platform for the Conservation Agriculture for Sustainable Intensification (SARP 4 CASI)”** through an effective collaboration and a firm commitment of all national leaders, institutions (NARS), donors and the CG Centres actively engaged in promoting CASI in South Asia.
- ix. Such a platform, (SARP 4 CASI) once established on the principles of earlier rice-wheat consortium (RWC), to share knowledge/success stories, technological options/innovations, expertise, etc. would require **effective NARS partnership**. It could be facilitated by one of the CG Centres actively involved in research and development on CASI practices, such as the CIMMYT through its two major regional programs: CSISA (funded by BMGF and USAID) and SRFSI (funded by ACIAR). Involvement also of other CG Centres and institutes like IRRI, ICRISAT, ICARDA, ILRI, ICRAF, BISA, etc. and the National/Regional Fora such as APAARI, SAARC, TAAS, etc. would strengthen further the initiatives on the CASI, so essential for achieving SDGs in the region.

## Program

### DAY 1: SEPTEMBER 8, 2017

0830-9000	Registration	
0900-1030	OPENING SESSION	
0900-0910	Welcome Remarks	John Dixon, Principal Advisor, ACIAR
0910-0925	Conservation Agriculture in South Asia: Setting the Context	Raj Paroda, Chairman, TAAS
0925-0935	Remarks by NARS Leader: Bangladesh	Bhagya Rani Banik, EC, BARC
0935-0945	Remarks by NARS Leader: India	T. Mohapatra, DG & AK Singh, DDG, ICAR
0945-0955	Remarks by NARS Leader: Nepal	Baidya Nath Mahto, ED, NARC
0955-1005	Remarks by NARS Leader: Pakistan	Yusuf Zafar, Chairman, PARC
1005-1025	Inaugural Address	Ramesh Chand, Member NITI Ayog, Govt of India
1025-1030	<i>Vote of Thanks</i>	TP Tiwari, Country Representative CIMMYT-Bangladesh
1030-1050	<i>Group Photograph &amp; Coffee Break</i>	
1050-1210	Session-I: Recent Advances on Conservation Agriculture in South Asia	
	<i>Co-Chairs:</i> Yusuf Zafar, Chairman, PARC and AK Singh, DDG, ICAR	
	<i>Facilitator:</i> YS Saharawat, ICARDA	
1050-1110	CSISA Initiative and Future Strategy	Andy McDonald, Country Representative, CIMMYT-Nepal
1110-1130	SRFSI Initiative and Way Forward	Mahesh Gathala, CIMMYT, Bangladesh

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1130-1150	How Does Conservation Agriculture Deliver to The Climate Smart Agriculture Portfolio? Learnings from South Asia	<b>ML Jat</b> , CIMMYT, India
1150-1210	<i>Discussion and remarks of Co-chairs</i>	
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1210-1500	<b>Session-II: Current Status on scaling CASI</b>	
	<b>Co-Chairs:</b> Dilaram Bhandari, Jt Secy, MoA, Nepal and Bhagya Rani Banik, EC, BARC	
	<b>Facilitators:</b> RK Malik, CSISA, CIMMYT	
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1210-1230	Country Status Report: <i>Bangladesh</i>	<b>Wais Kabir</b> , ED, KGF
1230-1250	Country Status Report: <i>India</i>	<b>BP Bhatt</b> , Director, RCER
1250-1400	Lunch	
1400-1420	Country Status Report: <i>Nepal</i>	<b>BN Mahto</b> , ED, NARC
1420-1440	Country Status Report: <i>Pakistan</i>	<b>Yusuf Zafar</b> , Chairman, PARC
1440-1500	<i>Open Discussion and Concluding Remarks</i>	
1500-1530	<b>Coffee Break and Breakout Group logistics</b>	
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1530-1700	<b>Session-III: Breakout Groups</b>	
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	<b>Group-I: Policy and Institutions</b>	
	<b>Chair:</b> Lin Crase, University of South Australia	
	<b>Facilitator:</b> AS Panwar, Director, IIFSR	
	<b>Group-II: Knowledge and Capacity Development</b>	
	<b>Chair:</b> Ejaz Qureshi, ACIAR	
	<b>Facilitator:</b> YS Saharawat, ICARDA	
	<b>Group-III: Entrepreneurships &amp; Business Models</b>	
	<b>Chair:</b> Eric Huttner, ACIAR	
	<b>Facilitator:</b> HS Sidhu, BISA	
1700-1730	<b>Chair:</b> Anthony Whitbread, ICRISAT Facilitators and Co-chairs Synthesis of Breakout Groups	
1900-2100	<b>Dinner</b>	

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**DAY 2: SEPTEMBER 9, 2017**

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**0900-1100 Session-IV: Policy Dialogue on Scaling CA**

**Co-Chairs:** Raj Paroda, Chairman, TAAS and Ejaz Qureshi, ACIAR

**Facilitator:** RK Tyagi, APAARI

**Panelists:**

Yusuf Zafar, PARC, Islamabad

Suraj Pokhrel, Secretary, Ministry of Agricultural Development, Kathmandu

Md. Fazle Wahid Khondeker, Addl, Secretary, Ministry of Agricultural, Govt. of Bangladesh

Hamid Helmandi, Senior Advisor, Kabul (Agriculture), President Office

Abul Kalam Azad, DG, BARI

Sudhir Kumar, Principal Secretary (Agriculture), Govt of Bihar, India

Suresh Pal, Director, NIAP, India

AK Padhee, Director (Country Relations & Business Affairs), ICRISAT, India

C. Chattopadhyaya, VC, UBKV, West Bengal, India

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**1100-1130 Tea/Coffee Break**

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**1130-1300 Session V: Plenary on Way Forward**

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*Welcome and Brief on Dialogue*

**Raj Paroda**, Chairman, TAAS

Synthesis Report

**JC Katyal**, Resource Person

Remarks

**Md. Fazle Wahid Khondeker**,  
Addl, Secretary, Ministry  
of Agricultural, Govt. of  
Bangladesh

Special Remarks of Guest of Honour

**Julia Niblett**, Australian High  
Commissioner to Bangladesh

Special Remarks of Guest of Honour

**Ramesh Chand**, Member, NITI  
Ayog, Govt of India

*Vote of Thanks*

**John Dixon**, Principal Advisor,  
ACIAR

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**1300-1400 Lunch**

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## Trust for Advancement of Agricultural Sciences (TAAS)

### GOAL

An accelerated movement for harnessing agricultural science for the welfare of people.

### MISSION

To promote growth and advancement of agriculture through scientific interactions and partnerships with stakeholders.

### OBJECTIVES

- To act as think tank on key policy issues relating to agricultural research for development (AR4D).
- Organizing seminars and special lectures on emerging issues and new developments in agriculture.
- To institute national awards for the outstanding contributions to Indian agriculture by the scientists of Indian and other origin abroad.
- Facilitating partnerships with non-resident agricultural scientists visiting India for short period.

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#### **Secretary**

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Dr. K.L. Chadha  
Dr. A.K. Srivastava  
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Mr. Raju Barwale  
Dr. J.L. Karihaloo

#### **Vice Chairman**

Dr. Gurbachan Singh

#### **Treasurer**

Dr. Narendra Gupta

## Recent TAAS Publications

- Special Lecture delivered at Indian Seed Congress 2013 on “Indian Seed Sector : The Way Forward” by Dr. R.S. Paroda, February 8, 2013.
- Foresight and Future Pathways of Agricultural Research Through Youth - Proceedings & Recommendations, March 1-2, 2013.
- Managing Our Water Resource for Increased Efficiency - Strategy Paper by Dr. R.S. Paroda, May 28, 2013.
- A Brief Report on Seventh Dr. M.S. Swaminathan Award presented to Dr. William D. Dar, DG ICRISAT, Hyderabad, June 24, 2013.
- Brainstorming on Achieving Inclusive Growth by Linking Farmers to Markets - Proceedings and Recommendations, June 24, 2013.
- The Indian Oilseed Scenario : Challenges and Opportunities - Strategy Paper by Dr. R.S. Paroda, August 24, 2013.
- National Workshop on Outscaling Farm Innovation - Proceedings and Recommendations, September 3-5, 2013.
- Brainstorming Workshop on Soybean for Household Food and Nutritional Security - Proceedings and Recommendations, March 21-22, 2014.
- The Eight Foundation Day Lecture on “Sustainable Agricultural Development - IFAD’s Experiences” by Dr. Kanayo F. Nwanze, President, IFAD, August 5, 2014.
- Need for Linking Research with Extension for Accelerated Agricultural Growth in Asia - Strategy Paper by Dr. R.S. Paroda, September 25, 2014.
- Global Conference on Women in Agriculture - Proceedings and Recommendations, March 13-15, 2015.
- Brainstorming Workshop on Upscaling Quality Protein Maize for Nutritional Security - Recommendations, May 21-22, 2015.
- The Ninth Foundation Day Lecture on “21st Century Challenges and Research Opportunity for Sustainable Maize and Wheat Production” by Dr. Thomas A. Lumpkin, Former DG, CIMMYT, September 28, 2015.
- National Dialogue on Efficient Management for Improving Soil Health - New Delhi Soil Health Declaration - 2015, September 28-29, 2015.
- Regional Consultation on Agroforestry: The Way Forward - New Delhi Action Plan on Agroforestry 2015, October 8-10, 2015.
- National Dialogue on Innovative Extension Systems for Farmers’ Empowerment and Welfare - Road Map for an Innovative Agricultural Extension System, December 17-19, 2015.
- Round Table Discussion on Promoting Biotech Innovations in Agriculture and Related Issues - Proceedings & Recommendations, August 4, 2016.
- Awareness cum Brainstorming Meeting on Access and Benefit Sharing – Striking the Right Balance – Proceedings, October 22, 2016.
- Delhi Declaration on Agrobiodiversity Management – Outcome of International Agrobiodiversity Congress 2016, November 6-9, 2016.
- National Conference on Sustainable Development Goals: India’s Preparedness and Role of Agriculture, May 11-12, 2017.
- Regional Policy Dialogue on Scaling Conservation Agriculture for Sustainable Intensification, Dhaka, Bangladesh, September 8-9, 2017.
- Policy Brief on Scaling Conservation Agriculture in South Asia.
- Retrospect and Prospect of Doubling Maize Production and Farmers’ Income – Strategy Paper by Dr. N.N Singh, September 10, 2017.
- Indian Agriculture for Achieving Sustainable Development Goals - Strategy Paper by Dr. R.S. Paroda, October, 2017