

Proceedings of the National Consultation on Conservation Agriculture

Jointly organised by NCAP, NAAS, and PACA on 11th December, 2009 at NASC Complex, New Delhi

The National Consultation on Conservation Agriculture – The Way to Sustainable Agriculture, was organised jointly by National Centre for Agricultural Economics and Policy Research (NCAP), National Academy of Agricultural Sciences (NAAS), and Professional Alliance for Conservation Agriculture (PACA) on 11th December, 2008 at the NASC Complex, New Delhi. The Consultation was a prelude to the forthcoming 4th World Congress on Conservation Agriculture (WCCA) being hosted by India in February 2009. The main objective was to develop a consensus at the national level with relation to the role and relevance of conservation agriculture (CA) considering the emerging challenges of depleting resources, state of environment, and farm economics. Over fifty leading experts in agricultural sciences and development economics attended the Consultation.

The Consultation was conducted in the background of several national level deliberations at the scientific and political level to understand, analyse and define strategies to respond to challenges facing the agriculture sector on issues concerning food security, widespread resource degradation, poverty, loss of biodiversity, and climate change. It recognised that overcoming these challenges and revitalising agriculture was fundamental to meet Millennium Development Goals and improve livelihoods of vast majority of farm families. The meeting recalled, as in the past, strategies to revitalise Indian agriculture with role of science and technology being pivotal in driving this change. It is in this context that the deliberations focused on elements of CA concept that could respond and contribute to the future of India's agricultural economy and the research system.

This Consultation initiated the process of sensitisation about CA and helped to develop a road map for Indian Agricultural Research System and identify internal partnerships in the context of CA. This note captures the proceedings in brief and the key resolutions adopted at the Consultation relevant to needs of policy making for sustainable agriculture in India.

Background

The National Consultation began with a strong conviction that the future of sustainable agriculture for India is through the CA route. This became evident through background presentations that set the stage for discussions on CA for meeting development goals in the context of forthcoming WCCA. These presentations clearly described the emergence of CA as an alternative to the negative consequences of conventional agriculture. They also dwelled on the definition, benefits, problems and current status of CA globally. Objectives of the forthcoming 4th World Congress on CA in India were discussed in the background of earlier Congresses held in Spain, Brazil and Kenya. Some of the critical issues that emerged clearly include:

- A general consensus that agriculture sector in India needed to be revitalised to enable it to respond effectively to the multitude of challenges that it faces. These include assuring food security and environmental sustainability against the background of declining natural resources and climate change impact along with the need to become increasingly competitive.
- There was a good degree of clarity that the problems facing the sector were highly location specific and would call for solutions that viewed problems from a systems perspective through an integrated approach. The single most critical element of change that was flagged time and again was the need to

increasingly adopt 'eco-regional' approach in solving location specific problems facing the farming community.

- Organising research for development efforts in the eco-regional context has several distinct advantages, also enabling the scientific community to define and focus the research agenda based on a better understanding of the bio-physical and socio-economic environment of farmers. This approach also permitted addressing twin concerns of enhanced productivity and maintenance of resource base quality, allowed focusing on policy related issues and provided a framework for linking local issues to national and global issues.

The session raised some pertinent questions on how to go about mainstreaming eco-regional/system perspective in the research system. While drawing parallels between the recommendations given by the Planning Commission and National Development Council for Agriculture sector in India, CA was hailed as the entry point for operationalising this approach into action. The discussion was structured around three major themes with implications by way of 'Technology generation, adaptation and adoption', 'Eco-regional context' and 'Institutional and policy support needed for CA induction'. The themes were explored through focused panel sessions around the key questions relevant for bringing changing needs in the context of CA.

Technology Generation, Adaptation and Adoption - Need for a Paradigm Shift

The session was chaired by Dr. J.S. Samra, CEO, National Rainfed Area Authority, who steered the discussion through five panellists around the needs for building a farming systems perspective in research for development, understanding implications of technology generation, adaptation and adoption and building linkages with development stakeholders.

Considering CA as an alternate paradigm would require a shift from technologies focusing on 'inputs' and 'yield maximisation' to those aimed at improving resource use efficiency and crop productivity. These would require exploration to deal with diverse, flexible and context specific needs of technology generation, adaptation and adoption and its management. Key points that emerged during the discussion include:

- Operationalising eco-regional approach through CA will have implications in terms of technology generation, adaptation and adoption. Several technology investment portfolios such as market interventions (Minimum Support Price), trade policies, incentives and subsidies need to be understood to help accelerate CA adoption.
- Most technologies related to CA (zero tillage, seeding in fields with residues, bed planting, multiple land use system and others) were evolved and their adaptation accelerated when farmers and scientists worked together on farmers' fields. Thus there is a need to relook at the way research needs to be organised for new generation technologies. Adaptive research has to be farmer participatory ensuring early acceptance by the farmers and can not be the responsibility of the extension system only. Continuous upgradation of technologies and knowledge base has to be combined with existing socio-economic milieu.
- Together with crops, livestock are an integral part of the farming system and there is a need to explore questions related to farmer's decision pertaining to the retention of crop residues on the soil surface, its usage for livestock, or being marketed as a fuel source to use in brick kilns. The need would be to

develop strategies to strike a balance to ensure meeting of minimum requirements in terms of crop residues as a soil cover and for its alternate uses.

- Key challenges for residue retention and management on the soil surface under varying farming situations would require development, standardisation and adoption of farm machinery for seeding with minimum soil disturbance. It would also require developing crop harvesting and management systems with residues maintained on the soil surface and developing and continuously improving site-specific crop, soil and pest management strategies.
- The new technologies being resource-centred and farmer being the main stakeholder, there is a need to strengthen linkages and mechanisms aimed at resource consciousness and education. A systems perspective will need to be built with farmers, scientists, extension workers and other stakeholders working in partnership mode for developing and promoting new technologies.
- The need is to build on existing mechanisms (such as campaigns before Kharif and Rabi seasons) for wider sensitisation of all the stakeholders such as farmers, scientists, extension workers, farm machinery manufacturers, especially to sensitise administrators, policy makers and politicians for wider CA acceptance.
- There is need for generating a dynamic database not only in respect of resource use but also related to systematic monitoring of the socio-economic, environmental and institutional mechanisms (such as custom hiring leading to larger adoption of Laser Leveller in Punjab and Haryana) becoming an integral part of CA based projects. Inclusion of conservation and sustainability concepts in the course curricula at the universities would be very important.

CA in the Eco-regional Context

The session was chaired by Dr. Abhijit Sen, Member, Planning Commission, and steered through some eminent panellists to give direction and address the key issues raised with respect to CA in the eco-regional context.

Agreeing that CA is the entry point in the eco-regional context, the discussions in this session raised key questions on how CA can contribute to enhanced productivity and needs of small farmers, address issues of resource degradation and contribute to mitigating/adapting to climate related changes. Key actions to move from commodity based approach to eco-regional based approach would require:

- To bring multi-functionality to the concept of agriculture enabling looking at policies that facilitate integrative approaches to serve ecosystem functions (social, cultural, ecological) and not just commodity production functions. It would also require looking at broad policy concerns such as commodity based trade policies (which do not account for ecological or carbon footprint of producing these commodities), relationship between trade policies and trade distorting policies such as subsidies related to fertilisers, water, chemicals and machineries.
- Eco-regional perspective can be built on the existing efforts identified such as 120 agro-climatic zones and established zonal research stations (during NARP I & II). There is also a need to foster convergence of roles with ongoing development efforts in the country. The need is to link CA into the existing developmental programmes/schemes such as finding a space within the 600

district plans which for example can be used by the research establishments for large scale demonstrations at little extra cost.

- With the current global climate change scenario, environment as a parameter for agriculture cannot be neglected anymore. This would require agriculture to be viewed as a part of wider environmental concern. India is the most eligible candidate for getting carbon credits and we need to develop linkages to energy, environment and climate change and its impact on employment/ livelihoods of the farmers.
- Our administrative system is designed to cater to state/district level that again do not necessarily fall under same eco-regions and thus will require looking at the kind of data/ information systems required that could be used by planners and decision makers.
- CA elements such as zero-tillage, crop residue retention on soil surface and crop sequences have to be viewed in the overall context of existing farming situation as reflected in the state of resources and socio-economic conditions. An effort is required to capitalise on these elements as they contribute to resource conservation and productivity enhancement while building upon farmers' knowledge and experience. CA as a theme for R&D means technologies have to be specific and should integrate concerns of socioeconomic conditions, natural resources, productivity, environment, and future. These technologies must have the potential for immediate savings on labour and energy.
- Implementing CA in the eco-regional context calls for a much better understanding of natural resource endowments and socio-economic relationships to influence present paradigm for transfer of technology. The need is to learn lessons from the past efforts and step up natural resource related research efforts aimed at minimising resource degradation with social scientists playing an important role.

Institutional and Policy Support Needed for CA Adoption

This session was chaired by Dr. R.B Singh, Former ADG FAO, with eminent panellists linking identified needs to measures that would stimulate the change process and address needs of human resource development. The deliberations helped in positioning the group for the upcoming WCCA particularly with respect to following institutional & policy issues:

- There is a need for sensitisation at various levels of the scientific community, policy makers, farmers and other stakeholders committed to CA. It would also involve sensitisation of S&T organisations, development and private sector to bring new issues on board, guiding the implementation process further.
- Small holders and small farmers especially need institutional support because they are not in a position to avail technologies or benefits of other support schemes/services left on their own. Illustrations from well tested farming systems would require institutional support for initial hand holding related to entrepreneurship, credit, input supply, assured market, and other enabling linkages based on socio-economic needs emerging.
- Building cutting edge human resource and developing best research practices and public investment is the key to bring in change even in the generally non-

performing state system for its induction into the mainstream. Social action and community participation would be particularly very crucial.

- There is a need for policy analysis to identify and understand how CA based technologies integrate with existing/indigenous resource conserving technologies, policy instruments and institutional arrangement that promote or deter CA. Implementing CA in rainfed areas needs to be re-emphasised with CA based package of practices developed for upscaling through large scale demonstrations.
- Innovation systems framework (ISF) can help linking identified needs to measures towards CA. ISF could guide how CA is different from the conventional approach to technology generation, its adaptation and then getting it to people for adoption. Farmers, scientists, and development actors in the field will be required to work together in a coalition mode.
- There is a need to institutionalise both policy and institutional arrangements while moving towards eco-regional approach especially with respect to small farmer's ability to move towards crop production, land management, crop residue management, and, conduct evaluations as may be deemed necessary.
- Research findings related to CA will get internalised only when it becomes innovation driven and integrates various facets of natural resources and not just about tillage/cover crops or mulching. Research must be translational with scaling up applicability, acceptability and adaptability. Research must be contextual, and time/situation/location appropriate.
- CA has to move from the conceptual stage to the action stage. This would require changes in the mindset at the policy making/planning level. The need is for a new framework to guide the paradigm shift that plugs the prevailing isolation experienced by research and development.

The Way Forward: Key Resolutions Adopted

This session was chaired by Dr. R.S. Paroda and summed up consultation deliberations with a call for action. This helped in arriving at some resolutions that could assist policy makers in their planning effort and are highlighted below:

- CA to serve as an entry point for eco-regional approach: The underlying principles of CA include minimum soil disturbance to raise crops, keep soil covered by maintaining crop residue on soil surface, and other interventions for adopting cropping/agro-forestry sequencing, both spatial and temporal. These scientifically well-researched principles have the potential to address multitude of challenges in Indian agriculture today. The meeting resolved to develop and promote eco-region based approach through context specific CA practices and technologies suited to regional resource endowment, cropping conditions, and socio-economic features.
- Information needed to promote eco-regional approach: The eco-regional approach demands a thorough understanding of biophysical and socio-economic dynamics related to farmers. Developing CA practices keeping such a context in view will permit addressing twin concerns of enhanced productivity and improved resource quality. This would require institutional innovations to complement technological innovations thus creating a demand on data/information about local land, soil and water resources, as well as

human and social capital in each eco-region. There is a need to build these dynamic and evolutionary eco-regional data/information systems on a priority basis.

- **Compensating farmers pursuing improved practices:** The nature and magnitude of benefits from adoption of CA based practices will vary under different situations and time periods. In the short term, benefits will accrue from these practices through reduced cost on account of minimal tillage operation. Other benefits accruing from resource conservation, enhanced soil-quality, carbon sequestration would take time to become evident. Mechanisms to compensate farmers adopting CA practices will need to be addressed for impetus to be given to the approach.
- **Improved awareness and sensitisation needed to promote CA:** Developing and promoting CA technologies and practices will call for greatly strengthened and adaptive farmer participatory research under a wide range of agro-climatic and farming situations. Adaptive research and technology refinement are key requirements for successful institutional and technological innovation and will call for involvement of multidisciplinary teams of scientists and development actors. Krishi Vigyan Kendra's along with Regional Research Stations would be required to take a lead in this effort with strong support from the State Agricultural Universities and ICAR institutes. To promote CA among stakeholders, higher level of awareness and sensitisation efforts need to be encouraged within the system and directed at associated stakeholders for improved adoption.
- **Institutional and policy support:** The need to develop capacities relating to CA innovation within each agro-eco system will call for strengthening of the social sciences component backed by effective documentation, monitoring, and evaluation efforts that are integral to generation of locally relevant CA practices. Furthermore, adaptation of local farm practices, markets and subsidies/pricing mechanisms to suit each bio-physical resource base and socio-economic profile will need to be strengthened. CA practices need to be applied equally to smallholder farmers and larger farmers, and in both rain-fed and irrigated situations, and would thus demand structural changes to influence the mindset of decision makers in relation to rural/agricultural infrastructure and policy support.
- **Eco-region focus:** There is an urgent need to strengthen CA research to ensure ecologically and economically sustainable development in selected eco-regions/production systems. Focus needs to shift to rainfed regions on an equal basis as irrigated regions and CA could contribute in a large measure to achieve this:
 - Intensively irrigated Rice-Wheat and Cotton-Wheat system dominated regions of North-West Indo-Gangetic plains (Haryana, Punjab and Uttar Pradesh)
 - Lower and middle Gangetic plains (West Bengal, Bihar and Eastern UP).
 - Rice-fallow dominated medium to high-rainfall region (Eastern and Central Plateau).
 - Soya bean based cropping regions of medium and deep black soils (Madhya Pradesh, Maharashtra and Rajasthan).

- Ecologically fragile mountain and foothill regions of Shivaliks and Himalayas (Himachal Pradesh, Punjab, Uttar Pradesh, Jammu & Kashmir)
- Hill region of Western and Eastern Himalayas
- Linkages to government programmes: An important consideration is the mainstreaming of CA projects that need to link and feed into major ongoing development programmes of the Government such as Watershed and Drought Prone Area Development Programme, NREGA, Rashtriya Krishi Vikas Yojna, National Food Security Mission, and other schemes covered under Ministry of Agriculture, Ministry of Rural Development, Ministry of Panchayati Raj, and Rainfed Area Authority. Linkages also need to be built with proposed activities of “Sustainable Agriculture Mission” of the National Action Plan on Climate Change and Biodiversity Conservation. Provisions should thus be made within these programmes to encourage CA’s induction as a preferred practice for which relevant mechanisms need to be positioned. Greater integration of the functions of S&T organisations with that of development organisations will have to be addressed.
- Agriculture as an influence on climate change: Technologies and practices based on CA principles developed and promoted in an integrated fashion over a period of time and in specific agro-ecosystems will help to provide an effective adaptive and mitigating strategy to overcome climate change related impacts. While environmental concerns related to agriculture are increasing, there is a need to freshly conceptualise the relationship between agriculture and environment. There is thus a need to see agriculture as part of the larger environmental concern and CA’s ability to offer adaptive and mitigation benefits through carbon sequestration.
- Need for innovative and multi-disciplinary efforts: Farmer participatory adaptive research aimed at generating, refining and promoting technologies and practices will call for several institutional changes that will be required to be built into programme planning, funding, implementation and monitoring of research for development. Most importantly there would be a need for scientists from different disciplinary backgrounds to work as a team in addressing and solving problems facing the farmers. Similarly scientific community will need to develop and work in partnership with variety of stakeholders, local farm machinery manufacturers being an example. These new requirements call for innovative approaches to research funding, performance measures and evaluation. Efforts will also need to be positioned to address strategic and basic research efforts that are critical in coping with changing technological needs.
- CA will demand mindset change among the research community: Developing and promoting CA technologies and practices will call for a paradigm shift in the way researchers plan and execute the research agenda. To make a success of efforts the following needs will have to be addressed: (i) Improved focus on adaptive and participatory research; (ii) Team based approach to plan, coordinate and integrate research; meeting needs of eco-system and development; and (iii) Developing a systems perspective (e.g. farming system) in defining and prioritising research for development. The aim of research should no longer be to focus on comparing CA with conventional practices but on optimising the functioning, production, and efficiency of CA cropping

systems. Linkages to international organisations will help in sharing developments through partnerships/networks developed with them. Institutional innovations will be needed to build robust research and development linkages with learning experiences from other regions/countries being considered.

All these efforts will call for greatly strengthened human resource capacity of researchers and development practitioners. Such human resource needs to form an integral part of efforts to achieve sustainable social and ecological goals through operationalisation of the CA approach.