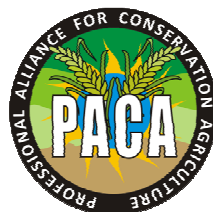


**Combating Land Degradation for Sustainable Agriculture:
Is Conservation Agriculture the Way Forward for India?**

17th June, 2008



Professional Alliance for Conservation Agriculture (PACA)

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Meeting Report - New Delhi, June 17th, 2008

Combating Land Degradation for Sustainable Agriculture -Is Conservation Agriculture the Way Forward for India?

Background:

Land degradation is increasingly becoming a major impediment in fostering global goals of sustainable agriculture. In India it has taken different forms depending on agro ecological setting and farming practices. Land degradation needs to be combated if agriculture has to sustain livelihoods, especially of vulnerable farmers practicing farming on degraded lands. Not only does this process weaken the soil's fertility, it also disrupts the balance of the water cycle and contributes to food insecurity and persistent poverty resulting in forced migration.

This complex issue requires a global response to help restore productivity of degraded land ecosystems to allow sustainable agricultural production. This needs to be achieved through a series of efforts, supported by pro-poor policies, given the lives being impacted by agriculture. Looking to needs of natural resource management, adaptive strategies require to be developed to address issues thrown up by climate change. Conversion of land to unsustainable use, in particular, induces a vicious circle commencing with land degradation, leading to natural resource degradation, poverty and hunger.

There are increasing concerns that conventional mode of agriculture has resulted in undue exploitation of natural resources, land in particular. The need to address this becomes critical looking to expectations from agriculture productivity to meet needs of food security. The United Nations Convention to Combat Desertification (UNCCD) provides a global framework to support policies and measures to prevent, control and reverse land degradation through scientific excellence, awareness raising and advocacy, thereby contributing to poverty reduction. The Convention has considerable role in promoting sustainable agriculture helping improve livelihoods of affected populations and ecosystems. Conservation Agriculture(CA) practices as pursued in many parts of the world are not only contributing to reversing land degradation, but also have the capacity to increase productivity, lower production costs and energy use. CA is based on agro-ecological principles making land use more sustainable and thus helping farmers use agricultural inputs more efficiently. June 17th, 2008 being observed by UNCCD as World Day to Combat Desertification offered a perfect opportunity for Professional Alliance for Conservation Agriculture (PACA) to bring together concerned professionals involved with the subject of agriculture and environment. Most agreed at the need for a fresh approach to be pursued, given the declining productivity and un-remunerative pursuit that agriculture has come to be known for of late.

Meeting Objectives:

This half day meeting focused on deliberations around the subject "Is Conservation Agriculture the Way Forward for India?" The meet helped address issues pertaining to CA with diverse experiences, concerns, and problems being shared; leading to discussions pointing the way forward to promote the cause of Conservation Agriculture (CA) in India (*Annexure 1*).

Participants:

The meeting attended by over 35 participants brought together concerned stakeholders, mostly practitioners and believers in the cause of Conservation Agriculture (*Annexure 2*) and included scientists from ICAR, the international agriculture system, State agricultural universities, and policy makers.

Meeting Deliberations:

Sanjeev Vasudev (SocietySTADD) welcomed the delegates on behalf of PACA and highlighted the need for CA looking to the food security situation the world is facing today. He briefly stated the challenges being faced by agriculture, given reduced area under cropping, stagnating productivity and the pressure of migration that was drawing the youth to migrate to urban areas. There was also a need to make agriculture competitive with the opening of global trade. While CA has been pursued in India, it has largely been restricted to technological initiatives such as zero-tillage. To experience benefits to a fuller degree, there is a need to adopt CA practices as a comprehensive approach. This was later taken up well during the presentations and discussions. He concluded by indicating that PACA would function as a platform to bring together stakeholders ranging from farmer groups, national research system, machinery manufacturers, policy makers and the international community to further the cause of CA.

This brief introduction paved the way for the inaugural presentation by Dr. R.S. Paroda, President, Trust for Advancement of Agriculture Sciences (TAAS), who was requested to chair the meet and speak on the subject, "Major concerns of Indian agriculture". Dr. Paroda complemented the PACA initiative that had brought together a selected group of stakeholders to help lead a useful discussion. He related major concerns of Indian agriculture to global concerns such as climate change, land degradation, droughts, desertification and declining buffer stocks of food crops world over. His presentation centered around three UN Millennium Development Goals (MDGs): eradication of extreme poverty and hunger (MDG 1), ensuring environmental sustainability (MDG 7), and developing a global partnership for development (MDG 8) that were directly related to agriculture especially in the Indian context. Though, India has done well in meeting these goals, yet lot more needs to be done. His presentation focused on declining buffer food stocks that resulted in higher imports and increasing prices and therefore the urgent need for increasing production.

Dwelling on the MDGs, Dr. Paroda stressed that MDG 1 was crucial, particularly for India. Though the country has been able to increase food production and reduce poverty and hunger, it has not ensured environmental sustainability (MDG 7) through its pursuit. These concerns however could not be discussed or achieved in isolation and there was thus a need to develop partnerships at national, regional and global levels. Even the Green Revolution would not have been a reality in the absence of strong partnerships with international Centers such as CIMMYT and IRRI. However, over last 5-6 years, productivity of food grains has stagnated whereas earlier almost 6 million tonnes were being added annually to country's food basket through special food grain production programmes. This regression and concerns of declining buffer food stocks was making the government to stepping up procurement again. Other concerns related to increase in prices of food grains and fuel, diversions of area under food grains to bio-fuels, availability of fodder, and climate change factors such as deviations in rainfall and temperatures were all adding to the major agricultural concerns. There was thus a need to adapt and mitigate the effects of climate change in relation to agriculture. He stressed the need for appropriate technologies in the form of new seed varieties that were resilient to effects of climate change, heat and water stress; and those related to integrated management of crop systems, nutrient and water management. Income enhancement or profitability for producers, he stated, was a crucial issue that could not be achieved without creation of linkages to the market. This needed to be managed through institutional structures such as cooperatives and farmers associations.

Dr. Paroda went on to stress that there was a need for adopting a farming systems approach that was inclusive of cropping systems based approach. The growth of agriculture, forestry and fisheries, depended upon renewable environmental resources and there was a need to look into diversification in agriculture, forestry, agro forestry, fisheries, and livestock. Sustainable agriculture could not be achieved in isolation. It needs to address

elements such as resilience, stability, productivity, and equity. There is a need for reorientation through a paradigm shift, from a uni-pillar strategy in the past to a twin pillar strategy where improvement and management needs to be centered around livelihood strategies. There is thus a need to look ahead and beyond green revolution technologies and concentrate more on lessons learned from past efforts.

He further referred to the need of translational research emphasized by Gordon at the recent International Rice Congress - to take the knowledge from basic sciences and translate them into forms that could take the shape of practical products or agricultural innovations. These innovations should be achieved through participation of key players involving NGO's, farmers, and the private sector who have been ignored thus far. He stressed the increasingly important role being played by the private sector in agriculture, managing 20% of the Krishi Vigyan Kendras, an example not found in many other countries. Benefits of participatory research in NRM with farmers on farmer field locations was repeatedly stressed. This was not possible with scientists working in isolation in their respective institutions, research farms, or within university boundaries through simulation based efforts. The need for bottom-up approach that had ownership of farmers was stressed. This was illustrated by Dr. Paroda through various technologies that had been successful in Central Asia and India. He also cited several examples of international collaborations in India, Rice-Wheat Consortium for Indo-Gangetic Plains being a good example of one such successful collaborative programme that was implemented in India, Bangladesh, Nepal and Pakistan. Lack of long term studies related to CA and the need for a comprehensive approach that involved all aspects of CA was pointed out by him. There was also a need for appropriate technologies for farmers, regional collaborations to learn from other's experiences, and reviving extension systems in line with the research system to develop a successful agricultural innovation base. While concluding his talk, he stressed the need for effective policies and capacity building of stakeholders. He ended by reminding the gathering that the path ahead was not likely to be smooth and as such there was no single quick recipe to meet goals of sustainability and that it would have to emerge from customized eco-regional approaches.

The inaugural presentation was followed by a talk from Dr. R.B. Singh, former Asst. DG, FAO on "Reforming agriculture to meet needs of climate change with specific reference to land degradation". He specifically talked on emerging food security concerns and the need to address issues of climate change, bio-energy, and defusing price spike.

The presentation began by addressing two important and interrelated issues in relation to sustainable agriculture, those being of land degradation and desertification. Changes in the climate were already visible in the form of rising temperature and changing rainfall pattern that were contributors to the problem of land degradation and desertification. He emphasized the need to understand the processes of desertification for remedies to emerge and understand the reasons for such changes that were becoming more evident year after year. The need pointed to looking beyond technology dissemination and into socio-economic reasons (poverty and hunger, that were strong polluters he said) that led to resource exploitation resulting in land degradation and desertification without intent. Footprints of agriculture on climate change were already visible in the form of polluters such as fertilizers, pesticides, nitrous oxide, carbon dioxide, and methane emissions, with most important being economic and ecological concerns. There was a need to look at reasons that impede the achievement of the first MDG - to eradicate extreme poverty and hunger, which is often very closely related to ecological sustainability. Policy support for these concerns was possible only when government understood the need to look at and understand the processes affecting ecological degradation.

The need to look at governance issues was well illustrated through an example of Indonesia, where the right kind of policy decisions that addressed concerns of corruption in high places that led to a decline in pesticide use without affecting rice yields. He also shared

his experience of the National Farmers Commission with special reference to farmers in rainfed areas of Rajasthan and Gujarat (75-80% are farmers of dryland areas), that have mostly been ignored so far, with CA offering a way forward. The need to widen the definition of desertification and its causes would help address possible remedies. A hint of caution was sounded with respect to crop diversification especially related to rice and wheat that may harm cereal needs of the nation. Technologies needed to have a human face and the link between the farmer and market was very crucial. He expressed the need for a policy to support this link through *market stabilization fund* or *AgriRisk fund* that would take care of farmers' livelihood requirements and ease migration pressure in case of severe ecological conditions developing especially in arid regions such as Rajasthan and Gujarat.

On another count, processes that led to exploitation of natural resources and energy imbalance needed to be understood. These regions had been largely neglected so far as reflected prominently in the recent report of National Commission on Farmers. The commission stressed on measures to serve farmers and on encouraging farming activity in these drylands. He concluded by emphasizing the urgent need to combat desertification. Since the problems were complex, their solutions demanded building a partnership amongst different stakeholders and multidisciplinary teams working together, a feature largely found wanting in India. If India could do it, with its experience, the country could assume a leadership role in the entire south Asia region with CA as the way forward.

Following these introductory presentations that brought forth myriad problems faced by Indian agriculture, Dr. I.P Abrol, Director, Centre for Advancement of Sustainable Agriculture (CASA) set forth discussions on the context and concerns that were important to make CA work for India. Connecting to the earlier presentations on major concerns of Indian agriculture, he focused specifically on certain facts related to Indian agriculture and what CA offered with an elaboration on how to make it work for India. Giving information on the extent of CA popularization the world over, he discussed some of the facts based on his learning and experiences of CA in India that ranged from direct benefits with cost reduction through saving fuel, labour and machinery cost; and improved input and resource use efficiency; to indirect benefits that integrate short term concerns of enhancing productivity and improving resource base quality in the long term. He saw a major role for CA to work towards sustainability of agriculture in India.

Dr. Abrol asserted that the basic elements of CA were based on sound well researched scientific principles and had been validated in different geographical and social situations elsewhere. With excellent beginnings already made in pockets of India, there was a great potential of CA becoming a new and a sound approach to research for development, though he cautioned the task ahead would not be easy. He called for developing and promoting location specific practices for a wide range of agro-ecological and socio-economic situations. Strong participative approaches were the only way ahead to meet overall goals of sustainability in agriculture. As CA is knowledge intensive, it would call for strong technological, institutional and policy support at both the state and central government levels. He reiterated that CA must become a farmer-led movement strongly backed by the scientific community working in a multi-stakeholder partnership model, involving scientists, farmers, extension workers, machinery manufacturers, among others. There was also a need for extension services to be viewed with a renewed approach as emphasized earlier. He concluded by highlighting the major challenges that would require a change in the mindset on the part of farmers, scientists and policy makers alike for CA to be successful. He emphasized the need to demonstrate and convey benefits to farmers to help them internalize and adopt CA approaches comprehensively especially where technologies such as zero-tillage had already made a beginning. The need for socioeconomic studies to understand the impact of CA approaches on quality of natural resources and multi-tiered capacity building needs of farmers, extension officers, and scientists were also emphasized. These were presented as posers to the eminent panel for the discussion to follow and give direction to the meeting.

The interactive panel discussion followed the talks of the three lead speakers and included eminent discussants who shared their views on CA. These panelists were from diverse institutions ranging from the State Department of Agriculture, State Agricultural University, Indian Council of Agricultural Research and Non-Governmental Organizations. The panelists shared their experience with specific benefits, constraints and scope related to CA adoption in farmer's fields. Interactions among them and later with participants resulted in much sharing and learning on CA.

The session started with a brief talk by Dr. Sanjeev Chopra, Principal Secretary, Department of Agriculture, Government of West Bengal. His views reflected on State Government's perspective, as agriculture in the country was a state subject. He began by emphasizing that CA needed to be looked from the point of view of sustainability of the public system. He shared his CA experiences by stating that zero-tillage was being practiced in the State of West Bengal for a long time and expressed the need to strengthen capacity at the grassroots. He expressed his concerns on the present mode of input intensive agriculture that required heavy funding, not feasible to be pursued by a small farmer. This mode of agriculture, he said, was not going to be sustainable from the public policy perspective because the policy did not cater to the needs of majority of farmers, especially marginal farmers, who had outnumbered the small farmers. He highlighted the importance of agriculture for marginal and small farmers since it was the only livelihood system known and available to them. In view of this, he saw CA as the only way to make agriculture an economically profitable profession. He believed that CA efforts have become more useful in the context of current decentralized *panchayati* system that focuses on strengthening local resources by building capacity at grassroots. The extension mechanisms needed to involve communities and electoral representatives of the people and ensure that it kept pace with the processes and experiences covering CA. He ended by emphasizing on the sustainability of the public system which otherwise was not possible under the current inclination towards extremely costly and highly input intensive agriculture. He shared his experience with some of the positive experiences with zero-tillage rice in districts of North 24 Pargana in West Bengal and looked forward to keep pace with latest knowledge on CA to help agriculture in the State.

Dr. R.K. Mallik, Director Extension HAU, from his experience of practicing CA being involved at the farmers' field level highlighted the inefficiencies in the system specifically with respect to fertilizers and chemicals to which CA is an answer. CA he stressed was more beneficial to small and marginal farmers as it helped in cutting cost of cultivation while adding to returns. He spoke about his experience with adoption of few CA technologies. The experience was related to both technological as well as institutional constraints to the adoption of CA technologies. Among CA technologies, zero-tillage was the first one to get flagged in particular. Zero-tillage, he said, had not only helped farmers economically, but also in increasing the productivity of rice in few brackish water areas of Haryana. Here, almost 90% of the farmers are practicing CA for the last 6-8 years. Zero-tillage has found success with other cropping systems also besides Rice-Wheat cropping system. Lack of communication among the researchers and extension workers was a major bottleneck in CA adoption. He emphasized the need to bring people together to build their capacities, and the need to expose policy makers and scientists to farmers experiences through site visits which is an essential exercise for CA to work. This was needed because feedback from farmers could help change mindset of scientists. Other technology experiences shared included those of bed planting which had dual advantage relating to multiple land use, intercropping to increase their incomes and ability to permit increased cropping intensity by inter cropping, benefits of direct seeded rice: an answer to the rising labour problem for transplanting. Transplantation with machine was only possible through zero-tillage and if it could become a reality, it could signal a major breakthrough for CA. CA technologies, he said, were helping small farmers through cost saving as brought out in impact assessment studies done by CIMMYT. The need for research scientists to come forward and look for

research agenda in farmer's fields and experiences was the real need. Capacity building of scientists, policymakers, and bottom-up approaches were the key requirements for CA implementation. Rigid mindset of scientists was a major impediment to CA adoption, while farmers were happy to follow it. To this end, he concluded, CA research was best done in farmer's fields.

Dr. S.S. Grewal, Director, SPACE, focused on challenges related to CA adoption in the hill and foothill ecosystems that were prone to resource degradation and equally crucial to ecosystems in the plains. He emphasized the importance of eco-regional approaches and shared his experience from the Shivaliks and foot hill regions of north India along with the ecosystem of Aravallis. He shared his learning from the successful Sukhomajri experiment while working with ICAR and his experience with the World Bank funded Integrated Watershed Development Project (IWDP) in these ecologically degraded regions. He also shared some of the successful projects implemented through SPACE in the degraded foothill regions of north India, for example, construction of water harvesting structures that had not only led to resource improvement but also increase in crop productivity and general well being of the farmers in the region. These efforts have mostly been done through bottom-up, community owned participatory approaches. Shivaliks, he said were one of the eight most degraded ecosystems of the country where small and marginal farmers were struggling with problems of droughts, floods, rainfed cropping (rainfall restricted to three months with, no other source of irrigation) undulating lands, small holdings, common crop failures, and low productivity. For survival, they were supplementing their incomes by breeding livestock and pursuing agro-forestry. With large herds of livestock, grazing was becoming a problem. Unrestricted grazing along with fuel wood extraction resulted in deforestation and degradation along with biodiversity erosion. This led to siltation of major reservoirs of the regions that may lead to catastrophic situation by affecting hydro-electric power generation of the region. Adding to these problems are near absence of soil and water conservation research for development programmes in the agricultural universities of these hill and foothill eco-regions. Since CA is built on agro ecological principles, it offers a hope to answer resource degradation problems in the region. However, the challenge is to carefully develop end to end strategies (technologies and institutions) specific to the region in consultation with the concerned stakeholders.

Dr. P.K. Joshi, Director, NCAP addressed some of the socio-economic and policy issues pertaining to CA adoption that ranged from direct issues such as return on investment, profitability, food security, income generation to others that affect the farmer participation like, availability of resources, cost of inputs, wage rate of labour, fixed assets, skills of farming community and capacity building of farmers. He dwelled on the need to prevent land degradation and ability of CA to cater to the needs of the growing population. As demand on land for alternative use was increasing, the quality of natural resources, soil and water in particular were deteriorating, and there was thus pressure on resources to produce more from lesser areas in a shorter period of time. CA is one option out of many technological options but its adoption will depend on specific location needs and conditions prevalent. He emphasized on conditions needed to improve induction of CA on the farm, policy, and institutional fronts. At the farm level, returns on investment, availability of resources, fixed assets and skills of the farming community were some of the issues that needed attention. The critical role of institutional mechanisms to make CA technologies available to small holders (constituting 80% of farmers) was essential for example, states like, Punjab and Haryana have already exhibited lease arrangement quite successful in adoption of some of these resource conserving technologies. He also referred to difference in perceptions of scientists and farmers with respect to these resource conserving technologies. While farmers looked for short term benefits to accrue from technologies, the scientists desired to set long term goals that became difficult for farmers to relate to. This conflicting approach needed to be resolved to reach a point of convergence. He suggested an amalgamation of

technologies, institutions and policies (TIP model) as the way forward for CA adoption. Technology that suited needs of farmers (being affordable, rewarding, accessible) should be made accessible to them. From an institutional point of view, credit delivery mechanism needed to be looked into. Policy that could help and encourage the farming community needed to be positioned to make a difference, for example, increase in the production of wheat by one million tones this year based on rise in support prices for wheat. He emphasized the need for diagnostic studies to understand adaptive strategies being adopted by the farmers to tackle problems of soil and water degradation. In the end, relating his apprehension to achieve the first MDG, he stressed the need to attack poverty which is inseparable from resource degradation.

Dr. M.S. Gill, Director, Project Directorate for Cropping Systems Research (PDCSR) highlighted research efforts being carried out towards adoption of resource conservation technologies through efforts of PDCSR. He informed about the availability of data on integrated nutrient management for the last 25 years. He also shared other efforts at PDCSR related to process of compiling data related to the biological, physical and chemical aspects of soils, their weeds and water dynamics in the selected locations. He stressed on the availability of multi-location (across 25 states) crop sequences for various eco-regions developed using integrated farming systems approach compared to the earlier approach based on cropping systems. Farmer participatory mode was followed in most of these locations. He shared other studies being carried out at PDCSR, like diagnostic survey related to yield gaps, crop rotation/diversification and intensification. Rice-wheat cropping system had been identified as the most dominant cropping system with CA practices found to be more popular with small and marginal farmers. The three pillars of CA - no-tillage, crop residue retention and crop diversification has been mostly followed in practice in these trials at 32 locations spread across 25 states that cover most of the agro-ecological regions of the country. Adoption of zero-tillage was earlier slow in areas where combine harvesters were used, but the practice of retaining loose residues in sufficient quantities on the soil surface has been followed now. Farmers were satisfied with the improved versions of equipments (such as the Happy Seeder/Turbo Seeder) but all such equipments needed a higher tractor horse power that became a major impediment which needs to be seriously addressed. Farmers, he said, were mostly concerned with the short term gains for example in western UP, which is predominantly a sugarcane growing area, farmers were shifting to rice, as rice residues fetched good prices (Rs. 1500-2000/ha.)

Dr. Ravi Gopal, Scientist, CIMMYT shared his experiences of CA adoption in the eastern Indo-Gangetic plains of Bihar and Jharkhand, and also West Bengal that was giving immediate benefits to the farmers' in the region. CA was being adopted in 9 districts through farmers' participatory programme in these states and they had been able to raise productivity of rice. Lack of machinery manufacturers (current supplies being met by manufacturers from Punjab) and equipment repair services were major bottlenecks in CA adoption. The need for policies like, subsidies for CA machinery and need for package of practices for double zero-tillage system was emphasized.

The panelists' session was followed by discussions with participation of attendees who expressed views and raised queries that were well responded to by the panel. Main discussion points related to constraints like, machinery availability, its repair, emergence of weeds and other field related problems while adopting CA in other regions (currently practiced largely in northern regions of India). Following experience sharing by the diverse stakeholders actually working with farmers located in various regions of India, queries were raised by the participating audience to which answers were provided by the panelists. The brainstorming session brought out some pertinent questions and discussions pointed to key approaches that could form the way forward for CA to be successful.

Among various issues and needs essential for transition to CA, the most predominant issue

was retention of crop residues on the soil surface that needed to be linked well with the livestock component for their fodder requirements. There was need to develop new genotypes that performed well under zero-tillage and new crop establishment techniques to integrate genotypes and tillage interactions. CA approach was largely in response to resource degradation with its multifold challenges including those from climate change and labour shortages. Lack of facilities for training of human resources for CA technologies was becoming an impediment and thus the need for an advance training centre was suggested. Concerns over diversion of cultivable land for food to grow vegetables, flowers, bio-fuel were also raised. Some participants shared their field experience related to nitrogen use efficiency which showed applied nitrogen was better utilized in bed-planting and zero-tillage fields. The need to cater to problems relating to accumulation of phosphorous and potassium in the top 5 cm layer of the soils in the zero-tilled farms were raised and identified as one of the researchable issue. Concerns on not following a comprehensive CA approach such as, non retention of crop residues on the surface and diverting its sale for more lucrative returns being given by brick kiln owners were raised and ways to enhance the practice of retention of a minimum amount of residues was emphasized. CA was also seen as an approach that could help cultivate land that was otherwise uncultivable. Hill ecosystems where farm holdings were small with small terrace sizes pointed to the need for adapting equipment for seeding, fertilizer placement and harvesting. Inability of the agricultural engineering departments (ICAR or universities) to support such CA technologies with inputs/ improvements/innovations was discussed and it was suggested that there was a need for all stakeholders to work in partnership and support private manufacturers, and even rural artisans who had actually made CA technologies successful. Here, agricultural engineers needed to contribute especially to capacity building by bringing about a change in their own mindset to begin with.

Land degradation was identified as the major issue of sustainability. Being a slow process however, it was not visible or being easily monitored, and to that extent strategies that addressed such a situation were needed. Likewise, adopting comprehensive CA approaches would also not bring about overnight improvements in resources such as soil and water quality. These long term benefits may not lure farmers easily who would be drawn to CA only when immediate visible benefits could be seen by them. But the science agenda had to take into account both short term as well as long-term sustainability needs and the need for long term monitoring studies on natural resource base. Research to develop genotypes with qualities like resilience, coping with stress environments, better genetic buffer would be beneficial for overall CA adoption. Any new approach would have both, benefits and constraints, and the best option considering its trade offs must be borne in mind. Outsourcing with scientists research getting benefited from the farmers experiments was another institutional innovation that would help CA adoption for example, scientists improved upon a variety of onion grown by farmers of Sikar, that required less irrigation (7-8 times) compared to previous variety that needed more irrigations (20-23 times). Participants showed interest in learning more on resource conserving technologies used in Central Asia, and elsewhere illustrated in one of the presentations.

The chair, Dr. R.S. Paroda gave concluding remarks by not only summarizing discussions but also pointing to the need to pursue research on issues related to soil heath, decomposition of organic matter, crop sequencing, weed control, impact on transitioning farmers, scientist's mindset, policy support, technology dissemination, information exchange, different extension mechanisms, different human skills and participatory approaches that would help improve the adoption rate of CA. He said that the time was appropriate to take up CA, though not as a blanket approach but as one that was specific to eco-regions and farming situations. The immediate need for impact assessment studies that would present specific recommendations for policy makers was reinforced. He concluded his talk by emphasizing the role expected to be played by a body such as PACA and the need for effective functioning to catalyze the process. This, he said, should be done

aggressively without losing time and PACA could play a major role in catalyzing this process. While executing plans, learning from global /regional experiences needed to be incorporated to form a global partnership program on CA with requisite sources of funding to take this forward.

The meet ended with Dr. I.P. Abrol thanking all for their valuable contribution by way of participation in the useful deliberations and committed on behalf of PACA to promote mainstreaming of CA effectively.

Based on presentations and focused panelist discussions during this half day meet of key stakeholders involved with CA adoption, following recommendations emerged.

Recommendations

This meeting came out with specific recommendations and ended with an affirmative note with most participants agreeing that CA does represent a way forward for India to combat resource degradation for sustainable agriculture. The recommendations below represent views that emerged from the meeting.

- Professional Alliance for Conservation Agriculture (PACA) was a timely initiative to take the cause of CA forward, considering the current challenges facing agriculture by way of wide spread problems of resource degradation, declining food grain productivity, rising fuel prices, and impacts related to climate change.
- Food security is an important issue and CA has the potential to address twin problems of stagnating productivity and resource degradation. The concept of CA also provides a framework to address the broader goals of livelihood security and rural development. Successful promotion and adoption of CA approaches called for reorientation of our scientific agenda supported by policy efforts.
- CA technologies and practices will be site and region specific. It is therefore important that these are developed and promoted in the context of well defined natural resource/socioeconomic domains and farming systems in different eco-regions. While a good beginning has been made by promoting zero-tillage for seeding wheat in irrigated rice-wheat based cropping systems, there are enormous opportunities to develop, adapt and promote CA based practices in a holistic manner in a wide variety of ecologies including rainfed regions, where resource degradation problems have assumed critical proportions. For this, a dialogue should be initiated with the Rainfed Authority of India to address the need for new strategies for enhancing agriculture productivity in the rainfed areas.
- Successful transition from conventional to CA based systems will call for a change in the mindset of both the scientific and farming communities. Development, adaptation and promotion of CA technologies and practices will call for innovative approaches in defining and pursuing research for development agenda. Most importantly, scientists will need to work along with farmers in a partnership mode in testing and adapting new technologies and responding to new problems as they emerge. Many of the problems faced by farmers will require that scientists from different disciplines interact and work together to find solutions. These will call for new institutional arrangements in planning and executing research for development agenda.
- Building and working in partnership mode with a range of stakeholders will be the key for rapid generation and uptake of new generation technologies. In particular there is a need to look for alternate mechanisms to link with extension department and private sector stakeholders, for example, farm machinery manufactures and input suppliers. Improved linkages will be necessary for ownership of the CA agenda at all levels.

- Being region and resource specific, a major lead to develop and promote CA systems should come from State Agricultural Universities and their regional research stations (including KVKs) with a strong support from ICAR institutes. Introduction and spread of CA technologies (zero-tillage, residue retention on soil surface) have implications for the whole range of management issues including choice of crops/varieties, land preparation and seeding and harvesting equipments, water and nutrient management, weed and pest control. This will call for considerable strengthening of interdisciplinary and disciplinary research to support new farming strategies. In particular, socio-economic studies on adoption and impact will be critical to understand opportunities and constraints in wider adoption of new technologies.
- CA practices benefit the farmers in the short term through reduced cultivation costs but also in the longer term by improving the quality of resource base. There is therefore a need to initiate long term studies on the impact of CA practices on productivity and resource base quality (such as, carbon sequestration, changes in soil physical, chemical and biological properties) as an input to long term implications of new management systems. These studies should be initiated at a number of places representative of major farming situations.
- While CA technologies and practices need to be developed and promoted in the context of specific regions, learning from experiences under different situations can be a powerful mechanism to accelerate the process of generation and adoption of new technologies. It is in this regard that modern information technologies that encourage networking amongst scientific group offer opportunities for a rapid transition from conventional systems. Building partnership at regional and global levels will be an important way to share and learn towards building knowledge intensive agriculture.
- Successful transition to CA system will call for much greater depth and breadth of knowledge base and skills increasingly requiring adoption of systems based approaches in planning and executing research for development agenda. This will call for considerable capacity building at all levels through improved training, collaboration and working in partnerships with relevant institutions nationally and globally.
- Adoption of CA systems over large areas is a way to improve ecological foundations that form the basis for sustainable agriculture. Institutional mechanisms will be required to ensure that CA approaches are adopted effectively. To meet these goals, key stakeholders, scientists, development agencies, policy makers, farmers and technologists need to change in a manner which integrates them well to meet the broader agricultural development goals. This could be achieved by organizing stakeholder meetings at the regional level to outline strategies for conservation agriculture.
- Initiatives such as PACA can play a significant role in catalyzing the much needed change by bringing relevant stakeholders on board for a cause which requires to be addressed urgently. This must be pursued aggressively and without losing time. In view of the forth coming fourth World Congress on Conservation Agriculture, being organized in India this year, PACA should seriously make best use in strategizing and planning its own agenda to promote Conservation Agriculture in India.

Professional Alliance for Conservation Agriculture

Getting Agriculture to Work For People & the Environment



Program: June 17th 2008 Meet

Combating Land Degradation for Sustainable Agriculture - Is Conservation Agriculture the Way Forward for India?

- Date:** Tuesday, 17th June, 2008
- Venue:** Lecture Hall, National Academy of Agriculture Science, NASC
Complex, Dev Prakash Shastri Marg, Pusa, New Delhi 110012
- Chair:** Dr. R.S. Paroda, President, Trust for Advancement of
Agriculture Sciences (TAAS)
- Schedule:**
- | | |
|---------------|--|
| 13:45 - 14:00 | Registration |
| 14:00 - 14:05 | Inauguration |
| 14:05 - 14:35 | Talk by Dr. R.S. Paroda, President, Trust for Advancement of
Agriculture Sciences (TAAS)
"Concerns of Indian Agriculture" |
| 14:35 - 15:05 | Talk by Dr. R.B. Singh, Former Asst. Director General, FAO
"Reforming Agriculture to Meet Needs of Climate Change
with Specific Reference to Land Degradation" |
| 15:05 - 15:30 | Talk by Dr. Inder Pal Abrol, Director, Centre for Advancement of
Sustainable Agriculture (CASA)
"Making Conservation Agriculture Work for India" |
| 15:30 - 16:00 | TEA BREAK |
| 16:00 - 17.25 | Interactive Panel Discussion
<u>Discussants:</u>
Dr. R.K. Mallik, Director, Extension, HAU
Dr. S.S. Grewal, SPACE
Dr. P.K. Joshi - Director, NCAP
Dr. Sanjeev Chopra - Principal Secretary, Dept. of Agriculture, Govt.
of West Bengal
Dr. M.S. Gill, Director, PDCSR
Dr. Ravi Gopal, CIMMYT |
| 17:25 - 17:30 | Final Remarks by Dr. R.S. Paroda |

Annexure II
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